College Students' Fake News Discernment: Critical Thinking, Locus of Control, Need for Cognition, and the Ability to Discern Fact from Opinion

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COLLEGE STUDENTS’ FAKE NEWS DISCERNMENT: CRITICAL THINKING, LOCUS OF CONTROL, NEED FOR COGNITION, AND THE ABILITY TO DISCERN FACT FROM OPINION

By

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ABSTRACT

In current news media environments where the separation between fact and opinion is blurred, it is important to understand college students’ media literacy practices and variables that may affect how they discern fake news. The purpose of this study was to investigate variables that may be related to college students’ fake news discernment, inspired by Potter’s cognitive media literacy model (2004). The investigated variables included college students’ ability to discern fact from opinion, critical thinking skills, beliefs in their control over situations or experiences (locus of control), and the degree to which they engage in and enjoy thinking (need for cognition). The study employed a sequential explanatory mixed-methods research design that consisted of a quantitative study followed by a qualitative study.

The survey quantitatively measured 296 college students’ fact and opinion discernment, critical thinking skills, need for cognition, and locus of control. Critical thinking was a variable positively correlated with the fact and opinion discernment, as well as the need for cognition respectively. Group differences in the fact and opinion discernment, locus of control, and need for cognition scores were found. The follow-up interview data with 19 college students further explained the survey results and their media literacy practices. They described how they discern fact from opinion and evaluate information when reading news online. They stated that polarized media environments and their prior knowledge made information evaluation difficult when reading news online. The participants also described the importance and motivation of discerning fact and opinion and evaluating information in news reports.

The study findings inform considerations for media literacy education which strengthens students’ skills regarding fake news discernment. This study suggests future work that further investigates the studied variables, such as developing the fact and opinion discernment
instrument with borderline statements and developing a media literacy model in the context of news reading.
CHAPTER 1

INTRODUCTION

This dissertation aims to investigate four variables that affect college students’ fake news evaluation, with an emphasis on their critical thinking skills. The variables of interest include critical thinking and the ability to discern fact from opinion, as well as locus of control, (college students’ belief in their control over situations or experiences), and the need for cognition (the degree to which they engage in and enjoy thinking). This study will explore these variables based on the cognitive media literacy model (Potter, 2004), using a sequential mixed methods design that employs a quantitative survey followed by qualitative interviews. This chapter begins by presenting the problem statement, significance of research, research purpose, and research questions. This chapter includes a brief overview of the theory and research methods.

Statement of the Problem

Following the 2016 US presidential election, fake news became a commonly used term that refers to misinformation or “fabricated information that mimics news media content in form but not in organizational process or intent” (Lazer et al., 2018, p. 1094). As fake news can intentionally mislead readers, especially by being spread through social media (Allcott & Gentzkow, 2017), many researchers, librarians, and instructors have raised awareness of the issue and studied what can be effective to improve people’s ability to evaluate and analyze information across disciplines.

Teaching about fake news is not a brand-new topic for library and information science (LIS) where scholars in the field have long discussed information literacy. Some scholars defined information literacy as the set of skills, abilities, and knowledge that is used to find, evaluate, and use information (Bruce, 2000; Doyle, 1992; Eisenberg, 2008) and to even filter out unnecessary
information (Eisenberg, 2008). Others defined information literacy as a way of learning (Kuhlthau, 1988, 1993) or a socio-cultural practice driven by contexts (Lloyd, 2006). These are closely related to media literacy, which is often studied in other disciplines as well. Potter (2004) a scholar in the field of communication, defined seven skills of media literacy that people use to interpret media messages and process information: analysis, induction, deduction, synthesis, and abstracting (p. 124) and presented a cognitive model of media literacy.

In 2018, in response to concerns around the phenomenon of fake news, the International Federation of Library Associations (IFLA) encouraged libraries to continue to support information, media, and digital literacy both for developing and well-functioning societies (IFLA Statement on Fake News, 2018). The statement was accompanied by an infographic on how to spot fake news (IFLA, 2018). Academic librarians have incorporated the Framework for Information Literacy for Higher Education adopted by the Association of College & Research Libraries (ACRL) in 2016 into their instruction against fake news (Faix & Fyn, 2020; Goodsett, 2017). Researchers in LIS and librarians have participated in the Project Information Literacy research and published reports on how college students engage with news (Head et al., 2018) and student experiences with news and information in the age of algorithms (Head et al., 2020). As such, understanding college students’ susceptibility to fake news is a critical and relevant topic in LIS.

In relevant literature, critical thinking is often mentioned. The IFLA highlighted critical thinking as a key skill in media and information literacy (How To Spot Fake News, 2018). Some librarians and instructors have explicitly applied critical thinking in their information literacy or reading instruction as they understand critical thinking as a skill for evaluating information or recognizing bias (Gammons & Inge, 2017; Goodsett, 2017; Lutzke et al., 2019). Empirical
studies developed educational interventions facilitating students’ critical thinking and measured its effect on evaluating fake news, but they did not examine the variables that might affect students’ abilities to spot fake news other than critical thinking. In addition, relatively few studies have focused on exploring the relationship between critical thinking and fake news discernment. Literature has demonstrated a relationship between critical thinking and other variables, such as locus of control (Oguz & Sariçam, 2016; Pickering, 1983), need for cognition, and students’ academic performance. In the field of cognitive psychology, several studies have focused on analytical thinking as a mediator variable that affects the ability to differentiate between fake and real news headlines (Bronstein et al., 2018; Pennycook et al., 2015; Pennycook & Rand, 2018). Rather than analytical thinking, this dissertation will focus on a broader range of critical thinking skills. This study will define an ability to differentiate between fact and opinion as the key component of fake news evaluation and examine the mediating effects of critical thinking in differentiating between fact and opinion in consuming news. It will also examine how students’ locus of control and need for cognition affect these variables. The results will support education in critical thinking in the context of information and media literacy for news reading.

Significance of Research

Many researchers have claimed that the news plays an important role in democracy and informing self-governing citizens, and there is a growing concern that people are not able to critically read the news. The Pew Research Center reported that a sizable portion of surveyed Americans are not able to identify factual and opinion statements in the news (Mitchell et al., 2018). According to the assessment conducted by the Stanford History Education Group, many middle school, high school, and college students have trouble judging the credibility of online
information (Wineburg et al., 2016). In this age of “fake news,” it is essential to determine what causes college students to believe fake news.

The ability to differentiate between fact and opinion appears to be a key part of being able to evaluate fake news. The Pew Research Center assumed this ability might shape the likelihood that Americans’ will fact-check or identify the credibility of news outlets (Mitchell et al., 2018). Critical thinking plays an important role in this process (Bronstein et al., 2018; De keersmaecker & Roets, 2017; Lutzke et al., 2019). For example, individuals who have a higher level of analytical reasoning showed a better ability to discern between fake news headlines and real news headlines (Pennycook & Rand, 2018). Many studies have measured individual critical thinking skills, but few have measured a set of overall critical thinking skills or statistically tested how they help people discern between fake news and real news.

This study tested statistical models that can help with teaching critical thinking as a way to combat fake news. The study measured two independent variables: college students’ perception of control over situations or experiences (locus of control) and the degree to which they engage in and enjoy thinking (need for cognition).

Some studies have showed associations between these variables and critical thinking (Bahadir et al., 2014; Moradi & Kouroshnia, 2016; Oguz & Sariçam, 2016; Shehab & Nussbaum, 2015; Stedman et al., 2009), but literature that examined how these variables help students differentiate between fact and opinion, particularly when critical thinking is involved, was not found.

In addition, this study interviewed college students as well as surveying them. Collecting and analyzing both types of data provides a more comprehensive picture of students’ abilities related to fake news evaluation. Interview data added abundant and in-depth data regarding
students’ news reading practices and their perceptions of measured variables. This will help researchers and educators better understand mechanisms that may contribute to students’ susceptibility to fake news.

The results of this study have academic and practical implications across disciplines, as well as for higher education, library and information science, and media studies by theorizing models that focus on the role of critical thinking in fake news evaluation. This study is significant because it will help researchers and educators identify groups of students that may be vulnerable to believing fake news. The study will help them highlight areas to teach and assess to prevent students from falling for fake news.

**Research Purpose and Research Questions**

The purpose of this study is to investigate variables that affect college students’ fake news evaluation, with an emphasis on their critical thinking skills. The investigated variables include college students’ beliefs in their control over situations or experiences (locus of control) and the degree to which they engage in and enjoy thinking (need for cognition). With these variables as two respective independent variables, the study conducted a statistical analysis to examine critical thinking skills as a mediator for college students’ discernment between fact and opinion in news. In addition, the study interviewed students to explore college students’ news reading and media literacy practices. This study surveyed 296 students and interviewed 19 of them. This study was expected to identify variables that may affect students’ susceptibility to believe fake news and to suggest models that can explain the relationships between those variables. The study results can inform considerations for media literacy education which strengthens students’ critical thinking skills particularly regarding fake news.
This study identified variables that are related to college students’ news reading and their perceptions of measured variables. This study focuses on how college students read news reports online rather than including various methods to access news. The survey instruments to measure study variables are reading-based. This study investigates students’ ability to discern fact from opinion in news reports in the context of their need for cognition, ability to think critically, and locus of control. In addition, this study explores students’ news reading practices and their perceptions of measured variables.

The research questions to be addressed are:

RQ1. Are college students able to discern fact from opinion in news reports?

RQ2. Is there an association between the ability to discern fact from opinion and critical thinking?

RQ3. Is there an association between the ability to discern facts from opinion and locus of control?

RQ4. Is there an association between the ability to discern facts from opinion and the need for cognition?

RQ5. Is critical thinking a mediator variable in the effect of internal locus of control on discernment between facts and opinions in news?

RQ6. Is critical thinking a mediator variable in the effect of need for cognition on discernment between facts and opinions in news?

RQ7. What are college students’ perceptions around differentiating between fact and opinion in news reports?

RQ8. What are college students’ perceptions towards their media literacy practices when reading news?
To address RQ1 to RQ6, each corresponding hypothesis will be tested:

H1. Students will be able to discern fact from opinion in news reports.

H2. The higher the scores on critical thinking, the higher scores on the ability to discern fact from opinion (the direction of association is +).

H3. The lower scores on locus of control (the more internal locus of control), the higher the scores of the ability to discern fact from opinion (-).

H4. The higher the score for need for cognition, the higher the scores of the ability to discern fact from opinion (+).

H5. When the scores for the ability to discern fact from opinion increase with critical thinking scores, the statistical relationship between locus of control and the fact from opinion discernment is no longer significant.

H6. When the scores for the ability to discern fact from opinion increase with critical thinking scores, the statistical relationship between need for cognition and the fact from opinion discernment is no longer significant.

**Overview of the Cognitive Model of Media Literacy**

![Cognitive Model of Media Literacy](image)

*Figure 1. The Cognitive Model of Media Literacy (Potter, 2004, p. 68)*
This dissertation is based on the cognitive model of media literacy developed by Potter (2004) (Figure 1). The concept of media literacy can include the topic of fake news discernment as Potter (2004) argued that people use media literacy to interpret media messages and process information in them. Potter (2004) presented a cognitive theory of media literacy and illustrated it as a model by synthesizing relevant themes to explain how media literacy works in human cognition. The model presented four major factors: Knowledge structures, personal locus, competencies and skills, and flow of information processing tasks.

These factors affect each other interactively. A person’s knowledge structures provide information to the personal locus. Personal locus refers to the extent to which the person is conscious about a wide range of options and their decision-making for particular purposes. The stronger the personal locus of the person is engaged, the more likely it is that the person will be driven to spend more energy in information processing. Personal locus governs the information processing tasks by using competencies and skills for information processing. This study aims to explore mechanisms among these factors, to clarify relationships between personal locus and skills, and to find how important skills are in the context of news reading. This study operationalizes and modifies the model because Potter (2004) did not explicitly state how to measure these factors. This study will operationalize the factors in the model to the variables in the context of news reading, such as locus of control, need for cognition, critical thinking, and facts and opinion discernment. The meaning and application of the model will be further described in Chapter 2.

**Overview of Methods**

To explore variables relevant to college students’ fake news discernment, this study will employ a sequential explanatory mixed-methods design in which a quantitative study is followed
by a qualitative study. A combination of quantitative and qualitative study, rather than relying on either type of study alone, is expected to provide the best information for the research questions (Creswell, 2009). The study will address specific research questions using surveys and interviews with undergraduate college students majoring in information technology at Florida State University. In this study, primary importance is situated on the quantitative study. The survey data will be analyzed using statistical models that can help with general understanding of the relationships among the variables. The following qualitative study will refine the statistical analysis of the quantitative data by exploring participants’ views in depth (Creswell, 2002; Ivankova et al., 2006). In addition, students’ information behaviors not revealed in the survey may be identified during the interviews. This mixed-methods approach will allow for understanding college students’ news reading practices in a comprehensive way.
CHAPTER 2
LITERATURE REVIEW

Introduction

Since the 2016 US presidential election, a new term, “fake news” has been commonly used to refer to news-style stories “that are intentionally and verifiably false, and could mislead readers,” especially on social media (Allcott & Gentzkow, 2017, p. 213). Lazer et al. (2017) defined fake news as “misinformation that has the trappings of traditional news media, with presumed associated editorial processes” (p. 4). Misinformation can be defined as “information that is presumed to be true at encoding but later on turns out to be false” (Ecker et al., 2014, p. 570).

People started to seriously recognize that fake news and misinformation may affect society in a negative way as many sources have claimed that the news plays an important role in democracy and informing self-governing citizens (Clifford et al., 2009; Schudson, 2008). There is a growing concern that people are not able to critically read the news. The Pew Research Center (Mitchell et al., 2018) reported that a sizable portion of the surveyed Americans are not able to identify factual and opinion statements in the news. According to the assessment conducted by the Stanford History Education Group (Wineburg et al., 2016), high school students have trouble judging the credibility of online information.

Regarding people’s ability to discern fake news and misinformation in media, media literacy can be a broader concept where people’s consumption of the news and other information practices can be discussed. Media literacy is defined as “the ability to access the media, to understand and to critically evaluate different aspects of the media and media content and to create communications in a variety of contexts” (Communication from the Commission to the
European Parliament, 2007). Potter (2004), who developed the cognitive theory of media literacy and illustrated it as a model, defined seven skills of media literacy that people use to interpret media messages and process information: Analysis, grouping, induction, deduction, synthesis, and abstracting (p. 124). These skills, used singularly or in various combinations, are used to solve an actual problem.

In other words, these skills are similar to critical thinking skills that include skills in analysis, interpretation, inference, evaluation, explanation, deduction, induction, and numeracy as measured by the California Critical Thinking Skills Test (Facione, 1990a). In terms of defining media literacy and critical thinking in an educational approach, an overlap can be found in previous research as well (Arke, 2005; Ruminski & Hanks, 1995). Critical thinking skills can be considered as mainly the ability to process information by analyzing and evaluating information (Ruminski & Hanks, 1995). Arke (2005) attempted to demonstrate a relationship between media literacy and critical thinking skills in a quantitative way although the results did not statistically support the relationship.

Regardless of the relationship between media literacy and critical thinking skills, it is true that much fake news research and education are adopting the concept of critical thinking (Bonnet & Rosenbaum, 2020; Clary & Bannister-Tyrrell, 2018; Diaz & Hall, 2020; Faix & Fyn, 2020; Fontanin, 2018; Friesem, 2018; Glisson, 2019; Horn & Veermans, 2019; LaGarde & Hudgins, 2018; Lutzke et al., 2019, p. 2; Polk, 2019; Weiss et al., 2020; Zakharov et al., 2019).

This dissertation study focuses on exploring variables related to college students’ fake news discernment: locus of control, need for cognition, critical thinking, ability to discern fact from opinion. The following section will discuss the media literacy model developed by Potter (2004) as a theoretical framework to study associations among relevant variables. The literature
review is organized by the subtopics of critical thinking, need for cognition, need for cognition and critical thinking, locus of control, locus of control and critical thinking, and fake news discernment. Each section of the review includes a definition of each variable, relevant study results, and instruments that will be used to explore the variables.

Theoretical Framework: Media Literacy Model

Figure 2. The Cognitive Model of Media Literacy (Potter, 2004, p. 68), Revisited

Potter (2004) defined media literacy as “a perspective from which we expose ourselves to the media and interpret the meaning of the messages we encounter” (p. 63). To synthesize relevant ideas and present a set of operating principles in media literacy, Potter (2004) developed the cognitive theory of media literacy and illustrated it as a model with four major factors: knowledge structures, personal locus, competencies and skills, and information processing tasks. The former two factors express a person’s level of awareness of media effects, content, and industries, as well as knowledge of the real world and the self. The other two major factors in the model are closely related. Information processing tasks are described as the ability to filter information, assign meaning to symbols, and to construct meaning from information.
Information processing tools encompass the competencies and skills needed to engage in information processing tasks (Figure 2).

In this model, personal locus refers to the extent to which the person is driven to be conscious about a wide range of options and their decision-making in response to media messages. In other words, the personal locus drives an individual to be conscious about their information processing. The decision made in the personal locus is executed by information processing tools such as competencies and skills. Potter (2004) explains that the personal locus shapes the information processing tasks by determining what information to be attentive to and controlling the meaning matching and meaning construction processes. However, he did not provide guidance on how to measure the personal locus.

This model emphasizes “the importance of motivation and information-processing skills to one’s ability to make sense of news messages” (Maksl et al., 2015, p. 31). Maksl et al. (2015) used this model to develop news media literacy skill measures and found it was a useful framework to assess media skills, but the resulting scale has not been validated.

This dissertation study aims to clarify relationships among relevant variables. The interpretation and application of the media literacy model for this study are the following. The personal locus will be operationalized as individuals’ characteristics, such as their locus of control and need for cognition, which are measurable variables. The competencies and skills indicate different aspects of skills involved in information processing. The concept of critical thinking is relevant to Potter’s description of media literacy skills. The specific information processing tasks are relevant to fake news evaluation through a task differentiating between facts and opinions. Through these modifications, the relationship between the personal locus and the information processing tools will be further addressed in this study.
The personal locus, as the most explanatory construct of the degree of media literacy, draws information from a person’s knowledge structures and governs the use of relevant competencies and skills for information processing tasks (Potter, 2004). The more a person is engaged in developing their personal locus, the more media literate a person can be (Potter, 2004). Personal locus is comprised of two dimensions: control and consciousness. On the consciousness dimension, individuals’ states range from automatic to mindful during information processing. This aligns with dual-process theory, “human cognition can be characterized by a distinction between autonomous, intuitive (System 1) processes and deliberate, analytic (System 2) processes” (De Neys, 2012; cited in Pennycook & Rand, 2018, p. 2).

Other fake news studies (Bronstein et al., 2018; Pennycook & Rand, 2018) support this reasoning approach, but Potter (2004) added the control dimension. The researcher stated that the way people have developed their own information-processing routines need to be examined because it could be conditioned by media, not by individuals. According to Potter (2004), both the control and conscious dimensions represent drives, and he maps the two dimensions by creating quadrants of an individual’s drive state: Automatic habitual, automatic manipulated, mindful manipulated, and a high degree of media literacy (Figure 1). These quadrants illustrate the drive states that motivate an individual’s analytical thinking when presented with fake news.

Thus, using Potter’s media literacy model as a starting point, this study will explore the associations between variables: locus of control, critical thinking, need for cognition, and the ability to discern fact from opinion to explore reasons for susceptibility to fake news and incorrect information.
Critical Thinking

Critical thinking is conceptualized in many ways. In 1990, the American Philosophical Association prepared a national Delphi study with 46 panelists who had expertise in critical thinking instruction, assessment, or theory (Facione, 1990). The consensus definition of critical thinking from the study was “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (Facione, 1990, p. 3).

Bailin et al. (1999) stated that from the perspective of educators critical thinking has at least three features:

- It is done for the purpose of making up one’s mind about what to believe or do; The person engaging in the thinking is trying to fulfil standards of adequacy and accuracy appropriate to the thinking; and the thinking fulfils the relevant standards to some threshold level. (p. 287)

The Stanford Encyclopedia of Philosophy summarized this and stated that critical thinking is careful goal-directed thinking, thus the conception of it can be dependent on contexts such as one’s scope, goal, considered criteria or thresholds, and thinking components (Hitchcock, 2018a). In educational contexts, Scheffler (1960) viewed critical thinking as a practical educational goal and emphasized a critical thinking process that students recognize, adopt, and implement with criteria and standards.

The Delphi study reported by Facione (1990) suggested two dimensions of critical thinking: the cognitive skill dimension and the dispositional dimension. In the study, core cognitive skills were identified as “interpretation, analysis, evaluation, inference, explanation,
and self-regulation” (Facione, 1990, p. 8). The affective dispositions of critical thinking included inquisitiveness, self-confidence, flexibility, open-mindedness, fair-mindedness, reasonableness, honesty, and diligence (Facione, 1990b). The report stated that each cognitive skill can be correlated with the cognitive disposition that motivates people to use the skill (Facione, 1990b). Many studies on critical thinking tend to focus on either skills or dispositions.

**Need for Cognition**

The concept of the need for cognition was suggested and used in the field of psychology. Cohen, Stotland, and Wolfe (1955) are the first researchers who conceptualized the need for cognition as “a need to structure relevant situations in a meaningful, integrated way” (p. 291). Cacioppo and Petty (1982) further described the need for cognition as “the tendency for an individual to engage in and enjoy thinking” (p. 116). The need for cognition can be conceptually differentiated from cognitive ability (Cacioppo et al., 1996).

Studies by Cacioppo and Petty (1982) and Cacioppo et al. (1996) confirmed that the need for cognition can be used to identify and measure individual differences in cognitive motivation and the preference to engage in and enjoy tasks that require complex information processing. Empirical studies reviewed by Cacioppo et al. (1996) indicated the differences do exist, ranging on a continuum. The differences indicate that individuals with a higher need for cognition have a high intrinsic motivation to engage in effortful cognitive activity, whereas those with a low need for cognition have low intrinsic motivation to exercise their mental efforts (Cacioppo et al., 1996; Cacioppo & Petty, 1982). Those who have a high need for cognition are motivated to engage in thinking about given topics with little prompting and they are likely to be able to process information in a more systematic way by sorting out the irrelevant from the important (Bost, 2007; Cacioppo et al., 1984; Cacioppo & Petty, 1982).
Cacioppo and Petty (1982) developed and validated a scale to measure the need for cognition that includes 34 items. The scale was revised and validated to have 18 items for more efficient assessment later by Cacioppo et al. (1984). The scale asks participants to rate the extent to which they agree with a given statement often using a 9-point Likert scale as used in Seifert et al. (2008).

In an educational context, the need for cognition is linked to academic performance (Sadowski & Gülgöz, 1996; Sadowski & Gulgoz, 1992) and intellectual task performance (Coutinho, 2006). Sadowski and Gülgöz (1996) stated that high scores on the need for cognition are positively associated with academic achievement particularly related to the ability to process information efficiently. Coutinho (2006) showed that the need for cognition was a significant predictor of intellectual task performance conducted by students. In this study, the need for cognition was equal to or a more important construct than metacognition, which predicted accurate answers for the intellectual tasks. According to the study concerning consumer behavior (Haugtvedt et al. 1992), the student with a low need for cognition was less likely to change their attitude toward the effort of thinking than those with a high need for cognition. Those with a low need for cognition were more susceptible to a single peripheral informational cue inherent in the advertisement (Haugtvedt et al., 1992).

Other studies revealed differences in students’ acceptance of polarizing topics according to their need for cognition (Kardash & Scholes, 1996; Kudrna et al, 2015). Kardashian and Scholes (1996) measured 96 undergraduate students’ level of need for cognition and degree of belief that HIV causes AIDS. The participants wrote a concluding paragraph after reading two conflicting views of the same topic on AIDS. The students with a high need for cognition tended to write a paragraph that included various evidence they had read. Those with a low need for cognition
were more likely to be overwhelmed by the contradictory information, and this could lead them to ignore information that conflicts with their personal beliefs (Kardash & Scholes, 1996). In the study by Kudrna et al. (2015), undergraduate students with a high need for cognition were more accepting of both anthropogenic climate change and evolution.

The need for cognition has been also used as an outcome measure. A large research project that employs the need for cognition scale is the Wabash National Study of Liberal Arts Education at Wabash College (WNS) that was launched in 2006. The goals of this project are “to learn about the teaching practices, programs, curricula, and institutional conditions that support the aims of liberal arts and general education” and “to develop methods and processes for assessing the impact of liberal arts and general education” (Center of Inquiry, 2022a). According to their website (Center of Inquiry, 2022b), it is a longitudinal study that assesses first-year students and then follows them for at least four years in liberal arts institutions in the US. In this project, the need for cognition is one of the student outcome measures that indicate the quantitative results of the liberal arts institution’s teaching practices and conditions. Their interpretation of scores on the need for cognition scale included that an individual with a high score on the need for cognition scale is more likely to be “a thinker” that liberal arts education advocates (Bost, 2007, para. 8).

The studies based on this research project used two measures, the need for cognition and positive attitude toward literacy, to assess one aspect of a students’ intellectual outcome, described as inclination to inquire and lifelong learning (Seifert et al., 2008) and self-motivated learning (Culver et al., 2019). Seifert et al. (2008), with participants from four institutions, showed that the students’ liberal arts experiences positively affected their need for cognition. Culver et al. (2019) analyzed longitudinal data from 3043 students in 46 institutions. In this
study, academic rigor, defined as in-class practices and assignments requiring students’ engagement in deep learning and demonstration of cognitive complexity, was positively associated to need for cognition both at the end of the first year and the fourth year of college. The magnitude of these relationships increased from the first year to the fourth year (Culver et al., 2019). In addition, Wang et al. (2015) analyzed students’ data from 17 institutions in the WNS project to examine how clear and organized classroom instruction and deep learning approaches affected growth in need for cognition. The study results showed that students’ perceived exposure to clear and organized classroom instruction positively influenced the need for cognition at the end of the fourth year through a mediator variable that is deep-learning approaches, such as higher-order learning, reflective learning, and integrative learning.

**Need for Cognition and Critical Thinking**

Although critical thinking is a concept that involves various constructs, few studies directly address the relationship between critical thinking and the need for cognition. The two exceptions are Stedman et al. (2009) and Shehab and Nussbaum (2015). Stedman et al. (2009) reported a moderate correlation between the need for cognition and critical thinking disposition constructs among undergraduate students enrolled in leadership courses. In this study, the need for cognition was measured by an 18-item test (Cacioppo et al., 1984) and critical thinking disposition was measured using the University of Florida EMI (UF–EMI) critical thinking disposition inventory. The UF-EMIL inventory included three constructs of critical thinking dispositions: engagement, cognitive maturity, and innovativeness. The study results showed that a correlation existed between each critical thinking construct, as well as total scores, and the need for cognition. Based on this, Stedman et al. (2009) determined that there is a close relationship between the need for cognition scales. The discussion also stated that the UF-EMI
should be further studied in regard to critical thinking. The study suggested research to examine critical thinking in terms of its relationships to thinking processes, behaviors, and environmental factors (Stedman et al, 2009).

Shehab and Nussbaum (2015) examined undergraduate and graduate students’ employment of two different critical thinking strategies: weighing refutations and constructing a design claim. The participants were 285 undergraduates and graduate school students in educational psychology courses at a large university. The study revealed an interaction effect between participants’ need for cognition according to their employment of two different critical thinking strategies. The results showed that the relationship between one critical thinking strategy, weighing refutations, and cognitive load depends on the level of need for cognition.

**Locus of Control**

The concept of locus of control was suggested and mainly used in Psychology. According to Rotter (1966), locus of control can be described as a person’s belief about a situation that is perceived as a reward or reinforcement. An individual’s control type is either internal or external. If the individual perceives the reward or reinforcement as contingent upon their behavior or attributes, they have an internal control orientation. If the individual perceives a certain consequence as controlled by outside forces, they have an external control orientation (Rotter, 1966).

Regarding differences in information processing depending on the locus of control orientation, individuals with an internal control orientation and an external orientation have different concerns in an experimental, task performance situation (Julian & Katz, 1968; Pines & Julian, 1972). Internals were more responsive to the informational requirements of the task by spending more time and looking for more information to work on a difficult task (Julian & Katz,
1968). They appeared to be more affected by the task difficulty and informational demands of the situation, whereas the externals were more affected by the social conditions of evaluation, such as the judgments and evaluations of other persons (Pines & Julian, 1972).

According to the book *Teach Internal Locus of Control* by Hill (2011), individuals need to have a high internal locus of control and it can be taught. Hill (2011) argued that those with an internal locus of control show higher motivation and performance levels, actively search for information, reflect on new information, use logical and organizational strategies for problem-solving, and can better overcome helplessness.

There are several instruments to measure a person’s locus of control orientation. Rotter (1966) developed and validated the Internal-External scale that consists of 29 paired forced-choice items, including six filler items. The scale by Rotter (1966) has been used often in locus of control research (Bahadir et al., 2014; Ewen, 2001; Flor et al., 2013; Moradi & Kouroshnia, 2016; Pickering, 1983). In a longitudinal study by Ewen (2001), nursing students’ locus of control became more internally oriented towards the end of the program. A study by Bahadir et al. (2014) on college students majoring in physical education reported a statistically significant difference in gender variable as the female pre-service teachers have more external locus of control.

The adult Nowicki-Strickland internal-external scale (ANSIE), developed and validated later by Nowicki and Duke (1974), was used in Marra (1997). Pickering (1983) adopted several different locus of control measures including Levenson's locus of control scales and Rotter’s scale.
Locus of Control and Critical Thinking

In the literature, individuals who have an internal locus of control rather than an external locus of control are expected to have higher critical thinking dispositions or skills (Bahadir et al., 2014; Flor et al., 2013; Moradi & Kouroshnia, 2016; Oguz & Sariçam, 2016; Pickering, 1983). A few studies found a positive relationship between internal locus of control and critical thinking dispositions (Bahadir et al., 2014; Oguz & Sariçam, 2016). According to a study by Oguz and Sariçam (2016), there was a relationship between these two variables among pre-service teachers. The researchers found that external locus of control was an important predictor for critical thinking dispositions based on their analysis. They showed that the higher the external locus of control, the lower the critical thinking disposition of the participant. In addition, external locus of control explained more than 20 percent of the total variance of critical thinking dispositions. Another study by Bahadir et al. (2014) also investigated the correlation between the critical thinking disposition levels and the locus of control of 356 students in the School of Physical Education and Sports at the Ege University in Turkey. The study adopted Rotter’s (1966) internal-external locus of control scale and California Critical Thinking Disposition Scale (CCTDI) as measurements. The study results showed that there was a significantly negative correlation between critical thinking disposition and locus of control of the participating students (Bahadir et al., 2014). This implies that students with an internal locus of control orientation tend to demonstrate higher scores on the critical thinking disposition test.

A study by Moradi and Kouroshnia (2016) investigated the locus of control as a moderator in the relationship between family communication patterns and the critical thinking disposition of 359 high school students. To measure the critical thinking measure, the study adopted the critical thinking disposition scale by Ricketts (2003). The study used Rotter’s scale
(1966) to measure the locus of control. The study found a statistically significant correlation between critical thinking and the locus of control. Their statistical analysis also reported that the locus of control did not have a moderating role in the relationship between family communication patterns and critical thinking disposition.

The dissertation study by Pickering (1983) investigated the relationship between internal locus of control and the critical thinking skills of high school seniors. The study adopted several locus of control measures including Rotter’s Internal-external locus of control measure, Levenson’s Chance Locus of Control, and Levenson’s internal locus of control measure. To measure critical thinking skills, the Watson-Glaser Critical Thinking Appraisal (WGCTA) was used. The study results demonstrated that locus of control was related to critical thinking skills, but it was limited only to the scores on Levenson’s Chance Locus of Control Scale and the WGCTA scores. A dissertation study by Maebius (1990) reported a statistically significant correlation between locus of control and critical thinking ability for nurses with associate degrees or diplomas. However, they were not related for nurses with a baccalaureate or higher degree.

There were other studies that attempted to investigate relationships between critical thinking and locus of control, but they did not report a statistically significant relationship (Ewen, 2001; Marra, 1997). A dissertation study by Ewen (2001) attempted to determine a relationship between these two variables. The longitudinal study of 115 nursing students examined the relationships among nursing students’ self-esteem, locus of control, anxiety, critical thinking, and academic achievement variables. The study results did not show a correlation between the students’ locus of control orientation and critical thinking (Ewen, 2001). In addition, a dissertation study by Marra (1997) explored the relationships among critical thinking, locus of control, learning style, and environmental perception variables of
baccalaureate nursing students. No statistically significant relationships were identified between the participants’ critical thinking ability measured by Watson-Glaser Critical Thinking Appraisal (WGCTA) and locus of control orientation measured by the Adult Nowicki-Strickland Internal-External (ANSIE) locus of control scale. However, the participants who had strong internal scores demonstrated the highest mean on WGCTA total scores.

**Fake News Discernment and Critical Thinking**

Researchers have studied variables, such as individuals’ cognition, political attitudes, and deliberation, that are related to their susceptibility to falling for fake news. Regarding individuals’ cognition, several studies focused on analytical thinking as individuals’ cognitive ability and/or thinking style (Bago et al., 2020; Bronstein et al., 2018; Pennycook & Rand, 2018, 2020). They aimed to test whether analytical thinking would positively predict the participants’ ability to discern between fake and real news headlines. To measure participants’ discernment of news items, the researchers selected 12 fake and 12 real news headlines from credible mainstream media sources, a fact-checking website, and fake news stories during the 2016 U.S. presidential election and conducted a pretest to validate the headline items. Participants rated the accuracy of each headline based on the degree of their beliefs in what the headline described actually happened. The researchers used questions from the Cognitive Reflection Test (CRT) as a tool to measure how much individuals engage in analytical versus intuitive thinking because the CRT had several problems in which intuitive answers are easily incorrect. The participants completed a total of seven items from two versions of the CRT. In these studies, across different samples, analytical thinking was negatively correlated with the perceived accuracy of fake news headlines. In addition, analytical thinking was positively correlated with the ability to discern between fake and real news headlines (Pennycook & Rand, 2018, 2020).
Including previously mentioned research, some studies considered political attitudes as an affecting variable to individuals’ discernment between fake and real news (Anthony & Moulding, 2019; Bago et al., 2020; Bronstein et al., 2018; Pennycook & Rand, 2020). Anthony and Moulding (2019) reported that political identity and political views were consistently correlated with individuals’ likelihood to believe in conspiratorial fake news about their opposite party’s candidate and vice versa. Pennycook and Rand (2018, 2020) also showed the participants’ tendency to overrate the accuracy of news headlines that are consistent with their political beliefs and attitudes. However, given a period of deliberation time, the participants tended to correct their intuitive mistakes that they rated fake news more accurate than real news (Bago et al., 2020). The studies showed that political attitudes or other factors alone do not predict individuals’ ability to discern between fake and real news (Bago et al., 2020; Pennycook & Rand, 2018, 2020). They suggest that analytical thinking, regardless of political attitudes, is a consistent factor against falling for fake news (Bago et al., 2020; Bronstein et al., 2018; Pennycook & Rand, 2018, 2020). In relation to critical thinking, thinking analytically rather than thinking intuitively, can be considered as a required cognitive process in critical thinking.

Leonard (2018), in a thesis in journalism, examined how effective survey respondents’ media literacy was to identify fake news stories under the effects of social identification. The respondents were asked to rate perceived credibility for both real and fake news. The rated credibility was highly correlated with their social identification. Media literacy was effective against the effects of social identification with the real news stories, and it was also an inoculant against fake news stories for conservatives.

Empirical studies on teaching students to identify fake news explicitly and implicitly mentioned the role of critical thinking in differentiating between fake and real news. Lutzke et al.
claimed that critical thinking plays an important role in limiting the influence of fake news about climate change on Facebook. They conducted experiments with interventions that used news evaluation guidelines to prime critical thinking. The participants first received a series of guidelines and rated the importance of each guideline, and then were exposed to news items. Exposure to the intervention led to the participants’ diminished likelihood to trust, like, and share fake news.

Scholars emphasized the importance of critical thinking in this era where people can be easily affected by fake news. LaGarde and Hudgins (2018), in their book, emphasized the need for teaching critical thinking skills and provided examples of teaching lessons to combat fake news. The authors argued that everyone should be able to discern facts from fiction for a better-informed society. Polk (2019) emphasized the importance of implementing critical thinking and reading into the curriculum. The researcher argued that students should practice applying critical inquiry across media and judging the credibility of multimodal news sources. For this, the researcher suggested that students read/analyze with the term “doubt” in their minds, with D meaning “Dig into facts,” O meaning “Object to opinions formed from unilateral inquiry,” U meaning “Unbiased news is hard to come by,” B meaning “Borrow from history and other disciplines to contextualize messages,” and T meaning “Truth is pliable, so one should not search for a single truth” (Polk, 2019, p. 263). Polk (2019) introduced several activities involving students reading news from different types of media and analyzing messages in the news, which helps students learn not only critical reading but also that a single truth cannot exist.

Academic librarians have incorporated the Framework for Information Literacy for Higher Education adopted by the Association of College & Research Libraries (ACRL) (2016) into their instructions against fake news (Faix & Fyn, 2020; Goodsett, 2017). In their
presentation, Goodsett (2017) emphasized teaching critical thinking skills to combat fake news and stated critical thinking skills or dispositions corresponding with the knowledge practices and disposition of the ACRL framework. The presentation introduced teaching methods for critical thinking in relation to the ACRL framework, such as inquiry-based learning, debate, and argumentation. Faix and Fyn (2020) found that critical thinking was incorporated in each ACRL framework. For example, the knowledge practices and dispositions from “Authority is constructed and contextual” indicate critical thinking by evaluating the authority of a source. As for “Searching as strategic exploration,” the research process requires critical thinking as students have to identify and locate sources of information.

Bonnet and Rosenbaum (2020) applied Penn State University Libraries’ fake news workshop and reported its effectiveness for college students in their institution. The 75-minute workshop consisted of a series of activities, such as having students define fake news and misinformation, “identify the various biases that impact selection and interpretation of information; develop a set of guidelines with which to evaluate information quality; and apply evaluation guidelines to contemporary news items” (p. 103). Diaz and Hall (2020) reported library faculty’s efforts at a university to raise awareness of fake news on campus. The librarians had faculty discuss fake news-related concepts and meet with local journalists. Both articles reported educational efforts by libraries, but they did not measure their impact on the participants’ understanding of fake news.
CHAPTER 3

METHODS

Mixed-Methods Research Design

This study employs a sequential explanatory mixed-methods research design that consists of a quantitative study followed by a qualitative study (Creswell et al., 2003). Researchers can employ this method when qualitative data can explain significant results or outliers (Morse, 1991). It is a popular design because it is possible to connect quantitative and qualitative data in a consecutive phase in one study (Ivankova et al., 2006). To be specific, this research adopted a follow-up explanations model of the explanatory design (Figure 3, Creswell & Plano Clark, 2007). The primary importance is placed on the quantitative phase (Creswell & Plano Clark, 2007).

This design was selected because the purpose of this study is to understand variables that are considered to be related to college students’ fake news evaluation. The quantitative phase looks for relationships between variables, particularly the mediating role of critical thinking on the discernment of fact and opinion. The researcher obtained objective measures of key variables, such as critical thinking, locus of control, and need for cognition, that influence the ability of college students to discern fact from opinion in news (Creswell & Plano Clark, 2007). Tests developed to measure each variable were presented as a single survey in the quantitative phase.

The sequential qualitative data collection helps explain or build upon initial quantitative results because the qualitative data can refine the statistical results of quantitative data by exploring participants’ views in depth (Creswell, 2002; Creswell et al., 2003; Ivankova et al., 2006; Literat, 2014). The instrument for the qualitative phase is interviews. The qualitative data
adds in-depth data regarding the students’ news reading practices and their perceptions of measured variables. The researcher can collect information as to why certain variables, tested in the quantitative phase, are significant predictors of the ability to discern fact from opinion in news or not. The researcher may discover students’ information behaviors beyond the data from the survey. These will help the researcher better understand mechanisms that may contribute to students’ susceptibility to fake news.

![Figure 3. Explanatory Design: Follow-Up Explanations Model](image)

**Target Population and Method of Sampling**

The research population for this study is undergraduate students who are enrolled in courses at Florida State University (FSU). FSU is a large research university with diverse undergraduate majors. According to the Office of Institutional Research at FSU, the enrollment of undergraduates in the fall of 2021 was 33,486 (Florida State University, 2021).

The researcher solicited classes in the College of Communication and Information (CCI) at FSU. The first target was classes in School of Information because they are assumed to understand the importance of evaluating information and thinking critically by being exposed to curriculums emphasizing information systems, innovation, and ethics in the Information Technology professions. The enrollment of undergraduates in the School of Information was 268 students in the summer of 2021. In Fall 2021, the researcher recruited participants who are enrolled in classes in all the three schools in the CCI: School of Information, School of Communication, and School of Communication Science and Disorder. In the fall of 2021, the enrollment of undergraduates was 366 in the School of Information, 845 (including 312 who
were not formally-admitted-students) in the School of Communication, and 280 (including 103 not-formally-admitted students) in the School of Communication Science and Disorder. The total number of undergraduates enrollment from the three schools were 1491.

The target sample size for the quantitative phase was 200 students as this number would provide a reasonable amount of data for a single mediator model analysis. The sample is comprised of adults 18 and older.

The target sample size for the qualitative phase was 30. The qualitative study participants were contacted from among the survey study participants. After analyzing the quantitative data, the researcher contacted participants who indicated a willingness to participate in an interview. Survey participants who have outlier scores in any variables of the model, would be considered of special interest.

Quantitative Data Collection and Analysis

Instrument Development

The quantitative study measured the college students’ locus of control, need for cognition, critical thinking, and ability to discern facts from opinions using established tests of these constructs. The following table (Table 1) summarizes the measurement of variables in this study. Each variable will be described in more detail in the next sections.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Initial Measure</th>
<th>Scoring of Initial Measure</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locus of Control</td>
<td>Locus of control scale (Rotter, 1966)</td>
<td>A forced-choice 29-item scale including 6 filler items</td>
<td>- A high score indicates the external locus of control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- A low score indicates the internal locus of control</td>
</tr>
</tbody>
</table>
Table 1 - Continued

<table>
<thead>
<tr>
<th>Construct</th>
<th>Initial Measure</th>
<th>Scoring of Initial Measure</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for cognition</td>
<td>Need for cognition scale</td>
<td>18-item measured on the 5-point Likert-type scale</td>
<td>A high score indicates the subject’s tendency to engage in and enjoy effortful cognitive endeavors</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>The Ennis-Weir Critical Thinking Essay Test</td>
<td>The total score ranges from -9 to 29 points. 9-item are graded based on the rubric (each item can receive scores like -1, 0, +1, +2, +3 and the last question can receive -1 to +5)</td>
<td>-A high score indicates the subject’s general critical thinking ability. -Subset analysis is not available</td>
</tr>
<tr>
<td>Facts and opinions discernment</td>
<td>Discernment between facts and opinions in online news</td>
<td>Forced choice 22-item</td>
<td>A high score means the subject’s higher capacity to correctly classify factual and opinion statements in news</td>
</tr>
</tbody>
</table>

**Fact and opinion discernment.** The coefficient alpha for the scale reliability was 0.87.

The initial instrument containing 22 items reported that they measured one latent variable. This initial scale was used for further statistical analysis.

**Table 2. Fact and Opinion Discernment Scale and Loading**

<table>
<thead>
<tr>
<th>Fact and Opinion Discernment</th>
<th>Factor 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care costs per person in the U.S. are the highest in the developed world.</td>
<td>0.70*</td>
</tr>
<tr>
<td>President Barack Obama was born in the United States.</td>
<td>0.70*</td>
</tr>
<tr>
<td>Immigrants who are in the U.S. illegally have some rights under the Constitution.</td>
<td>0.59*</td>
</tr>
<tr>
<td>ISIS lost a significant portion of its territory in Iraq and Syria in 2017.</td>
<td>0.81*</td>
</tr>
<tr>
<td>Spending on Social Security, Medicare, and Medicaid make up the largest portion of the U.S. federal budget.</td>
<td>0.83*</td>
</tr>
<tr>
<td>Democracy is the greatest form of government.</td>
<td>0.89*</td>
</tr>
</tbody>
</table>
Table 2 - Continued

<table>
<thead>
<tr>
<th>Fact and Opinion Discernment</th>
<th>Factor 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing the federal minimum wage to $15 an hour is essential for the health of the U.S. economy.</td>
<td>0.72*</td>
</tr>
<tr>
<td>Abortion should be legal in most cases.</td>
<td>0.87*</td>
</tr>
<tr>
<td>Immigrants who are in the U.S. illegally are a very big problem for the country today.</td>
<td>0.75*</td>
</tr>
<tr>
<td>Government is almost always wasteful and inefficient.</td>
<td>0.59*</td>
</tr>
<tr>
<td>Republicans currently hold a majority of seats in both chambers of Congress</td>
<td>0.68*</td>
</tr>
<tr>
<td>Most of the heroin that currently makes it into the U.S. comes across the southern border</td>
<td>0.86*</td>
</tr>
<tr>
<td>In the aftermath of the war in Iraq, no active weapons of mass destruction were found</td>
<td>0.51*</td>
</tr>
<tr>
<td>In general, regardless of who is in power, politicians can’t be trusted</td>
<td>0.73*</td>
</tr>
<tr>
<td>The government must make a greater effort to reduce climate change</td>
<td>0.66*</td>
</tr>
<tr>
<td>The courts have gone too far in restricting public expression of Christian beliefs</td>
<td>0.85*</td>
</tr>
<tr>
<td>Several coronavirus vaccines have now been approved for use, either by individual countries or groups of countries.</td>
<td>0.54*</td>
</tr>
<tr>
<td>For coronavirus vaccines, most countries prioritize those over 60 years of age, health workers, and people who are clinically vulnerable.</td>
<td>0.74*</td>
</tr>
<tr>
<td>The amount of stimulus check payments is different for different people.</td>
<td>0.84*</td>
</tr>
<tr>
<td>Fear of the side effects caused by a certain version of coronavirus vaccines is exaggerated.</td>
<td>0.62*</td>
</tr>
<tr>
<td>More colleges and universities should require students to get vaccinated against COVID-19 before they return to campus.</td>
<td>0.66*</td>
</tr>
<tr>
<td>Stimulus checks are likely to help families rather than an individual recipient.</td>
<td>0.37*</td>
</tr>
</tbody>
</table>
The instructions for the questions using these statements were amended according to the feedback by provided by the dissertation supervisory committee and pretests. As participants may not understand the difference between factual and opinion statements, a word in the instructions used by the Pew Research Center was changes and an example was added:

You will now be shown a series of statements that have been taken from news stories. Regardless of how knowledgeable you are about the topic; would you determine whether each statement is a **factual statement** (whether you think it is accurate or not) OR an **opinion statement** (whether you agree with it or not)?

Here is an example:

- FSU canceled Spring Break in 2021 in an effort to mitigate the spread of COVID-19.

  → This is a factual statement because this can be proved or disproved with objective evidence regardless of this statement is true or not.

- FSU should have not canceled Spring Break in 2021.

  → This is an opinion statement because this is an expression of beliefs or values.

**Critical thinking.** Many researchers have attempted to define critical thinking (Ennis, 1962; Facione, 1990b; Kurfiss, 1988; Paul & Binker, 1990; Scriven & Paul, 1987; Siegel, 1988). A highly cited definition is that critical thinking is “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (Facione, 1990b, p. 5).

As critical thinking is a complicated construct, various instruments have been developed to assess critical thinking skills or abilities. Each instrument tends to have its own definition of
critical thinking skills or an instrument particularly focuses on different critical thinking skills. In general, there are two perspectives in terms of critical thinking assessment and instruction (Morris et al., 2018): critical thinking skills as 1) generic abilities that provide a thinking framework that apply to a variety of content (Davies, 2013; Ennis, 1989), and 2) subject- or content-dependent thinking skills that apply to a specified context (Beyer, 1987; Smith, 2002).

This dissertation study needs to measure critical thinking as a generic skill independent of context as the fact and opinion discernment, which is the dependent variable of the study, will also be measured regardless of news subjects or topics. Furthermore, in the qualitative study phase, the study is interested in learning about people’s thought processes and thinking frameworks that influence their news evaluation. This is the reason the researcher will select a measurement that assesses critical thinking skills as generic cognitive abilities that apply to any content over the measurement assessing domain-specific critical thinking skills.

The Stanford Encyclopedia of Philosophy (Hitchcock, 2018b) listed eight currently available standardized tests:

- Cornell Critical Thinking Tests Level X and Level Z (Ennis et al., n.d.)
- Ennis-Weir Critical Thinking Essay Test (Ennis & Weir, 1985)
- California Critical Thinking Skills Test (Facione, 1990b, 1992)
- Halpern Critical Thinking Assessment (Halpern, 2016)
- Critical Thinking Assessment Test (Critical Thinking Assessment Test, 2017)
- Collegiate Learning Assessment (CLA+ Student Guide, 2017)
To select a test for this study, the researcher reviewed the Critical Thinking Assessment Test (CAT), the Ennis-Weir Critical Thinking Essay Test, and the California Critical Thinking Skills Test (CCTST) because they are commonly used to test critical thinking skills of undergraduates (Morris et al., 2018). The following reviews specific skills measured by the tests, scoring options, costs, and limitations.

**Critical Thinking Assessment Test (CAT).** This is the only faculty driven assessment among the standardized test list. Faculty from diverse disciplines across different institutions developed the instrument and external experts validated it.

Twelve skills are tested in four categories: evaluating information, creative thinking, learning and problem solving, and communication (Stein & Haynes, 2011):

**Evaluating Information**

1. Separate factual information from inferences.
2. Interpret numerical relationships in graphs.
3. Understand the limitations of correlational data.
4. Evaluate evidence and identify inappropriate conclusions.

**Creative Thinking**

5. Identify alternative interpretations for data or observations.
6. Identify new information that might support or contradict a hypothesis.
7. Explain how new information can change a problem.

**Learning and Problem Solving**

8. Separate relevant from irrelevant information.
9. Integrate information to solve problems.
10. Learn and apply new information.
11. Use mathematical skills to solve real-world problems.

Communication

12. Communicate ideas effectively.

The test instrument is constructed of 15 questions with the majority requiring short answer responses. The questions are derived from real world situations. Each question does not try to measure one dimension of critical thinking skills. The test is not a timed test, but it usually takes 30 to 45 minutes for students to complete. Faculty who received training for grading the CAT responses need to score them.

**California Critical Thinking Skills Test (CCTST).** The California Critical Thinking Skills Test (CCTST) by Insight Assessment is “an objective measure of the core reasoning skills needed for reflective decision making concerning what to believe or what to do” for undergraduate and graduate level students. The test measures eight specific skills, which are analysis, interpretation, inference, evaluation, explanation, deduction, induction, and numeracy. The test also provides overall reasoning skills scores based on the specific skills measured. The question types are multiple choice items using everyday scenarios. It usually takes 45-50 minutes to administer the test. The administered test responses are scored and analyzed by Insight Assessment.

**Ennis-Weir Critical Thinking Essay Test.** This is “a general test of critical thinking ability in the context of argumentation” (Ennis & Weir, 1985, p. 1). It is an essay test appropriate for high school and college students and recommended to measure the effectiveness of critical thinking instructions.

The test covers the following areas of critical thinking competence (R. H. Ennis & Weir, 1985, p. 1):
- Getting the Point
- Seeing the Reasons and Assumptions
- Stating One’s Point
- Offering Good Reasons
- Seeing Other Possibilities (Including Other Possible Explanations)
- Responding Appropriately to and/ or Avoiding:
  - Equivocation
  - Irrelevance
  - Circularity
  - Reversal of an If-Then (or Other Conditional) relationship
  - The straw person fallacy
  - Overgeneralization
  - Excessive skepticism
  - Credibility problems
  - The use of emotive language to persuade

Regarding administration, the test has test-takers read the letter to the editor of a fictional newspaper. The writer of the letter wrote eight paragraphs with arguments to support the main point of the letter, and each paragraph includes at least one error or correct type of reasoning. It takes a total 40 minutes to administer the test. The test takes 10 minutes to read the given instructions and letter and 30 minutes to write nine paragraphs evaluating each argument of the letter. Test takers write a total of nine paragraphs, eight paragraphs evaluating each paragraph and one paragraph evaluating the letter as a whole (Ennis & Weir, 1985). For scoring, graders interpret responses and give scores based on the rubric. At least two graders will be needed to
obtain inter-rater reliability. The test manual kit is no longer formally published, but a free version is available now.

**Selection of critical thinking skills test.** This study decided to employ the Ennis-Weir critical thinking essay test to measure the participants’ critical thinking skills for several reasons. The Ennis-Weir test reports moderate external validity and the responses can show the thought patterns of test-takers (Morris et al., 2018). CAT, with its format of short answer responses, also is useful for obtaining data on the participants’ thought patterns (Morris et al., 2018) and shows high validity and reliability because the test designers train the prospective users who will grade responses (Stein & Haynes, 2011). However, trained faculty might not be available for the researcher. Regarding the CCTST, it would be convenient for the researcher to automatically grade and analyze the results even on the subscale level, but it might not be an affordable option without enough funding. In addition, it could be difficult to incorporate the test into the survey because it needs to measure other variables as well.

Several studies compared and evaluated current critical thinking assessment tools (Abrami et al., 2008; Morris et al., 2018; Possin, 2008). Possin (2008) reported problems with objective tests such as the Watson-Glaser Critical Thinking Appraisal Test, the Cornell Critical Thinking Test, and the California Critical Thinking Skills Test. The problems found included the lack of assessing certain abilities like identifying fallacious arguments, limited options that might lead to guessing correct answers, and problems found in specific questions. Possin (2008) suggested that some essay tests could better indicate more global critical thinking skills involved in critically reviewing and adopting arguments, beliefs, and actions. Possin (2008) recommended the Ennis-Weir test as an easy, effective, and affordable essay test tool when considering the cost of other essay tests such as the International Critical Thinking Test and the Collegiate Learning
Assessment. Students will be tested on “their ability to identify and assess arguments for cogency” and identify informally made fallacious arguments (Possin, 2008, p. 211).

There are several limitations of using the Ennis-Weir test. Like any essay test, it could be challenging to obtain inter-rater reliability. However, the answer key and rubric, which are thorough and clear, will help to achieve a certain degree of consistency in scoring (Possin, 2008). Regarding test administration, this study will incorporate the test materials in an online survey form that will prompt the participants’ reading and writing. It is difficult to know the impact of different format on students’ responses because research adopting an online format is not found.

The Ennis-Weir Critical Thinking Essay test was designed with a total of nine items that a student writes paragraphs to evaluate a given letter. For the first eight items, a student evaluated each paragraph of the letter by writing whether the thinking is good or bad and the reasons of their judgment. The last item had a student write an overall evaluation of the letter. The students’ answers were graded with rubrics. Each of the first eight items was given a score of -1, 0, 1, 2, 3 according to “-1 = judges incorrectly or shows bad judgment in justifying, 0 = makes no response, 1 = judges correctly, but does not justify, 2 = justifies semi-adequately, 3 = justifies adequately.” For the ninth item, the score range was -1 to +5 according to its rubric that describes aspects for credit.

For the inter-rater reliability, the researcher trained a second grader who was a doctoral student in the School of Information, and we discussed any disagreement until consensus was reached. First, the second grader graded 10 responses based on the rubric, and then we discussed inconsistent scores and revised the rubric. And then, the second grader graded 30 responses and 9 among 30 responses showed differences more than 3 points in total scores. After consensus
was reached, the second grader graded additional 30 responses based on the agreed grading criteria.

Because few study analyzed the items of this instrument, the researcher conducted an item analysis of a total of nine items using collected data from the survey. The researcher reviewed statistics that presents the coherence between an item and the other items in a test using a methodology of the classical test theory, including the correlation between scores from one item and scores from items that exclude that item. These statistics reported an issue in Item 3 and Item 8. They presented negative item-total correlation coefficients (-0.119 and -0.052), which means they may not be good items. Based on this information, the researcher excluded Item 3 and Item 8 for further analysis. Item 3 and Item 8 were different from other items; Item 3 and Item 8 attempted to ask whether students able to recognize that the paragraph did not have a problem while other items contained logical errors the students had to pointed out.

The final scale with seven items showed an acceptable scale reliability with the coefficient alpha of 0.715. The researcher examined the final items using IBM SPSS 27 and all the items reported an acceptable loading for one factor. This means that they measured one latent variable.

**Locus of control.** Locus of control can be described as a person’s belief about a situation that is perceived as a reward or reinforcement (Rotter, 1966). There are several instruments to measure a person’s locus of control orientation. These instruments include the Internal-External scale (Rotter, 1966), the adult Nowicki-Strickland internal-external scale (ANSIE) (Nowicki & Duke, 1974), and the Levenson locus of control scale (Levenson, 1973).

This study adopted the Internal-External scale developed and validated by Rotter (1966). It has been used often in locus of control research (Bahadir et al., 2014; Ewen, 2001; Flor et al.,
The scale consists of 29 paired forced-choice items including six filler items that are intended to make the purpose of the test more ambiguous (Rotter, 1966). The items are “sampled widely from different life situations where locus of control attitudes might be relevant to behavior” (Rotter, 1975, p. 62).

For scoring, one point was awarded for the choice of underlined statement given (see Table 5). Each item is given an equal weight. Statements 1, 8, 14, 19, 24, and 27 are filler items to hide the intention of the questions. A high score indicates an external locus of control and a low score indicates an internal locus of control. Rotter (1966) did not provide an absolute standard that can differentiate the internal and external groups. In research, internal-external groups can be divided by the median score presented in a tested sample (Lefcourt et al., 1968).

There have been discussions on the lack of uni-dimensionality of the LOC. In the development of the scale, Rotter (1966) and Franklin (1963) conducted two factor analyses, but one general factor accounted most of the variance and some factors had only a few significantly loading items for a small variance. The factors other than the first factor contained very few items to be reliable subscales.

Keeping in mind this, factor analysis was done with collected data, and the results were similar to the studies mentioned. The researcher took the following steps. This variable was regarded as a dichotomous and categorical variables. This means a parallel analysis is more appropriate to extract the number of factors. A parallel analysis, using the psych package in R, suggested the number of components should be two. An item factor analysis with the estimator of WLSMV was done using MPlus 8. The two factor models presented 11 problematic items (Table 3). Cross-loading items (LC3, LC9, LC13, LC15, LC29) indicated they were explained by multiple dimensions. Items loaded to Factor 2 (L12, L17, L20, L22) were minor-dimensional
items. L26 did not have significant factor loadings at all. It was difficult to cluster these items according to what each item asks about. Relying on the parallel analysis result, these 11 problematic items were removed.

Table 3. Item Factor Analysis of Locus of Control

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor loading</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>LC2</td>
<td>0.51*</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>LC3</td>
<td>-0.46*</td>
<td>0.46*</td>
<td></td>
</tr>
<tr>
<td>LC4</td>
<td>0.27*</td>
<td>0.22*</td>
<td></td>
</tr>
<tr>
<td>LC5</td>
<td>0.34*</td>
<td>-0.12</td>
<td></td>
</tr>
<tr>
<td>LC6</td>
<td>0.43*</td>
<td>-0.11</td>
<td></td>
</tr>
<tr>
<td>LC7</td>
<td>0.45*</td>
<td>-0.20</td>
<td></td>
</tr>
<tr>
<td>LC9</td>
<td>0.20*</td>
<td>0.27*</td>
<td></td>
</tr>
<tr>
<td>LC10</td>
<td>0.37*</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>LC11</td>
<td>0.58*</td>
<td>-0.18</td>
<td></td>
</tr>
<tr>
<td>LC12</td>
<td>0.12</td>
<td>0.57*</td>
<td></td>
</tr>
<tr>
<td>LC13</td>
<td>0.29*</td>
<td>0.27*</td>
<td></td>
</tr>
<tr>
<td>LC15</td>
<td>0.35*</td>
<td>0.27*</td>
<td></td>
</tr>
<tr>
<td>LC16</td>
<td>0.62*</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>LC17</td>
<td>0.00</td>
<td>0.67*</td>
<td></td>
</tr>
<tr>
<td>LC18</td>
<td>0.61*</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>LC20</td>
<td>0.08</td>
<td>0.32*</td>
<td></td>
</tr>
<tr>
<td>LC21</td>
<td>0.47*</td>
<td>-0.02</td>
<td></td>
</tr>
<tr>
<td>LC22</td>
<td>-0.05</td>
<td>0.61*</td>
<td></td>
</tr>
<tr>
<td>LC23</td>
<td>0.44*</td>
<td>-0.06</td>
<td></td>
</tr>
<tr>
<td>LC25</td>
<td>0.64*</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>LC26</td>
<td>0.14</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>LC28</td>
<td>0.51*</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>LC29</td>
<td>0.20*</td>
<td>0.33*</td>
<td></td>
</tr>
</tbody>
</table>
The new set with the remaining 12 items were examined. A parallel analysis suggested one factor, which means this set is unidimensional. One factor analysis result was consistent with factor loadings significant for all the items (RMSEA estimate = 0.047, Probability RMSEA \(\leq .05\): 0.603 / CFI 0.910, TLI 0.891, SRMR = 0.108). This set of items were used to further data analysis. A coefficient alpha for the reliability was 0.68.

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC2</td>
<td>0.54*</td>
</tr>
<tr>
<td>LC5</td>
<td>0.26*</td>
</tr>
<tr>
<td>LC6</td>
<td>0.40*</td>
</tr>
<tr>
<td>LC7</td>
<td>0.35*</td>
</tr>
<tr>
<td>LC10</td>
<td>0.37*</td>
</tr>
<tr>
<td>LC11</td>
<td>0.48*</td>
</tr>
<tr>
<td>LC16</td>
<td>0.60*</td>
</tr>
<tr>
<td>LC18</td>
<td>0.62*</td>
</tr>
<tr>
<td>LC21</td>
<td>0.50*</td>
</tr>
<tr>
<td>LC23</td>
<td>0.41*</td>
</tr>
<tr>
<td>LC25</td>
<td>0.75*</td>
</tr>
<tr>
<td>LC28</td>
<td>0.57*</td>
</tr>
</tbody>
</table>

(* significant at 5% level)

This study analyzed this locus of control variable in two ways: categorical and ordinal variables. The internal-external locus of control category can be divided by the median score. For a different statistical analysis, this variable can be treated as an ordinal variable that directly uses the participants’ scores.
### Table 5. Revised Rotter’s Locus of Control Scale

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
</table>
| 2      | a. Many of the unhappy things in people's lives are partly due to bad luck.  
b. People's misfortunes result from the mistakes they make.                          |
| 5      | a. The idea that teachers are unfair to students is nonsense.  
b. Most students don't realize the extent to which their grades are influenced by accidental happenings. |
| 6      | a. Without the right breaks one cannot be an effective leader.  
b. Capable people who fail to become leaders have not taken advantage of their opportunities. |
| 7      | a. No matter how hard you try some people just don't like you.  
b. People who can't get others to like them don't understand how to get along with others. |
| 10     | a. In the case of the well-prepared student there is rarely if ever such a thing as an unfair test.  
b. Many times exam questions tend to be so unrelated to course work that studying in really useless. |
| 11     | a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.  
b. Getting a good job depends mainly on being in the right place at the right time.      |
| 16     | a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.  
b. Getting people to do the right thing depends upon ability. Luck has little or nothing to do with it. |
| 18     | a. Most people don't realize the extent to which their lives are controlled by accidental happenings.  
b. There really is no such thing as "luck."                                            |
| 21     | a. In the long run the bad things that happen to us are balanced by the good ones.  
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three. |
| 23     | a. Sometimes I can't understand how teachers arrive at the grades they give.  
b. There is a direct connection between how hard I study and the grades I get.          |
| 25     | a. Many times I feel that I have little influence over the things that happen to me.  
b. It is impossible for me to believe that chance or luck plays an important role in my life. |
| 28     | a. What happens to me is my own doing.  
b. Sometimes I feel that I don't have enough control over the direction my life is taking. |
**Need for cognition.** Cacioppo and Petty (1982) described the need for cognition as “the tendency for an individual to engage in and enjoy thinking” (p. 116). They developed and validated a scale to measure the need for cognition that includes 34 items (Cacioppo & Petty, 1982). Cacioppo et al. (1984) later revised the 34-item scale and validated a scale with 18 items.

This dissertation study will employ the 18-item Need for Cognition Scale (NCS). The scale was used in many studies that measured the need for cognition (Coutinho, 2006; Culver et al., 2019; Seifert et al., 2008; Wang et al., 2015). The NCS appears to be a valid and reliable measure of individuals’ tendencies to pursue and enjoy the process of thinking (Cacioppo et al., 1996; Cacioppo et al., 1984; Cacioppo & Petty, 1982; Sadowski & Gulgoz, 1992).

The 18 items are presented in Table 6. Scores on the nine items (No. 3, 4, 5, 7, 8, 9, 12, 16, and 17) are reverse coded as recommended by Cacioppo et al. (1984) and are summed up to obtain an overall score for the need for cognition. The scale (Cacioppo et al., 1984) asks participants to rate the extent to which they agree with a given statement using a 9-point Likert scale where +4 signifies very strong agreement, zero indicates neither agreement nor disagreement, and −4 indicates very strong disagreement.

The Need for Cognition Scale with 18 items developed by Cacioppo et al. (1984) was adopted. The original scale (Cacioppo et al., 1984) asks participants to rate the extent to which they agree with a given statement using a 9-point Likert scale. In this study, participants used a 5-point Likert scale to rate their level of agreement for each item by choosing “strongly disagree = 1” to “strongly agree = 5.” Scores on the nine items (NC3, NC4, NC5, NC7, NC8, NC9, NC12, NC16, and NC17) were reverse coded as instructed by Cacioppo et al. (1984). Scores on all the items were summed up to obtain an overall score for the need for cognition.
The researcher examined the scale with collected data from the survey. Based on the classical test theory, three items were problematic. NC8, NC16, and NC18 reported relatively weak correlation with the total items except for that respective item. After excluding those three items, the coefficient alpha for the scale reliability was 0.858. In addition, an item factor analysis was conducted. The IBM SPSS 27 was used because this variable could be processed as a continuous variable. Based on reviewing the communalities, factor loadings, and scree plot, one factor was extracted from the scale without NC8, NC16, and NC18. This means the scale with 15 items without those three items was unidimensional. The factor explains 30.07% of variance. The scores from the 15 items were used for further data analysis.

Table 6. Revised Need for Cognition Scale with Factor Loading

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>Factor loading</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC1</td>
<td>I prefer complex to simple problems.</td>
<td>0.56</td>
<td>0.31</td>
</tr>
<tr>
<td>NC2</td>
<td>I like to have the responsibility of handling a situation that requires a lot of thinking.</td>
<td>0.65</td>
<td>0.42</td>
</tr>
<tr>
<td>NC3</td>
<td>Thinking is not my idea of fun. (R)</td>
<td>0.70</td>
<td>0.49</td>
</tr>
<tr>
<td>NC4</td>
<td>I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (R)</td>
<td>0.72</td>
<td>0.51</td>
</tr>
<tr>
<td>NC5</td>
<td>I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something. (R)</td>
<td>0.52</td>
<td>0.27</td>
</tr>
<tr>
<td>NC6</td>
<td>I find satisfaction in deliberating hard and for long hours.</td>
<td>0.46</td>
<td>0.21</td>
</tr>
<tr>
<td>NC7</td>
<td>I only think as hard as I have to. (R)</td>
<td>0.41</td>
<td>0.17</td>
</tr>
<tr>
<td>NC9</td>
<td>I like tasks that require little thought once I’ve learned them. (R)</td>
<td>0.41</td>
<td>0.17</td>
</tr>
<tr>
<td>NC10</td>
<td>The idea of relying on thought to make my way to the top appeals to me.</td>
<td>0.51</td>
<td>0.26</td>
</tr>
</tbody>
</table>
### Table 6 - Continued

<table>
<thead>
<tr>
<th>Question</th>
<th>Factor loading</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC11 I really enjoy a task that involves coming up with new solutions</td>
<td>0.58</td>
<td>0.33</td>
</tr>
<tr>
<td>to problems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC12 Learning new ways to think doesn’t excite me very much. (R)</td>
<td>0.51</td>
<td>0.26</td>
</tr>
<tr>
<td>NC13 I prefer my life to be filled with puzzles I must solve.</td>
<td>0.54</td>
<td>0.30</td>
</tr>
<tr>
<td>NC14 The notion of thinking abstractly is appealing to me.</td>
<td>0.53</td>
<td>0.28</td>
</tr>
<tr>
<td>NC15 I would prefer a task that is intellectual, difficult, and</td>
<td>0.58</td>
<td>0.34</td>
</tr>
<tr>
<td>important to one that is somewhat important but does not require much</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thought.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC17 It’s enough for me that something gets the job done; I don’t</td>
<td>0.42</td>
<td>0.18</td>
</tr>
<tr>
<td>care how or why it works. (R)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Survey

The quantitative study used an online survey to collect data. Before measuring the study variables, in the first part of the survey the participants answered questions regarding their demographics and their news reading practices. These survey questions asked for the participants’ major, gender, race, school year, age, whether they transferred to Florida State University from a community college, whether they are the first to go to college in their family, their political ideology, the number of news articles they fully read during a typical week, and the most common ways of getting news.

The survey was created online using Qualtrics. Demographic questions and a series of questions that measure locus of control, need for cognition, critical thinking skills, and an ability to distinguish between fact and opinion were included in one survey link. The online survey was self-administered. It was expected to take about an hour in total to complete the survey because the Ennis-Weir critical thinking test could take about 40 minutes (Ennis & Weir, 1985).
For the pretest, the survey loaded on Qualtrics was reviewed by two Ph.D. students and one faculty member in the School of Information at FSU. They reported that it is feasible to complete the survey within about an hour. Two completed the survey within 40 minutes. The researcher updated answer choices for some questionnaires and fixed minor errors based on their feedback. There were some suggestions to modify instructions for the critical thinking test or wording in the questionnaire items for easier understanding. The researcher added a brief instruction for the critical thinking test and provided an example to the questionnaire distinguishing between factual and opinion statements.

Regarding the order of the measurements, the survey begins with some demographic questions. And then, the participants are prompted to take the test differentiating between fact and opinion statements, which is how the dependent variable of the study is measured. The reason they take this test before other measurements is that other tests might imply that they should use a certain cognitive aspect. Next, they take a test to measure critical thinking skills because this test requires a relatively intensive use of their cognitive functions and takes more time than measurements for the other variables. Then, they take tests that measure need for cognition and locus of control one after another. The order of the tests might have an effect on the participants’ behaviors including performance on the critical thinking skills test and other responses. It is difficult to know whether or not order influenced the participants of the study though some studies present correlations between critical thinking and the other variables. This study kept the order of the measurements the same for all the participants to provide them with the same conditions.
Data Collection Procedures

For survey participant recruitment, the researcher introduced the survey to students who took courses in the College of Communication and Information (CCI) at FSU during the summer and fall semesters in 2021 and encouraged their participation. Near the beginning of the semesters, the researcher collaborated with the instructors who indicated interest in using the survey as an extra credit activity for their courses. To encourage participation, most instructors agreed to give the students who complete the study some extra credit points. The researcher requested the instructors’ permission to give a brief presentation in their class, and then the researcher solicited participation in the study by introducing the study and providing the online survey link. The researcher explained that the participants may receive extra credit and have a chance to enter into a raffle for a gift card once they complete the survey. The distribution of extra credit among participating students differed by instructor and class, but most classes offered credit for one weekly assignment in their course. In three classes, students were not offered extra credit, but in all classes, participation was voluntary, and all students were eligible for a gift card raffle. The researcher requested the instructors to post a survey link on their course management websites as well. During the 2021 summer semester, the researcher visited and promoted the participation in five online classes in the School of Information. From June 17th to June 22nd, 2021, 134 surveys were collected.

During the 2021 fall semester, the researcher encouraged participation in one class taught in the School of Communication Science and Disorder, 10 classes in the School of Information, and all classes that adopted the Sona system in the School of Communication. From the School of Information and School of Communication Science and Disorder, the researcher collected a total of 376 surveys. Participants in the School of Communication were recruited from the
School of Communication Sona system, which allows students in Communication courses to receive course extra or required credit in compensation for their time. The Sona system is used by the School of Communication to manage undergraduate student participation in research for course credit. Instructors willing to grant credit for research participation alert their students via their syllabi that students may earn credit via the Sona system. The students view and sign-up to participate in available studies and allot credit to the courses they select. The researcher recruited 51 students from the system.

Survey participation was voluntary, and the recruiting process followed approval by the institutional review board (IRB) at FSU. The survey results were recorded anonymously and scored for analysis. As a reward, students who completed the survey earned extra credit for the course at the instructors’ discretion. To receive the extra credit points, the participants submitted a screenshot of their final survey page that displayed a unique code to their course management website. Before recruitment, the researcher cooperated with instructors to ensure the process of rewarding participants with extra credit. In addition, participants who wanted to be entered into a raffle for a 1 in 5 chance of receiving a $25 gift card were asked to leave their email addresses at the end of the survey. The researcher randomly selected gift card recipients and distributed the online gift cards to their emails on July 31, 2021 for the summer participants and on October 25, 2021 for the fall participants.

To investigate the relationships between variables, it is critical to obtain complete and quality responses from the survey. The researcher excluded responses that showed significant lack of attention to the survey based on the completion time and the quality of written response for the critical thinking skills test part. As the Qualtrics software tracks the time that it takes for
participants to complete the survey, responses that took less than 20 minutes to complete were not considered for data analysis. Therefore, 296 surveys were analyzed in this study.

**Data Analysis**

The quantitative study phase attempted to examine critical thinking as a variable through which the independent variable, such as need for cognition and locus of control, acts to influence fact and opinion discernment in news. A mediating relationship refers to the situation in which a variable or variables mediates the relationship between the independent and the dependent variable (Howell, 2013). In a single mediator model, the independent variable affects the mediator, which in turn affects the outcome variables.

Collected quantitative data was analyzed to answer the explanatory research questions and to test hypotheses:

RQ1. Are college students able to discern fact from opinion in news reports?

RQ2. Is there an association between the ability to discern fact from opinion and critical thinking?

RQ3. Is there an association between the ability to discern facts from opinion and locus of control?

RQ4. Is there an association between the ability to discern facts from opinion and the need for cognition?

RQ5. Is critical thinking a mediator variable in the effect of internal locus of control on discernment between facts and opinions in news?

RQ6. Is critical thinking a mediator variable in the effect of need for cognition on discernment between facts and opinions in news?

H1. Students will be able to discern fact from opinion in news reports.
H2. The higher the scores on critical thinking, the higher scores on the ability to discern fact from opinion (the direction of association is +).

H3. The lower scores on locus of control (the more internal locus of control), the higher the scores of the ability to discern fact from opinion (-).

H4. The higher the score for need for cognition, the higher the scores of the ability to discern fact from opinion (+).

H5. When the scores for the ability to discern fact from opinion increase with critical thinking scores, the statistical relationship between locus of control and the fact from opinion discernment is no longer significant.

H6. When the scores for the ability to discern fact from opinion increase with critical thinking scores, the statistical relationship between need for cognition and the fact from opinion discernment is no longer significant.

In this study, two separate independent variables, the internality of the locus of control measured using the locus of control scale and need for cognition, were examined. The mediator variable is critical thinking and the dependent variable is the ability to discern facts and opinions. A statistical model that theorizes that critical thinking mediates the effect of the locus of control and the need for cognition on students’ ability to discern facts and opinions is diagrammed as below (see Figure 4).

Regarding data analysis, Baron and Kenny (1986) and Sobel (1982) suggested widely used steps to test for mediation. According to Baron and Kenny (1986), all three paths, between the independent and the mediator variable, between the mediator and the dependent variable, and between the independent and the dependent variable, should have a significant relationship. This can be tested by correlation analysis (Howell, 2013). Once these conditions are satisfied, the
significance of the relationship between the independent and dependent variables should be tested and should show a great reduction when both the mediator and the independent variable are used as predictors of the dependent variable. In this final step, the ideal scenario is that the statistical relationship between the independent variable and the dependent variable is no longer significant whereas the mediating variable is significant to predict the dependent variable (Howell, 2013; Leerkes & Crockenberg, 2002). However, it is more common in actual studies that the relationship between the independent and dependent variable remains significant though its effect is reduced (Howell, 2013). In this case, Sobel-test (Sobel, 1982) or Bootstrapping (Preacher & Hayes, 2009) can be the next step.

![Figure 4. The Mediator Models to Be Tested](image)

**Qualitative Data Collection and Analysis**

The qualitative study employed semi-structured online interviews with a subset of the participants who were tested. This phase focused on why certain variables, tested in the quantitative phase, were significant or not significant predictors of the participants’ abilities to discern fact from opinion in news. This study phase allows the researcher to answer the following research questions:

RQ7. What are college students’ perceptions around differentiating between fact and opinion in news reports?
RQ8. What are college students’ perceptions towards their media literacy practices when reading news?

The interview data was used to provide additional in-depth information that explain the results of the quantitative study regarding students’ perceptions of each variable and their news reading practices. The researcher firstly asked how they understood the difference between factual and opinion statements. The researcher asked their rationale for how they discern fact from opinions, and how they evaluate information in news. In addition, the researcher shared the participants’ responses to the survey participants’ responses to the survey questions and results, such as critical thinking test scores and scores in other tests they took in the quantitative phase. The researcher obtained the participants’ reactions to the results. Regarding their perceptions, the researcher asked how much they perceive critical thinking as an important skill and how they think their personal characteristics are related to their news reading experiences and fake news evaluation. Interview questions for each research question are the following:

RQ7: What are college students’ perceptions around differentiating between fact and opinion in news reports?

1. When taking the survey, were you able to understand the difference between factual and opinion statements from the question? What made this easy/hard? What was the hardest part of separating facts from opinion statements?

2. How did you tell the difference between factual and opinion statements in the survey?

3. What is it about news reports that makes it hard to tell facts from opinion?

4. 1) How do you usually discern facts from opinions in news?

   2) What makes differentiating between facts and opinions important?
5. Are there other strategies you have not to fall for fake news/to identify fake news?

6. How do you evaluate information when reading news?

RQ8: What are college students’ perceptions towards their media literacy practices when reading news?

1. Here are your critical thinking test scores, locus of control type, and need for cognition scores. [Explain what each test measures.] Can you think of any ways scores might be related to your news reading? If not, why not?

When reading news online,

2. How do you evaluate information?

3. What motivates you to evaluate information in news? Why might you sometimes evaluate information in news and not care to at other times?

4. What makes it difficult to evaluate information?

5. What kinds of messages or statements do you filter out? And, why?

Interview participants were recruited from the quantitative study participants who indicate that they would be willing to be interviewed by providing their email addresses. After analyzing the quantitative data, the researcher randomly contacted them. The interview participants were recruited based on their willingness and availability for interview although ideal interview participants were those who showed extreme scores in each variable in the survey or outlier scores in terms of the relationships between variables. Online interviews were conducted on Zoom at agreed upon times averaged 35 minutes in length. The interviews were recorded and transcriptions were created using Zoom live transcription. They were then coded for thematic analyses.
One benefit of interview participation was that they would learn their scores on the tests on the survey. In addition, the researcher offered a $15 Amazon gift card to all interview participants as compensation.

The researcher interviewed 19 students. The target sample size for the interview was 30. However, the researcher decided interview content had reached the saturation point where no new information is being generated, the interview process can be stopped (Schutt, 2015, p. 379).

Inter-coder reliability was ensured by enlisting a second coder who reviewed two of the 19 interviews. The codes from the first and second coders were compared and showed 90% agreement. We discussed any disagreement until consensus was reached. The coding differences were related to the inclusion of students’ examples for the fact and opinion discernment. The first coder included students’ demonstration of discerning fact and opinion to understand their discernment processes and contexts.
CHAPTER 4

FINDINGS

Survey Findings

The researcher developed an online survey using Qualtrics and recruited participants for the summer and fall semesters in 2021. The participants were undergraduate students who were enrolled in courses provided in the College of Communication and Information at Florida State University. The researcher visited the classes and provided students with the survey link in class. During the time survey participation was open (June 17-October 5, 2021), the survey was started 547 times and 343 responses were submitted. The researcher excluded partial responses and the responses that indicated a lack of attention. The criteria for lack of attention were response time and answers for the critical thinking skills test in the survey. Those responses were completed within 20 minutes or recorded only meaningless and repetitive words in the critical thinking skills test. After data cleaning, 296 complete responses were analyzed.

Demographic Characteristics of Survey Participants

The number of participants who were enrolled in courses in the College of Communication and Information at FSU and spent more than 20 minutes answering all the survey questions was 296. The demographics of the participants are presented in Table 7. In terms of gender, 59.8% (177) were female, 39.9% (118) were male, and one participant (0.3%) was non-binary or third gender. The participants’ age ranged from 18 to 51, and the majority (278, 93.9%) were under 24. In terms of race and/or ethnicity, 59.5% (176) were White, 20.6% (61) were Hispanic or Latino, 10.1% (30) were Black or African American, and 5.1% (15) were Asian or Pacific Islander. Eleven participants (3.7%) selected other and described themselves as multi-racial, that were specified as Asian and Hispanic, Black and White, White and Asian,
White and Hispanic, and others. There was one Native American or American Indian (0.3%), and two participants (0.7%) preferred not to answer.

Participants described their class standing as follows: 123 (41.9%) were seniors, 101 (34.1%) were juniors, and 19 (6.4%) indicated that they spent more than 4 years in the university. The remaining participants were 15 freshmen (5.1%) and 37 sophomores (12.5%). More than half of participants (168, 56.8%) majored or planned to major in information technology (IT) or information, communication and technology (ICT). There were 47 (15.9%) participants majoring in communication science and disorders and 35 (11.8%) were communication majors. The remaining 46 (15.5%) students were seeking different majors: computer science (3, 1%), political science (4, 1.4%), business (2 management in information systems (MIS), 1 MIS and finance double major, 1 risk management/insurance, total 4, 1.4%), psychology (2, 0.7%), economics (3, 1%), English (3, 1%), humanities (3, 1%), criminology (1 criminology and 1 cyber criminology, total 2, 0.7%), education (2, 0.7%), entrepreneurship (1 entrepreneurship and 1 product development, total 2, 0.7%), hospitality (2, 0.7%), social science (2, 0.7%), studio art (2, 0.7%), math (1, 0.3%), biochemistry (1, 0.3%), civil engineering (1, 0.3%), computer engineering (1, 0.3%), nursing (1, 0.3%), statistics (1, 0.3%), undecided (1, 0.3%) and double majors (5, 1.6%). Each double major student wrote their majors: computer science and IT, communication science and disorder and psychology, ICT and theatre, psychology and criminology, and psychology and studio art.

Almost a quarter of participants (73 or 24.7%) responded that they transferred to FSU from a community college. Forty-three (14.50%) indicated that they were the first to go to college in their family.
Regarding their political position, 110 (37.2%) selected that they were liberal, 104 (35.1%) were moderate, 53 (17.9%) were conservative, and 29 (9.8%) preferred not to choose a political description of themselves.

Table 7. Demographic Characteristics of Survey Participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>177</td>
<td>59.8%</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>118</td>
<td>39.9%</td>
</tr>
<tr>
<td></td>
<td>Non-binary/ third gender</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Age</td>
<td>18-20</td>
<td>141</td>
<td>47.6%</td>
</tr>
<tr>
<td></td>
<td>21-23</td>
<td>137</td>
<td>46.3%</td>
</tr>
<tr>
<td></td>
<td>24-26</td>
<td>5</td>
<td>1.7%</td>
</tr>
<tr>
<td></td>
<td>27-29</td>
<td>4</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td>30-32</td>
<td>2</td>
<td>0.6%</td>
</tr>
<tr>
<td></td>
<td>33-35</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>45-51</td>
<td>4</td>
<td>1.2%</td>
</tr>
<tr>
<td>Race and/or ethnicity</td>
<td>White</td>
<td>176</td>
<td>59.5%</td>
</tr>
<tr>
<td></td>
<td>Hispanic or Latino</td>
<td>61</td>
<td>20.6%</td>
</tr>
<tr>
<td></td>
<td>Black or African American</td>
<td>30</td>
<td>10.1%</td>
</tr>
<tr>
<td></td>
<td>Asian/ Pacific Islander</td>
<td>15</td>
<td>5.1%</td>
</tr>
<tr>
<td></td>
<td>Native American or American Indian</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>11</td>
<td>3.7%</td>
</tr>
<tr>
<td></td>
<td>Prefer not to say</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Class standing</td>
<td>Freshman</td>
<td>16</td>
<td>5.1%</td>
</tr>
<tr>
<td></td>
<td>Sophomore</td>
<td>37</td>
<td>12.5%</td>
</tr>
<tr>
<td></td>
<td>Junior</td>
<td>101</td>
<td>34.1%</td>
</tr>
<tr>
<td></td>
<td>Senior</td>
<td>124</td>
<td>41.9%</td>
</tr>
<tr>
<td></td>
<td>Spent more than 4 years</td>
<td>19</td>
<td>6.4%</td>
</tr>
</tbody>
</table>
Table 7 - Continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major or future major</td>
<td>IT/ICT</td>
<td>168</td>
<td>56.8%</td>
</tr>
<tr>
<td></td>
<td>Communication science and disorders</td>
<td>47</td>
<td>15.9%</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td>35</td>
<td>11.8%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>46</td>
<td>15.5%</td>
</tr>
<tr>
<td>Transfer to FSU from a community college</td>
<td>Yes</td>
<td>73</td>
<td>24.7%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>223</td>
<td>75.3%</td>
</tr>
<tr>
<td>First-generation college student</td>
<td>Yes</td>
<td>43</td>
<td>14.5%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>251</td>
<td>84.8%</td>
</tr>
<tr>
<td></td>
<td>Prefer not to state</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Self-description of political position</td>
<td>Conservative</td>
<td>53</td>
<td>17.9%</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>104</td>
<td>35.1%</td>
</tr>
<tr>
<td></td>
<td>Liberal</td>
<td>110</td>
<td>37.2%</td>
</tr>
<tr>
<td></td>
<td>Prefer not to state</td>
<td>29</td>
<td>9.8%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>296</td>
<td></td>
</tr>
</tbody>
</table>

Most participants (238, 80.4%) responded that they fully read at least one online news article during a typical week. Among these respondents, 187 (63.2%) read one to three articles, 30 (10.1%) read four to six articles, 21 (7.1%) read more than six articles a week. However, 58 (19.6%) participants responded that they did not fully read an online news article during a typical week.

The participants were able to choose up to 3 platforms they use to get news. Table 8 presents the frequency and percentage of each platform selected. The most preferred platform was social media as 265 (89.5%) students selected it. In orders, discussion with peers (online or face-to-face) was selected by 205 (69.3%) students. News feeds, such as Apple News, Feedly, or alerts, were selected by 107 (36.1%) students. Online newspaper sites like nytimes.com were
selected by 88 (29.7%) students. Television (66, 22.3%) and podcasts (33, 11.1%) were the next. A small number of students selected radio (10, 3.4%), print newspapers or magazines (2, 0.7%), and discussions with librarians (online or face-to-face) (1, 0.3%).

<table>
<thead>
<tr>
<th>Platform</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social media (i.e., Facebook, Twitter)</td>
<td>265</td>
<td>89.5%</td>
</tr>
<tr>
<td>Discussion with peers (i.e., online or face-to-face)</td>
<td>205</td>
<td>69.3%</td>
</tr>
<tr>
<td>News feeds (i.e., Apple News, Feedly, or alerts)</td>
<td>107</td>
<td>36.1%</td>
</tr>
<tr>
<td>Online newspaper sites (i.e., nytimes.com)</td>
<td>88</td>
<td>29.7%</td>
</tr>
<tr>
<td>Television</td>
<td>66</td>
<td>22.3%</td>
</tr>
<tr>
<td>Discussions with teachers/professors (i.e., online or face-to-face)</td>
<td>39</td>
<td>13.2%</td>
</tr>
<tr>
<td>Podcasts</td>
<td>33</td>
<td>11.1%</td>
</tr>
<tr>
<td>Radio</td>
<td>10</td>
<td>3.4%</td>
</tr>
<tr>
<td>Print newspapers or magazines</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Discussions with librarians (i.e., online or face-to-face)</td>
<td>1</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

**Descriptive Statistics of Study Variables**

The four main variables in this study are: critical thinking, the ability to discern fact and opinion, locus of control, and need for cognition. Critical thinking skill was measured using the revised Ennis-Weir Critical Thinking test with 7 items. The possible score range is -6 to 23. The participants’ scores ranged from -6 to 22. The mean score was 8.77 (SD=6.886).

The ability to discern fact from opinion was measured with 22 statements. Each statement was worth one point. The scores ranged from 1 to 22 and the mean score was 18.8 (SD=3.91).
Locus of control scores determined the participants’ locus type as either internal or external. Locus of control was measured by the Locus of Control Scale by Rotter (1966), and the scale was revised to have 12 items. The participant had to choose one statement from a pair, consisting of one internal item and one external item, and the external item was worth 1 point. The potential range of scores was from 0 to 12. The participants’ scores ranged from 0 to 12. The mean score was 6.43 (SD=2.515). The median score is 6. This indicates that scores lower than 6 can be categorized as the internal locus type and those who scored 6 or higher can be categorized as having an external locus type in this data set.

Need for cognition scores indicate higher engagement in effortful cognitive activities. The scores were measured using a 5-point Likert scale with 15 items. Reverse scoring was used on the 8 items among the 15 items. The potential range of scores was from 18 to 90. The participants’ scores ranged from 28 to 75 with a mean score of 50.81 (SD=8.43).

### Table 9. Descriptive Statistics for Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking</td>
<td>296</td>
<td>8.77</td>
<td>6.686</td>
<td>-6~22</td>
</tr>
<tr>
<td>Fact and opinion discernment</td>
<td>296</td>
<td>18.80</td>
<td>3.914</td>
<td>1~22</td>
</tr>
<tr>
<td>Locus of control</td>
<td>296</td>
<td>6.43</td>
<td>2.515</td>
<td>0~12</td>
</tr>
<tr>
<td>Need for cognition</td>
<td>296</td>
<td>50.81</td>
<td>8.431</td>
<td>28~75</td>
</tr>
</tbody>
</table>

### Relationship Between Study Variables

The correlations between the four study variables are given in Table 10. Critical thinking was positively correlated with fact and opinion discernment and need for cognition respectively at the alpha level of 0.01. However, there was no correlation between the following pair of
variables: locus of control & fact and opinion discernment, locus of control & critical thinking, locus of control & need for cognition, and fact and opinion discernment & need for cognition.

Table 10. Pearson Correlations for Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Critical thinking</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Fact and opinion discernment</td>
<td>.225**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Locus of control</td>
<td>.104</td>
<td>0.105</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Need for cognition</td>
<td>.229**</td>
<td>0.058</td>
<td>0.057</td>
<td>-</td>
</tr>
</tbody>
</table>

**p<.01. Correlations with p-values less than .001 are reported as significant and marked by an asterisk.

Differences in Scores by Demographics

The researcher obtained scores from four main variables from the survey: ability to discern fact from opinion, critical thinking skills, locus of control, and need for cognition. The researcher examined whether there is a score difference in groups of participants by their demographic characteristics, such as gender, race and/or ethnicity, class standing level, transferred to FSU from a community college, first-generation college student, and self-description of political position. The researcher also considered the number of news reports the participants fully read a week.

Group differences were reported in the fact and opinion discernment, locus of control, and need for cognition scores; not in the critical thinking scores. To be specific, the fact and opinion discernment scores differed by the participants’ gender, race and/or ethnicity, whether they transferred from a community college, and their political position (Table 11). Locus of control scores differed by the participants’ gender, whether they transferred from a community
college, and political position (Table 12). Need for cognition scores were different by gender, class standing, whether they transferred from a community college, and the number of news reports they read (Table 13). Critical thinking skill scores did not show a statistically significant difference by demographic information.

Table 11. Differences in Fact and Opinion Discernment Scores

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>F/t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>119</td>
<td>18.16</td>
<td>4.27</td>
<td>-2.264*</td>
<td>0.025</td>
</tr>
<tr>
<td>Female</td>
<td>178</td>
<td>19.24</td>
<td>3.597</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>176</td>
<td>19.39</td>
<td>3.449</td>
<td>3.329**</td>
<td>0.006</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>61</td>
<td>17.59</td>
<td>4.595</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black or African American</td>
<td>30</td>
<td>17.33</td>
<td>4.155</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian / Pacific Islander</td>
<td>15</td>
<td>19.93</td>
<td>3.058</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>2</td>
<td>20.5</td>
<td>2.121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other, please specify</td>
<td>12</td>
<td>18.17</td>
<td>5.132</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>73</td>
<td>17.77</td>
<td>4.644</td>
<td>-2.3*</td>
<td>0.023</td>
</tr>
<tr>
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### Table 12. Differences in Locus of Control Scores

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<th>N</th>
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### Table 13. Differences in Need for Cognition Scores

<table>
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<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>F/t</th>
<th>p</th>
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<td>2.492</td>
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<tr>
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<tr>
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<td>5.04</td>
<td>2.192</td>
<td>10.496**</td>
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<td>9.934</td>
<td>0.042</td>
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</table>
**Gender.** For group means comparison, the researcher had to use two categories, male and female. This is because the other category, non-binary/third gender, had only one participant. The participant was added to both male and female groups because one sample was not enough to statistically compare them as groups. An independent samples t-test was run. The results showed gender differences in scores on fact and opinion discernment, need for cognition, and locus of control. For the fact and opinion discernment scores, males (Mean=18.16) averaged about 1 point lower than females (Mean=19.24) (t[223.03] = -2.26, p = .025, 95% CI [-2.01, -0.14], Cohen’s d = -0.28). For need for cognition scores, males (Mean=52.77) averaged about 3 point higher than females (Mean=49.52) (t[295] = 3.31, p = .001, 95% CI [1.32, 5.18], Cohen’s d = 0.39). For locus of control scores, males (Mean=6.01) averaged about 0.7 point lower than females (Mean=6.71) (t[295] = -2.39, p = .017, 95% CI [-1.29, -0.12], Cohen’s d = -0.28). This means males in the sample have more internal locus of control than females. For critical thinking scores, there was no statistically significant difference in genders (Male M = 8.84, Female M = 8.74, p = .9).

**Race and/or ethnicity.** A one-way ANOVA was run to compare the effect of race and/or ethnicity (races) on the scores. The statistical comparison required at least two samples in each group. Only one participant was included in Native Americans or American Indian, so the participant was categorized into Others for the statistical comparison. In the fact and opinion discernment scores, there was a statistically significant difference between at least two groups (F[5, 290] = 3.33, p = 0.006). Tukey’s HSD Test for multiple comparisons indicated that the mean score of White (M = 19.39, SD = 3.45) was significantly different from the scores of the Hispanic or Latino group (M = 17.59, SD = 4.56) (p = 0.015, 95% CI [0.23, 3.37]). However,
there was no statistically significant difference in mean, fact and opinion mean scores between other groups of races.

**Class standing.** A Kruskal-Wallis H test was used as an alternative for a one-way ANOVA when an assumption for ANOVA was violated. A Kruskal-Wallis H test showed that there was a statistically significant difference in need for cognition scores between different school standing levels, Kruskal-Wallis H = 9.934, p = 0.042, with a mean rank need for cognition scores of 151.43 for Freshman, 139.18 for Sophomore, 136.93 for Junior, 152.17 for Senior, and 201.87 for those who spent more than 4 years in school. In the fact and opinion discernment, critical thinking, and locus of control scores, there was not a statistically significant difference.

**Transfer to FSU from a community college.** All the participants selected either yes or no for the question asking whether they transferred to FSU from a community college. This allowed the researcher to compare mean scores from the two groups, and an independent samples t-test was run. The results showed statistically significant group differences in the fact and opinion discernment, locus of control, and need for cognition scores. In the critical thinking scores, the average scores of both groups were not statistically different.

In the fact and opinion discernment scores, the participants who transferred (Mean = 17.77) averaged about 1.3 points lower than those who did not transfer (Mean = 19.13) (t[101.689] = -2.3, p = 0.023, 95% CI [-2.546, -0.188], Cohen’s d = -0.35). In the need for cognition scores, the participants who transferred (Mean = 52.78) averaged about 2.6 points higher than those who did not transfer (Mean = 50.16) (t[294] = 2.32, p = 0.023, 95% CI [0.398, 4.84], Cohen’s d = 0.31). In the locus of control scores, the participants who transferred (Mean = 5.82) averaged about 1 point lower than those who did not transfer (Mean = 6.63) (t[294] = -
2.395, \( p = 0.017 \), 95% CI [-1.468, -0.144], Cohen’s \( d = -0.32 \). This means that the average score of the non-transferred group is more oriented towards internal locus of control.

**First-generation college student.** For t test, two samples who selected prefer not to select were added to both Yes and No groups. There was no statistically significant difference in group mean scores between those who are the first to go to college in their family and those who are not.

**Political position.** A one-way ANOVA was run to compare the scores by different political positions. There was a statistically significant difference in the fact and opinion discernment scores (\( F[3, 292] = 2.66, p = 0.048 \)). Robust tests were also conducted against the violations of normality and homogeneity. Welch’s test was significant (\( F[3, 93.610] = 2.78, p = 0.045 \)) and Brown-Forsythe test was not (\( F[3, 137.493] = 2.241, p = 0.86 \)).

There was a statistically significant difference in the locus of control scores (\( F[2, 264] = 15.64, p < 0.001 \)) between at least two groups at the alpha level of .05. Welch’s and Brown-Forsythe tests results were also significant (\( p < 0.001 \)).

Post hoc tests using Tukey’s HSD Test were run for multiple comparisons. Regarding the fact and opinion discernment scores, the results showed that difference was not significant for any pair of means. Regarding the locus of control scores, the results indicated a statistically significant difference between the mean of Conservative, Moderate, and Liberal. The mean score of Conservative was significantly different from the mean of Moderate (\( p = 0.011 \), 95% CI [-2.31, -0.21]) and Liberal (\( p < 0.001 \), 95% CI [-3.26, -1.19]). The mean score of Moderate was different from the mean of Liberal (\( p = 0.019 \), 95% CI [-1.81, 0,12]). As lower scores mean more internal locus of control, this indicates that locus of control of political group is more internal in the following order: Conservative (\( M = 5.04 \)), Moderate (\( M = 6.30 \)), and Liberal (\( M = 7.26 \)).
**News count.** A one-way ANOVA was run to compare the scores by different number of news reports the participants read fully during a week. Four groups were compared: 0, 1-3, 4-6, and more than 6 articles. There was a statistically significant difference in the need for cognition scores between at least two groups at the alpha level of .05. (F[3, 296.476] = 4.31, p = 0.005). Welch’s test (F[3, 58.931] = 4.13, p = 0.10) and Brown-Forsythe test (F[3, 99.314] = 3.9, p = 0.011) results were also significant.

To find pairs of groups with significant difference, Tukey’s HSD Test for multiple comparisons were conducted. The results indicated the difference between the mean of the 0 group (M = 47.79, SD = 8.026) and the average of the other three groups reading at least one article was significant.

**Interview Findings**

The researcher interviewed 19 students among the participants who completed the survey and left their email addresses to schedule an interview. The interviews were conducted individually using Zoom for 30 to 40 minutes. The researcher asked questions regarding their perceptions around differentiating between fact and opinion in online news reports and their media literacy practices when reading news online. The interview was semi-structured as the researcher asked them follow-up questions and other exploratory questions in addition to the prepared interview questions. The interview transcripts were coded using NVivo 22. Data was analyzed using both inductive and deductive coding. The following section presents interview findings based on themes. Interview participants demographics with their survey scores are presented in Table 14.
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<th>Race/Ethnicity</th>
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<td>CT</td>
<td>LOC</td>
<td>NC</td>
</tr>
<tr>
<td>S1</td>
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<td>6</td>
<td>51</td>
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<td>S2</td>
<td>19</td>
<td>3</td>
<td>4</td>
<td>57</td>
</tr>
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<td>20</td>
<td>8</td>
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</tr>
<tr>
<td>S4</td>
<td>22</td>
<td>12</td>
<td>6</td>
<td>71</td>
</tr>
<tr>
<td>S5</td>
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</tr>
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<td>12</td>
<td>49</td>
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<td>7</td>
<td>56</td>
</tr>
<tr>
<td>S9</td>
<td>22</td>
<td>8</td>
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<td>58</td>
</tr>
<tr>
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<td>5</td>
<td>37</td>
</tr>
<tr>
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</tr>
<tr>
<td>S12</td>
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<td>52</td>
</tr>
<tr>
<td>S13</td>
<td>22</td>
<td>4</td>
<td>9</td>
<td>54</td>
</tr>
<tr>
<td>S14</td>
<td>19</td>
<td>4</td>
<td>7</td>
<td>59</td>
</tr>
<tr>
<td>S15</td>
<td>21</td>
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<td>18</td>
<td>13</td>
<td>6</td>
<td>47</td>
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</table>
Discerning Fact from Opinion in the Survey

The participants described how they discerned factual statements from opinion statements when they responded to the survey questions. They were asked to explain their thought processes when classifying example statements and their rationales. The major methods they were using included checking word cues, the existence of quantitative or statistical evidence, and the way the statement is phrased. Before being asked to elaborate on their processes, some students commented that they just knew the difference by seeing how it was phrased.

Table 15. Discerning Fact from Opinion in the Survey

<table>
<thead>
<tr>
<th>Theme</th>
<th>Summary</th>
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<tbody>
<tr>
<td>Processes</td>
<td>Checking word cues</td>
</tr>
<tr>
<td></td>
<td>Checking whether quantitative or statistical evidence exists</td>
</tr>
<tr>
<td></td>
<td>Checking how the statement was phrased</td>
</tr>
<tr>
<td>Difficulty</td>
<td>Easy or not very hard to differentiate between fact and opinion</td>
</tr>
<tr>
<td></td>
<td>Opinion statements were easy (or difficult) to recognize than factual statements.</td>
</tr>
<tr>
<td></td>
<td>When opinion statements consistent with their own thoughts, opinions, or beliefs, those were hard to differentiate.</td>
</tr>
</tbody>
</table>

Processes. Related to word cues, several participants commented that they determined a statement as an opinion when definite or subjective words such as ‘is,’ ‘should,’ ‘it is essential,’ and ‘the greatest’ were included. In addition to that, one student also defined opinion statements as the statement about “whether agree or not disagree” and added, “An opinion can look like a fact, but it's not always fact. If it's a 99% fact and 1% opinion, it's still an opinion” (S18). Given the example of statement in the survey, “Abortion should be legal in most cases,” the student told
it was a hard one to differentiate and “I would say it's not factual because, many people say it should be, but many people say it shouldn't be. So, I think it's not factual, and it's whether you agree or disagree.”

Some students commented that if the statement does not have back up information such as factual evidence, “substantial evidence” (S4) and statistics, that is an opinion statement (S2, S4, S5, S7, S18). One student expressed this like, “if you have to back it up with something, it’s an opinion” (S18). They asked themselves “You could find evidence for that?” to determine the statement is an opinion and “can I make this a true or false thing?” to determine the statement as a factual statement (S7). For the opinion statement in the survey, “Stimulus checks are likely to help families rather than an individual recipient,” one student commented that they were not sure about this statement, but attempted to determine whether that was factual or opinion saying that, “Because I feel like there's evidence that could be given to say like stimulus checks are likely to help families, but I guess the reason it’s going to be an opinion because it doesn't really say how they're likely to help families” (S7).

**Difficulty.** The participants described how difficult it was to discern factual statements from opinion statements when taking the survey. And then, they were asked what made the process easy or hard to explore factors related to discerning factual from opinion statements.

Regarding the difficulty of the survey questions, most interview participants commented the statements in the survey were easy or not very hard to determine. Regarding the factors that made them feel easy, one student commented that at their age, it was not hard to differentiate between “something that can be proven” and “emotional opinion” (S2). The other student said that “reading a lot, talking to people, being educated and informed about different things” helped “just knowing the difference inherently” (S18).
Some students mentioned that “the more opinionated ones were easy to differentiate.” (S4, S18). Student 19 said opinions were not easy to recognize while facts were easily recognized.

They commented that, when the opinion statements were related to their own thoughts, opinions, or beliefs, those were a little hard to differentiate. One student mentioned that they had to separate their own thoughts about the statements (S7). Other students commented that it was difficult to differentiate the statements “if you have an opinion going in on that” (S5) and “if it's something that I believe in and the opinion lines up with mine” (S18). One student commented that when they thought about their agreement with the statement, they were more likely to say the statement was a factual statement (S5).

Discerning Fact from Opinion in Actual News

The researcher examined the participants’ perceptions of discerning facts from opinions in actual news. They described their thought processes, rationale of the discernment, difficulty, and importance of the discernment. Based on understanding of factual and opinion statements from the survey questions, the participants were asked how they discerned facts from opinions when reading news articles online. However, it seemed that some participants explained how they evaluated information in news to determine whether it is “truthful” facts or not. For example, Student 7 introduced their thought processes of differentiating facts and opinions like, “Would this statement be used in a scientific journal? Could evidence be found to support that statement? If evidence can be found to support something, that makes it factual, if the evidence is also true.” This section attempted to focus on the process of discerning factual from opinion statement, but sometimes it was difficult to clearly separate the process of differentiating between factual and opinion statements from the process of evaluating information based on
criteria. Some participants were asked a follow-up question, “If you narrow down to just one news article, how do you discern factual statements from opinion statements in that article?”

Table 16. Discerning Fact from Opinion in Actual News

<table>
<thead>
<tr>
<th>Theme</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processes</td>
<td>Factual statements contain numbers, figures, hard evidence, and statistics.</td>
</tr>
<tr>
<td></td>
<td>Opinion statements include personal beliefs and speculative statements.</td>
</tr>
<tr>
<td></td>
<td>Check emotions delivered in a sentence and determine whether the claims were exaggerated.</td>
</tr>
<tr>
<td></td>
<td>Use context clues and prior knowledge and compare news sources</td>
</tr>
<tr>
<td>What makes the discernment difficult?</td>
<td>Fact and opinion being presented together.</td>
</tr>
<tr>
<td></td>
<td>A blurry line between fact and opinion.</td>
</tr>
<tr>
<td></td>
<td>Too many opinion statements made the discernment difficult.</td>
</tr>
<tr>
<td></td>
<td>Speculative comments by experts and certain news sources</td>
</tr>
<tr>
<td>Importance</td>
<td>Fact and opinion discernment is important for rational decision-making</td>
</tr>
<tr>
<td></td>
<td>To prevent from negative social impacts and miscommunication</td>
</tr>
</tbody>
</table>

Processes. Several students used the phrase, “I should take everything with a grain of salt” (S18) before describing their discernment processes. Many students commented that they used the same methods with the survey to discern facts from opinions in news. They perceived a statement or information as factual “when numbers and figures are offered” (S13) from a third person perspective (S1) or they described fact as “hard evidence” (S2); while opinion is “like your personal beliefs” (S2). Several students said that without back-up data or statistics, they tend to determine it as an opinion (S4). Regarding opinion statements, one student commented that, “Speculation statements or speculative statements are still opinion-based because they're
speculating based on their own beliefs or what they interpret the data to be, but not actually presenting facts” (S4). Student 6 correctly explained the definition of factual statement like, “Factual statements may not be ‘true factual statement’ but are factual statements.”

Student 15 described their discernment processes: Reading a statement, checking whether back-up data and date of an event are included, and determining whether the author is simply reporting what happened or try to say something. The student described the difference with an example, “There's a difference between a statement that says 98% of students on campus like cookies and cream ice cream, compared to someone saying that cookies and cream ice cream is better than every other ice cream” (S15).

Several participants discussed emotion that is delivered in a sentence as a criterion to differentiate between fact and opinion in news. They commented that a statement was opinion-based when “railing about a certain issue” (S6). Student 3 described that “the emotion is key” and the fact and opinion discernment directly connected to evaluating the information like the following:

You can know facts are usually stated without emotion. But even more important, opinions are usually stated with emotion. So, it is very easy for me to pick up on opinions because you can just tell that the author has a certain emotion when they write a certain sentence. And the second, (when) emotion is picked up, it's like, ‘oh there's opinion, an idea coming from that person, there's a bias coming from that person.’

Many participants commented that checking wording and tone of the language is one way of discernment (S1, S6, S9, S11, S16, S18). They said an opinion is typically presented in stronger language “using very strong adjectives and descriptive words” (S16) and seemed one-directional (S11), strongly one-way and political (S16). One student commented that when “the
things seem exaggerated in the news” and they saw “the grand sweeping claims that don’t provide much insight into the issue,” it is an opinion (S18). Also, one student mentioned they were “using context clues and prior knowledge” (S13). For example, one student compared news sources to recognize one side of argument was presented as a weaker argument based on the writer’s purpose (S16).

In discerning fact from opinion in actual news. The participants were asked, “what makes it hard to tell the difference between fact and opinion in news?” and they described their challenges and factors that may affect their challenges. Regarding the difficulty of the fact and opinion discernment in actual news, when the students described their methods for discernment, most students said the discernment was easy. However, most students were able to describe the hardest part of the discernment, and some students commented that they were struggling when reading actual news.

Many students commented that facts and opinions being presented together made the discernment difficult. Student 6 said that “It’s the hardest when there’s a mix of it.” Several participants said news tended to report opinion as if it was fact (S5, S7, S16, S18). One student expressed an opinion-based news commentary as “a very twisted fact” by saying that opinions were framed in a way that being a fact (S18). One student brought an opinion statement, Democracy is the greatest form of government from the survey as an example. The student explained that, in actual news reports, the statement could be phrased in a factual manner like, “(Another form of government) has been horribly disproved wrong by social experiment of democracy” to stimulate readers’ emotions and to earn clicks (S5). Although both statements should be still considered as opinions, the student attempted to explain the wording made it harder to differentiate between facts and opinions in news. Other students further commented
that a statement with information could look like factual, but the writer could frame opinion as
fact, or fact could be used for propaganda (S16, S17). Student 17 created an example that facts in
news could be "cherry-picked to lead up to” a certain opinion:

For example, someone interviewed an expert and was saying that 500,000 immigrants
come to the UK illegally from Syria. And then, the interviewer asked them about the
crime rate the homelessness within immigrants, and how that drives the rates up in the
UK. Eventually, it kind of leads to his opinions that immigrants are bad for native UK
citizens. And, it all looks like it's fact-based because you're being thrown a whole bunch
of information. I guess it's harder when facts are used for propaganda.

They concluded this made the discernment more difficult. One student commented that
even one word, comma, or grammar could change the meaning of a sentence, a whole passage,
and the meaning of the news article (S9).

In addition to the way a sentence is phrased, some participants commented that it is
harder to tell the factual and opinions statements when an opinion statement is slipped in “other
very fact-based statements” (S6). The student explained that when they were exposed to factual
statement in a row, they automatically expected the next statement to be factual because they
already perceived the whole news article as factual. However, the next statement could be an
opinion statement. Another student spoke about their perception of recent news articles. The
student said that the “blurry lines” between an opinionated piece and a journalistic piece made
the fact and opinion discernment difficult. The student said, “I feel like journalism today has
become more opinionated. I think a lot of the articles I read sounded like a regular journalistic
article, but there was a ton of opinionated stuff coming from the author and it was just melted
together with the facts” (S14).
In a similar context, several participants commented that too many opinion statements in news reports made for them difficult to discern facts (S17). One student commented (S4):

The frustrating thing is that I want them [the reporter] to speculate and want their opinions, but then other times, I just want to know what the facts are. It’s like, ‘is the Pfizer vaccine cleared by the FDA yesterday?’ Oh, I don't need to know whether the reporter thinks that it's going to be safe or it's a crunch time. All I need to know is either it's approved or it's not approved.

Statements made by experts seemed to make the fact and opinion discernment difficult. This part is closely related to information evaluation processes, but it is related to the participants’ perception of factual and opinion statements in news. It seemed that some students perceived statements made by experts are all opinion statements but factual at the same time.

One student commented, by describing one news topic example (S17):

There are subject matter experts in different fields, and it can feel kind of wrong to deny someone that spent their entire life studying something as opposed to me someone that is just casually interested in things. And for me to overlook that opinion, sometimes I feel a little bit cautious about doing.

The other student (S4) stated that speculative comments made by experts are all opinions saying,

(…) experts believe that it's [the fire is] going to spread to these three areas based upon the lack of precipitation in the area. (…) So that's speculating, that is not really the fact, but I would want them to give me their opinions.

Related to sources of information, two participants mentioned some sources made the fact and opinion discernment difficult and connected that with information evaluation. One
student spoke that, when they had a hard time to differentiate facts and opinions, they just went to a different source and did their own research for the discernment (S13). One student (S2) commented that,

that [news statements] can be seen as they [one news channel] are pushing one side of agenda versus just telling the news for what it is. (…) (I) go online and find a reputable source or credible source and see that that was a little exaggerated.

Other elements mentioned by the participants were pictures or graphics in news articles. One student commented that, “Sometimes it is hard to tell the facts and opinion things especially when there's like pictures, graphics, or things more interesting. (…) People kind of saying like, ‘Oh, this is written in a certain way, there's a picture, and it's like infographic.’” (S8)

Some students described news environments made the discernment difficult. One example was social media (S3). Other students mentioned certain news outlets. This is related to information evaluation in news that will be discussed in a later section.

**Importance of Discerning Fact from Opinion in Actual News**

Every participant commented it is important for people to discern fact from opinion in news for different reasons. The majority discussed negative results expected when people did not discern fact from opinion news.

The major reason was related to “rational decision-making.” One student commented that “… [opinion is] just trying to sway you one way or another, without really any basis and what's really going on. So, facts are needed to actually make rational decisions about things and decide what's good for, what's going on around you” (S7). When the participants were asked about the importance of discerning fact from opinion, several students reiterated the difference between fact and opinion to explain why they thought the discernment was important. Several students
emphasized the importance of having factual evidence for decision-making. They recognized that filtering facts from opinions as the first step of verifying factual information. Several students mentioned negative results of people not being able to discern fact from opinion, such as miscommunication and negative social impact. One student commented, “The facts, usually are backed by evidence and are more likely to have truth behind them, or really are true. I think you can get the most information out of a fact. But an opinion or some sort of speculation, (if) people will take as the truth and then relate to other people, as if it was a fact, that just leads to miscommunication” (S4). One student discussed a cancel culture that could result from not differentiating between fact and opinion. Another reason for the importance was that they want to be seen as an informed person, not ignorant (S18).

**Evaluating Information in Online News**

The participants were asked how they evaluate information included in online news articles and what were strategies not to fall for fake news. Five themes emerged in terms of their evaluation criteria: factual and opinion statements, relevance, authority, accuracy, and purpose. The students shared their experience by describing information evaluation processes and tools.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fact and Opinion</td>
<td>Discerning fact from opinion as a first step to evaluate information</td>
</tr>
<tr>
<td>Currency</td>
<td>Web search with date range to find current information</td>
</tr>
<tr>
<td>Authority</td>
<td>Author's qualification</td>
</tr>
<tr>
<td></td>
<td>Major news outlets are reliable</td>
</tr>
<tr>
<td>Theme</td>
<td>Summary</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Click and read a full article</td>
</tr>
<tr>
<td></td>
<td>Check whether other articles were published on the same topic</td>
</tr>
<tr>
<td></td>
<td>Identify the original source of information</td>
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<tr>
<td></td>
<td>When seeing emotional or outlandish statements, search for better sources</td>
</tr>
<tr>
<td></td>
<td>Verify the original source and data</td>
</tr>
<tr>
<td></td>
<td>Compare multiple sources to verify information and to understand contexts and other perspectives.</td>
</tr>
<tr>
<td><strong>Relevance</strong></td>
<td>Are topics important and relevant?</td>
</tr>
<tr>
<td></td>
<td>Using Google Scholar for schooling</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Check political biases in news outlets</td>
</tr>
<tr>
<td></td>
<td>Check writer's bias</td>
</tr>
<tr>
<td></td>
<td>Interpretation of data can be different</td>
</tr>
<tr>
<td></td>
<td>Check purpose of news outlets</td>
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</table>

**Factual and opinion statements.** Several students mentioned differentiating between factual and opinion statements in news headlines and articles as their first step in evaluating information. One student commented that, “I'll try to come decide whether it's an opinion or a fact. And sometimes you can tell from the headline, like how they express it” (S1). One student said they determine whether a kind of article is factual or opinion style, and then see whether the fact can support the claim in the article “because sometimes facts kind of be twisted” (S7). When a statement in an article is an opinion, they examine if it is substantiated. One student commented they decide whether it is something to be proven and tested (S13). Once they
distinguish fact from opinion, they research about the factual statement (S11, S18). If it is an opinion statement, they check the purpose of the statement (S19) and there is back-up information from analysis or experts (S4). The other student said they research the topic of the opinion statement especially when it is treated as a fact in news (S18). One student mentioned that they basically try to avoid the article when they see an opinion statement (S4).

**Relevance.** The participants mentioned they evaluated information based on their needs. They ignore the information when the topic is not relevant for them (S18) or not important (S7). One student mentioned the purpose of information and tools for evaluating the information saying,

> For schooling, I use Google Scholar. I really like *Google Scholar* because you can kind of put the date range, so try to keep it five years of the current year. It's reliable and more of kept up information. I also use *Google* because it'll give me a lot of resources.

This is also related to currency that could be a minor theme of evaluation criteria.

**Accuracy.** The participants checked whether the content was reliable, truthful, and correct by identifying primary sources of information and by searching for multiple sources on the same news topic. There were comments about identifying primary sources, including reports from governments and companies. They also check the accuracy by finding that other articles or sources are reporting the same thing (S9). In addition, they try to search for accurate information by recognizing emotional language and possible biases in sentences. To evaluate information, several students commented that they click and read an article when they see a shared news article on social media that seems to be biased.

Many students mentioned about diversifying sources to verify information in news (S2, S4, S6, S7, S16, S18). One student (S4) commented:
I think that there's obviously a very definite spectrum of beliefs within them [resources], so obviously Fox goes more conservative than New York Times to go more liberal, and so they'll all have typically main points that are all the same. [By accessing multiple sources to understand the full story and reading, watching, or listening to all of them] I shall find an average of all the facts, and then I'll take those as what the with the actual truth is.

Two students mentioned Google as a search engine to look for credible sources or other articles outside of the news article.

Student 18 mentioned that once they saw “crazy headlines that are designed to get clicks” on Apple News, they try to obtain accurate information like the following:

(…) Going past the first three sources or the first three websites on Google. A lot of the issues that people find the information is the top. The top things that Google presents are things that will more than likely get you to click because the internet is the epitome of confirmation bias. If you search for dogs are bad, you'll get reasons why dogs are bad. And you can search for dogs are good, you'll get reason why dogs are good. So, you always have to take that with a grain of salt whenever you're researching so that's what I tend to do. I'll frame the question in many ways for a topic as many ways as I can get it. (…) I'll take that [information from searching] and put it into my little imaginary notebook and (if) these two sources disagree on the same fact (…) and we'll find out who is right in the end.

As mentioned earlier by this student, when they see outlandish and overgeneralized statement, or emotional language in the news article, they identify primary sources, look for more articles, and verify the information (S7, S13, S14). Student 7 commented about checking whether the information is supported by evidence like statistical data, “I feel like a lot of the time
they're just trying to make me angry (...) I don't really see a point in that (...) I'll look for things like numbers in them or like statistics, it seemed like actually factual.” However, checking statistical data does not happen in every situation. Regarding the accuracy of fact, Student 7 differentiated fact and opinion, but they said, “I don't really do much like outside research, outside of an article, like if I see it fact or statistics I usually generally believe that facts or statistics is right.”

**Authority.** The participants mentioned they investigate the source of information to evaluate it. They check the author’s qualifications and whether the source is reliable and reputable. Four students checked who the author was and whether the information was from or delivered by experts in the field (S4, S8, S15, S19). Student 4 described as the following:

I think there is some benefit to listening to educated experts, when they do make speculative statements. So, for instance, with the election for instance, the reporters on live streams would say we believe that the vote in or the mail in ballots will be heavily democratic, so we will expect to see a spike in democratic votes over the night once those ballots are counted. So, that is a speculative statement, which is based upon some facts, but it's still an opinion, but because it's given through that analysis, and through an expert and presented in that fashion, I'm more receptive to it. So, although I do prefer facts over opinions, [it depends] on who they're delivered by.

Related to the author, Student 8 commented that it is important for an author to “have a closer connection (with the information sources) to be able to get the best information.” The student mentioned the author’s experience should help gain more information from the information sources’ personal experience.
Regarding the information sources’ authority, the participants evaluated the publishers of the news articles. One student commented that they thought CNN, BBC, and New York Times, and other “big companies” are more truthful because “they have more credible sources” (S19). Another student commented that, “Usually just big news stations and local news stations are my strongest sources because you can't go wrong with them there. I would say [they are] 98% accurate on most things” (S10).

Purpose. The participants evaluated information by checking biases in news outlets and writers and purpose of presented information. Their main question was “for what reason would someone say that” (S5). Several students were critical about certain news outlets, the type of magazine, and news platforms. One student considered intention of news media by saying that “[specific media platform name] news is not reliable. They just look for attention” (S9). Another student commented that, “It sounds like there are some news media outlets that their only job is to promote and sell propaganda. I can't remember the name of the magazine right now but there's a magazine out there and their only thing is to report celebrity gossip in news. And for me, I classify that as fake news” (S14).

Many students commented they paid attention to potential political biases in news outlets (S6). One student commented that they used a media bias chart to see the tendency of news outlets and news sources when they researched for a reason of news articles they read. This led to a further step to research on a person quoted in a news article (S16). One student mentioned knowing about biases in media is “another way to avoid fake news” because “they are looking at it from a certain angle.” Regarding media biases, the student (S17) commented that,

I think one of the big ones that I try to look for is when the news source itself is not independent. It's usually owned by giant conglomerates that have profit motive. So,
whether it's advertising or sourcing, all these different kinds of biases that they have. I try to keep that in mind when I read those so if I see anything on a website like CNN or Fox News, I already know ‘Okay, they have an agenda to serve for their advertisers, investors, all the board, all these people.’

Another student thought that news companies were biased, and other students named news outlets related to political spectrum of the media (S4, S5, S6, S17, S18). Below is an example comment from Student 4:

I think that there's obviously a very definite spectrum of beliefs within them, so obviously Fox News goes more conservative than New York Times to go more liberal, and so they all have typically main points that are all the same (across their news articles). From there I'll be able to say ‘okay, that's probably the truth, and then they'll add on to details that don't lie with all the other ones.’

The students assumed news articles inherently had biases. One student (S4) spoke about obtaining impartial information “So, always take that with a grain of salt. But I also think that it's important to read that side because it'll also give a different take, or interpretation of things which it's times could be insightful, but I just kind of make sure to be aware of what that tendency is.”

In addition, the participants mentioned the way data is presented and interpreted in news can be biased, so they pay attention to that. Regarding quantitative and statistical data, Student 4 commented the importance of understanding the context because “there's difference between causation and correlation.” The student presented examples of causation and correlation and commented that, “It (Statistics) doesn't actually present the full story. (…) the numbers are really good to have, but even with the numbers it’s even hard sometimes to trust.” Regarding
interpretation of data, Student 11 commented the importance of context of data interpretation saying:

Numbers can mean different things to people. Like someone can say how many million hundred thousand people have died from COVID, someone can come back and say, well it's less than 1%. So, it's how you look at those numbers and how you interpret them. (…) but that's still like hundred thousand million people. [The student emphasized the ratio and numbers are not exact and just examples] … language like surrounded by one is so different than the language surrounded by the other. It's like glass half full or glass half empty, like using that language to discern what that makes sense.

There were comments about authors’ biases can make different impressions on certain news topics. One student (S4) commented that,

Another important point that I should make is, for instance people crossing the border. Reporter can either say they are undocumented workers or illegal immigrants. And, regardless of how you want to say it or what your belief on the issue is, both of those have very different connotations and contexts behind them. I think they are not intentionally trying to mislead, but depending on your selection of words, it'll reflect the opinion of that reporter. I think if someone's more sympathetic to Mexicans trying to get work in America, they'll say undocumented workers, but if they don't like people coming in and breaking laws they'll say illegal immigrants. And so, that will reflect their opinions, even though I think they're trying their best to stay away from bias.

Other students spoke about using multiple sources of information. One student mentioned that they referred to the comments section of a news article to know different perspectives (S12).
Other students spoke about potential biases in information sources other than news articles, such as Wikipedia and report from organizations (S17).

**Difficulty in Evaluating Information in Online News**

The participants spoke about what makes information evaluation in news difficult. One of the factors discussed was polarized media environments (S13, S14, S18). One student called the media environment “invasive journalism” where news outlets are on the extreme of beliefs and try to be the first one to have information before verifying the information (S14). Another student spoke about finding balance between extreme news outlets and considered the intention of news outlets is to gain more views (S18). The student (S18) stated that “I'll tend to balance between like *Fox News* and *CNN* and then *ABC*.” Another student commented that “news media drive viewership as opposed to present the truth” and indicated the lack of context in news articles (S4). Another student commented that different channels targeted different groups of people, so they reported differently based on biases of the reporters and news networks. The student said this made it difficult to determine reported events as opinions or facts (S13).

Knowledge about the topics was a factor that affected information evaluation in news (S9, S12). One student commented with an example about an expert cited in news on unfamiliar topics and fields. Even if the expert was not relevant to the topic, the expert could be considered as a reputable source (S16). In contrast, one student commented that, “when you're interested in something and you're already knowledgeable in that field, it's a lot easier for you to be able to interpret the truth, or detach meaning from events” to be less affected by their internal biases.

The volumes of coverage also affected information evaluation because of time limit. One student said that “there're lots of the same articles out there that could all be fake, it's scary” (S3). The student commented they had to read too many headlines on the news app, but did not have
time to read the actual articles. This made the student prefer certain news outlets. The student (S3) stated that “I go on Reddit for news. NPR is probably my best source of news.”

Table 18. Difficulty in Evaluating Information in Online News

<table>
<thead>
<tr>
<th>Theme</th>
<th>Summary</th>
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<tbody>
<tr>
<td>What makes information evaluation difficult?</td>
<td>Polarized media environments</td>
</tr>
<tr>
<td></td>
<td>Readers' knowledge about news topics</td>
</tr>
<tr>
<td></td>
<td>Time limit when reading the actual articles when there are too many news articles</td>
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</table>

Motivation to Evaluate Information in Online News

The participants were asked “What motivates you to evaluate information in news? Why might you sometimes evaluate information in news and not care to at other times?” All the participants described their motivations to evaluate information in online news. In their responses, several themes emerged: Decision making, influence on myself, contexts and purposes, and emotions.

Table 19. Motivation to Evaluate Information in Online News

<table>
<thead>
<tr>
<th>Theme</th>
<th>Summary</th>
</tr>
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<tbody>
<tr>
<td>Motivation</td>
<td>Decision-making</td>
</tr>
<tr>
<td></td>
<td>News topics relevant to readers' life</td>
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<tr>
<td></td>
<td>Contexts and purposes of using information</td>
</tr>
<tr>
<td></td>
<td>Emotions felt from news lead to information evaluation or avoidance</td>
</tr>
</tbody>
</table>
**Decision making.** One participant evaluated factual statement for decision making. The student commented that collecting accurate information was needed to select the best option and to understand the context (S7).

**Influence on myself.** Most participants described that “it depends on how important it [information] is” (S1) and mentioned that the news topics were important motivation. They judged the importance of the information according to news categories of the topics and whether it affects them or other close people. Student 14 responded like the following:

Various topics such as the nature's emergency, politics, or even Community Affairs, I would spend more time being critical of the information sources. But if it can be simpler celebrity news or anything like in the entertainment industry, I'm not so critical of evaluating the new source.

Several participants described news categories in which they were motivated to evaluate information: society and world (“big issues in the country or world” (S1)), religions and politics (S12, S5), law and policies for a local area (S4), politics (S7), and emergency, politics, and community (S14). Other participants commented that they did not evaluate information that seemed only for entertainment even if it is a lie (S6) and celebrity related news (S14). There were variations in topics among individuals, and many participants described that they feel the information is important when it directly affects them, people around them, or society. “The thing you always ask is, if it's true, does it affect me? If this is true, does this make an effect that I should care about?” (S5) Regarding the topic of politics, one student commented that “if I'm reading something I don't agree with politically, I would be more likely to do a little more background research into that” (S7). Another relevant comment was that: For me motivation really comes on whether or not it's something important. And the way that I see something is
important is weather it affects societies, social justice, and anything that can be damaging information to social situations. (S15)

**Contexts and purposes of using information.** Six participants commented that contexts where the information is discussed and the purpose of using the information motivated them to evaluate information. Some of them viewed information evaluation as related to their social reputation. They connected this to the situations where they needed to provide accurate, factual information during conversations with people or using the information for certain purposes. One student commented that “what motivates me most is that I want to be able to like have a conversation about that topic and know what I'm saying is factual and it's true” (S13). Another student also mentioned that “giving out correct statements” matters for impressions of her “when you're talking to a group of people, even a business partner, or when you visit your boss” (S10). One student mentioned working on schoolwork as well as conversation with people motivated her to “make sure everything is factual (…) and that actually did happen” (S13). Related to school, another student mentioned that working on assignments for grades made her dig deeper into some information because they needed to prove and support their claims and opinions in assignments (S9).

**Emotion.** Emotions also affected whether they wanted to evaluate or paid attention to certain information. One student looked back on past experience and explained the motivation of information evaluation related to shameful emotion saying that “I was uninformed, and I felt silly for not that I was informed.” The student mentioned this motivation worked with motivation related to contexts and purposes. Some students felt urge to point out and correct wrong information during the conversation. This feeling influenced on information evaluation.
One student commented that feeling interested in a certain topic motivated information evaluation (S9). It was related to pure interest related to hobbies. One participant commented that they were not interested in topics they did not know well (S16).

For some students, emotion discouraged information evaluation. When they felt overwhelmed by news topics, they avoided them. For example, one student commented that they were stressed out COVID related news, so they avoided to read that news. The other student expressed they filtered out news statements with language that made them feel angry because it did not include information (S7).

**Critical Thinking Skills**

Based on the participants’ experience in answering the critical thinking skills test in the survey, nine participants described that they applied the same skills to their news reading. During the interviews, the responses related to the tested skills were coded. Codes were from the tested skills (Ennis & Weir, 1985) and the interview participants described the following themes: offering good reasons and credibility, seeing other possibilities, responding or avoiding overgeneralization, use of the emotive language, separation between correlation and causation, irrelevance, and other logical fallacies.

**Offering good reasons and credibility.** Participants paid attention to authority of sources to evaluate credibility. One student commented that “big news stations” had more credible information sources (S10). Another student said that they checked credibility of sources and the author to trust information.

**Seeing other possibilities.** While reading news, many students commented that they used multiple sources to compare information. One student referred to the comments section of the article to know different perspectives (S12).
Overgeneralization. Several students mentioned they avoided overgeneralized statements in news.

Regarding sources, many students commented they checked credibility of sources for information evaluation. Regarding evidence as an evaluation criterion, Student 5 related critical thinking skills test responses with the fact and opinion discernment. Survey participants had to evaluate paragraphs of a given letter that included argument. Because the argument could be opinion, the fact and opinion discernment was not directly related to the test. However, some students referred to opinion statements when pointing out a paragraph without proper evidence.

The use of emotive language. When evaluating information in news, two students commented that they considered whether the language is aggressive or biased (S11, S7).

Separation between correlation and causation. There is a difference between correlation and causation, and they considered it when evaluating information in news (S4).

Irrelevance. Some participants commented that the fact and opinion discernment helped them to understand the news better by determining relevancy of the statement.

Logical fallacies. One student commented that it was very helpful to differentiate between fact and opinion for problem solving. “Weird attacks, bad reasoning, or poor logic” can be seen in certain statements and the discernment provided them with more information (S4).

Summary of Findings

The survey findings showed positive correlations between 1) critical thinking scores and fact and opinion discernment scores and 2) critical thinking scores and the need for cognition scores. Group differences in the fact and opinion discernment, locus of control, and need for cognition scores by demographics were found. Interview findings showed that the students in this study discerned fact from opinion when reading actual news by using different methods such
as checking wordings and the existence of evidence in news statements. The increased ratio of opinion statements in news and a blurry line between fact and opinion statements made the discernment difficult. The interview findings also showed that the students used information evaluation criteria that are discerning fact from opinion, checking authority, accuracy, relevance, and purpose of sources. Polarized media environments and readers’ knowledge made information evaluation difficult when reading news online. The participants also described importance and motivation of discerning fact and opinion and evaluating information in news reports.
CHAPTER 5
DISCUSSION AND CONCLUSIONS

This chapter discusses findings reported in the previous chapter in response to the research questions and other studies. In addition, study limitations and implications will be presented.

Discussion of Findings

This section revisits the research questions of this study and discuss relevant findings. The first six research questions of this study addressed the relationships between 4 variables measured in the survey: college students’ ability to discern fact and opinion, critical thinking, locus of control, and need for cognition. There were six hypotheses to be tested to answer for those research questions. The seventh research question addressed college students’ perceptions around the fact and opinion discernment. The eighth research question addressed college students’ perceptions towards their media literacy practices related to their news reading.

RQ1. Are College Students Able to Discern Fact from Opinion in News Reports?

In response to RQ1, the survey results showed that many participants received high scores in the fact and opinion discernment test from the survey. When the full score was 22 points, their mean score was 18.8 and median score was 20. More than 50% of participants received 21 or 22 points, which meant most of the participants were able to correctly discern factual and opinion statements. The first research hypothesis, “Students are able to discern fact from opinion in news reports” is accepted.

The fact and opinion discernment test, consisting of total 22 statements, adopted 16 statements from the Pew Research Center survey in 2018 that collected information regarding Americans’ fact and opinion discernment in news (Mitchell et al., 2018). Their sample included
college students, but did not present statistics only for them. Also, their unit of analysis was each statement not the total scores counting the correctly identified items. Thus, it was impossible to directly compare the study participants and their sample.

**RQ2. Is There an Association between the Ability to Discern Fact from Opinion and Critical Thinking?**

This research question is related to a hypothesis, “H2. The higher the scores on critical thinking, the higher scores on the ability to discern fact from opinion (the direction of association is +).” The survey results showed that there was a positive correlation between the fact and opinion discernment scores and critical thinking scores at the alpha level of 0.01. H2 was accepted with this result. The relationship between the variables will be discussed in a later section.

**RQ3. Is There an Association between the Ability to Discern Fact from Opinion and Locus of Control?**

This research question is related to “H3. The lower scores on locus of control (the more internal locus of control), the higher the scores of the ability to discern fact from opinion (-).” The survey results did not show a statistical correlation between the ability to discern fact from opinion and the locus of control scores. The hypothesis was rejected. The possible reasons of the results will be discussed in a later section.

**RQ4. Is There an Association between the Ability to Discern Fact from Opinion and the Need for Cognition?**

This is related to “H4. The higher the score for need for cognition, the higher the scores of the ability to discern fact from opinion (+).” The survey results did not show a statistical correlation between the ability to discern fact from opinion and the need for cognition scores.
The hypothesis was rejected. The possible reasons of the results will be discussed in a later section.

**RQ5. Is Critical Thinking a Mediator Variable in the Effect of Internal Locus of Control on Discernment between Facts and Opinions in News?**

**RQ6. Is Critical Thinking a Mediator Variable in the Effect of Need for Cognition on Discernment between Facts and Opinions in News?**

RQ5 and RQ6 were related to testing two different hypotheses as stated below. With the hypotheses, theoretically driven path models were expected, but collected data did not show that critical thinking was a mediator variable.

H5. When the scores for the ability to discern fact from opinion increase with critical thinking scores, the statistical relationship between locus of control and the fact from opinion discernment is no longer significant.

H6. When the scores for the ability to discern fact from opinion increase with critical thinking scores, the statistical relationship between need for cognition and the fact from opinion discernment is no longer significant.

These hypotheses assumed significant correlations between the fact and opinion discernment and locus of control (H5) or need for cognition (H6). Both assumptions were not met in response to the previous research questions as the locus of control was not statistically correlated with either critical thinking scores or the fact and opinion discernment scores. Thus, for RQ5, collected data did not show critical thinking as a mediator variable because. For RQ6, there was no correlation between the fact and opinion discernment scores and the need for cognition scores. Collected data did not show critical thinking as a mediator variable. The later
sections after RQ7 and RQ8 will discuss possible reasons based on both survey and interview findings.

**RQ7. What Are College Students’ Perceptions Around Differentiating between Fact and Opinion in News Reports?**

The interview findings presented the participants’ perceptions towards the fact and opinion discernment in news reports in terms of their methods for the discernment, processes, importance, challenges, and factors affecting the discernment process.

**Methods and processes.** The students’ processes and methods to discern factual and opinion statements were similar both in the survey and actual news reports, but those were simpler when answering the survey questions. They paid attention to wording, tone of the language, and whether there was back-up information or evidence for statements. In addition to that, for actual news reading, they considered other elements in news to differentiate between fact and opinion, such as authors, sources of information, or news outlets where the news article was published. All the interview participants described that it took several steps to discern fact and opinion when reading news. This was followed by their descriptions of news examples when they were confused.

**Factors related to the fact and opinion discernment.** The students in this study perceived that current news styles made the fact and opinion discernment difficult. To be specific, current news styles presented “blurry lines” between fact and opinion, opinions that were phrased as facts, and opinion presented among factual statements. In terms of students’ unit of analysis, they mainly discussed different statements in one news article, but also perceived that a news article as a whole can be also classified as fact or opinion. Students commented that there were more opinionated news articles recently and authors tended to mix opinion and fact in
their news reports. One student said many recent articles look like journalistic articles, which should be in a form of reporting news and factual events, but they consisted of opinionated statements reflecting authors’ biases. This was related to another students’ response that they assumed everything they read online was opinion even before the discernment. One student commented that when they needed only factual information, it was hard to find fact among too many opinions. Regarding the wording, many students perceived that opinion in recent news tended to be framed as fact. One student discussed the structure of news articles presenting factual statements that slip in an opinion statement among them to make the articles look factual. These are aligned with journalism studies that discussed the blurred line between fact and opinion. The book Truth Decay reported an increased blurring of the line between fact and opinion in the news as well as increased opinion-based news coverage, and that resulted in the influence of opinion and personal experience over fact in recent years (Kavanagh & Rich, 2018). College students in this study thought that this was usually intended by polarized news outlets or authors.

It is notable that some students tended to focus on how they evaluated information to discern only truthful and credible statements from other statements when they were asked about fact and opinion discernment. During the interview, the researcher presented sample factual and opinion statements and confirmed their understanding of the difference between them. Except for one student, they were able to demonstrate correct understanding of the difference in factual and opinion statements. However, when they applied the same concepts to actual news, they focused on verifying information. There are possible explanations. First, the discernment was simpler in the survey, but there may be many borderline statements in actual news reports, which are ambiguous statements between factual statements and opinions (Mitchell et al., 2018). This is
related to the increased blurry line between fact and opinion. In addition, prior knowledge about news outlets or platforms also affected the discernment process. For example, several students described that the discernment was not easy when experts were cited. When they did not have knowledge about the field and the expert, the discernment was difficult. In this situation, they may think it is more efficient to search for more information and verify it by reading other sources or articles. One student commented that when the discernment was not easy, they moved on to other sources and compared information.

It is also possible that the fact and opinion discernment process can happen in the information evaluation processes. In this sense, college students considered the fact and opinion discernment as one of the processes to evaluate credibility of news they read. According to previous journalism studies, separation of fact and opinion in news was one of the dimensions of measuring news and media credibility (Gaziano & McGrath, 1986; Rimmer & Weaver, 1987). One student described their discernment processes as a series of actions that include reading a statement, checking whether back-up data and data of an event were included, and determining whether the author is reporting factual events or conveying their intention. Among those actions, checking the presence of back-up data is directly related to the fact and opinion discernment. Checking the data of an event is related to currency of news. With this information, the student determined the author’s intention and the tone of the language in news articles. Those actions may be relevant to each other, and this may help further information evaluation of news they read.

Students’ beliefs and political ideology seem to be another factor related to differentiating fact and opinion in news. When asked about the fact and opinion discernment in the survey, students commented that the discernment was difficult when they had opinions or agreed with a
news statement. According to the report from the Pew Research Center, “Republicans and Democrats more likely to classify a news statement as factual if it favors their side – whether it is factual or opinion” (Mitchell et al., 2018, p. 24). They were not asked about their political ideology in the interviews. The survey question asked them to identify their political ideology as conservative, moderate, liberal, and prefer not to state. Nine among 19 interview participants identified themselves as either conservative (2 students) or liberal (7). Thus, it is not clear how the participants differed by political ideology, but they described its impact on the fact and opinion discernment.

RQ8. What Are College Students’ Perceptions towards Their Media Literacy Practices Related to News Reading?

Information evaluation. College students in this study described their information evaluation processes and related factors during the interviews. The students’ evaluation of information for news reading was analyzed using five criteria: fact and opinion discernment, relevance, authority, accuracy, and purpose. The criteria of the CRAAP Test were used for analysis (Evaluating Information - Applying the CRAAP Test, 2010). The CRAAP test lists questions to help evaluate information with five criteria: currency, relevance, authority, accuracy, and purpose. All of these information processes were observed in their criteria except for currency.

Students’ information evaluation were consistent with evaluation strategies described in the theory of media literacy by Potter (2004). The evaluation strategies included examining the credibility of claim, seeing if there is support compared to the other side of information, and weighing one (Potter, 2004). In addition, students discerned factual and opinion statements for evaluating information in news.
Motivation. The students’ motivation to evaluate information was related to their decision making, influence on self, contexts and purposes, and emotions. Two major themes can be considered as influence on self and emotions. Students were motivated to evaluate information in news when the news topics were important to them. Students defined the importance differently, but the importance was mainly related to whether the news was relevant to them, people close to them, or society. In addition, emotions were important motivations for information evaluation. As cited in Potter (2004), Goleman (1995) indicated that emotions are an important part of evaluation because emotions, such as gut feeling and emotional wisdom, help make a judgment. Potter (2004) stated that “we need to have enough self-awareness about our emotions to determine where our preferences lie” and “When we are highly media literate, we use our emotions” (p. 127). Emotions are also related to personal locus in the cognitive model of media literacy (Potter, 2004). Interview participants were conscious about their emotions and effect of media. This helped them discern fact from opinion and avoid exposure to too many headlines, news platforms that may publish fake news, or stimulating news statements. The interview participants were motivated; they used information evaluation skills as information processing tools for filtering, one of the information processing tasks in the media literacy model.

Relationships with Fact and Opinion Discernment

This section reviews the fact and opinion discernment variable and examines relationships with other variables and news reading. In this study, the participating college students’ ability to discern fact from opinion differed by gender, race and/or ethnicity, and whether they transferred from a community college. Regarding gender, males (Mean=18.16) averaged about 1 point lower than females (Mean=19.24). Regarding race and/or ethnicity, the
mean score of White (M = 19.39, SD = 3.45) was significantly different from the scores of the Hispanic or Latino group (M = 17.59, SD = 4.56). The participants who transferred (Mean = 17.77) averaged about 1.3 points lower than those who did not transfer (Mean = 19.13). According to the report from the Pew, the ability to differentiate fact and opinion differed by political awareness, digital savviness, and trust in news media. This dissertation study asked the number of news articles the participants read in a week, but there was no difference in the fact and opinion discernment.

**Fact and opinion discernment and critical thinking.** RQ2 asked about the relationship between fact and opinion discernment and critical thinking skills. From the survey results, there was a correlation between the fact and opinion discernment scores and critical thinking scores. There were interview data presenting the relationship between the two variables. Students perceived that the fact and opinion discernment helped them to recognize statements with logical fallacies or irrelevant statements in news articles. Other aspects of critical thinking skills tested in the survey included offering good reasons and check credibility of the reasons. In addition, students with critical thinking skills should be able to avoid or respond properly to the use of emotive language. One way to discern fact and opinion discernment for students was to discern statements that stimulated their emotions or reflect the writer’s emotions. Recognizing the emotive language in news reports would be closely related to one aspect of critical thinking skills.

**Fact and opinion discernment and need for cognition.** RQ4 asked about the association between fact and opinion discernment and need for cognition. The researcher expected higher fact and opinion scores to be related to higher need for cognition scores. Sadowski and Gülgöz (1996) stated that high scores on the need for cognition are positively
associated with academic achievement, particularly related to the ability to process information efficiently. The researcher hypothesized that fact and opinion discernment might be related to efficient information processing. However, there was no statistical relationship between those scores.

A possible reason for the missing association is that for many students, the fact and opinion discernment was intuitive and relatively easy process while the need for cognition scale measured how much they enjoyed thinking. One interview participant (S7) received high scores in the fact and opinion discernment while they received a relatively low score for need for cognition. The student used the fact and opinion discernment to evaluate news articles and recognized the factual statements could be twisted. However, the student tended to avoid taking further steps to evaluate information. “I don't really do much like outside research, outside of an article. If I see fact or statistics, I usually generally believe that facts or statistics are right” (S7). This implies that even with the fact and opinion discernment skills, students may not be easily motivated to read or think more about news articles when they do not have high need for cognition.

**Fact and opinion discernment and news reading.** Fact and opinion discernment is an important factor for news reading as students perceived its importance and close relation to information evaluation. It can be used as tool to evaluate credibility of news. Students perceived that differentiating fact and opinion in news helped their filtering tasks, one of the three information processing tasks (filtering, meaning matching, and meaning construction) described by Potter (2004). With the fact and opinion discernment, many students filtered out opinion statements to decide their attention when reading news because they considered opinion statements as biased and not informational.
Relationships with Critical Thinking

Critical thinking scores differed by gender, school standing levels, the number of news articles students read in a week, and whether they transferred from a community college. As discussed above, critical thinking skills scores were correlated with fact and opinion discernment scores. In addition, critical thinking scores were correlated with need for cognition.

Critical thinking and need for cognition. There was a positive correlation between these two variables. This is consistent with results of previous studies with college students. Stedman et al. (2009) reported a moderate correlation between the need for cognition and critical thinking disposition constructs. Shehab and Nussbaum (2015) studied undergraduate and graduate students. Their results showed that the relationship between weighing refutations, which is one critical thinking strategy, and cognitive load depended on the level of need for cognition (Shehab & Nussbaum, 2015).

Seven interview participants did not present this tendency in scores for critical thinking and need for cognition. Their critical thinking scores were below average while their need for cognition scores were above average and higher than other participants. Despite their scores, interview data presented the relationship between need for cognition and critical thinking. Seeing other possibilities was the most frequently mentioned aspect of critical thinking related to need for cognition. They liked reading information from multiple sources and analyzing issues to understand different perspectives and contexts while reading news. Their high level of need for cognition was related to critical thinking activities that consider other possibilities surrounding an issue.

Critical thinking and news reading. Related to information evaluation in news, critical thinking aspects were observed during the interviews. Students considered whether there was
credible information to support statements in news articles. They also attempted to avoid or be
critical of the emotive language in news. When they felt emotions in news, they evaluated
whether authors or news outlets were biased. In addition, some students perceived the
importance of context and the interpretation of statistics and quantitative data presented in news.
As one student commented, “Causation is different from correlation.” Those critical thinking
skills may generally help them with spotting logical fallacies in opinionated news and pursue
accurate and reliable information by understanding different perspectives.

**Relationships with Locus of Control**

Locus of control scores differed by gender, political ideology, and whether they
transferred from a community college. However, any statistical relationship with other variables
was not found. The researcher assumed that the internality of locus of control was positively
correlated with critical thinking or the fact and opinion discernment. This result is consistent
with other two studies (Ewen, 2001; Marra, 1997) that did not present a correlation between
locus of control and critical thinking skills among nursing students.

Interview data may help explain the result. One student (S7) showed very high externality
in locus of control, which was an outlier (see Table 11). The student received high scores in
critical thinking and full points in fact and opinion discernment. According to previous studies
related to information, people with internal locus of control spent more time and looked for more
information to work on a difficult task (Julian & Katz, 1968). They appeared to be more affected
by the task difficulty and informational demands of the situation, whereas the externals were
more affected by the social conditions of evaluation, such as the judgments and evaluations of
other persons (Pines & Julian, 1972). In this study, the student’s evaluation of news was
motivated by the need of rational decision-making and the possible influence on them according
to news topics. It may be related to external locus of control to consider possible influence of outside factors on them. The student was well aware of this personal characteristic, and the awareness seemed to make a difference in news reading behaviors. They tried to avoid certain types of news because they did not want to be easily impacted. They did not access platforms that might give fake news and filtered out news that may stimulate emotions. The student had strong knowledge structures, including the understanding of media effects and the self according to the definitions from Potter (2004). With this, the locus of control seemed not to influence the student.

**Locus of control and news reading.** According to the interview data, students’ perceptions towards control of certain consequences may be related to their news reading. One student commented that, “I can’t control how it’s reported on and who reports on it. But what I can control is I take that information and internalize it. (...) I am taking this to make sure, when I evaluate a new source or whatever happens” (S6). However, most students did not explicitly connect the concept of locus of control and news reading during the interviews.

**Relationships with Need for Cognition**

Need for cognition scores differed by gender, school standing level, the number of news students read in a week, and whether they transferred from a community college. Relationships between need for cognition and other variables were discussed in previous sections.

**Practical and Academic Implications**

Related to the cognitive model of media literacy model (Potter, 2004), the four major factors of the model were described among the college students who participated in this study related to their news reading practices: Knowledge structure, decisions motivated, information-processing tools, and flow of information-processing tasks. Students showed that self-awareness
and knowledge about media industries and effects (knowledge structure) motivated their decision to use skills, such as the fact and opinion discernment and critical thinking skills, that can be seen as information evaluation skills. These skills were used for information-processing tasks and the study focused on filtering process. These were observed in interview data and consistent with the described mechanisms of media literacy in Potter (2004).

In addition, using the survey, the researcher attempted to quantitatively measure the connection between personal locus and skills for media literacy in the theory (Potter, 2004). Based on the theory, the researcher assumed personal characteristics, such as need for cognition and locus of control, could affect the use of information evaluation skills. However, the direct effect of personal characteristics to fact and opinion discernment, which can be one of information evaluation skills, was not statistically found. This does not necessarily mean the relationship between personal locus and competencies and skills in the theory is missing. This study seems to be the first attempt to measure the relationship quantitatively. Different measurements can be adopted and tested to explain the relationship. Qualitative aspects of personal locus in the model could be further studied as personal locus considers many aspects such as the role of emotions. The findings of this study provide considerations to developing media literacy model in the context of news reading.

The four instruments that measured fact and opinion discernment, critical thinking skills, locus of control, and need for cognition were tested and modified using empirical data to check for uni-dimensionality. Those instruments can be further developed and used for learning assessment or research purposes. Particularly, there was not a tool to test the fact and opinion discernment with statements in news.
This study provides educators, teachers, librarians, and researchers with information that help with news literacy education. The students in this study emphasized the importance and their use of the skill to discern fact from opinion. The fact and opinion discernment was correlated with critical thinking skills, and students applied critical thinking skills to evaluating information in news. This study supports other studies that it would be effective to focus on teaching the fact and opinion discernment and critical thinking skills in the context of online news reading. In addition, they may pay attention to a certain group of students as this study presented that students’ ability to discern fact from opinion and critical thinking scores differed by demographic information. In addition, the students in this study described the difficulty of discerning fact from opinion from news on current news media. It would be beneficial for students to learn about borderline statements and various news articles in class.

The study results provide information about variables related to fake news discernment. The survey collected data to find relationships between personal characteristics, critical thinking, and fact and opinion discernment that may be related to fake news discernment. The findings showed that critical thinking skills are related to the fact and opinion discernment and need for cognition respectively. Locus of control was not related to any other variables. The interview findings provided qualitative information about the relationship between variables that include a relationship between fact and opinion discernment and news evaluation. Perceptions of the college students in this study towards news media, their news reading, their evaluation process of information in news will provide researchers with information for study variables.

**Study Limitations**

A mixed-method explanatory sequential design was used to collect quantitative and qualitative data to explore variables that may be related to college students’ fake news
discernment. The study participants for the survey and interview were recruited from the College of Communication and Information (CCI) at Florida State University. The majority were students who were majoring in disciplines from the CCI, but there were many students whose majors were not from the CCI. In addition, this study used a non-probability sampling method. The study findings may not be generalizable to the CCI students. Due to the small sample size and limits of the participants’ majors, the findings of this study are not generalizable to the university or college students.

The quantitative survey results did not present predicted statistical relationships between variables. Although this study was inspired by the Potter’s cognitive media literacy framework (2004), there was no attempt to quantitatively measure related factors of the model. This means the selected instruments may have measured different concepts from the factors in the theory.

The semi-structured interview did not show the students’ actual news reading practices because the researcher had to rely on the students’ explanations, rather than observations of their behavior. There is a possibility that there is a difference between their responses in the interview and news reading practices.

The triangulation between the quantitative data and qualitative data was not perfectly achieved. Interview data explained general tendency and outlier scores of the survey data but did not fully explain the relationships between variables measured in the survey. The researcher was not able to select interview participants based on their scores due to the limited interview participation. A part of interview participants did not fully address variables discussed in survey results.
Suggestions for Future Work

This study focused on the fact and opinion discernment related to fake news discernment. Based on the interview findings, there were increased statements containing both fact and opinion in news media. It was difficult for students to identify those borderline statements and interpret them. The inclusion of borderline statements in the quantitative and qualitative study may provide more information on college students’ news reading.

Related to fake news, the fake and real news discernment could be considered as another study variable. As students discussed that news topics and their prior knowledge influenced their information evaluation, the different results among topics should be considered.

Differentiating between factual and opinion statements in actual news was closely related to information evaluation processes. There is a possibility that students skipped the fact and opinion discernment process for information evaluation or did not perceive the step. Some students may not be able to clearly understand the concept of discerning factual from opinion statements as different from verifying truthful fact in news. Future studies can demonstrate these points when they collect qualitative data. Instead of semi-structured interview, experiment or case studies could be employed.

The media literacy model could be better explained with more qualitative data or case studies. Future studies can focus on a part of the media literacy model. For example, the quantitative measurements of factors can be further developed based on qualitative data.

Conclusion

This study investigated the relationship between variables that may be related to college students’ fake news discernment inspired by Potter’s cognitive media literacy model (2004). The survey measured 296 students’ fact and opinion discernment, critical thinking skills, need for
cognition, and locus of control. Critical thinking was a variable positively correlated with the fact and opinion discernment and need for cognition respectively. The survey did not reveal the relationships between main variables, especially relationships between locus of control and other variables, and between need for cognition and fact and opinion discernment. Students’ ability to discern fact from opinion and critical thinking scores differed by demographic information.

The follow-up interview probed 19 students to understand their perceptions of differentiating fact and opinion in news and their media literacy practices focusing on information evaluation. The interview data further explained the survey results. College students addressed their ability to discern fact from opinion in news, factors, and motivations related to information evaluation in news. They emphasized the importance of differentiating between fact and opinion when reading news and described the difficulty. As one of the factors that made their fact and opinion discernment difficult, they discussed current news media environment when the separation between fact and opinion is blurred.
APPENDIX A

IRB APPROVAL

FLORIDA STATE UNIVERSITY
OFFICE of the VICE PRESIDENT for RESEARCH

EXEMPTION DETERMINATION

April 19, 2021

Hyerin Bak,

Dear Hyerin Bak:

On 4/19/2021, the IRB staff reviewed the following submission:

<table>
<thead>
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<th>Type of Review</th>
<th>Exempt (3)(i)(B) Benign behavioral interventions (low risk)</th>
</tr>
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<tr>
<td>Title</td>
<td>College Students’ Fake News Discernment: Critical Thinking, Locus of Control, Need for Cognition, and the Ability to Discern Fact from Opinion</td>
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<tr>
<td>Investigator</td>
<td>Hyerin Bak</td>
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<tr>
<td>Submission ID</td>
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<td>Study ID</td>
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<td>IND, IDE, or HDE</td>
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The IRB staff determined the protocol qualifies for exemption, effective on 4/19/2021. Your study conforms to FSU policy on COVID-19-related requirements and restrictions related to research activities that involve in-person interventions or interactions with human research participants.

Note that once the COVID-19-related requirements and restrictions are lifted and IF you plan to substitute remote interactions or interventions with in-person alternatives, or IF you plan to include as human subjects persons who were previously excluded due to their high risk for severe illness from COVID-19 or ages 65 or more years, please be sure to submit a modification to the
IRB for its review of these substitutions. If however you only plan to discontinue other COVID-19-specific risk mitigation (e.g., social distancing, screening, use of PPE), then no study modification request need to be submitted to the IRB for review before these changes may be implemented. For all other study modifications, see notes below.

You are advised that any modification(s) to the protocol for this project that may alter this exemption determination must be reviewed and approved prior to implementation of the proposed modification(s).

Modifications to the research may invalidate the exemption determination (because the research no longer meets the exemption criteria described in HRP-312 – WORKSHEET – Exemption Determination).

Examples of minor changes to exempt research that would not alter the exemption determination and should therefore not be submitted to the IRB for further review include the following:

- Making administrative (formatting, grammar, spelling) revisions to the protocol, consent or recruitment materials or other study documents
- Adding or revising non-sensitive questions or non-identifiable response options to a survey, interview, focus group or other data collection instrument
- Increasing or decreasing the number of study subjects—unless adding a new study sample such as children or prisoners or adding a new source of data or records
- Making study team/personnel changes—except a change in Principal Investigator (PI)

Examples of changes to exempt research that do require prospectively submitting a modification to the IRB before implementing changes include the following:

- Making substantive revisions or additions (e.g., change in PI; funding source; sample; source of study subjects or their data; study sites or settings; procedures, interventions or interactions with study subjects; use of any drug, device, supplement or biologic; study subjects’ time or duration spent performing or participating in study activities) to the protocol, consent or recruitment materials or other study documents
- Adding or revising sensitive questions or identifiable response options to a survey, interview, focus group or other data collection instrument
- Adding a new study sample such as children or prisoners or adding a new source of data or records
- Obtaining, using, studying, analyzing, generating, storing or maintaining identifiable information or identifiable biospecimens in addition to or in lieu of de-identified or anonymous information or specimens
- Change in study risks (e.g., impact upon study subjects; impact upon students’ opportunity to learn educational content or assessment of educators who provide instruction; any disclosure of study subjects’ responses outside of the research may place study subjects at risk of criminal or civil liability or be damaging to subjects’ financial standing, employability, educational advancement or reputation)
- Change in Principal Investigator (PI) or (for students) faculty advisor
- New or change in financial interest

In conducting this protocol, you are required to follow the applicable requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the Library within the RAMP IRB system.
Sincerely,

Office for Human Subjects Protection (OHSP)
Florida State University Office of Research
2010 Levy Avenue, Building B Suite 276
Tallahassee, FL 32306-2742
Phone: 850-644-7900
OHSP Group Email: humansubjects@fsu.edu
OHSP Web: https://www.research.fsu.edu/hs
APPENDIX B

SURVEY INFORMATION SHEET

Title of the Study: College Students’ Fake News Discernment: Critical Thinking, Locus of Control, Need for Cognition, and the Ability to Discern Fact from Opinion
Principal Investigator: Hyerin Bak, Doctoral Student at the School of Information, FSU
Faculty Advisor: Dr. Melissa Gross

You are being invited to volunteer to take part in my dissertation study. It is up to you whether you choose to take part or not. There will be no penalty or loss of benefits to you if you choose not to take part or decide later not to take part.

The purpose of this study is to investigate variables that affect college students’ fake news evaluation, with the emphasis on their critical thinking skills. The investigated variables will include college students’ beliefs in their control over situations or experiences and the degree to which they engage in and enjoy thinking. The survey questions will ask you to respond regarding these variables. The survey will take about an hour to complete.

This project does not involve more than minimal risk to subjects. The results of the study may be published or presented, but no information that may identify you will ever be provided or released in publications or presentations.

When you complete the survey, you will be entered into a raffle for a $25 gift card in addition to earning extra credit for this course. Some survey participants will be invited to a virtual audio interview later, and each of those interview participants will receive a $15 gift card. For a gift card raffle or the interview participation, you will have to leave your email address in the end of the survey. Your email address will be used only for the raffle and interview participation.

You have to be over 18 years-old to participate in this study.

If you have any questions, or concerns, contact Hyerin Bak at ###@my.fsu.edu or my advisor Dr. Melissa Gross at ###@fsu.edu.

By starting the survey, you are consenting to participate in the project.
APPENDIX C

SURVEY

The survey will consist of 5 parts. It will take about an hour to complete the total survey. You can leave and resume your survey.

In Part I, you will answer basic demographic questions.
In Part II, you will differentiate news statements between fact and opinion.
In Part III, you will read a given letter and write paragraphs to eluate the letter. During this survey, you will spend most of the time working on this part.
In Part IV & V, you will answer questions to understand your attribute and characteristics.

PART I.
1. What is your age?
2. How do you define your gender?
   A. Male
   B. Female
   C. Non-binary/third gender
   D. Prefer not to say
3. What is your ethnicity/race?
   a. White
   b. Hispanic or Latino
   c. Black or African American
   d. Native American or American Indian
   e. Asian / Pacific Islander
   f. Prefer not to answer
   g. Other, please specify: _____
4. What is your year in the school?
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior
   e. Spent more than 4 years
5. What is your major or future major?
   a. IT/ICT
   b. Communication
   c. Communication Science & Disorder
   d. Other. Please enter: _____
6. Did you transfer to FSU from a community college?
   a. Yes/No/ Prefer not to state
7. Are you the first to go to college in your family?
   a. Yes / No/ Prefer not to state
8. How do you describe yourself politically?
   a. Conservative
b. Moderate
  c. Liberal
  d. Prefer not to state

9. During a typical week, what are the most common ways of getting news? (You can check up to 3): Discussions with peers (i.e., online or face-to-face), social media (Facebook, Twitter), Online newspaper sites (nytimes.com), Discussions with teachers/professors (online or face-to-face), News feeds (Apple News, Feedly, or alerts), Television, Radio, Print newspapers or magazines, Podcasts, Discussions with librarians (online or face-to-face).

10. During a typical week, how many news articles do you fully read?
   a. 0
   b. 1-3
   c. 4-6
   d. More than 6 articles

PART II.
You will now be shown a series of statements that have been taken from news stories. Regardless of how knowledgeable you are about the topic, would you determine whether this statement is a factual statement (whether you think it is accurate or not) OR an opinion statement (whether you agree with it or not)?

Here is an example:
FSU canceled Spring Break in 2021 in an effort to mitigate the spread of COVID-19.
⇒ This is a factual statement because this can be proved or disproved with objective evidence regardless of this statement is true or not.
FSU should have not canceled Spring Break in 2021.
⇒ This is an opinion statement because this is an expression of beliefs or values.

[Randomize the 22 statements]
[Three selections: A factual statement (whether you think it is accurate or not) / An opinion statement (whether you agree with it or not)/ I don’t know ]

[Factual statement]
1. Health care costs per person in the U.S. are the highest in the developed world.
2. President Barack Obama was born in the United States.
3. Immigrants who are in the U.S. illegally have some rights under the Constitution.
4. ISIS lost a significant portion of its territory in Iraq and Syria in 2017.
5. Spending on Social Security, Medicare, and Medicaid make up the largest portion of the U.S. federal budget.

[Opinion statements]
6. Democracy is the greatest form of government.
7. Increasing the federal minimum wage to $15 an hour is essential for the health of the U.S. economy.
8. Abortion should be legal in most cases.
9. Immigrants who are in the U.S. illegally are a very big problem for the country today.
10. Government is almost always wasteful and inefficient.
11. Republicans currently hold more seats than Democrats in the Senate
12. Most of the heroin that currently makes it into the U.S. comes across the southern border
13. In the aftermath of the war in Iraq, no active weapons of mass destruction were found
14. In general, regardless of who is in power, politicians can’t be trusted
15. The government must make a greater effort to reduce climate change
16. The courts have gone too far in restricting public expression of Christian beliefs
17. Several coronavirus vaccines have now been approved for use, either by individual countries or groups of countries, such as the European Union and the World Health Organization (WHO).
18. For coronavirus vaccines, most countries prioritize those over-60 years of age, health workers, and people who are clinically vulnerable.
19. The amount of stimulus check payments is different for different people.
20. Fear of the side effects caused by a certain version of coronavirus vaccine is exaggerated.
21. More colleges and universities should require students to get vaccinated against COVID-19 before they return to campus.
22. Stimulus checks are likely to help families rather than an individual recipient.

PART III. [Critical Thinking]

The next page will present shorter instructions and the letter for you.

Read the letter to the editor of the Moorburg newspaper. Consider it paragraph by paragraph and as a total argument. Then write a letter to the editor in response to this one. For each paragraph in the letter you are about to read, write a paragraph in reply telling whether you believe the thinking good or bad. Also write a closing paragraph about the total argument. Defend your judgments with reasons.

Your answer should have nine numbered paragraphs. Numbers one through eight should give your reactions to paragraphs one through eight in the letter. Your paragraph number nine should give your overall evaluation of the letter considered as one total argument. Each paragraph, including the last, should contain your reason(s).

Spend about 10 minutes reading the letter and thinking about it. Then write for not more than 30 minutes (about three minutes for each of your short paragraphs). The maximum total time for the test is 40 minutes.

Do not forget to give your reasons in each paragraph. Please write clearly. You are a local citizen, and this topic concerns you.

Remember, write nine numbered paragraphs and give reasons.
Dear Editor:

Overnight parking on all streets in Moorburg should be eliminated. To achieve this goal, parking should be prohibited from 2 a.m. to 6 a.m. There are a number of reasons why any intelligent citizen should agree.

1. For one thing, to park overnight is to have a garage in the streets. Now it is illegal for anyone to have a garage in the city streets. Clearly, then, it should be against the law to park overnight in the streets.

2. Three important streets, Lincoln Avenue, Marquand Avenue, and West Main Street, are very narrow. With cars parked on the streets, there really isn’t room for the heavy traffic that passes over them in the afternoon rush hour. When driving home in the afternoon after work, it takes me thirty-five minutes to make a trip that takes ten minutes during the uncrowded time. If there were no cars parked on the side of these streets, they could handle considerably more traffic.

3. Traffic on some streets is also bad in the morning when factory workers are on their way to the 6 a.m. shift. If there were no cars parked on these streets between 2 a.m. and 6 a.m., then there would be more room for this traffic.

4. Furthermore, there can be no doubt that in general, overnight parking on the streets is undesirable. It is definitely bad and should be opposed.

5. If parking is prohibited from 2 a.m. to 6 a.m., then accidents between parked and moving vehicles will be nearly eliminated during this period. All intelligent citizens would regard the near elimination of accidents in any period as highly desirable. So, we should be in favor of prohibiting parking from 2 a.m. to 6 a.m.

6. Last month, the Chief of Police, Burgess Jones, ran an experiment which proves that parking should be prohibited from 2 a.m. to 6 a.m. On one of our busiest streets, Marquand Avenue, he placed experimental signs for one day. The signs prohibited parking from 2 a.m. to 6 a.m. During the four-hour period, there was not one accident on Marquand. Everyone knows, of course, that there have been over four hundred accidents on Marquand during the past year.

7. The opponents of my suggestions have said that conditions are safe enough now. These people don’t know what “safe” really means. Conditions are not safe if there’s even the slightest possible chance for an accident. That’s what “safe” means. So, conditions are not safe the way they are now.

8. Finally, let me point out that the Director of the National Traffic Safety Council, Kenneth O. Taylor, has strongly recommended that overnight street parking be prevented on busy streets in cities the size of Moorburg. The National Association of Police chiefs has made the same recommendation. Both suggest that prohibiting parking from 2 a.m. to 6 a.m. is the best way to prevent overnight parking.

I invite those who disagree, as well as those who agree with me, to react to my letter through the editor of this paper. Let’s get this issue out in the open.

Sincerely,
Robert T. Raywift

In response to this letter, you are going to write a letter. Write your evaluation in paragraphs for each numbered argument (#1~8). Include both your evaluation and reasons.
PART IV. [Locus of control]
Choose the best description of you.

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
</table>
| 1     | a. Children get into trouble because their patents punish them too much.  
       | b. The trouble with most children nowadays is that their parents are too easy with them. |
| 2     | a. Many of the unhappy things in people's lives are partly due to bad luck.  
       | b. People's misfortunes result from the mistakes they make. |
| 3     | 3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.  
       | b. There will always be wars, no matter how hard people try to prevent them. |
| 4     | 4. a. In the long run people get the respect they deserve in this world  
       | b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries. |
| 5     | a. The idea that teachers are unfair to students is nonsense.  
       | b. Most students don't realize the extent to which their grades are influenced by accidental happenings. |
| 6     | a. Without the right breaks one cannot be an effective leader.  
       | b. Capable people who fail to become leaders have not taken advantage of their opportunities. |
| 7     | a. No matter how hard you try some people just don't like you.  
       | b. People who can't get others to like them don't understand how to get along with others. |
| 8     | a. Heredity plays the major role in determining one's personality  
       | b. It is one's experiences in life which determine what they're like. |
| 9     | a. I have often found that what is going to happen will happen.  
       | b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action. |
| 10    | a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.  
       | b. Many times exam questions tend to be so unrelated to course work that studying in really useless. |
| 11    | a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.  
       | b. Getting a good job depends mainly on being in the right place at the right time. |
| 12    | a. The average citizen can have an influence in government decisions.  
       | b. This world is run by the few people in power, and there is not much the little guy can do about it. |
| 13 | a. When I make plans, I am almost certain that I can make them work.  
    b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow. |
| 14 | a. There are certain people who are just no good.  
    b. There is some good in everybody. |
| 15 | a. In my case getting what I want has little or nothing to do with luck.  
    b. Many times we might just as well decide what to do by flipping a coin. |
| 16 | a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.  
    b. Getting people to do the right thing depends upon ability. Luck has little or nothing to do with it. |
| 17 | a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.  
    b. By taking an active part in political and social affairs the people can control world events. |
| 18 | a. Most people don't realize the extent to which their lives are controlled by accidental happenings.  
    b. There really is no such thing as "luck." |
| 19 | (filler) |
| 20 | a. One should always be willing to admit mistakes.  
    b. It is usually best to cover up one's mistakes. |
| 21 | a. It is hard to know whether or not a person really likes you.  
    b. How many friends you have depends upon how nice a person you are. |
| 22 | a. In the long run the bad things that happen to us are balanced by the good ones.  
    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three. |
| 23 | a. With enough effort we can wipe out political corruption.  
    b. It is difficult for people to have much control over the things politicians do in office. |
| 24 | a. Sometimes I can't understand how teachers arrive at the grades they give.  
    b. There is a direct connection between how hard I study and the grades I get. |
| 25 | a. A good leader expects people to decide for themselves what they should do.  
    b. A good leader makes it clear to everybody what their jobs are. |
| 26 | a. A good leader expects people to decide for themselves what they should do.  
    b. A good leader makes it clear to everybody what their jobs are. |
| 27 | a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.  
    b. By taking an active part in political and social affairs the people can control world events. |
| 28 | a. Most of the time I can't understand why politicians behave the way they do.  
    b. In the long run the people are responsible for bad government on a national as well as on a local level. |
Part V. [Need for Cognition]

Please describe the extent to which you agree with each statement using a 5-point scale.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Item Wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I prefer complex to simple problems.</td>
</tr>
<tr>
<td>2</td>
<td>I like to have the responsibility of handling a situation that requires a lot of thinking.</td>
</tr>
<tr>
<td>3</td>
<td>Thinking is not my idea of fun. **</td>
</tr>
<tr>
<td>4</td>
<td>I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. **</td>
</tr>
<tr>
<td>5</td>
<td>I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something. **</td>
</tr>
<tr>
<td>6</td>
<td>I find satisfaction in deliberating hard and for long hours.</td>
</tr>
<tr>
<td>7</td>
<td>I only think as hard as I have to. **</td>
</tr>
<tr>
<td>8</td>
<td>I prefer to think about small daily projects to long term ones. **</td>
</tr>
<tr>
<td>9</td>
<td>I like tasks that require little thought once I’ve learned them. **</td>
</tr>
<tr>
<td>10</td>
<td>The idea of relying on thought to make my way to the top appeals to me.</td>
</tr>
<tr>
<td>11</td>
<td>I really enjoy a task that involves coming up with new solutions to problems.</td>
</tr>
<tr>
<td>12</td>
<td>Learning new ways to think doesn’t excite me very much. **</td>
</tr>
<tr>
<td>13</td>
<td>I prefer my life to be filled with puzzles I must solve.</td>
</tr>
<tr>
<td>14</td>
<td>The notion of thinking abstractly is appealing to me.</td>
</tr>
<tr>
<td>15</td>
<td>I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.</td>
</tr>
<tr>
<td>16</td>
<td>I feel relief rather than satisfaction after completing a task that requires a lot of mental effort. **</td>
</tr>
<tr>
<td>17</td>
<td>It’s enough for me that something gets the job done; I don’t care how or why it works. **</td>
</tr>
<tr>
<td>18</td>
<td>I usually end up deliberating about issues even when they do not affect me personally.</td>
</tr>
</tbody>
</table>

Note: **=Reverse scoring is used on this item

[List 5-point Likert scale for each item:
Very Strong disagreement – Moderate agreement – Neither agree nor disagree – Moderate agreement – Very strong agreement]
APPENDIX D

INTERVIEW INFORMATION SHEET

Title of the Study: College Students’ Fake News Discernment: Critical Thinking, Locus of Control, Need for Cognition, and the Ability to Discern Fact from Opinion
Principal Investigator: Hyerin Bak, Doctoral Student at the School of Information, FSU
Faculty Advisor: Dr. Melissa Gross

Information for the Interview

You are being invited to volunteer to take part in my dissertation study. It is up to you whether you choose to take part or not. There will be no penalty or loss of benefits to you if you choose not to take part or decide later not to take part.

The purpose of this study is to investigate variables that affect college students’ fake news evaluation, with the emphasis on their critical thinking skills. The investigated variables will include college students’ beliefs in their control over situations or experiences and the degree to which they engage in and enjoy thinking. The interview questions will ask you to respond regarding these variables.

The interview will take about 30-40 minutes to complete. The interview will be recorded and only audio will be used for the research purpose.

This project does not involve more than minimal risk to subjects. The results of the study may be published or presented, but no information that may identify you will ever be provided or released in publications or presentations.

When you complete the interview, you will receive a $15 gift card to your designated email address. Your email address will be used only to send the gift card.

You have to be over 18 years-old to participate in this study.

If you have any questions, or concerns, contact Hyerin Bak at ###@my.fsu.edu or my advisor Dr. Melissa Gross at ###@fsu.edu.

If you have any questions or concerns about your rights as a research participant, or questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged to contact the FSU Office for Human Subjects Protection (OHSP) at (850) 644-7900, by email at humansubjects@fsu.edu, or by mail at 2010 Levy Avenue, Research Foundation Building B, Suite 276, Tallahassee, FL 32306-2742.

By scheduling the interview, you are consenting to participate in the project.
REFERENCES


Center of Inquiry. (2022a). *About the Center of Inquiry*. Center of Inquiry at Wabash College. https://centerofinquiry.org/about-strengthen-liberal-arts-education/


Ricketts, J. C. (2003). The efficacy of leadership development, critical thinking dispositions, and student academic performance on the critical thinking skills of selected youth leaders


BIOGRAPHICAL SKETCH

Hyerin Bak earned her undergraduate degrees in both Library and Information Science and Global Studies from Pusan National University. She continued her study to earn her Master’s degree in Library and Information Science (MSLIS) from Syracuse University. Then, she pursued a Ph.D. in the School of Information at Florida State University (FSU). She earned her graduate certificate in Measurement and Statistics from the School of Education at FSU.

Her research interests focus on media literacy, information literacy instruction and learning assessment, and academic libraries. Her main research populations have been K-12 and college students. She is interested in studying individuals’ information behaviors surrounding misinformation and how to support them to access reliable information. In addition, she has teaching experience in various subjects with undergraduates majoring in information technology.