DATA LITERACY: HOW DEVELOPING BEST PRACTICES FOR HIGHER EDUCATION IN COMMUNICATIONS WILL DRIVE INNOVATION IN TOMORROW'S WORKPLACE

ALEXA NACCARATO

Thesis submitted to the University of Ottawa in partial fulfillment of
the requirements for the Masters of Arts in Communications degree

Department of Communications
Faculty of Arts
University of Ottawa

Table of Contents

Acknowledgements

I am grateful to Dr. Meredith Rocchi, Dr. Simon Beaudry, Dr. Martine Lagacé and Dr. Stefanie Haustein for their thoughtful and generous feedback on earlier versions of this work, and for the many discussions surrounding data literacy. I am thankful to Dr. Rocchi for her guidance, support, and encouragement throughout my research process, and for helping me excel as a young researcher. This study is funded by the Social Sciences and Humanities Research Council of Canada. I am pleased to have worked with a talented group of researchers on this grant.

Abstract

Data literacy has become one of the most important competencies for a citizen to exercise in their personal and professional lives. It contributes to more informed decision-making in all aspects of life, and is more frequently being utilized in organizations to drive innovation and change. These skills are especially important for communications professionals, as interpreting and communicating data to various publics is the foundation of information sharing in virtually every industry and sector. Data competencies are typically acquired in post-secondary education; however, existing curricula are lacking robustness, adaptability, and transferability of skills needed in the workplace and in our ever-changing world. Through the results collected from both professors and practitioners in the communications field, this study identifies the gaps in existing curricula, and justifies the importance of communications students acquiring data literacy skills to ensure that they will be equipped for their careers and the world at large. This research highlights that improving data and research skills will better prepare citizens for their professional and personal lives.

Key Words: data literacy, research education, qualitative research, communications, stakeholder consultations, curriculum development

Chapter I: Introduction

With the continuous advancement and evolution of modern technology, the ways in which we live our lives are increasingly becoming more efficient. These new technologies have simplified our activities, and continuously produce new opportunities for citizens and businesses. As our world changes, technologies change, therefore they must respond and adapt to consumer demands and trends. This is one of the reasons why our communications, information-seeking and sharing, and consumer behaviour – amongst many of our other daily activities – are data-collection hubs that store unprecedented amounts of information on our choices, tendencies and actions (Cowan et al., 2014). Data, which has penetrated nearly every aspect of our personal and professional lives, has shaped how we inform ourselves and how we make decisions. Technological developments, and the magnitude of data that come with these changes, have allowed us to, for example, quickly access news, information, products and services that fit our needs and desires, and have also helped us guide our decision-making. We are both consumers and producers of data, and this data exists in the news we read, the politics we participate in, the social media that we contribute to, the information we seek, and more.

The speed at which data and information have become available in our world today creates both benefits and risks. Information about ourselves (e.g., social media data or public opinion data), and information on the world in which we live (e.g., world news), are being distributed instantaneously by both credible sources and the lay public. The discrepancies in information sources make it increasingly difficult for individuals to distinguish between factual information versus misinformation, as well as good and bad representations of data (Twindale et al., 2013). The spread of misinformation is one of the greatest dangers in our modern world, and poses serious challenges to societies worldwide (Roozenbeek & van der Linden, 2019). With society

increasingly using and becoming reliant upon data, data literacy is a critical tool that citizens must exercise to ensure that they truly understand the information they consume and contribute to (Wolff et al., 2016). It is a skill that is now essential for functioning in our data-driven society as interactions with data are becoming ever more commonplace both in our personal and professional lives (Wolff et al., 2016). While scholars have provided various definitions of data literacy, the essence of data literacy is the ability to understand and use data effectively to inform decisions, and to turn data into actionable knowledge to solve real problems and communicate their solutions (Mandinach & Gummer, 2013; Wolff et al., 2016). For example, these skills teach individuals to identify misleading or false content so that they can exercise well-informed decision-making. They also teach citizens to read, comprehend, and use data in a variety of contexts. These skills are not only essential in everyday life; they are becoming highly demanded in the job market, and are deemed necessary for participating in today's knowledge economy and succeeding in the modern workforce (Cowan et al., 2014; Shorish, 2015). Individuals working in marketing, politics, crisis management, healthcare, journalism, and program evaluation are interacting with exponentially more data than previously thought possible (Ikemoto & Marsh, 2007). These skills are required amongst professionals working in the communications industry, as fields such as public relations, marketing, social media, organizational communications, and public affairs are responsible for interpreting and communicating data to various audiences, and demonstrating the importance of this information. In general, the number of organizations who are using data and research to support their work functions continues to grow, and more employers are seeking foundational competencies in data literacy in their existing and future employees (Chetty et al., 2018). While this is a growing requirement in many organizations, some employers report that these skills are

lacking amongst their employees and new graduates, and hold academic institutions responsible for not teaching students this important, practical skillset (Chetty et al., 2018).

Some data literacy skills are acquired in postsecondary education through research methods courses, which include, but are not limited to, statistics, qualitative methods, and quantitative methods. Scholars have identified that existing research methods courses, and university curricula at large, are lacking robustness and application to the current job market (Wolff et al. 2016, Neumann et al., 2013). Students who have taken these courses express disinterest in the subject matter, and are not able to understand its application to the real world or to their careers (Neumann et al., 2013). This is problematic considering the expectations that the job market has placed onto academic institutions to prepare students for the workforce (Ridsdale et al., 2015). Today, there is a growing expectation that professionals in all fields have the competencies to work with data, and to be able to effectively understand and utilize it, especially amongst decision makers (Ridsdale et al., 2015; Davenport & Patil, 2012; McKendrick, 2015; Pryor & Donnelly, 2009). Outside of the workplace, data literacy has become a crucial competency in the 21st century context, as citizens must be data literate for the benefit of Canada's socioeconomic well-being (Ridsdale et al., 2015; Mitrovic, 2015). If academic institutions are not able to teach students research methods courses and data literacy competencies in ways that are transferable, relevant and timely, graduates will not be able to exercise these skills in the workplace, and will be ill-prepared for the world at large (Wolff et al., 2016; Williams et al., 2008, Neumann et al., 2013). Given the demand of data literacy from multiple sectors, this educational gap must be carefully explored. Consultations between academic institutions and industry have been recommended by scholars as being the key solution to understanding the uses of and demands for data in the real world (Neumann et al, 2013; Wolff

et al., 2016; Ridsdale et al., 2015). This insight will help improve curricula so that students can be properly equipped students with well-rounded data literacy and research competencies.

By following these recommendations, this study explored consultations between academic institutions and industry to understand two perspectives. The first perspective sought to identify if and how data literacy is being taught in university, and what the current gaps are in existing data literacy education. The second perspective sought to explore how organizations are using data and research, whether there truly is an expectation to possess data literacy and research competencies to perform this work, and what those skills would be. Considering that the existing literature has highlighted that there is a gap in university curricula, the objective of this study was to understand where and why these gaps exist, and whether industry could offer insight into how to improve curricula based upon the uses and demand for data literacy in the current job market, should they exist. To host these consultations, interviews were conducted with participants who could speak to the experiences and insights of both of these identified perspectives. The first participant group consisted of professors from two prominent Canadian universities who have taught research methods courses to students enrolled in the communications programs at these schools. The second participant group consisted of practitioners in the communications industry, some of whom work in the private sector, and others who work in the public sector in Ottawa, Canada. Each participant group spoke to their experiences, challenges, and expectations of current students and the institutions that teach them, and offered tremendous insight into how university curricula should be improved to prepare the next generation of data literate workers and decision-makers.

The following chapters outline the presentation of this study and the outcome of this research:

Chapter II of this study, *Problematization*, offers a literature review of what data literacy is and how it is defined, and the importance of this competency in our world today. This chapter also elaborates on how data and research are utilized in the current job market, particularly in the communications industry, and the challenges that organizations face with respect to not having a data literate workforce. In addition, this chapter identifies the challenges with teaching research methods and data literacy to students, and what should be explored in future research.

Chapter III, *Methodology*, presents how this study was conducted through in-depth interviews with two stakeholder groups: professors in the communication departments from the University of Ottawa and Carleton University, and practitioners in the communications industry in Ottawa, Canada. This chapter also identifies how the interview data was collected, organized and analyzed through Braun and Clarke's thematic analysis model.

Chapter IV, *Results and Discussion*, presents the results of the interviews conducted with both participant groups. These results highlight the barriers to teaching research methods courses and data literacy competencies to students, as well as the barriers organizations face with respect to employing skilled, data literate workers. In addition, this chapter presents the solutions to these barriers, which were also identified by both stakeholder groups.

Chapter V, *Conclusion*, offers suggestions for improving the Communications curricula at the University of Ottawa and Carleton University. These recommendations can be applied to other undergraduate programs within the Humanities and Social Sciences faculties, and beyond. This chapter also provides suggestions for future research.

Chapter II: Problematization

2.1 Data Literacy

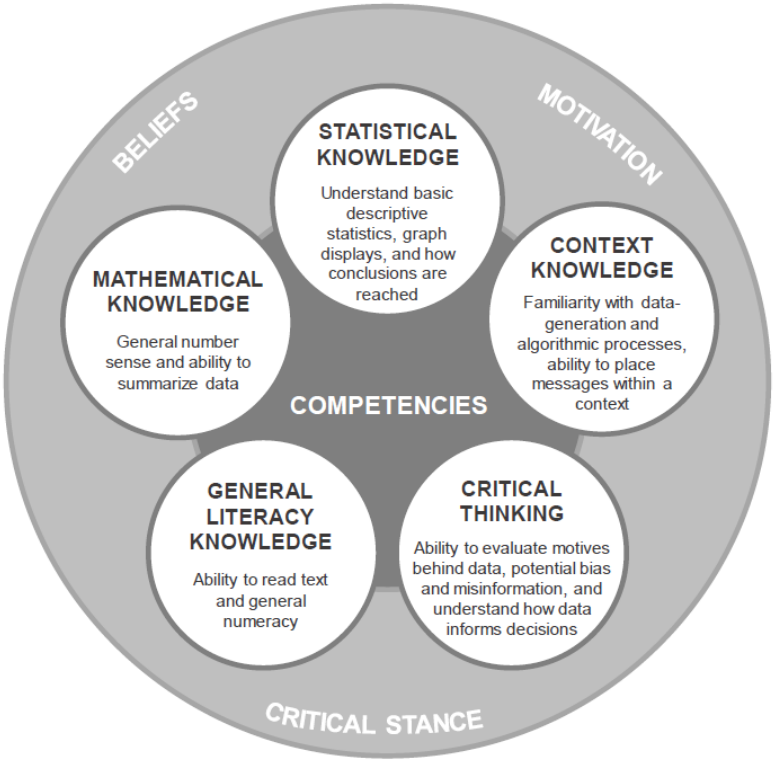
Data literacy is defined as the ability to identify, collect, organize, summarize and prioritize data, and use this information in everyday life (Mandinach et al., 2013; Deahl, 2014; Vahey et al., 2006; Neumann et al., 2013). While there was once a perception that this skillset is only important for research practitioners or academics, it has now become increasingly important for individuals in all professional and personal contexts to have the necessary skills to understand the meaning and value of data, and identify good and bad representations of data (Twindale et al., 2013; Pothier & Condon, 2019). Whether conducting interviews, working with performance indicators, tracking social media behavior, or reading charts, individuals working in fields such as marketing, politics, crisis management, healthcare, journalism, and program evaluation need to utilize data literacy as these professions are interacting with exponentially more data compared to five years ago (Rocchi, 2020; Ikemoto et al., 2007). Data literacy is intertwined with other competencies in information, statistical, digital, media, computational, and visual literacies, making this skillset applicable and important for all job functions and contexts (Ridsdale et al., 2015; Hattwig et al., 2013; Mackey & Jacobson, 2011). Scholars have highlighted that professionals who possess data literacy skills will fill organizational gaps and help to continue to move businesses forward in their objectives (Pothier & Condon, 2019). In everyday life, a data literate individual would have the ability to, for example, “read and interpret summary statistics in the everyday media [through] graphs, tables, statements, surveys and studies” (Carlson et al., 2014, p. 15) This is an imperative skill as statistics and data capture a true representation of our current environment and our population’s behaviour and opinions. These insights permeate our daily lives, as data and statistics are available with almost every piece of news media and information that we read, and help to guide our decision-

making (Callingham, 2006). Regardless of the context to which it is employed, data literacy allows an individual to apply evidence-based decision-making through an understanding of how to collect, manage, and evaluate information (Wing, 2008). According to some scholars, it is crucial to Canada's socioeconomic well-being that citizens have the ability to contribute, interact with, and understand data, meaning that citizens must be data literate (Ridsdale et al., 2015; Mitrovic, 2015).

Iddo Gal, a prominent scholar in the field of data and statistical literacy, notes that in order to acquire data literacy, it is important to recognize the key elements that constitute an individual's ability to act as an effective data consumer in diverse life contexts (Gal, 2002). These contexts emerge when, for example, individuals are reading the news, visiting Internet sites, looking at advertisements while shopping, participating in community or political events, or reading workplace materials and reports (Gal, 2002). Gal proposes a model of the key knowledge bases that should be available to adults, and by implication to learners graduating from schools or colleges, so that they can comprehend, interpret, critically evaluate, and react to statistical messages and data encountered in everyday life (Gal, 2002). According to Gal's conceptualization, data literacy occurs through the joint activation of five competencies or knowledge elements: critical thinking, context knowledge, general literacy knowledge, and mathematical, and statistical knowledge (see Figure 1) (Gal, 2002).

Figure 1

Gal's Conceptualization of Data Literacy



When an individual possesses *critical thinking*, they are able to evaluate the motives behind data, potential bias, or misinformation, and have the ability to understand how data informs decisions (Rocchi, 2020). Critical thinking has been highlighted by other scholars as being an important component to data literacy, as data literate individuals can properly evaluate data, and use it to make critical judgments on the reliability of the information presented and even to better understand how their own contributed data is being utilized to make more informed decisions (Wolff et al., 2016). Applying a critical stance to information consumption allows data literate individuals to question numeric and text-based data that may be misleading, biased or incomplete, and be able to adapt to changes and innovations (Rocchi, 2020).

The second knowledge base, *context knowledge* refers to the ability to familiarize oneself with how data is generated, and to be able to contextualize information. Scholars identify the importance of contextual knowledge when understanding how data can solve real problems, the ethics of using data, and the role and impact of data in society within different contexts (Wolff et al., 2016). *General literacy skills* refer to numeracy and the ability to read text. *Mathematical knowledge* and *statistical knowledge* promote the ability to have general number sense and summarize data, and also the ability to understand basic descriptive statistics, graphs, and how conclusions are reached (Rocchi, 2020). According to Gal, these competencies interact within three essential dispositional elements which include *beliefs and attitudes, critical stance,* and *motivation*. The relationship between the key competencies within the dispositional elements is what Gal shows to predict an individual's data literacy. These dispositional elements require that individuals hold a questioning view when they see information that is potentially incomplete or biased, whether intentional or not (critical stance), have an appreciation for the power of data to lead to valid conclusions (beliefs), and have an attitude and motivation to engage in cognitive processes involved in data literacy (motivation) (Rocchi, 2020; Gal, 2002). Gal explains that this model "should not be viewed as fixed and separate entities but as a context-dependent, dynamic set of knowledge and dispositions" that enable statistical and data literate behavior (Gal, 2020, p. 5). This model has been utilized as a framework by multiple scholars as it reflects the multi-faceted way data literacy is applied to any individual, in any field, including the humanities and social sciences, and are not specific to fields in mathematics, sciences, or statistics (Rocchi, 2020; Gal, 2002; Murray et al., 2002). These are also core competencies or building blocks to data literacy which individuals will use in their daily life, and make them a more informed decision-maker (Gal, 2002). In addition to these foundational competencies, more complex data literacy skills are

increasingly demanded outside of academia in the professional world. These include the ability to analyze and create explanations from data, and evaluate the validity of explanations presented in these findings in an organizational context (Wolff et al., 2016).

2.2 Data Literacy in the Job Market

With the rapid evolution of technology, as well as data leaving digital traces of these changes and our responses to them, organizations must respond and adapt to these new realities (Wolff et al., 2016). Businesses are increasingly using research and data to provide insight into their current practices to, for example, help spark new business ideas, and use data analytics to support their work functions (Wolff et al., 2016). Moreover, data is being used across organizations to identify opportunities, innovations, risks, and change (Chen et al., 2012). In almost every industry, data and research are being utilized by companies of all sizes to take their business to the next level (Pothier & Condon, 2019). In the communications industry, data is increasingly being used as a roadmap to reform in public affairs (Mandinach et al., 2013). Fields such as governance and communications require the utilization of data and research tools (Gal, 2002). In this context, scholars believe it is difficult to think of policy questions and communicating change when there is no statistical component applied to this work, and how the use of statistics and data is a general and fundamental method since data is omnipresent in modern life and business (Moore, 1998; Gal 2002). More specifically, in the public relations field, research and data are imperative when, for example, conducting environmental scans, tracking consumer behavior and feedback, conducting market research, and analyzing campaign and social media metrics (Watson & Noble, 2007; Carlson et al., 2014). More abstractly, both quantitative and qualitative research in the areas of public relations and marketing communications provide insight into how communication influences the dynamic process through which we create our realities and

cultures (Daymon & Holloway, 2010). Ultimately, data, statistics, and research act as a blueprint to guide organizations, especially in the communications industry, on the directions they and their clients should take with future decision-making (Chen et al., 2012).

In addition, data and research competencies are being used in daily operational tasks to simplify the techniques, technologies, systems, practices, methodologies, and applications that critically analyze business data to help enterprise better understand its business and market and make timely business decisions (Chen et al., 2012). More organizations, especially newer businesses, recognize the importance of being able to describe data sets and analytical techniques in applications, especially with social media data, and how these practices require more advanced, complex data literacy competencies (Chen et al., 2012). For example, since more organizations are using social media to communicate with their audiences, or to sell products and services, it is critical to have trained employees who are able to understand and analyze an organization's social media and digital footprint (Liu, 2014). Due to the fact that data and technology are closely linked, the literature highlights how both data and digital competencies exercised through, for example, social media analytics and communications, are increasing in demand within organizations (Chetty et al., 2018). This means that in some workplaces, it is important to have qualified employees who offer this skillset to perform this work efficiently. If not, further training opportunities might be needed for employees to progress to levels of fluency and mastery of data literacy (Chetty et al., 2018). In fact, scholars highlight that data literacy, and a strong digital acumen are becoming required amongst junior positions in administrative, business management, communications, finance, IT, medical and sales sectors, where the most valued employees can integrate their digital and data skills into their daily operational tasks (Chetty et al., 2018). Some organizations who have recognized the importance of data literacy have implemented professional development programs

to help promote a more inclusive digital society involving technical, social, cultural, and creative skill-sets (Chetty et al., 2018). While professional development in research and data literacy is tremendous progress, this is not a widely recognized business trend, as many organizations believe it is the responsibility of academic institutions to teach young professionals foundational digital and data literacy skills (Wolff et al., 2016).

With business adapting to our digital environment, and organizational needs constantly changing, the skills that employers will be looking for in the future are also subject to change (Chetty et al., 2016). Scholars highlight that in recent years, data literacy and research competencies have become essential in almost all fields of business, and are so important that in some circumstances, the absence of such skills can deny citizens access to formal employment (Chetty et al., 2018). Some organizations are holding academic institutions responsible for not producing graduates who are sufficiently data literate, and believe that these competencies must be taught in school (Chetty et al., 2016; Wolff 2018). Academics play a vital role in guiding the standard for data literacy education in the evolving labour market (Chetty et al., 2016). Some of the feedback received from organizations suggests that "graduates are expected to be adaptive, with skills that have transferable application in data, technologies, and methods" (Ridsdale et al., 2015, p. 4) According to Ridsdale et al. (2015), a trained workforce with foundational knowledge in data literacy acquired in school would result in a decreased level of on-the-job training needed, which would allow "employers to focus on domain-specific training, or elements of data skill where employees require mastery or fluency." They note that there is an important societal expectation of post-secondary institutions to produce competitive graduates, to which data literacy, which is acquired in school, is becoming an internationally recognized skill that is necessary in the twenty-first century (Ridsdale et al., 2015). To improve the state of data literacy in the job market,

scholars suggest that consultations between employers and academic institutions must take place to derive insight into current job market demands, and ensure transferability and relevance of data and research skills (Neumann et al., 2013). Addressing these professional limitations at the undergraduate level in university will help prepare young adults for their careers, and for making well-informed decisions in their daily lives (Neumann et al., 2013).

2.3 Teaching Data Literacy

Foundational data literacy and research competencies are often introduced and taught to students enrolled in postsecondary education, whether in university or college through research methods courses, including, but not limited to, statistics, qualitative and quantitative courses (Ball & Pelco, 2006). Despite the recognized importance of data literacy in recent years, previous research has indicated that data literacy education was inconsistent, and mostly left out of the humanities and social sciences curricula all together (Scheitle, 2006). Scholars identify that today, many Canadian universities (including the University of Ottawa, Dalhousie University, York University, Ryerson University, and others) offer these courses for almost all disciplines in the humanities and social sciences, and even offer specialized degrees related to data (Ridsdale et al., 2015). In fact, research methods courses are often required courses for university programs, and are taught to students throughout the entire duration of their post-secondary career (Ball & Pelco, 2006). However, there are few course offerings at the undergraduate level that directly focus or explicitly incorporate comprehensive data literacy education (Ridsdale et al., 2015). This is despite the increased importance and prevalence of data and research within the humanities and sciences (Ridsdale et al., 2015; Doucette & Fyfe, 2013; Martin & Leger-Hornby, 2012; Wanner, 2015). One of the reasons as to why comprehensive data literacy education is not being offered is due to a general assumption that individuals who are enrolled in school have the requisite knowledge and

skills to interpret and analyze data, and use this information in decision-making (Ridsdale et al., 2015). In addition, scholars highlight that society has a misperception of individuals who are born after 1983 ('digital natives') having inherent technological skills and abilities (Ridsdale et al., 2015). While these individuals possess a strong understanding of the digital world, as well as a complex and diverse range of skills, being a digital native does not mean that someone possesses mathematical and statistical knowledge. This concept is highlighted in Gal's conceptualization model, which demonstrates that data literacy requires the activation of a number of knowledge sources (Gal, 2002). Formal education is required to bridge the gaps between the digital skills that the current student generation possesses, accompanied by strong data literacy, to ensure that there is not a major skills gap in industry (Ridsdale et al., 2015; Jones et al., 2009; Thompson, 2012; Romani, 2009; Manyika et al., 2011). While society as a whole is becoming increasingly data-centered, academia is beginning to recognize the necessity to prepare graduates with more data-based skills for the workforce (Ridsdale et al., 2015; Koltay, 2014; Gunter, 2007). Even though organizations, and some scholars, are pushing academic institutions to teach students more transferable skills in data and research, there are different philosophies, approaches, and challenges with teaching research methods courses that might hinder this objective.

Previous research on best teaching practices for data literacy education has highlighted that the use of too much theory in research methods courses has been ineffective and somewhat problematic to students' retention of information and skills (Neumann et al., 2013). This has created an imbalance in teaching research methods courses, as some academic institutions promote the employment of a theoretical lens to teaching, while others advocate for more hands-on learning and the transferability of learning material beyond the classroom (Neumann et al., 2013). However, other scholars believe it is imperative to uphold the theoretical perspective in teaching that

university curricula offer, which includes the development of skills such as different ways of thinking and critical thinking, research, problem solving, creativity, and analysis (Ghazivakili et al., 2014). Critical thinking, in particular, has been recognized by scholars as a civic skill, but also as an imperative tool for acquiring data literacy (Pentland, 2013; Swan et al., 2009). The ability to ask the right questions, evaluate findings, and be critical of concepts, claims, and arguments is essential, and the basis for success in the 21st century, all of which are skills that a data literate individual would exercise (Ridsdale et al., 2015). In fact, some scholars believe that upholding the academic or theoretical approach to teaching research methods and data will provide students and educators with a more robust understanding of the discipline and its interaction with other fields (Raffaghelli & Stewart, 2020). This is because students need to learn how to think critically about data before they can analyze it successfully (Hogenboom et al., 2011). Ridsdale and colleagues explain the importance of teaching students these more abstract skills: "Working with data requires the ability to ask the right questions and critically evaluate outcomes. Problem solving requires navigating difficult situations thoughtfully. Computational thinking incorporates a level of both critical thinking and problem solving" (2015, p. 4). These skills are fundamental concepts of data literacy and research knowledge (Ridsdale et al., 2015; Wing, 2008). In order for students to acquire the cognitive abilities to work with data, data literacy education must facilitate opportunities to solve complex problems critically, using higher-order thinking (Ridsdale et al., 2015, p. 15; Gunter, 2007). While the development and practice of these skills has been deemed important by researchers, other scholars advocate for incorporating more application and less theory (Neumann et al., 2013). These positions are based on the belief that learning material should focus on how data and research can be applied beyond a theoretical or academic scope, especially given job market demands, and the growing importance of data literacy (Neumann et al., 2013;

Ridsdale et al., 2015). In fact, for learning to be effective, it needs to have a long-term impact on other aspects of knowledge or skill acquisition – it needs to be transferable to other contexts (Phillips, 2005, p. 5). This means that placing more emphasis on teaching the application of data and research methods courses to other subjects is imperative for skill development and retention (Phillips, 2005). While both positions hold value, the consensus is unclear as to which approach, or even a combined teaching approach, is suitable for research methods courses, and the acquisition of data literacy. Scholars highlight the benefits and challenges with both approaches, making it difficult for professors to decipher best practices to teaching this material to students. Some recent studies suggest that using less theory, and employing more hands-on learning and application will help with student perceptions of these courses, as well as some of the challenges with teaching research methods courses, as previously noted in the literature (Neumann et al., 2013; Carter et al., 2017).

The existing literature on teaching data literacy to students highlights that one of the greatest obstacles in data literacy education has been due to negative student attitudes and poor feedback on these courses (Carter et al., 2017). University research methods and statistics classes have been criticized as being overly rigid and abstract, and for using teaching methods that remove much of the enjoyment from learning this material (Neumann et al., 2013). Given the fact that research methods courses are often mandatory in university curricula, students report disinterest in these courses as there are preconceived expectations about the course content being irrelevant to students' future careers (Steel et al., 2019). Particularly, students in the humanities and social sciences feel that these courses are irrelevant, as the students' perceptions of data and research is that this field is dominant in mathematics, which is not a requirement in these disciplines (Neumann et al., 2013). In many cases, the incorporation of math and statistics in data and research

courses has resulted in students' fear and anxiety when they are asked to work with and analyze data (Williams et al., 2008; Carter et al., 2017). The anxiety expressed by students towards learning this material, as well as the perceived irrelevance of the material have been highlighted as two main barriers to teaching research methods and data literacy to students (Carter et al., 2017). This has created difficulties in teaching this material to students. Moreover, students have difficulty retaining this information and using it in their everyday lives (Carter et al., 2017). Scholars suggest that to alleviate fear and anxiety towards research methods courses, highlight the relevancy of this material, and teach comprehensive data literacy to students, teaching practices must include application and transferability to the real world (Neumann et al., 2013). In recent years, some scholars have made suggestions to improve data literacy education in the future, which in turn, will support organizational objectives and recruitment.

2.3.1 *Best Practices for Teaching Data Literacy*

Based on interviews with students who have taken statistics and research methods classes, Neumann et al. (2013) noted that the incorporation of real-life data was particularly important for students in social sciences as many of these students have expressed negative attitudes towards statistics and data. The use of real-life data involves using less theory and more data, making data analysis central, and using context to develop statistical inference. Specifically, using real-life data that students are familiar with and are interested in has been highlighted to promote greater participation in the classroom, as it can help students learn and engage with the material better (Neumann et al., 2013). Making content relevant, applicable, and transferable is critical in research methods and data literacy education as studies show that made up data reinforces the perception that statistics is artificial, dreary, and uninteresting (Neumann et al., 2013). Using more personal and applicable data sets helped students maintain their interest, and was useful to them in

developing their understanding and appreciation of the relevance of statistics and research methods (Neumann et al., 2013, p. 61). These scholars suggested that incorporating real-life data in future curricula can "assist teachers in communicating how data is analyzed but also why it is analyzed" to show the transferability of this education to subjects outside of the classroom (Neumann et al., 2013, p. 60). It may also be a motivating tool that makes learning this material more meaningful for students and prepares students to use data and statistical literacy in their careers (Neumann et al., 2013; Cimpoeru & Roman, 2018).

Incorporating real-life data is only one step towards improving data and research curricula, and helping students to prepare for the workplace and everyday life. Due to poor student feedback on research methods courses, and the perceived irrelevancy of these classes, scholars have identified other ways in which teachers can demonstrate the importance of this material to students. Having students lead their own projects through the incorporation of real-world data, which is relevant to students' interests, has been identified as another key success factor to data literacy education (Ridsdale et al., 2015). This hands-on learning style has been supported by scholars as being effective when teaching data literacy as it increases engagement, which can foster innovation, improve learning, and increase the likelihood of lifelong learning (Ridsdale et al., 2015, p. 5). It will also encourage creative and cross-disciplinary thinking and application, which can help students break out of academic silos, enable more creativity, and draw connections to areas beyond academia (Ridsdale et al., 2015). Course content should also focus on what Ridsdale and colleagues identify as 'data-skilling' or building up competencies incrementally through workshops, courses and modules, as opposed to incorporating one-off projects throughout the duration of a research methods course. They explain that 'data-skilling' allows students "to focus on specific aspects of data literacy (e.g., finding data, evaluation of data, visualization,

manipulation tools, data storage, data ethics, data curation, etc.) and build competencies successively" (Ridsdale et al., 2015, p. 16). These researchers also explain that this continuous approach to learning is integral for professional development in one's career (Ridsdale et al., 2015).

While having students lead their own projects and incorporating real life data and 'data skilling' into teaching are helpful tools in research education, scholars have determined that more research is needed to gather insights from different stakeholders (namely professors and employers) to offer a more detailed, relevant curricula (Johnson et al., 2015). This is because it is critical to draw connections between academia and business to demonstrate to students how data literacy can be applied in their careers, and to help organizations achieve their objectives, as data and research are increasingly being used for multiple business functions (Chen et al., 2012). According to scholars, post-secondary institutions must cooperate with industry to understand market demands so that curricula can be reassessed and readjusted to maintain relevancy and applicability to students (Ridsdale et al., 2015; Neumann et al., 2013; Cimpoeru & Roman, 2018).

2.4 Limitations in Existing Literature

The existing body of literature on data literacy highlights the importance of data literacy skills in our personal and professional lives, but lacks key pieces of information that are needed to propose change in order to meet professional and economic demands. In particular, existing literature lacks evidence on data and research methods in a multi-disciplinary field like communication studies. The communications field, which intersects with virtually every industry and discipline, has been disrupted and greatly impacted by data and technology in recent years. Due to the fact that individuals who study and work in communications are interacting with exponentially more data today, there is no research to explore how research methods courses are

taught in this field, or how data and research are used in the communications industry. In addition, there is no evidence to highlight input from employers on what specific competencies and tools are required to perform work with research and data in the communications industry. While the literature has suggested that these skills are in demand in the workplace, it would be valuable to understand how these competencies are being utilized to perform different work functions, and to acquire a better understanding of employer expectations so that academic institutions can enhance their teaching practices to meet these demands. Currently, the literature on data literacy offers a broader perspective on the importance of this skillset as opposed to how it can be beneficial for specific industries or work functions. This breadth in the literature is also evident through scholars' definitions of data literacy, and how 'data literacy' and 'statistical literacy' are often used synonymously. While statistical knowledge is undoubtedly one component of data literacy, it does not encompass the true or complete essence of data literacy. Gal's Conceptualization of Data Literacy (2002) is one of the only models that illustrates the multifaceted, comprehensive skillset that a data literate individual possesses, which is adaptable to different life contexts. Critical thinking, general literacy knowledge, mathematical and statistical knowledge, and context knowledge are competencies that are applied beyond the scope of statistics; however, much of the literature on data literacy does not make this distinction. Additionally, it is unclear as to whether professional development is needed in data literacy and research skills because employees lack data literacy all together, or if organizations provide these opportunities to their employees to remain competitive and up-to-date on evolving business trends and practices. While scholars note the growing requirement amongst employers to possess data literacy, the consensus is unclear as to whether the expectation is that individuals possess these skills prior to entering the job market, or whether they can be acquired and built upon through on-the-job training (Ridsdale et al., 2015).

Gal highlights that data and statistical literacy, are a "critical, but often neglected skill area that needs to be addressed if adults (or future adults) are to become more informed citizens and employees" (Gal, 2002, p. 1). Gathering industry perspectives would help to identify if, for example, professional development is a solution to a problem that employers are experiencing with their workforce. Understanding these perspectives will also help to identify if there are more problems that organizations face with respect to data and research literacy, and if these issues can be fixed.

Current research on data literacy education notes that there is an urgent need to update research methods courses, and how new proposed curricula must be future oriented and flexible in order to identify new trends, challenges, and developments, and must emphasize applied practice and real-world experience (Johnson et al., 2015). Data literacy has not been the focus in teaching research methods courses, despite the number of studies that highlight the importance of the skillset in our world today. While some studies offer suggestions of teaching methods to improve research methods courses, and help students acquire data literacy, there is little information on how to improve curricula in this area. The current literature highlights multiple barriers to teaching research methods courses to students, and suggests that future research should aim to gather insight from practitioners to understand current workplace demands. Gathering industry insight can help research methods courses become more forward-thinking, and can help to identify trends, challenges, and technological developments that are likely to occur in the near future (Ridsdale et al., 2015) Ridsdale and colleagues (2015) express that cross-collaboration between industry and academic institutions will help teachers match data literacy competencies and meta-skills with the positions of Canadian employers needs not only now, but in the future. Understanding multiple stakeholder perspectives will also help to identify how data literacy, which has been recognized as

one of the most important skillsets in the 21st century, can be the focal point of research methods courses to prepare students for their careers and everyday life.

2.5 Present Study

This study seeks to explore the gaps and inconsistencies in data literacy education offered in undergraduate communications programs. This study also explores the data and research competencies that employers in the communications industry are seeking, if any, amongst the current and future workforce. Understanding industry perspectives will help establish best practices for integrating data literacy education into undergraduate curricula, and especially into communication programs. While data literacy is noted as being a necessary skillset for all fields, this study focuses on its importance within the communications field given the presence and use of data within most communication roles and functions. Being able to interpret and communicate data and research to multiple audiences is a skillset that communications professionals are often expected to possess, and these competencies are best developed during post-secondary education. When exploring the current state of data literacy education, and its outcomes, it is important to identify the two main stakeholder groups who influence and are impacted by how research methods courses are taught to students. The stakeholders impacted by these decisions and outcomes include professors, who teach research methods and data literacy competencies to students in communications programs, as well as practitioners in the communications field, who work with data and research and hire the next generation of workers. The approach to exploring the perspectives and experiences of both stakeholder groups is led by three overarching research questions:

1. How are research methods and data literacy being taught to undergraduate students enrolled in the communications programs at the University of Ottawa and Carleton University?
2. Which data and research skills are needed by employers in the communications field in Ottawa who are looking to hire the next generation of communication practitioners?
3. How can the communications curricula at the University of Ottawa and Carleton University be improved to better prepare undergraduate students for their careers?

Considering there are two main stakeholders impacted by data literacy education, two sets of interviews were conducted. One set of interviews was conducted with professors who teach research methods courses in the communications departments at the University of Ottawa and Carleton University, and another set was conducted with communication practitioners in both the private and public sectors in Ottawa, Canada. Participants from these two prominent universities were recruited to understand whether there were discrepancies in teaching practices and experiences in two similar undergraduate programs. Participants from both the private and public sectors in the communications industry were recruited to understand similarities or differences in expectations of graduates between sectors with different interests, audiences, and clients. In-depth interviews were held with each participant in each stakeholder group to better understand their experiences, challenges, and suggestions on how to improve research methods courses within communications curricula. Due to the fact that the purpose of the interviews was to collect data that could be used to improve research methods courses and data literacy, it was important to identify the barriers that both participant groups have experienced with respect to teaching data literacy to students, or hiring graduates and individuals with this skillset. Identifying these barriers highlighted the core problems with the curricula at both universities, to which suggestions or

solutions were applied to make these programs more robust, transferable, and useful to students. By understanding various experiences and barriers to teaching research methods and data literacy from the perspective of professors, this has helped to inform solutions to improving undergraduate curricula in communications programs. In addition, by understanding how data and research are utilized in the communications industry, and the expectations that these practitioners have of graduates who wish to pursue this type of work, this has also provided solutions on how to make course material transferable, and how to prepare students for the workplace and the world at large.

Chapter III: Methodology

This study seeks to collect information on the experiences, insights, and advice of key stakeholders in the communications field, which would be used to better prepare the next generation of communications practitioners and citizens. These objectives require the application of a research design which would develop a space for each participant to reflect, critique, and advise on the best approaches to improving research methods courses under the communications curricula at the University of Ottawa and Carleton University. To respect these considerations, this study followed a qualitative approach, specifically through the form of semi-structured e-interviews (Deakin & Wakefield, 2014). Interviews, by nature, are more comprehensive and allow for greater detail, which can result in richness and validity of data in comparison to other data-collection techniques (McCoyd & Kerson, 2006). For this study, it was important to provide an opportunity for faculty members in communication studies to share their experiences teaching research methods courses to undergraduate students, as well as their thoughts on how these courses could be improved. It was equally important to create a space for employers in the communications field to provide information on which data and research competencies are being utilized in the workplace today, and how universities at large can equip students with the skills to perform this work in the future.

3.1 Selection of Participants

The first group of participants (Group 1) included communication professors in the Department of Communication at the University of Ottawa and the School of Journalism and Communication at Carleton University. The second group of participants (Group 2) included Ottawa-based employers (in both the private and public sectors) who work in the communications

industry or perform a communications role within their organizations. To be eligible to participate in this study, participants in Group 1 had to have taught qualitative, quantitative, or mixed methods courses to undergraduate students in the communications program within the last three years from the date the study was conducted. Participants in Group 2 had to be currently working in a communications capacity (which could include areas such as social media, public relations, consulting, etc.); had to currently hold a mid- to senior-level role in their organization and be in a position to supervise or hire a student; and had to have worked with a communications student, or a graduate of a communication program, within the past three years. This three-year time period was imposed on both participant groups, as the field of communications, especially with respect to how data and research are applied to the discipline, is quickly evolving. Whether a professor is linking teaching material to current events, or a practitioner is utilizing data metrics in the workplace, data and research advance at the same rate as the world around us. This is why, for the purposes of this study, it was important to examine the most recent teaching and business practices.

3.2 Recruitment: Group 1

To recruit participants in Group 1, the University of Ottawa and University of Carleton websites were searched to explore the qualifications of professors in the Department of Communications at the University of Ottawa and Carleton University. Both websites include publicly available information on all current professors (both professors that teach on a full-time and a part-time basis) within each faculty and department, their specializations and the courses they teach, and their contact information. With an understanding that not every professor who was contacted would respond to participate in the study, or would have the capacity to participate, a larger recruitment sample was employed. In total, 19 professors from the University of Ottawa and Carleton University who appeared to meet the inclusion criteria were contacted individually by

email using the contact information available on the university websites. The initial emails that were sent to these professors included an explanation of the study, the qualifications to participate, and an inquiry as to whether there was interest in participating (See Appendix A for the Email Recruitment Text). Of the 19 professors who were initially contacted, 8 professors responded and expressed interest in participating. With an understanding that interested participants would respond at various times throughout the recruitment process, a rolling recruiting approach was implemented to ensure that the timelines of the study were adhered to. As professors expressed their interest in participating, each participant was provided a consent form to sign, as well as a virtual calendar invitation to a Microsoft Teams meeting on an agreed-upon date for the interview. Participants were selected on a first-come, first-served basis, and interviews were conducted during the recruitment process until saturation was achieved. With respect to the 11 other individuals that were contacted, they were not included in the study because they either did not respond to the initial recruitment email or indicated that they were not qualified to participate in the study. In total, participant Group 1 contained 8 professors, which included 4 professors from the University of Ottawa, and 4 professors from Carleton University. Figure 2 below identifies all of the participants that were recruited in Group 1.

Figure 2

Participant Group 1 - Professors

Name[1]	**Gender**	**Institution**	**Role**
Alex	Male	Carleton University	Part-time professor
Carrie	Female	University of Ottawa	Full-time professor
Arnie	Male	University of Ottawa	Part-time professor
Sonya	Female	Carleton University	Part-time professor
Amy	Female	Carleton University	Part-time professor

Amelia	Female	Carleton University	Full-time professor
Emma	Female	University of Ottawa	Full-time professor
Cameron	Male	University of Ottawa	Part-time professor

[1] *The real names of participants have been replaced with a pseudonym to protect their identity*

3.3 Recruitment: Group 2

To recruit participants for Group 2, LinkedIn was utilized to research Ottawa-based practitioners in the communications industry. LinkedIn is a free, social media platform for individuals who choose to share their professional information with other LinkedIn and Internet users (van Dijck, 2013). Reaching out to these practitioners on LinkedIn was not an intrusion of their privacy, as these profiles are made available to the public, which provides anyone with the ability to connect with and contact them (van Dijck, 2013). While the amount of information that is shared on individual LinkedIn profiles is at the discretion of the account owner, the majority of profiles include a history of which organizations the individual has worked for, the role they performed, the duration of these jobs, and sometimes, a brief description of the role. This simplified the recruitment process for determining which individuals were qualified to participate in the study.

Due to the fact that this research was seeking information on and advice from a specific sample (mid- to senior-level communications professionals in Ottawa), a targeted recruiting approach was best suited to achieve optimal results. This included the use of specific search words in the search function of the website. The use of the search words “Ottawa”, “Communication”, “Public Relations”, “Marketing”, and “Social Media” was successful as it presented numerous professionals in the communications industry in the Ottawa area. In total, 32 communications practitioners in the Ottawa-area who appeared to meet the qualifications of the study were

contacted individually by LinkedIn InMail, which is the direct messaging function on the LinkedIn website for LinkedIn users. A large number of individuals were contacted initially with the understanding that not every individual contacted would be qualified to participate in the study based upon the amount of information available on their LinkedIn profile. In addition, it was clear that not every individual who was contacted would have the capacity to participate in the study. A third consideration for utilizing a larger recruitment sample was the uncertainty around how often individuals use their LinkedIn profile. Considering that some people use LinkedIn more frequently than others, there was little guarantee that all professionals that were contacted would respond to the inquiry. The initial messages sent to participants included an explanation of the study, the qualifications to participate, and an inquiry as to whether there was interest in participating (See Appendix B for the LinkedIn Recruitment Text). A rolling recruitment approach was also employed during the recruitment of participants in Group 2. As these practitioners expressed their interest in participating in the study, or referred a colleague or another professional who qualified for the study, each participant was provided a consent form to sign, as well as a virtual calendar invitation to a Microsoft Teams meeting on an agreed-upon date for the interview. Participants were selected on a first-come, first-served basis. Of the 32 practitioners who were initially contacted, 8 practitioners responded and expressed interest in participating. With respect to the 19 other individuals that were contacted, they were not included in the study because they either did not respond to the initial recruitment message, or indicated that they were not qualified to participate in the study. In total, participant Group 2 contained 8 practitioners, from both the private and public sectors in the Ottawa area. Figure 3 below identifies all of the participants that were recruited in Group 2.

Figure 3

Participant Group 2 – Practitioners

Name[2]	Gender	Sector, Field	Role
Diane	Female	Private, Health Communications	Director
Karen	Female	Private, Marketing	Vice President
Simone	Female	Private, Science Communications	Manager
Marc	Male	Private, Education and Communications	Director
Isabelle	Female	Private, Media and Issues Management	Director
Arlette	Female	Public, Research and Communications	Strategic Advisor
Rhiannon	Female	Private, Organizational Communications	Senior Consultant
Jodi	Female	Public, Digital Communications	Senior Strategist

[2] *The real names of participants have been replaced with a pseudonym to protect their identity*

3.4 Data Collection

E-interviews are a new, innovative, and preferable form of qualitative data collection amongst scholars, as video-conferencing tools are free and accessible to both the interviewer and participants (Deakin & Wakefield, 2014). The selection of semi-structured interviews presented a greater opportunity for participants to have fluid, organic discussions, as it encourages participants to speak openly and honestly about their experiences and ideas, without the restrictions of time, closed-ended questions, or a rigid interview structure (Longhurst, 2013). In the calendar invitation that was provided to each participant, a link to a Microsoft Teams meeting was provided to each participant to engage in the e-interview at the agreed-upon meeting time. In this calendar invitation, participants were provided a deadline to submit their signed consent form. An electronic copy of the form, signed by both the participant and the interviewer, was then sent back to the participant

for their records. These copies were stored in a locked secure file, which were password protected. Before each interview began, a brief overview of the consent form was discussed, and each participant was asked if they consented to the audio of the interviews being recorded. Audio-recording was utilized in this study as it was necessary for the creation of verbatim transcription. Audio-recording captures the true essence of the participant's response in real-time, and upholds the validity of the content (Al-Yateem, 2012). All participants agreed to their interviews being recorded, and each interview was recorded using the recording function on Microsoft Teams. While each interview was a video-conference, participants were assured that the recording of the session would be converted to an audio file, and only the audio recording would be used for transcription and data analysis.

During interviews with participants in Group 1, the participants were asked to describe how they have taught research methods courses and data literacy competencies to their students, what perceived challenges teaching this material has raised, and their opinions on how data literacy can be further integrated into the Communications curriculum based upon their own experiences and anecdotal evidence (See Appendix C for the Group 1 Interview Guide). During interviews with participants in Group 2, the participants were asked to describe how data and research are used in their organization and their role, and which competencies are used to perform this work. These participants were also asked if these competencies are sought in new graduates they hire, how and if data and research will contribute to their organization's future work, and which skills are needed by new graduates to make these contributions (See Appendix D for the Group 2 Interview Guide). In total, 16 interviews were held for this study. Each participant interview, regardless of which participant group they belonged to, were between 30 and 45 minutes in length.

After each interview, an audio recording of the session was generated using an online audio generator. Once the audio file was produced, the video recording of the interview was securely deleted. All audio recordings were saved into separate secure folders according to which participant group they belonged, and each audio file was renamed to a pseudonym to anonymize each interview. This process was undertaken to safeguard each participant's identity. Finally, the 16 audio recordings were uploaded and transcribed using Temi, an artificial intelligence (AI) program (Temi, 2021). Temi is a secure and efficient way to convert audio files into text, and is considered to be 85% accurate, according to scholars who have used the program to transcribe interviews (ResearchGate, 2015). Once the transcriptions were published into texts, a second review of the texts was conducted to confirm that the transcriptions were accurate and verbatim.

3.5 Thematic Analysis

To interpret the data collected from these interviews, an interpretivism approach was applied to understand the experiences, challenges, and perspectives of each participant. Interpretivism research, which is often utilized in qualitative studies, seeks to gain in-depth insight into the lives of respondents through the understanding that individuals experience objective reality in different ways (Chowdhury, 2014). Interpretivism was the most suitable approach for this study because this study allowed individuals to share their experiences in an in-depth, respondent led, unstructured manner. The data collected from the 16 interviews with participants was examined and analyzed at face value, and a thematic analysis was employed to identify patterns and inconsistencies in the data. Organizing this data into themes helped to establish which subjects were of high importance and consideration for curriculum improvement. It also clearly identified the challenges in both curriculums, and the opportunities to improve this education for students.

This data analysis process was modeled after Braun and Clarke's (2006) recommended six-step coding process for thematic analyses in qualitative research. A thematic analysis is defined as a method for identifying, analyzing, and reporting themes found within a data set, which helps to organize and describe data sets in rich detail. The first step of this analysis included a review of the transcriptions. After each transcription was produced and thoroughly, they were uploaded to and analyzed through NVivo software, which was used to conduct a thematic analysis. This constituted the second component of the coding process, which included the initial production of codes from the data (Braun & Clarke, 2006). The third coding phase included the initial coding and collating of the data into a list of different codes identified across the data set. In NVivo, three coding sets were created to categorize the data collected from participants in Group 1, participants in Group 2, and general themes identified from the data collected from both participant groups. The coding set for Group 1 categorized data into themes such as challenges with the curriculum, students' fear of data and numbers, and teaching methods (See Appendix E for the Coding Guide for the Thematic Analysis). The coding set for Group 2 categorized data into themes such as the use of data in organizations, skills in the workplace, and tools utilized to perform this work (See Appendix E). A third coding set categorized the remaining data into general themes that were found in the data collected from both participant groups. Some of these themes included both groups' definitions of data literacy, the importance of data literacy, and the transferability of skills (See Appendix E).

The fourth and fifth steps in the thematic analysis included the refinement of the data (Braun & Clarke, 2006). This included the revision of the themes within each coding set to determine whether the themes accurately reflected the meanings evident in the data set as a whole (Nowell et al., 2017). After this revision, 19 codes emerged from the data in total. The fifth step

of the thematic analysis included the identification of how these themes fit into the overall story about the entire data set, and how the themes are interdependent on one another in relation to the research questions. This data was then organized into a mind map to illustrate the relationship between the 19 codes within the three coding sets (See Appendix F for the Data Mind Map). Through the creation of the mind map, the categorization of these three coding sets was clarified and renamed to Academic Themes, Organizational Themes, and General Themes were created (See Appendix F).

Based upon the reorganization of the data into the mind map, these barriers became apparent in both the Academic Themes coding set, and the Organizational Themes coding set. To highlight these barriers, a Barriers and Solutions Model was created to clearly identify which academic and organizational barriers emerged from the themes in the data. These themes are with respect to teaching data and research competencies to students, and preparing them with these skills for the workplace (See Appendix G for Thematic Analysis - Barriers and Solutions Model). The solutions to both academic and organizational problems were apparent from the data collected, and were applied to each barrier identified. The categorization of these academic and organizational barriers into general barriers further clarified the relationship and dependencies between the codes in the data. The themes that emerged from the data collected from both participant groups include: inconsistencies in the curriculum; the stigmatization of research methods; the transferability of skills; and professional development. These themes demonstrated that these academic and organizational issues are interconnected and stem from one another, and that both stakeholders hold the answers to each other's challenges.

Chapter IV: Results and Discussion

The results of this study have been categorized and presented through two overarching themes: barriers and solutions. The barriers that emerged from the data were identified by Group 1 and Group 2 participants, and include problems or challenges to achieving best practices in the communications curriculum at the University of Ottawa and Carleton University, and to hiring graduates from the communications field with strong data literacy. The solutions that emerged from the data were proposed by both participant groups to potentially fix these identified challenges. The relationships between these barriers and solutions will be analyzed to explore how these findings answer the research questions of this study.

For the purposes of lightening up the text, and for efficiency, the results are discussed as they are presented. This chapter is structured through the following storyline: barrier, solution, and discussion. The four main barriers that were identified in the data include: (i) inconsistencies in the curriculum; (ii) the stigmatization of research methods; (iii) the transferability of skills; and (iv) the need for professional development. The results gathered from Group 1 participants informed the first three barriers, and the results gathered from Group 2 participants informed the second, third, and fourth barriers. Each barrier is then followed by the solution(s) that participants have identified. Figure 4 illustrates the presentation of these results.

Figure 4

Presentation of Results

Results	Data Source
○ Barrier (i): Inconsistencies in the Curriculum ▪ Striking a balance between teaching theory vs. application ▪ Resources ○ Solutions ○ Discussion	Group 1
○ Barrier (ii): Stigmatization of Research Methods	Group 1, Group 2

▪ Student anxiety and fear ▪ Perceived irrelevance of research methods ○ Solutions ○ Discussion	
○ Barrier (iii): Transferability of Skills ▪ Lack of understanding of industry and stakeholder needs ▪ Lack of application to the real world ○ Solutions ○ Discussion	Group 1, Group 2
○ Barrier (iv): Need for Professional Development ▪ Lack of basic research knowledge and data literacy skills in the workplace ○ Solutions ○ Discussion	Group 2

4.1 Inconsistencies in the Curriculum

4.1.1 *Striking a Balance Between Teaching Theory vs. Application*

One of the most prominent subthemes that emerged during interviews with participants in Group 1 (professors) from the University of Ottawa and Carleton University was that there are different philosophies of teaching research methods to Communication students. These philosophies were highlighted from professors being asked to reflect on their experiences teaching research methods courses to students throughout their careers, the challenges they have encountered when teaching this material, and what, if anything, they would change to improve these courses for students and the curriculum at large. When speaking about their teaching experiences, many professors expressed challenges with striking a balance between teaching theory and ensuring material is relevant, transferable, and useful to students outside of the classroom. Of these participants, some believe that there is a strong theoretical bias in the communications program at their respective university. While participants were divided on this subject overall, many participants expressed that university philosophy places more emphasis on the exploration and understanding of theory, versus teaching students more tangible skills. Participants who agreed with this statement have noticed this imbalance over the years; however,

it was not until recently that some professors felt strongly towards striking a balance between teaching theory and tangible skills. One participant, Alex, expressed that throughout his experience teaching data literacy skills to students, he has witnessed "the internal dynamics of having a lopsided faculty with [professors] who would advocate for the need for data literacy in a more theoretically inclined tradition," and believes that "over the years, there has been an erosion" of this philosophy.

Another participant, Sonya, expressed that at the departmental level, conversations surrounding incorporating "experiential learning opportunities for students to build real-world skills" was both a pressure more recently enforced by the Ontario education system, and a highly debated topic amongst professors. She explained that throughout these conversations, there was a divide between professors who were pushing to help students develop "real-world skills," and others who believe in approaching communication studies from both a cultural and critical perspective, while focusing on helping students master skills such as critical thinking. However, participants noted that considering the ever-changing state of our world, and technology's influence on the communications industry and other disciplines, it is important to ensure that teaching material is relevant, timely and prepares students beyond their academic careers. One participant, Cameron, who felt strongly about this position, noted that "there is no clientele approach in university." This means that there is very little focus on the application of the learning material, and how it can serve a purpose to various audiences and stakeholders outside of the classroom. He elaborated further and identified that too much emphasis on theory in the classroom "is not pleasing the student." Cameron expressed his concern for this theoretical bias in the program, and noted that professors "need to ensure that material will be useful to students in the long term." Placing more emphasis on teaching the application of this material, and its connection

to other subjects, has been supported by scholars who recognize this imbalance in teaching. Some of these scholars have identified that university research methods course are criticized for being overly rigid and abstract, and for employing teaching methods that remove the enjoyment from learning this material (Neumann et al., 2013). This idea suggests that it is important to show students how to apply this material outside of an academic scope, and how students can utilize this knowledge in their personal and professional lives.

On the contrary, the remaining professors supported the prominence of a theoretical approach to research methods courses and to university courses in general, or believe that there is already a good balance between teaching theory and tangible skills. One professor, Emma, felt the concept of teaching tangible skills to students was a problematic way of teaching research methods. While she explained that teaching data literacy skills to students is important, she believes that these skills "are in the camp of those kinds of abstract skills that universities are excellent at offering students; critical thinking and reasoning, analytical skills, the ability to see a problem and dissect it down to its various components so that [a student] can start dissecting it." In addition, Sonya elaborated on the importance of universities teaching critical thinking, and how it can "help us navigate [the world] at an individual and a professional level," and that there should not be much emphasis placed on the idea of "preparing students for the workforce." Emma believes that these skills, in fact, "are really essential skills for any job." She continued to note that "if data literacy skills are being taught, they will be transferable."

One of the solutions identified by professors and practitioners is that while teaching theory is important, and should be included in curricula, professors must demonstrate how research methods can be applied and used outside of the classroom. According to some professors, they have incorporated a more balanced approach in their teaching by, for example, "allowing students

to run their own projects at the beginning of the course" (Alex, Professor), and by "incorporating real-life data into teaching" (Amy, Professor). Amelia, another professor, noted that through the inclusion of hands-on learning opportunities, her students "seem to appreciate the pragmatic nature of the courses, and they appreciate that assignments and other learning activities are hands-on, and they are given opportunities to build research skills through direct application." Cameron (Professor) noted that when he incorporates more hands-on learning into his coursework, the evaluations and feedback he receives from his students are positive and encouraging. Specifically, he noted that his students will tell him at the end of the course, "I didn't imagine I would learn so much in this class." Researchers have identified hands-on work as one teaching technique that helps students learn the course material in ways that are creative and practical, which can help students retain knowledge and apply it beyond academia. Specifically, one study highlights the impacts of incorporating student-centered techniques into teaching with respect to making coursework more relevant to students' interests, and focusing on their development of useful, tangible skills in research methods. This literature has demonstrated that introducing a range of specific teaching techniques, including case study teaching, problem-based learning, and group work in research methods courses had a positive effect on student performance, learning experience, and subject evaluation (Barraket, 2005). Utilizing case studies and problem-based learning would include presenting students with a scenario in which they would use data to find an explanation or solution to a situation, which allows students to explore hands-on learning through the application of learning material, and exercise critical thinking, and problem solving. These teaching techniques, particularly case study and problem-based learning, often incorporate real life data and examples of how data and research are applied to issues and fields beyond academia (Neumann et al., 2013). In fact, the use of these student-centered techniques was proven

to facilitate a strong social context for learning, and provided students with an experiential framework for which to explore the technical aspects of the curriculum (Barraket, 2005). These results exemplify how incorporating more hands-on learning opportunities for students, which allow students to connect course material to their lives and the world around them, will have positive impacts on their experience in the classroom, and their retention of the information taught. This is especially important when examining the technical aspects of the Communications curricula with respect to research methods courses, as students have a greater ability to learn research and data competencies, carry these skills with them after university, and apply them to their future personal and professional endeavors. Results from this current study, and in previous scholarship, have highlighted the importance of making research methods courses relevant to students. Other scholarship has supported some participants' strategy of incorporating real-life data into teaching. This method involves teaching less theory; making research more personal and relevant to students, and connecting coursework to subjects beyond an academic scope (Neumann et al., 2013). This strategy was reinforced and recommended by some professors as well as practitioners who advocate for teaching students' transferable skills.

While it is critical to highlight the importance of incorporating real-world application of research methods into the classroom, part of achieving a balanced approach to teaching this material to students is not to completely remove theory from the curriculum. Some scholars support the perspectives that some participants hold of honoring a theoretical approach to research methods, and take a position rooted in the intersection of pedagogy and data literacy. According to Raffaghelli and Stewart (2020), upholding an academic perspective to teaching research methods and data will provide students and educators with a more robust understanding of the discipline and its intersection with other fields. The scholars describe their "Critical Approach to

Data," which includes a vision of personal, social, or technical/research data where the users go beyond data handling (technical abilities) and embedding into social life, but they reflect over the cultural, semiotic and political nature of data in its context of production (Raffaghelli and Stewart, 2020). This critical approach, embedded in Critical Theory, emphasizes that it is important to develop an understanding of how data and research both impact and are impacted by the world outside of academia, and how these theories are important for students to explore in their education. In fact, other scholars have insisted that students need to learn how to think critically about data and statistics before they can analyze data successfully (Hogenboom et al., 2011). When exploring program development in the future, it is important to acknowledge both schools of thought on teaching philosophy by upholding the theoretical essence of research methods, and university curricula at large, while placing attention on the development of tangible skills. Scholars have highlighted that a curriculum that offers a combination of lectures, problem sets, and guest speakers that provide both a theoretical background and analytical methods needed to address research problems are positively received by students, and increase their motivation to learn the material (Mayborn & Lesher, 2018). The results from this study highlight students cannot acquire sound data literacy and research skills without the presence of theory in the classroom, coupled with a strong focus on the application of research and data outside of the academic world.

4.1.2 *Resources*

One of the barriers identified in achieving this balance between teaching theory and more tangible skills are the resources available to professors. Alex (Professor) expressed that communication "departments are not well-equipped to teach practical courses." He noted that this department does not have the infrastructure to teach students more advanced research methods or data literacy skills as there is little-to-no access to labs and learning spaces to help students acquire

these skills and hands-on experiences. He made reference to how students in other departments, such as in engineering or computer science, are "built with the understanding that data is what they do," so these departments are accompanied with those tools, and how these same resources are not available in the communications department. This exemplifies that not only is the teaching material important for data literacy and research skill development, but the environment in which students learn this information and acquire these competencies, and the tools they have access to, is equally imperative.

A solution that was highlighted by Amelia (Professor) is that "there should be more cross-collaboration between communications and other streams" to teach all students how data and research can influence and connect multiple fields. She also suggested that this could be achieved by offering "more applied, workshop-style courses," especially for students who wish to "further specialize in research methods." Workshop-style courses are known for offering students more hands-on learning opportunities, and contribute to active learning. According to one study conducted on the implementation of active learning techniques, an active learning environment, which allows students to be more interactive by promoting activities and facilities that offer brainstorming, group work, case studies, was a workable and preferable approach for students to learn about research methods (Punyabukkana, 2017). Having access to these learning environments, whether in future communications curricula, or in collaboration with other departments, will allow students to better connect with material in research methods courses, and help them understand its application through more active and interactive learning practices. Overall, offering these opportunities to students will help them acquire and retain data literacy.

Another inconsistency in the communications curricula at the University of Ottawa and Carleton University is the lack of teaching resources available. Specifically, professors noted that

throughout their teaching careers at their respective university, there have been very few professors who can teach the same research methods courses consistently year after year. Emma explained that this inconsistency is highlighted with the way quantitative methods is taught in her department. She has noticed that "often part-time professors teach [this course, then] the TA [teaching assistant] will come from psychology or another discipline, and we end up not incorporating communication theories into the teaching of quantitative research methods." This is one barrier to teaching data literacy skills and research methods to communications students as quantitative methods is learnt and applied differently in other disciplines. Additionally, it is challenging to teach research methods, and help students develop sound data literacy skills as they advance throughout their university careers if their foundational knowledge, which is typically acquired in first and second-year university, is inconsistent and at different levels. This challenge was also expressed by another participant, Amy (Professor), who has noticed this lack of consistency in her students' data literacy and research knowledge in third and fourth year-level research methods courses. She explains that once communications students have reached their third year of university, she has to reteach foundation material because these students "had such uneven instruction in their second-year course." Amy discussed her experience working with students who have had inconsistent training and data literacy throughout their university careers. One pattern she has noticed with respect to this subject is how students that she has worked with at all levels "lack a complete understanding of the scientific method." Specifically, she explains that it is most challenging for students to "refer to a scientific method, to understand it, and communicate with evidence" in the work students produce. She interprets that this is because "there is something missing foundationally in their knowledge" when "they are taught this material in their first-year classes." This participant, and others, agreed that one of the ways to resolve this inconsistency is by universities ensuring that

either the same part-time or full-time professors can commit to teaching the same courses year after year.

The solution that Emma (Professor) identified is that universities should have "full-time or part-time professors that know the communications field well [to] consistently teach these courses," especially at the "intro methods" level. This would be one way to address the inconsistencies in students' knowledge of the material, as all students would be taught similar material from the same full-time or part-time professors consistently year after year. This was highlighted as being especially important for students in their first and second years of university, who are likely to be introduced to this material for the first time in their academic career. Emma suggested that with first- and second-year research methods courses, "rather than surveying a bunch of different methods," it is important to focus on teaching students basic skills such as "how to develop really good research questions or hypotheses, what a variable is, what a research design is and why it matters, how we can make claims and the different kinds of evidence that can be useful" consistently by the same professor(s). Introductory-level research methods courses could host a large number of students, which would introduce the fundamentals of research methods, and would be consistently taught by a group of professors to ensure that all students acquire the same baseline knowledge of research methods and data literacy.

Part of acquiring this baseline knowledge includes an understanding of the scientific method, to which one participant noted was lacking amongst communication students. In a study conducted on teaching the scientific method to students in research methods courses, scholars highlighted that when students are able to define their own projects and develop a connection to their research, they acquire a better understanding of the process and how it can be applied to other areas of research methods (Mayborn & Lesher, 2018). The results of this study showed that

students possessed high levels of insight and creativity, and demonstrated that they were challenged and motivated to learn about the scientific method's application to research. Additionally, students felt a sense of accomplishment upon the completion of their own project (Mayborn & Lesher, 2018). The incorporation of student-led projects into introductory research methods courses is an important consideration to highlight in the development of a consistent program, when teaching students research methods at the introductory level, as well as teaching the scientific method. Teaching foundational skills and principles to students, and supporting this learning through the creation of their own projects will help students acquire strong data literacy. By ensuring that all students have this similar baseline knowledge of research methods early on in their academic careers, this will help professors, who are teaching third- and fourth-year research methods courses, build on their students' knowledge even further, try more advanced material and techniques, and help students acquire a higher data literacy. Once students reach their upper year research methods courses, these classes could be smaller, more specialized and offer more hands-on learning opportunities for students to master research and data competencies. By having students enter third- and fourth-year research methods courses with a consistent, strong baseline understanding of the material, it will help professors incorporate more advanced, hands-on learning opportunities for students that incorporate real-life data and more student-led projects, which will help students acquire a stronger interest in the material, as well as more sound data literacy.

4.2 Stigmatization of Research Methods

Another theme that was identified in the data collected from participants in Group 1 and in Group 2 is the stigmatization of research methods courses, and learning about data in university. One of the greatest barriers to teaching and learning data literacy and research skills is that students

struggle to understand how research methods will be useful for their careers in the communications industry. Professors in Group 1 consistently noted that the use of equations and components of math in research methods courses, according to Emma (Professor), "is daunting for most people in social sciences" and specifically amongst communication students. According to other participants in Group 1, quantitative methods has been a particular challenge because students cannot see the connection between research methods and work that they might perform in the future, such as "writing press releases or coming up with a communications strategy" (Alex, Professor). This finding supports existing literature on how there are preconceived expectations about the course content in research methods classes being irrelevant to students' future careers (Steel et al., 2019). These results create further challenges in teaching this material, as well as further deterrence against students' adoption and retention of research skills and data literacy.

The challenges with teaching research methods courses in general, and especially quantitative methods, was highlighted as a constant issue for all participants in Group 1, as their students have consistently expressed disinterest in the subject, as well as fear and resistance towards learning with numbers. Emma (Professor) expressed that "there is a lot of anxiety that as a professor, [she] has to manage before [she] can even get to the stage of teaching people the basics that [she] needs them to know." The fear and anxiety experienced by students has been highlighted as one of the main barriers to teaching research methods to students throughout scholarship, especially amongst students in the arts and social sciences (Carter et al., 2017). Cameron (Professor) noted that one of the reasons why students have this fear is because research methods courses are "dry courses." He explained that:

> "99.5% of students in [his] classes have an interest for psychology or communication or something else. But they're not here because they like stats or data. They're here

> because they wanted to do something else, but they are imposed a research methods class and a stats class. So, they all come in with a pre-made idea that they're not into that. That's not what they were here for."

In addition, Amelia (Professor) explained that one of the reasons why students express resistance and trepidation with taking these mandatory courses is because students question their usefulness and practicality when they are not pursuing careers in math or computer science, and therefore question how this information will be relevant to them.

Some participants in Group 2 (Practitioners) who had studied communications at the undergraduate level reflected on their experiences taking research methods courses, and their hesitation towards learning this material as well. Isabelle (Practitioner), who is working as a Director of Media and Issues Management in the health field expressed her dread for learning this material throughout her undergraduate degree, and explained that she didn't understand how it would be useful to her at the time. She attributes these feelings to the ways in which this information was taught to her, and expressed that "the way it was taught was not useful" as it was focused on the theory of statistics and research methods, as opposed to its application to areas beyond an academic scope. In retrospect, she admits that learning this material helped her acquire a foundation that she continues to build upon throughout her career, but only recognized the value of this information after she left university. Jodi (Practitioner), who works in digital communications with the Government of Canada, explained that she experienced similar feelings, and understood this resistance from communication students. She expressed that when students are entering research methods courses "from the more creative side, there is sometimes resistance. [Students] are afraid of spreadsheets […] Creativity and math do not always go together." This discrepancy between more a more "creative" program such as communications versus other

programs that are more number or data centric was highlighted by Carrie (Professor), who has taught communication courses to students in the program and to students in other disciplines such as computer science. She reflected on how the mix of students from different disciplines could have "increased the art student phobia" of acquiring data literacy and research skills, particularly when students have compared themselves to one another. She explained that many communication students possess strong "art skills, and they're excellent researchers. They can write, and think outside of the box." She proceeds to interpret the way some of these students have felt in these situations, and said: "But because I'm sitting next to someone who already knows about natural language processing, or who already has all of these tech skills, they're going to ace natural language processing […] or digital humanities, and I'm [going] to fail. So maybe I should take a step back." Due to this feedback, this is one of the reasons why professors have difficulty teaching this material to students in interesting ways; when they recognize that these courses are perceived negatively, and specifically because they are viewed as being dry and not useful to students.

The fear and hesitation that students have expressed was also shared with two professors, Cameron and Amy. Cameron (Professor) explained that because there is a known stigma towards these courses, he used to feel "so stressed because teaching stats is super stressful." He expressed that he would "choke before class […] because [he] knew that what was being taught was difficult, and [he] knew how hard it is to convey this material properly." Amy (Professor) echoed a similar experience, and she mentioned how "it's very nerve wracking to bring in new research methods and approaches and to take chances on learning objectives when you're being evaluated [by students], and that could affect whether or not you're going to have a job in the future." This comment exemplifies the fear she has experienced when she attempts to strike a balance between teaching theory, and presenting interesting ways in which this information can be relevant to

students' careers. The struggle to find this balance was also shared amongst other Group 1 participants, coupled with the balance of teaching students the material they need to know, while managing their anxieties towards this subject matter. Some of the tactics that participants utilize to strike this balance is to ease into teaching research methods by teaching the material in "unique ways through multimedia," linking the material to other theories such as "political communication theories," introducing the material "slowly", and "being available to answer questions for students" as often as possible. However, even with these strategies in place, participants expressed that it is still challenging to demonstrate the transferability of this material, and make it interesting for students overall.

With respect to the fear and anxiety that students feel towards taking research methods courses, and working with data and numbers, professors shared multiple pieces of advice to help students overcome these fears and gain confidence in their research abilities. Sonya (Professor) explained that throughout her time teaching research methods courses, she has tried to "demystify the complexity" of data because, having worked in the software industry prior to her teaching career, she believes technology, data, and software engineering industries "frame this information as complex technology" and have created a "mythology" about this information. She explains that she tries to use examples in her courses where she strips the information down to teach students the fundamentals and basics of data and research. She elaborates on how she tells her students that this material "is not rocket science, and there is no mythology or secrecy" with respect to how data and research work in various industries. She has achieved success in teaching this material by showing her students how these systems work by "breaking this information down into chunks" that are more digestible and less complex. She explains that when she utilizes this approach, the "light bulb goes on and the fear diminishes, as [students] can see how they can access particular

kinds of seemingly complex applications in ways that enable them to do particular kinds of things with them."

In addition, Alex (Professor) demonstrated how he diminishes fear and anxiety in the classroom by having students run their own projects at the beginning of the course. Due to the fear and resistance that he would notice from students at the beginning of each semester, he reflects on how he used to spend the first five weeks of his courses tending to those fears "before getting into running data. Now, [he does] it after the second week of the semester." His rationale for this approach is that students:

> "…Get into doing something applied right off the bat, even though they probably don't understand what they're doing. It doesn't matter to me. I just want them to produce numbers through the software. And then [they] are re-engineering backwards, and try to understand what that means instead of building it up, and then [they] understand how it works."

He explains that for students "to be able to start running their own projects within two weeks, they'll say 'I'll never be able to do that' and within two weeks, they were able to do it, even if it's at the very basic level. And I think they appreciate that." He believes that when students are given the autonomy to start their own projects, "confidence breeds confidence," and this helps them develop more of an appreciation for the material, and feel confident about it, because they produced part of it themselves. This is another solution to teaching these courses in interesting ways, as it allows students to get involved with the material by allowing them to produce their own projects. Cameron (Professor) believed in a similar approach by letting his students run their own complete projects throughout the semester, so they can acquire the necessary skills and data

literacy, but feel proud about completing their own project from start to finish. Scholars have supported these strategies, and have highlighted that when professors are hosting student-led projects, these projects should include a wide range of investigation and have real-world applicability, which will solidify the connection between process/theory and practice (Ridsdale et al., 2015). These projects should also include "real-world data, relevant to the students' interests and in an engaging context, not just data for the sake of data. Increased engagement in working with data can foster innovation, improve learning, and increase the likelihood of lifelong learning" (Ridsdale et al., 2015). Some participants of this current study highlighted that implementing projects that offered students (whether in introductory level research methods courses or more advanced courses) the opportunity to run their projects, and select personal topics of research resulted in positive student feedback, greater confidence in their abilities and work, and a greater connection to the course material.

Another solution to diminish student fears and anxiety towards research methods is for professors to make themselves available to students to answer questions and provide them with support. Emma (Professor), who understands the complexity of research methods courses and data, explains that when her students approach her and express that they don't understand a concept, she "will re-explain the same concept seven different times, over seven different meetings, if that's what the student needs." Cameron (Professor) offers this as well, because he understands that students need to feel "their sense of competency. They need to feel competent to feel motivated and to continue to feel comfortable. So, you need more practice for that." Existing literature has noted that offering students time to ask for help, figure out processes and methods on their own, and make mistakes will help them readjust their own understanding, as mechanics are very important in data literacy, therefore more practice is required (Ridsdale et al., 2015). In addition

to extra time, an appropriate physical space is also important in this endeavor, to which scholarship has noted that environments which offer hands-on learning environments in workshops and labs "provide students with the necessary practical experience needed to fully understand the technical skill" (Ridsdale et al., 2015). Offering students the opportunity to explore course material with the individual guidance of a professor (if needed), as well as more active learning environment will encourage students to employ critical thinking and problem solving to their work (Ridsdale et al., 2015). Adequate support, as well as a hands-on learning environment will allow students to fully adopt knowledge in research and data, exercise critical thinking skills, and gain more confidence in their understanding and abilities. When students feel more confident about their abilities, this can also make professors more confident about teaching this material to students, which would address the fear and anxiety expressed by some participants who have taught research methods courses. These opportunities and strategies are suggested to help diminish the fear and anxiety amongst students, and help them acquire data literacy.

Other professors support the idea of being available to students to provide them with extra help, but also by incorporating their personality into teaching. Professors also expressed that they incorporate humor into their lectures, or they get to know students better, because these actions allow professors to connect with students and make them feel more comfortable in the course. According to student feedback that these professors have received on these teaching styles, Cameron explained that his use of humor in the classroom is usually well received, as well as his care, and the adaptability that he brings to the classes. Students have expressed to him that they initially "thought the course would be dreadful, but they realized their autonomy was supported. They realized they felt competent. They got this relatedness, which has made them more excited about the material." This demonstrates that when professors allow for more time and opportunities

to help and connect with their students, students view these courses and the material more positively. This could also help professors feel less intimidated or fearful towards teaching the material if there is time and effort applied to connecting with students. Participants also noted that supporting students' autonomy can help to make these courses more interesting for students, and allow them to connect with the material better, see the value of the work they've produced, and understand how it could be applicable to work they could perform in their future careers.

4.3 Transferability of Skills

The third theme that emerged from the data collected from both participant groups is the importance of the transferability of research skills into the workplace. One of the barriers identified with respect to the transferability of skills is that, according to some participants, universities do not have an adequate understanding of industry and stakeholder needs. Alex (Professor) recognized this issue, and noted that it is extremely important for professors to "get a sense of what's going on in the marketplace." He, being a professor himself, explained that a professor:

> "…cannot teach these courses in isolation. You do a disservice to your students if you don't understand how it's used in your world, or in the consulting world; you're actually doing a disservice, because you're teaching stuff that they won't be able to use in the marketplace."

This was echoed by some practitioners who were interviewed, one of whom, Isabelle expressed how important it is "for communicators in any educational curriculum [to] link material to the 'so what'." Some professors who were interviewed were attuned to this notion, as Cameron explained that he incorporates "a lot of hands-on practice with real world problems," and has his students "think critically about these problems." While some professors are adopting these strategies today,

the results from this study have highlighted that these strategies are not necessarily common practice since there is a divide in teaching philosophy. In addition, other professors presented their struggle to offer a balance between teaching theory, and presenting how this information can translate into useful, tangible skills for students. These discrepancies, and lack of consistency with teaching research methods courses and data literacy have been noticed by practitioners in the communications field. In fact, the practitioners who participated in this study consistently noted that there are gaps in students' research knowledge, and these inconsistencies are apparent in the work they perform within their organizations. Rhiannon (Practitioner), who is working as an Organizational Communications Consultant, had experienced this first-hand: "I remember taking those classes, but I never actually remember them landing with me. As a practitioner, I always sort of had a feeling that this will be great knowledge if I became a professor or if I wanted to do research in this space, or if I wanted to go into academia; then I would know how to do this. I think where there is a gap is how this translates into practice. I think that some of those skills and competencies are missing."

A solution that was highlighted throughout interviews with both groups is that professors "must bring practitioners into the classroom to show students how data and research are applied outside of the classroom" (Alex, Professor) and to demonstrate what the demands are for this type of work in the communications field. Arnie (Professor) noted that for other professors teaching research methods to students, "having an understanding of the practical world is the most useful perspective in teaching." Arnie explained that he likes to "go to the public sector and private sector to give students an idea of what they can do when they graduate." In addition, Alex (Professor) expressed that if "professors don't have any perspective on how it's being used in the world, [they] don't teach the right things to students." This professor explained that while he has been teaching

research methods to students, he has "always had his foot in the practical world." In his experience leading and working on research teams in the private sector, as well as for Crown Corporations, he believes that this experience "is the most useful perspective that [he brings] to teaching quantitative methods" because he has an understanding of how these skills can be applied in various roles and organizations. For professors who cannot offer their own perspectives and experiences from using data and research outside of academia, he explains that it is important to bring in practitioners to demonstrate this connection to students. He notes that if a professor "is not on the other side experiencing how people consume data, there's a big gap in terms of what university teaches, and how it is applied in the real world." Scholars have highlighted how critical it is to draw these connections between academia and business, as organizations are increasingly using data and research to collect insights into their current practices, spark new business ideas, and use data analytics to support their work functions to understand techniques, technologies, systems, practices, methodologies, and applications (Chen et al., 2012). Considering the presence of data in multiple work functions, as well as how it can be applied to roles and responsibilities in the communications profession, it is important to demonstrate the value of this learning material to students, and how the skills they are acquiring will be beneficial to their careers. Participants in both groups agreed that demonstrating this connection between educational material and its application to other fields and jobs is paramount for ensuring material is transferable for students.

Understanding different perspectives on how data and research are used outside of academia will also help professors gain a better understanding of what to teach students, and how to teach it. For example, Alex explained that if students "want to use these skills and get into the business world, they need to be able to tell a story. Storytelling is one of the most important things […] You're using data to tell a story to your client." This was echoed by practitioners who believe

it is important to demonstrate to students how data can "determine an organization's next strategy", or how to summarize data to "make key messages to help your organization's brand and reputation", or even how to "write a narrative […] and part of that understanding comes with having an understanding of what research is, and what data is." Amy (Professor) noted that, even at the most foundational level, students should learn how to "understand the differences in sources when collecting evidence" and use "critical thinking to ask questions about data or look at data in multiple ways." She expresses that this is "particularly important for communication professionals" because they need to have an understanding of "these sources, and understanding exactly what this data means." These are some of the suggestions that practitioners provided to professors to teach this material to students, and help them acquire practical skills and data literacy. While there is little existing scholarship on how data literacy is used in the communications industry, scholars have identified the role data and research are playing in business at large. Ridsdale et al. (2015) identify collaboration between educators, organizations, and institutions as one of the best practices to teaching data literacy. Bringing practitioners into the classroom to demonstrate how coursework in research methods are applied to their jobs and organizations, and teaching students tangible skills to perform similar work to these professionals will ensure that goals are being met by all stakeholders (Ridsdale et al., 2015). The comments and suggestions offered by participants in both groups of this study demonstrate the importance that data and research play in the communications profession, and why it is especially important for communication students to acquire tangible research skills. Teaching students practical material and more transferable skills was also expressed as being extremely important to some professors, particularly Cameron, believes that transferability allows a professor "to be able to adapt to what comes next. Students need to be able to have skills, because if [they] only learn theory of media

relations […] they will learn this and never use it again in their lives, so why did I waste my time teaching it? Why are we even seeing this if it's not going to be applied somewhere else?" Demonstrating the application of research methods will help connect teaching material to the "so what," which was identified by one practitioner as being important when teaching data and acquiring data literacy.

To apply coursework and research methods theories to information beyond an academic scope, Arnie (Professor) uses "information from data research firms, or market research firms, so [students] can get a better idea of what to do with the information that [he] is giving them, even though it is introductory information." In one example, he explained: "My biggest approach to teaching has been to teach [students] the steps of conducting survey research. It's been to show them how surveys influence opinions and attitudes of the real world, and what's happening in the U.S. Presidential Election, or the Canadian Election, different conspiracy theories, COVID-19, and how data is used in those contexts." Amy has her students "read data in a real report about a real submission submitted by a real city [to give] them first-hand knowledge of what those kinds of reports look like, and how they're adjudicated." In one of her fourth-year research methods courses, she also teaches her students how to present a "pitch to data scientists," and specifically, "why they should care about a critical perspective of data, especially since they are the producers of data products." Carrie, another professor, tries to achieve this balance by approaching her courses "with a project-management angle" and thinking about her coursework as a complete project with an audience at the end of the project. As explored previously, scholars have noted the importance of project-based learning to connect students with data and research (Mayborn & Lesher; 2018; Ridsdale et al., 2015) Arnie, who was very firm on incorporating multimedia into his teaching in research methods, believes that it is critical for students to "explore how research,

data and numbers influence opinions and attitudes in the real world." Participants noted that these more pragmatic learning activities have caused their student's views to change about this material, and in many cases "they learn that they can use these skills later in their jobs or in future research" or in their future careers.

4.4 The Need for Professional Development

Another theme that emerged from the data collected is professional development. Practitioners explained the role that data plays in their business practices, and the importance of their employees exercising these skills. Arlette (Practitioner) explained that in her role as a Strategic Communications Advisor, she needs to exercise the ability to educate her clients, bosses, and management on the value of her ideas, and to be able to advise others properly. In one of the tasks that she performs, which is understanding and communicating with various audiences, she explains that "you need to use data and research" to perform this work fully and accurately, otherwise the work is incomplete and lacks validity. Another practitioner, Karen, who is a Vice President at a marketing agency, expressed that in her field, she and her Project Managers "need to have a fairly high degree of data literacy" because they are communicating the data that they use and generate to their clients every day. She explains that at the agency, "those who are working directly with data need to have the ability to interpret the data from marketing campaigns and activities, and that data will either lead to recommendations – start this or stop that – or to reflect on how [they] have been doing as an organization. So, data literacy is key as it's used on a daily basis." While these are only two examples of how data is used in the communications industry, every practitioner noted that they exercise some degree of data literacy in their role, and that they could not perform their work function without having an understanding of data and research. These skills are so important that in many cases, organizations offer professional development

opportunities for their employees to achieve a higher fluency in data and research (Chetty et al., 2018). One of the reasons why more organizations are offering these learning opportunities is because it is important to keep abreast of research trends and tools. This supports existing literature on how companies of all sizes are looking to take their business to the next level, and are using data and research to meet these objectives (Pothier & Condon, 2019; Chetty et al., 2018). Karen (Practitioner) noted that the company she works for "does their best to educate their employees [because] it's important for everyone to have some digital acumen," and how they look for people to hire who have graduated with these skills. She continues to explain that their employees have ongoing learning opportunities in data and research, and all employees attend these sessions. Many practitioners expressed their gratitude towards their employers for offering professional development opportunities in data and research, because they recognize the importance of these tools in the work they perform for their organizations and their clients. These participants expressed that they all attend these professional development sessions to stay up-to-date on the latest trends in the field. Others expressed gratitude towards their employers because they had not acquired data literacy at university, and are now able to develop it in the workplace.

In other cases, professional development in research and data literacy has been provided in some workplaces because some employers witness the lack of basic research knowledge and data literacy that their employees possess. This was identified by scholars as being "one major hurdle for companies seeking to become data-centric" as there is a lack of "data literate talent for hire in the current market of recent college graduates" (Pothier & Condon, 2019). Data literacy is no longer only required amongst specialized positions in data science or data analysis; having data literate business professionals will fit organizational gaps and help to continue to move industry forward (Pothier & Condon, 2019). Practitioners highlighted how data and research are important

to their work functions in the communications industry, but that they are having difficulty finding professionals with baseline data literacy and research knowledge. One participant, Simone, who holds a lot of experience working with new graduates, has witnessed this lack of research knowledge and data literacy that she believes communication graduates should possess. In fact, she explained that there is an expectation that communication graduates possess strong data literacy skills, and claimed that in her experience, "people don't have great data literacy coming out of a B. Comm [Bachelors of Communications] most of the time." One example she has noticed with predominantly recent graduates is that when they are performing research, they will use secondary sources instead of primary sources. She explains that in these situations, "the thought process that leads to going to the primary source is often missing." She elaborates further by explaining how she intervenes by walking her team through the research steps. She points out that everyone on her team who is performing this work has access to a rich database with multiple information sources and journals, but "it's not innate in a lot of communication graduates to not use secondary sources." This participant adds that new graduates will often fail in these tasks where data literacy is required, and with "anything related to data." She explains that her colleagues with a "dual background" (i.e., individuals who have education and/or experience in more than one discipline) are typically most successful in achieving these research tasks because they have more experience working with data. In comparison to graduates in communications, she believes that they have "a huge challenge, and there is an expectation that these people know how to interpret data and how to turn action into findings, but we're just not there yet. So internally, employers will have to have some data literacy plans to support employees." She concluded her thought by expressing her hope that these skills "should be part of the education program" as they are not only

used in one's professional life, but also in their personal lives, and she mentions that it would be useful for people to have this knowledge "as part of their overall skill set and in their tool belt."

While it is positive that some organizations are investing dollars into their employees' professional development in this area, some participants believe it is becoming an expectation that new hires, especially recent graduates, possess strong data literacy. Another participate, Diane, who is a Director of Communications in the health field, explained that having research skills "is almost expected now because we know the value of it." This expectation was also expressed by other participants, as some noted that it is challenging to recruit staff members because data literacy is needed in multiple work functions, and many people do not have it. Simone noted that she has "not been incredibly successful" at finding communication graduates who have a strong research acumen, and has had more success hiring individuals who have a "dual background who don't come from a communications background only" because the students with a dual background "have had to use data in some way, shape, or form" throughout their education. She explains that when she has hired communication graduates, "especially new grads, it's been challenging because [she] has to do the coaching, and then the training, and then the mentoring that comes with that, and the revisions." She highlighted that this extra training that is involved with communication graduates contributes to her overall workload, and makes her "plate much heavier." She also noted that in interviews with communication graduates, they will "fail answering questions that are related to data literacy, and anything that has to do with data. Data literacy, but also performance measurement, and all of those things." She believes that this is one of the greatest barriers to hiring new employees because there is an expectation that graduates possess these skills, but in her experience, they do not. She highlights that to compensate for this lack of knowledge and training, "employers will have to have some data literacy plans to support employees." While more

organizations are offering professional development opportunities to their employees to improve their data literacy and research skills, these results demonstrate that demand for these skills amongst new hires in the communications field is increasing in many organizations. In fact, another practitioner believes this demand for high data literacy is "going to start to become more apparent now that our world is becoming more and more digital, and we have access to more digital information and data." Existing literature has highlighted that while some organizations are offering professional development in data and research, it is not common practice, as many organizations believe it is the responsibility of academic institutions to teach young professionals foundational data literacy and research skills (Wolff et al., 2016). Studies have determined that organizations hold educational institutions responsible for producing graduates who are sufficiently data literate, therefore the development of basic data literacy skills should be acquired in university (Chetty et al., 2018; Wolff et al., 2016).

Practitioners offered suggestions to how academic institutions can prepare students with these skills for the workplace. Participants applied the same solutions that were identified in the barriers under the "Transferability of Skills," particularly with ensuring that professors acquire an understanding of how data and research are used in the marketplace, and to teach students tangible skills that can benefit their work in research in their future careers. To prepare students for careers in the communications industry, and to ensure that students acquire strong data literacy, and apply this knowledge to their future work, practitioners provided additional suggestions of skills that they can teach their students in research methods courses. Practitioners reiterated that it is important to "know how to tell a story with data, and convince people to care about that story" (Jodi, Practitioner). It was also highlighted that it is critical "to contextualize and distill information, and be able to bridge the gap" between data and communication (Simone,

Practitioner). This can be achieved by bringing practitioners into the classroom to demonstrate how learning material can be applied outside of the classroom. It can also be achieved by professors incorporating real-life data into their coursework so students can apply learning material to the "so what" (Isabelle, Practitioner). Bridging this information also requires students to exercise more abstract skills that some professors and scholars have noted as being critical to teaching research methods and data literacy. One of the most common suggestions offered by practitioners, particularly Diane, was for students to be able to "exercise critical thinking, and apply this when looking at data." Critical thinking has been highlighted by scholars and professors interviewed in this study as being an imperative tool for acquiring data literacy (Pentland, 2013; Swan et al., 2009). Having both stakeholder groups recognize the importance of this skill will hopefully inspire change in university curricula to ensure that students master this competency. Additionally, Simone (Practitioner) suggested that it is also critical for students to "understand how to summarize findings and make sense of them," "understand the validity of sources," and "understand how to visualize and present data." These suggestions could be explored in hands-on learning environments, or through student-led projects that participants and scholars have highlighted as best practices to teaching research methods to students (Ridsdale et al., 2015). Participants in Group 2 also highlighted that if these skillsets are incorporated into research methods courses, students will graduate with data literacy that can be applicable to any role in communications.

4.5 Discussion

The results from this study have provided insight into the two main research questions of this study, which sought to explore how research methods courses have been taught to students at both universities, and which competencies organizations are looking for when hiring

communication graduates. The solutions to the identified barriers in the study answer the third research question on how curricula in communication studies can be improved. These results demonstrated that the ways in which research methods and data literacy are taught to communication students will have an impact on students' ability to exercise these skills in their professional and personal lives. This information also demonstrates that organizations in the communications industry who use data and research as part of their communications functions look to academic institutions to prepare their future employees with these competencies. The greatest barrier to preparing students with these skills is a result of what professors are teaching to students in research methods, and how these courses are being taught to students. Participants in this current study and other scholars have highlighted that academic institutions hold the responsibility to teach students sound research skills and data literacy. If not, there are tremendous impacts not only on the students who pursue these programs, but also some of the organizations which hire these students in the future.

4.6 Limitations

This study has potential limitations that should be noted and discussed. First, socio-demographic information was not collected from the participants in this study. Data on participants' amount of professional experience, their age, gender or educational background were not documented or taken into consideration when interpreting the results of this study. It is important to recognize that these variables may have influenced participants' responses and perspectives to interview questions. However, these considerations do not align with the nature of an interpretivist approach to the data analysis used in this study. Utilizing an interpretivist approach to data analysis requires the documentation and interpretation of data at face value. Analyzing why participants responded to questions the way they did, or identifying factors that might have

motivated participants to provide the responses they provided would have resulted in reaching beyond the data, to which qualitative research does not allow. This study sought to identify barriers and solutions to achieving best practices in data literacy education, therefore the methodology employed in this study would not have supported the analysis of participants' demographic information. Gender differences, age, or the amount of experience that participants held could be examined in future studies, particularly on university professors, to better understand their behaviours and motivations with respect to teaching data literacy and research methods to students.

Additionally, it is important to highlight that the majority of professors who participated in this study have taught, or primarily teach research methods courses in English. While some francophone professors participated in the study, the majority of professors who were interviewed taught or teach these courses in English. Francophone professors were contacted during the recruitment process; however, due to the fact that a rolling recruitment approach was utilized to adhere to research timelines, participants were selected on a first-come, first-served basis. Some francophone professors were not available to participate in the study, in which case, other professors were contacted for recruitment. The language in which research methods courses are taught is another socio-demographic variable that was not analyzed in the study, but it is worth noting that the bilingual nature of the institutions may contribute to the challenges of standardizing the content taught in research methods courses. The exploration of language, and the potential discrepancies between research methods courses taught in English and French could be another future study, particularly in the exploration of curriculum improvement. While this current study did not support this exploration, this could be one factor worth examining if professors and curriculum experts seek to establish foundational research methods courses in first and second year university curricula.

A third limitation to note is in the recruitment of communication practitioners. The majority of practitioners interviewed in this study are employed in the private sector, while only one practitioner is employed in the public sector. Over 30 practitioners were contacted through LinkedIn during the recruitment period of this study, which consisted of practitioners from both sectors. As mentioned previously, selection of participants was established on a first-come, first-served basis, and ensuring that participants met the eligibility criteria to participate in the study. While there was a strong representation of communication practitioners belonging to different industries (e.g. health communications, social media, marketing and advertising, government communications), future studies could further explore and analyze potential differences in expectations, experiences, and perspectives between practitioners and employers in the private and public sectors.

Chapter VI: Conclusion

In conclusion, the results from this study have also demonstrated that there is a demand for academic institutions to improve research methods courses within the communications programs at the University of Ottawa and Carleton University to promote data literate graduates. Currently, there are multiple challenges with teaching research methods courses and data literacy to their full potential. These barriers include: the opposing views on the importance of a theoretical versus a practical approach to teaching research methods courses; students' fears and apprehension towards the educational material; the lack of available resources to teach this material consistently and effectively; and the difficulties with making course material interesting and relevant to students' lives and their careers. As a result of these barriers, students are not graduating with strong data literacy skills that are now a requirement to working and advancing in the communications industry. This has a direct impact on organizations who are seeking these skills amongst new graduates. Practitioners have expressed that professional development opportunities are offered in some workplaces for employees to keep abreast of ongoing trends and advancements in data and research, but also because of the lack of the foundational data literacy that the workforce possesses. The barriers identified by both participant groups demonstrate that if graduates do not possess foundational data literacy skills that are transferable and applicable to the job market, they will be ill-prepared for their careers, and will be a hindrance on their personal and organizational advancement. There are numerous solutions to presented to fix these identified barriers, and are suggestions on how to fill the current educational gaps to prevent this unfortunate outcome from materializing. Bringing practitioners into the classroom, employing workshop-style courses and hands-on activities led by students, and teaching an appropriate balance of theory and application of learning material solutions proposed by both professors and practitioners in the communications

field. Ensuring that the same professors are available to teach research methods courses consistently, and teaching students in more interactive environments were solutions proposed on improving university curricula at large. Giving students the space and autonomy to personalize their work, lead their own projects, and connect learning material to real-world issues were additional solutions to helping students overcome their fears, establish more confidence, and acquire an appreciation of and interest in data and research. Conclusively, the availability of these tools and resources will help students acquire strong data literacy skills. These suggestions can be incorporated into future curriculum development to ensure that students are taught sound data literacy competencies and become more informed citizens and decision-makers. In addition to these solutions offered by professors and practitioners, utilizing Gal's Conceptualization of Data Literacy (2002) can act as a tool to teaching students research methods and data literacy in a holistic, comprehensive manner. The five competencies that Gal outlines in his model constitute an individual's ability to act as an effective data consumer in different life contexts, and is a model which is adaptable to not only the field of communications, but any university program. Ensuring that students possess strong critical thinking, general literacy knowledge, mathematical and statistical knowledge, and context knowledge will benefit them, regardless of their career or path in life. Should academic institutions honour the ideas and suggestions passed on from the professors and practitioners in this study, universities will be properly equipped to offer students practical, transferable, and enjoyable learning outcomes.

5.1 Recommendations for Future Research

Scholars have identified that institutions must adapt their undergraduate programs to ensure that data literacy and research skills are up-to-date with evolving business and marketplace trends and demands, and to the world at large (Neumann et al., 2013). This study has demonstrated key

barriers to achieving best practices in research methods and data literacy education, and has provided solutions from two stakeholder groups on how to improve the current state of these course offerings. With the problems and their solutions being highlighted by stakeholders who contribute to, and are impacted by these learning outcomes, it is recommended that this information be considered in future curriculum enhancement or development. The outcome of offering more robust research methods courses in communications programs, and other programs within the humanities and social sciences, will help students acquire strong foundational data literacy skills that they will be able to retain and apply to their personal and professional lives. Organizations will be in a better position to meet their business objectives, remain up-to-date on market trends, and stay relevant and competitive by having a data literate workforce.

For greater curriculum enhancement, additional research could explore other stakeholder perspectives, such as from students who have taken, or are currently enrolled in research methods courses, to further understand attitudes, motivation, and interests of individuals learning and applying this material. This perspective could contribute to developing an understanding of more potential barriers to achieving best practices in data literacy education. This proposed idea, as well as the insights gathered from this current study, can be tools to be utilized in future curricula enhancement or development not only in university communication departments, but to any undergraduate program in any field. While this study sought to explore educational gaps in communications curricula, and how data and research are used in the communications industry, the advice and recommendations presented by participants in this study are applicable to all university programs that are seeking to enhance data literacy and research education.

Higher education institutions must take initiative to ensure that students are achieving the competencies they need to be successful in the future. Improving data literacy education can only

be achieved if we continue to consult, seek guidance, and collaborate with industry stakeholders. This is one critical step to preparing the next generation of professionals, advocates, and decision-makers.

Bibliography

Al-Yateem, N. (2012). The effect of interview recording on quality of data obtained: a methodological reflection. *Nurse Researcher, 19*(4), 31-35. https://doi.org/10.7748/nr2012.07.19.4.31.c9222

Ball, C. T., & Pelco, L. E. (2006). Teaching Research Methods to Undergraduate Psychology Students Using an Active Cooperative Learning Approach. *International Journal of Teaching and Learning in Higher Education*, 147-154

Barraket, J. (2005). *Teaching Research Method Using a Student-Centred Approach? Critical Reflections on Practice*. Retrieved from Journal of University Teaching & Learning Practice. Retrieved from: https://ro.uow.edu.au/jutlp/vol2/iss2/3/

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Callingham, R. (2006). *Assessing Statistical Literacy: A Question of Interpretation?* Retrieved from ResearchGate: https://www.researchgate.net/publication/252144607_ASSESSING_STATISTICAL_LITERACY_A_QUESTION_OF_INTERPRETATION

Carlson, J., Fosmire, M., Miller, C., Nelson, M., & Carlson, J. (2011). Determining Data Information Literacy Needs: A Study of Students and Research Faculty. *Portal: Libraries and the Academy*, *11*(2), 629–657. https://doi.org/10.1353/pla.2011.0022

Carter, J., Brown, M., & Simpson, K. (2017). From the Classroom to the Workplace: How Social Science Students Are Learning to Do Data Analysis for Real. *Statistics Education Research Journal*, *16*(1), 80–101. Retrieved from: https://iase-web.org/documents/SERJ/SERJ16(1)_Carter.pdf?1498105017

Castleberry, A. (2018). NVivo 12 [software program]. Version 11. QSR International.

Chen, H., Chiang, R., & Storey, V. (2012). Business intelligence and analytics: from big data to big impact.(Special Issue: Business Intelligence Research)(Essay). *MIS Quarterly*, *36*(4), 1165–1188. https://doi.org/10.2307/41703503

Chetty, K., Aneja, U., Mishra, V., Gcora, N., & Josie, J. (2018). Bridging the digital divide in the G20: Skills for the new age. *Economics*, *12*(24), 1-21. http://dx.doi.org.proxy.bib.uottawa.ca/10.5018/economics-ejoumal.ja.2018-24

Chowdhury, M. (2014) Interpretivism in Aiding Our Understanding of the Contemporary Social World. *Open Journal of Philosophy*, 4, 432-438. 10.4236/ojpp.2014.43047.

Cimpoeru, S., & Roman, M. (2018). Statistical Literacy and Attitudes Towards Statistics of Romanian Undergraduate Students. *IDEAS Working Paper Series from RePEc*. Retrieved from http://search.proquest.com/docview/2189148295/

Cowan, D., Alencar, P., & Mcgarry, F. (2014). Perspectives on Open Data: Issues and Opportunties. *2014 IEEE International Conference on Software Science, Technology and Engineering*, 24–33. https://doi.org/10.1109/SWSTE.2014.18

Davenport, T. H., & Patil, D. (2012, October). *Data Scientist: The Sexiest Job of the 21st Century*. Retrieved from the Harvard Business Review: https://hbr.org/2012/10/data-scientist-the-sexiest-job-of-the-21st-century

Daymon, C., & Holloway, I. (2011). *Qualitative Research Methods in Public Relations and Marketing Communications.* New York: Taylor & Francis Group.

Deahl, E. (2014). *Better the Data You Know: Developing Youth Data Literacy in Schools and Informal Learning Environments.* Massachusetts Institute of Technology. https://doi.org/10.1057/s41599-019-0279-9

Deakin, H., & Wakefield, K. (2014). Skype interviewing: reflections of two PhD researchers. *Qualitative Research*, *14*(5), 603–616. https://doi.org/10.1177/1468794113488126

Doucette, L., & Fyfe, B. (2013). Drowning in research data: Addressing data management literacy of graduate students. ACRL. Retrieved from http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/2013/papers/D oucetteFyfe_Drowning.pdf

Gal, I. (2002). Adults' Statistical Literacy: Meanings, Components, Responsibilities. *International Statistical Review*, *70*(1), 1–25. https://doi.org/10.1111/j.1751-5823.2002.tb00336.x

Ghazivakili, Z., Norouzi Nia, R., Panahi, F., Karimi, M., Ghlosorkhi, H., & Ahmadi, Z. (2014, July). *The role of critical thinking skills and learning styles of university students in their academic performance*. Retrieved from US National Library of Medicine National Institutes of Health: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4235550/

Gunter, G. A. (2007). *Building student data literacy: An essential critical-thinking skill for the 21st century*. MultiMedia & Internet@Schools [H.W.Wilson - EDUC], 14(3), 24-28.

Hattwig, D., Bussert, K., Medaille, A., & Burgess, J. (2013, January). *Visual Literacy Standards in Higher Education: New Opportunities for Libraries and Student Learning*. 10.1353/pla.2013.0008

Hogenboom, K., Phillips, C., & Hensley, M. K. (2011). Show Me the Data! Partnering With Instructors to Teach Data Literacy. *The Proceedings of the ACRL 2011 Conference* (pp. 410-417). Chicago: Association of College & Research Libraries. Retrieved from Illinois Digital Environment for Access to Learning and Scholarship.

Ikemoto, G., & Marsh, J. (2007). Cutting Through the "Data-Driven" Mantra: Different Conceptions of Data-Driven Decision Making. *Yearbook of the National Society for the Study of Education*, *106*(1), 105–131. https://doi.org/10.1111/j.1744-7984.2007.00099.x

Janghorban, R., Roudsari, R., & Taghipour, A. (2014). Skype interviewing: The new generation of online synchronous interview in qualitative research. *International Journal of Qualitative Studies on Health and Well-Being*, *9*(1), 24152. https://doi.org/10.3402/qhw.v9.24152

Johnson, L. Adams Becker, S., Estrada, V. & Freeman, A. (2015). NMC Horizon Report: 2015 Higher Education Edition. Austin, Texas: The New Media Consortium. Retrieved from: http://www.nmc.org/publication/nmc-horizon-report-2015-higher-education-edition/

Jones, C., Ramanau, R., Cross, S., & Healing, G. (2010, April). *Net generation or Digital Natives: Is there a distinct new generation entering university?* Retrieved from ScienceDirect: https://www.sciencedirect.com/science/article/abs/pii/S0360131509002620

Koltay, T. (2014). Big data, big literacies? *TEMA*, 24, 3-8.

Knox, S., & Burkard, A. (2009). Qualitative research interviews. *Psychotherapy Research*, *19*(4-5), 566–575. doi: https://doi.org/10.1080/10503300802702105

Kvale, S. (2007). *Ethical Issues of Interviewing*. https://dx.doi.org/10.4135/9781849208963.n3

Liu, Y. (2014). Big Data and Predictive Business Analytics. *The Journal of Business Forecasting*, *33*(4), 40–42. Retrieved from http://search.proquest.com/docview/1657419180/

Longhurst, R. (2013). Using Skype to Mother: Bodies, Emotions, Visuality, and Screens. *Environment and Planning D: Society and Space*, *31*(4), 664–679. https://doi.org/10.1068/d20111

Mackey, T. P., & Jacobson, T. E. (2011). *Reframing Information Literacy as a Metaliteracy*. Retrieved from College & Research Libraries: https://crl.acrl.org/index.php/crl/article/view/16132

Mandinach, E., & Gummer, E. (2013). A Systemic View of Implementing Data Literacy in Educator Preparation. *Educational Researcher*, *42*(1), 30–37. https://doi.org/10.3102/0013189X12459803

Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Hung Byers, A. (2011). Big data: The next frontier for innovation, competition, and productivity. McKinsey Global Institute. Retrieved from http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation

Martin, E., & Leger-Hornby, T. (2012). Framework for a data management curriculum: course plans for data management instruction to undergraduate and graduate students in science, health science, and engineering programs. Retrieved from http://library.umassmed.edu/data_management_frameworks.pdf

Mayborn, K. R., & Lesher, C. E. (2018, January 31). *Teaching the Scientific Method Using Contemporary Research Topics as the Basis for Student-Defined Projects*. https://doi.org/10.5408/1089-9995-48.2.145

McCoyd, JLM., & Kerson, TS (2006) Conducting intensive interviews using email. *Qualitative Social Work* 5(3): 389–406.

Mitrovic, Z. (2015). Building Open Data Capacity through e-Skills. *Mitrovic Development and Research Institute* , 1-33. Retrieved from Mitrovic Development and Research Institute.

Mosley, L. (2013). *Interview Research in Political Science.* Cornell University.

Neumann, D., Hood, M., & Neumann, M. (2013). Using Real-Life Data When Teaching Statistics: Student Perceptions of this Strategy in an Introductory Statistics Course. *Statistics Education Research Journal*, *12*(2), 59–70. Retrieved from http://search.proquest.com/docview/1509079545/

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017, October 2). *Thematic Analysis: Striving to Meet the Trustworthiness Criteria*. https://doi-org.proxy.bib.uottawa.ca/10.1177/1609406917733847

Opdenakker, R. (2006) Advantages and disadvantages of four interview techniques in qualitative research. *Forum: Qualitative Social Research* 7(4). Retrieved from: http://nbn-resolving.de.proxy.bib.uottawa.ca/urn:nbn:de:0114-fqs0604118.

Pentland, A.S. (2013). The data-driven society. *Scientific American* 309(4), 78-83. Retrieved from http://www.nature.com/scientificamerican/journal/v309/n4/pdf/scientificamerican1013-78.pdf

Phillips, R. (2005). *Challenging The Primacy Of Lectures:The Dissonance Between Theory And Practice in University Teaching*, 2(1), 1-12. Retrieved from Journal of University Teaching & Learning Practice: https://ro.uow.edu.au/jutlp/vol2/iss1/2

Pothier, W. G., & Condon, P. B. (2019, October 21). *Towards data literacy competencies: Business students, workforce needs, and the role of the librarian*. Retrieved from Taylor & Francis Online: https://www.tandfonline.com/doi/full/10.1080/08963568.2019.1680189

Pryor, G., & Donnelly, M. (2009). Skilling up to do data: Whose role, whose responsibility, whose career? *The International Journal of Digital Curation*, 2(4), 158-170. https://doi.org/10.2218/ijdc.v4i2.105

Punyabukkana, P. (2017, December 12). *Teaching research methods for computer science students using active learning approach*. Retrieved from IEEE Xplore: https://ieeexplore-ieee-org.proxy.bib.uottawa.ca/document/8252343

Raffaghelli, J. E., & Stewart, B. (2019, November 19). *Centering complexity in 'educators' data literacy' to support*. Retrieved from Taylor & Francis Group: https://journals-scholarsportal-info.proxy.bib.uottawa.ca/pdf/13562517/v25i0004/435_ccidltasrotl.xml

Rathwell, S., Camiré, M., & Young, B.W. (2016). Comparing data quality from Skype and in-person interviews: A two-stage assessment. *5th International Conference for Qualitative Research in Sport and Exercise.*

Ridsdale, C., Rothwell, J., Smit, M., Ali-Hassan, H., Bliemel, M., Irvine, D., . . . Wuetherick, B. (2015). *Strategies and Best Practices: Knowledge Synthesis Report.* Halifax: Dalhousie University.

Rocchi, M., Sweet, S., Gainforth, H., Lagace, M., & Beaudry, S. (2020). Data Literacy Education – Developing Best Practices for Higher Education in the Humanities and Social Sciences. *Social Sciences and Humanities Research Council Insight Development Grants Proposal.*

Romani, J. C. C. (2009). Strategies to promote the development of e-competencies in the next generation of professionals: European and international trends. ESRC Centre on Skills, Knowledge and Organisational Performance (SKOPE). Retrieved from: https://ora.ox.ac.uk/objects/uuid:da0007a3-b504-4c20-858b-21dd359e3cae

Roozenbeek, J., & van der Linden, S. (2019, June 25). *Fake news game confers psychological resistance against online misinformation.* Retrieved from Humanities & Social Sciences Communications: https://www.nature.com/articles/s41599-019-0279-9

Sedgwick, M.,Spiers, J. (2009) The use of videoconferencing as a medium for the qualitative interview. *International Journal of Qualitative Methods* 8(1): 1–11.

Scheitle, C. (2006). Web-Based Data Analysis: Creating a Sociological Laboratory. *Teaching Sociology*, *34*(1), 80–86. https://doi.org/10.1177/0092055X0603400108

Schuff, D. (2017). Data Science for All: A University-Wide Course in Data Literacy. *Analytics and Data Science*, 281-297. https://doi.org/10.1007/978-3-319-58097-5_20

Shorish, Y. (2015). Data Information Literacy and Undergraduates: A Critical Competency. *College & Undergraduate Libraries*, *22*(1), 97–106. https://doi.org/10.1080/10691316.2015.1001246

Steel, E., Liermann, M., & Guttorp, P. (2019). Beyond Calculations: A Course in Statistical Thinking. *The American Statistician: Statistical Inference in the 21st Century: A World Beyond p < 0.05*, *73*(1), 392–401. https://doi.org/10.1080/00031305.2018.1505657

Stewart, K., & Williams, M. (2005). Researching online populations: the use of online focus groups for social research. *Qualitative Research, 5*(4), 395–416. https://doi.org/10.1177/1468794105056916

Sullivan, J. R. (2012). Skype: An appropriate method of data collection for qualitative interviews? *The Hilltop Review (6),* 54-60. Retrieved from: https://scholarworks.wmich.edu/cgi/viewcontent.cgi?article=1074&context=hilltopreview

Swan, K., Vahey, P, Kratcoski, A., van 't Hooft, M., Rafanan, K., and Stanford, T. (2009). Challenges to cross-disciplinary curricula: Data literacy and divergent disciplinary perspectives. Presented at the *Annual Conference of the American Educational Research Association,* San Diego, CA. Retrieved from http://www.sri.com/work/publications/challenges-cross-disciplinary-curricula-dataliteracy-and-divergent-disciplinary-p

Temi. (2021). Retrieved from Speech to text transcription in 5 minutes, Advanced speech recognition software: https://www.temi.com/

Thompson, P. (2012). The digital natives as learners: Technology use patterns and approaches to learning. *Computers & Education*, 65(2013), 12-33 https://doi.org/10.1016/j.compedu.2012.12.022

Twindale, M. B., Blake, C., & Gant, J. (2013). Towards a data literate citizenry. *iConference 2013 Proceedings,* 247-257.

Vahey, P., Yarnall, L., Patton, C., Zalles, D., & Swan, K. (2006). Mathematizing middle school: Results form a cross-disciplinary study of data literacy. *American Educational Research Association,* 1-15. Retrieved from: https://www.academia.edu/2738485/Mathematizing_middle_school_Results_from_a_cross-disciplinary_study_of_data_literacy

van Dijck, J. (2013). "You have one identity": performing the self on Facebook and LinkedIn. *Media, Culture & Society*, *35*(2), 199–215. https://doi.org/10.1177/0163443712468605

Wanner, A. (2015). Data literacy instruction in academic libraries: best practices for librarians. *The UBC School of Library, Archival and Information Studies Student Journal*, 1-18. https://doi.org/10.14288/sa.v1i1.186335

Watson, T., & Noble, P. (2007). *Evaluating Public Relations: A Best Practice Guide to Public Relations Planning, Research and Evaluation.* London: Kogan Page.

Williams, M., Payne, G., Hodgkinson, L., & Poade, D. (2008). Does British Sociology Count?: Sociology Students' Attitudes toward Quantitative Methods. *Sociology, 42*(5), 1003–1021. https://doi.org/10.1177/0038038508094576

Wing, J. M. (2008, July 31). *Computational thinking and thinking about computing*. Retrieved from The Royal Society Publishing: https://royalsocietypublishing.org/doi/10.1098/rsta.2008.0118

Wolff, A., Gooch, D., Cavero Montaner, J., Rashid, U., & Kortuem, G. (2016). Creating an Understanding of Data Literacy for a Data-driven Society. *The Journal of Community Informatics*, *12*(3), 9–26. Retrieved from http://search.proquest.com/docview/2110078157/

Appendices

Appendix A: Email Recruitment Texts for Professors

Professors at the University of Ottawa

Good [morning/afternoon/evening],

I am a Masters of Arts in Communications student here at the University of Ottawa, and am currently seeking participants to engage in my Master's thesis research on data literacy education at the University of Ottawa in the Department of Communications.

Specifically, I am seeking to explore how data literacy competencies have been, and are currently being taught to undergraduate students in the Communications program at uOttawa. I am interested in understanding how your experiences teaching these courses, and any insights you might be able to offer, can contribute to improving the current Communications curriculum. Given the state of our information-laden, technologically-driven society, data literacy is more important than ever before. This is why it is critical to incorporate more robust, transferable, and appropriate research and data material in your courses, and ensure that students are developing strong data literacy competencies.

I will be hosting individual 30-45 minute video interviews with Communications professors who have taught, and are currently teaching undergraduate courses in Qualitative Research, Quantitative Research, and/or Mixed Methods research in the Communications field. To qualify, professors must have taught these classes in the Department of Communications within the past three (3) years.

Please let me know if you are interested in participating. I would greatly appreciate your insight and feedback!

Kind regards,

Alexa Naccarato

Professors at Carleton University

Good [morning/afternoon/evening],

I am a Masters of Arts in Communications student here at the University of Ottawa, and am currently seeking participants to engage in my Master's thesis research on data literacy education at Carleton University in the Department of Communications and Media Studies.

Specifically, I am seeking to explore how data literacy competencies have been, and are currently being taught to undergraduate students in the Communications program at Carleton University. I am interested in understanding how your experiences teaching these courses, and any insights you might be able to offer, can contribute to improving the current Communications curriculum. Given the state of our information-laden, technologically-driven society, data literacy is more important than ever before. This is why it is critical to incorporate more robust, transferable, and appropriate research and data material in your courses, and ensure that students are developing strong data literacy competencies.

I will be hosting individual 30-45 minute video interviews with Communications professors who have taught, and are currently teaching undergraduate courses in Qualitative Research, Quantitative Research, and/or Mixed Methods research in the Communications field. To qualify, professors must have taught these classes in the Department of Communications within the past three (3) years.

Please let me know if you are interested in participating. I would greatly appreciate your insight and feedback!

Kind regards,

Alexa Naccarato

Appendix B: LinkedIn Recruitment Text for Communication Practitioners

Good [morning/afternoon/evening],

I am a Masters of Arts in Communications student at the University of Ottawa, and am currently seeking participants to engage in my Master's thesis research on data literacy education at the University of Ottawa in the Department of Communications.

Given the state of our information-laden, technologically-driven society, data literacy skills are more important than ever. Data and research are also driving business innovation, and provide key insights into the health of an organization. Understanding how to acquire and interpret this information is becoming evermore critical in today's marketplace.

My project is seeking to explore how data and research are being used in the Communications industry, and which (if any) competencies are required to perform this type of work at [insert organization's name]. I am interested in understanding how data and research are used in your organization, which competencies are required in your workplace to perform these activities, and what your expectations are when hiring new graduates in this area of work. Understanding your experiences, insights and advice in this area will contribute to improving the Communications curriculum at the University of Ottawa to ensure that more students are being equipped with data literacy competencies to help businesses like yours in the future.

I am wondering if I could interview you through Microsoft Teams, or another video conferencing platform to learn more about your experiences in this area? I am hoping to take 30-45 minutes of your time.

Please let me know if you are interested in participating, and if you have any questions. I would greatly appreciate your insight and feedback!

Kind regards,

Alexa Naccarato

Appendix C: Group 1 Interview Guide

Purpose of Study: to gain insight into how research methods courses and data literacy competencies have been taught to undergraduate Communications students at the University of Ottawa.

Part I: Opening Questions (focus lies on getting to know the participants, their history working at the University of Ottawa and Carleton University, and which research-based Communications courses they have taught)

1. Tell me about yourself; what has been your experience working at the [University of Ottawa/Carleton University] thus far?
    - How long have you worked at the [University of Ottawa/Carleton University] for?
    - Which courses have you taught?
    - Which research methods courses have you taught thus far?
    - Have the other courses you've taught influenced how you have taught your research methods courses? If so, how?

Part II: Key Questions (focus lies on gaining insight into how professors have taught data and research competencies to their students, if/how these teaching methods have evolved, and what their overall experiences have been teaching this material)

2. What is your understanding of data literacy?
    - Have you taught these competencies to your students?
        - If so, how?
    - How have the teaching methods for these research-based courses evolved over the years?
        - What is different, if anything?

3. What has been your experience teaching this material to your students?
    - Was it well-received?
    - What was very effective?
    - What was less effective?

4. What has been the most challenging aspect of teaching research material and helping students acquire these skillsets?

5. What improvements would you make to the current curriculum?

6. Would you like to add anything else related to our interview?

Appendix D: Group 2 Interview Guide

Purpose of Study: to gain insight into how data and research are utilized in various workplaces in the Communications industry, and which skillsets are needed to perform these tasks.

Part I: Opening Questions (focus lies on getting to know the participants, their history working at their organization, and which events led them to their current position)

1. Tell me about yourself; what has been your experience working at [insert organization's name]?
    - How long have you worked here?
    - What lead you to your current position?

Part II: Key Questions (focus lies on gaining insight how data and research are utilized in their organizations, which skillsets are required to perform this work, and how data and research will be utilized in their organizations' future)

2. Data literacy is the ability to identify, collect, and communicate data. This information is used in everyday life, when, for example, we are reading the news or interpreting statistics, and also in business. How are these activities used in your role?
    - How are they used in your department?

3. Can you give me an example of a project, internal or external, where data and research were utilized in your team, or within your organization?

4. Do you think it is important for an organization to use research and data? If so, why?

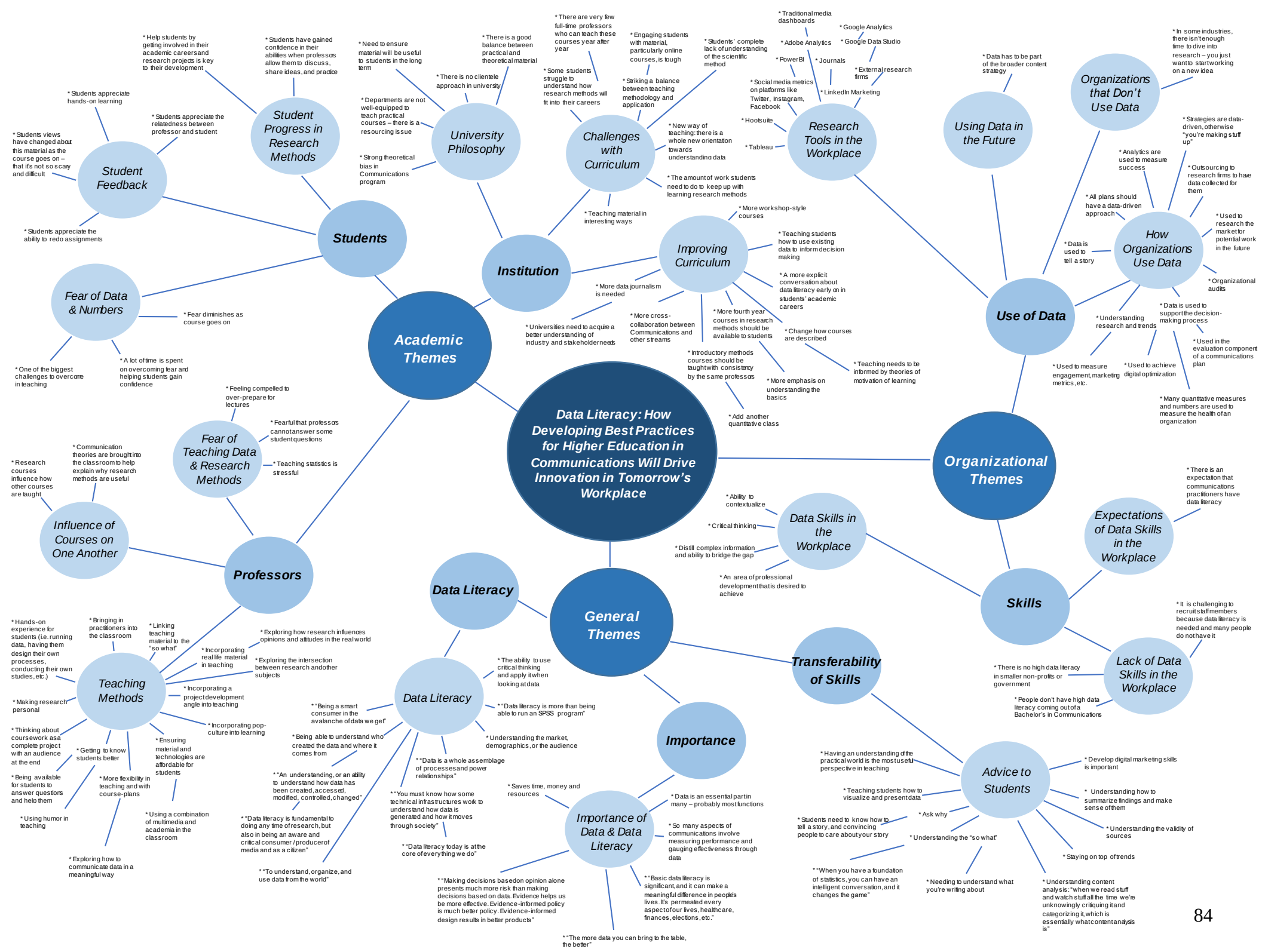
5. Which competencies and skills are required to perform data and research activities at [insert organization's name]?
    - Are these skills taught to your employers, or are employers expected to already have this training and education?

6. How do you anticipate research and data will be utilized in your firm in the future?
    - What skills can Communication students acquire to help your organization achieve these objectives and ideas?

7. Would you like to add anything else related to our interview?

Appendix E: Coding Guide for Thematic Analysis

	Themes		
	Academic Themes	**Organizational Themes**	**General Themes**
Codes	University Philosophy	How Organizations Use Data	Definitions of Data Literacy
	Teaching Research Methods	Organizations that Don't Use Data	Importance of Data and Data Literacy
	Fear of Data and Numbers	Research Tools in the Workplace	General Advice to Students
	Challenges with Curriculum	Using Data in the Future	
	Student Feedback	Data Skills in the Workplace	
	Fear of Teaching Data and Research Methods	Expectations of Data Skills in the Workplace	
	Influence of Courses on One Another	Lack of Data Skills in the Workplace	
	Improving Curriculum		
	Student Progress in Research Methods		


Data Literacy: How Developing Best Practices for Higher Education in Communications Will Drive Innovation in Tomorrow's Workplace
Academic Themes
Students
Student Progress in Research Methods
* Help students by getting involved in their academic careers and research projects is key to their development
* Students have gained confidence in their abilities when professors allow them to discuss, share ideas, and practice
Student Feedback
* Students appreciate hands-on learning
* Students appreciate the relatedness between professor and student
* Students views have changed about this material as the course goes on – that it's not so scary and difficult
* Students appreciate the ability to redo assignments
Fear of Data & Numbers
* Fear diminishes as course goes on
* One of the biggest challenges to overcome in teaching
* A lot of time is spent on overcoming fear and helping students gain confidence
Fear of Teaching Data & Research Methods
* Feeling compelled to over-prepare for lectures
* Fearful that professors cannot answer some student questions
* Teaching statistics is stressful
Influence of Courses on One Another
* Research courses influence how other courses are taught
* Communication theories are brought into the classroom to help explain why research methods are useful
Professors
Institution
University Philosophy
* Need to ensure material will be useful to students in the long term
* There is a good balance between practical and theoretical material
* There is no clientele approach in university
* Departments are not well-equipped to teach practical courses – there is a resourcing issue
* Strong theoretical bias in Communications program
Challenges with Curriculum
* There are very few full-time professors who can teach these courses year after year
* Some students struggle to understand how research methods will fit into their careers
* Engaging students with material, particularly online courses, is tough
* Striking a balance between teaching methodology and application
* Students' complete lack of understanding of the scientific method
* New way of teaching: there is a whole new orientation towards understanding data
* The amount of work students need to do to keep up with learning research methods
* Teaching material in interesting ways
Improving Curriculum
* More workshop-style courses
* Teaching students how to use existing data to inform decision making
* A more explicit conversation about data literacy early on in students' academic careers
* More data journalism is needed
* Universities need to acquire a better understanding of industry and stakeholder needs
* More cross-collaboration between Communications and other streams
* More fourth year courses in research methods should be available to students
* Change how courses are described
* Introductory methods courses should be taught with consistency by the same professors
* Add another quantitative class
* More emphasis on understanding the basics
* Teaching needs to be informed by theories of motivation of learning
Organizational Themes
Use of Data
Research Tools in the Workplace
* Traditional media dashboards
* Google Analytics
* Adobe Analytics
* Google Data Studio
* PowerBI
* Journals
* External research firms
* Social media metrics on platforms like Twitter, Instagram, Facebook
* LinkedIn Marketing
* Hootsuite
* Tableau
Using Data in the Future
* Data has to be part of the broader content strategy
Organizations that Don't Use Data
* In some industries, there isn't enough time to dive into research – you just want to start working on a new idea
How Organizations Use Data
* Strategies are data-driven, otherwise "you're making stuff up"
* Analytics are used to measure success
* Outsourcing to research firms to have data collected for them
* All plans should have a data-driven approach
* Used to research the market for potential work in the future
* Data is used to tell a story
* Organizational audits
* Understanding research and trends
* Data is used to support the decision-making process
* Used in the evaluation component of a communications plan
* Used to measure engagement, marketing metrics, etc.
* Used to achieve digital optimization
* Many quantitative measures and numbers are used to measure the health of an organization
Skills
Data Skills in the Workplace
* Ability to contextualize
* Critical thinking
* Distill complex information and ability to bridge the gap
* An area of professional development that is desired to achieve
Expectations of Data Skills in the Workplace
* There is an expectation that communications practitioners have data literacy
Lack of Data Skills in the Workplace
* It is challenging to recruit staff members because data literacy is needed and many people do not have it
* There is no high data literacy in smaller non-profits or government
* People don't have high data literacy coming out of a Bachelor's in Communications
General Themes
Data Literacy
Teaching Methods
* Hands-on experience for students (i.e. running data, having them design their own processes, conducting their own studies, etc.)
* Bringing in practitioners into the classroom
* Linking teaching material to the "so what"
* Incorporating real life material in teaching
* Exploring how research influences opinions and attitudes in the real world
* Exploring the intersection between research and other subjects
* Incorporating a project development angle into teaching
* Incorporating pop-culture into learning
* Making research personal
* Thinking about coursework as a complete project with an audience at the end
* Being available for students to answer questions and help them
* Using humor in teaching
* Getting to know students better
* More flexibility in teaching and with course-plans
* Exploring how to communicate data in a meaningful way
* Ensuring material and technologies are affordable for students
* Using a combination of multimedia and academia in the classroom
Data Literacy
* The ability to use critical thinking and apply it when looking at data
* "Data literacy is more than being able to run an SPSS program"
* Understanding the market, demographics, or the audience
* "Being a smart consumer in the avalanche of data we get"
* Being able to understand who created the data and where it comes from
* "An understanding, or an ability to understand how data has been created, accessed, modified, controlled, changed"
* "Data literacy is fundamental to doing any time of research, but also in being an aware and critical consumer / producer of media and as a citizen"
* "To understand, organize, and use data from the world"
* "Data is a whole assemblage of processes and power relationships"
* "You must know how some technical infrastructures work to understand how data is generated and how it moves through society"
* "Data literacy today is at the core of everything we do"
Importance
Importance of Data & Data Literacy
* Saves time, money and resources
* Data is an essential part in many – probably most functions
* So many aspects of communications involve measuring performance and gauging effectiveness through data
* "Basic data literacy is significant, and it can make a meaningful difference in people's lives. It's permeated every aspect of our lives, healthcare, finances, elections, etc."
* "The more data you can bring to the table, the better"
* "Making decisions based on opinion alone presents much more risk than making decisions based on data. Evidence helps us be more effective. Evidence-informed policy is much better policy. Evidence-informed design results in better products"
Transferability of Skills
Advice to Students
* Having an understanding of the practical world is the most useful perspective in teaching
* Develop digital marketing skills is important
* Teaching students how to visualize and present data
* Understanding how to summarize findings and make sense of them
* Ask why
* Understanding the validity of sources
* Students need to know how to tell a story, and convincing people to care about your story
* Understanding the "so what"
* Staying on top of trends
* "When you have a foundation of statistics, you can have an intelligent conversation, and it changes the game"
* Needing to understand what you're writing about
* Understanding content analysis: "when we read stuff and watch stuff all the time we're unknowingly critiquing it and categorizing it, which is essentially what content analysis is"

Appendix G: Thematic Analysis – Barriers and Solutions Model

<table>
<tr><td rowspan="4">Themes</td><td>Barriers</td></tr>
<tr><td>Inconsistencies in Curriculum
There is a strong theoretical bias in Communication programs
There are very few professors who can teach the same courses consistently year after year
Students lack a complete understanding of the scientific method
There are different philosophies/schools of thought on teaching this material to students</td></tr>
<tr><td>Stigmatization of Research Methods
Students struggle to understand how research methods will fit into their careers
Students fear data and numbers
It is challenging to teach material in research methods courses in interesting ways
It is challenging to teach this material as teaching statistics is difficult, and professors know that student attitudes towards the subject is negative</td></tr>
<tr><td>Transferability of Skills
Universities need to acquire a better understanding of industry and stakeholder needs
There is an expectation that communication practitioners have strong data literacy skills, and people coming out of a B.A. in Communications do not have these skills</td></tr>
<tr><td>The Need for Professional Development
It is challenging to recruit staff members because data literacy is needed and many people do not have it
Data literacy is an area of professional development that companies are providing to their employees</td></tr>
<tr><td colspan="2">Solutions</td></tr>
<tr><td colspan="2">Professors must bring practitioners into the classroom to show students and professors how research and data are applied outside of the classroom, and demonstrate what the demands are in the Communications field.
Having an understanding of the practical world is the most useful perspective in teaching
There should be more workshop-style courses available to students
There should be more cross-collaboration between Communications and other streams
Students appreciate hands-on learning
In teaching, professors must strike a balance between application and theory
Allow students to run projects at the beginning of the course
Teach students how to use existing data to inform decision-making
Incorporate real-life data into teaching
Link teaching material to the “so what”
Make research personal to students
Approach courses with a project-management aspect: think about coursework as a complete project with an audience at the end
Students should explore how research, data, and numbers influence opinions and attitudes in the real world.
Universities should have full-time or part-time professors teach the same courses consistently year after year
Introductory methods courses should be taught with consistency by the same professors (part-time or full-time professors)</td></tr>
</table>

- Professors are encouraged to spend time helping students overcome their fears, and help them gain confidence by letting them run their own projects
    - Professors should be available to help students, and allow them to repeat exercises many times

- Professors should place more emphasis on teaching students the basics in research methods

- Students who are learning this material in university need to develop strong skills in the following:
    - Know how to tell a story, and convince people to care about that story
    - Understand what you're writing about
    - Contextualize and distill information, and be able to bridge the gap
    - Exercise critical thinking, and apply this when looking at data
    - Understand how to summarize findings and make sense of them
    - Understand the validity of sources
    - Understand how to visualize and present data