

TEACHER PERCEPTION OF THE USE OF TWITTER AS A PROFESSIONAL
LEARNING TOOL

ALLISON DISHMAN

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The undersigned, approved by the Department Chair of Graduate Studies in Education, have examined a dissertation entitled:

TEACHER PERCEPTION OF THE USE OF TWITTER AS A PROFESSIONAL
LEARNING TOOL

Presented by Allison Dishman a candidate for the degree of Doctor of Education and hereby certify that in their opinion it is worthy of acceptance.



Dr. Benny Fong, Advisor/Chair
Graduate Studies in Education
Southwest Baptist University



Dr. Tammy Conder, Committee Member
Graduate Studies in Education
Southwest Baptist University



Dr. Pam Hedgpeth, Committee Chair
Executive Director
Greater Ozarks Cooperating School District

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LEARNING TOOL

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By

Allison Dishman, B.S., M.A.

Dr. Benny Fong, Dissertation Advisor

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ABSTRACT

This narrative qualitative study aimed to explore the perceptions of using Twitter as an effective professional learning tool for public school secondary-level teachers in Missouri. In addition, the researcher sought to find the perceptions of teachers who used Twitter for professional use, what they found to be valuable in developing a professional learning network through Twitter, and perceptions of Twitter compared to traditional professional learning. Participants selected for this study were Missouri public school teachers who taught students in any of the sixth through 12th grades. The ongoing development of teaching skills is an element of the educational world that is important to the growth of a teacher and students. Ross, Maninger, LaPrairie, & Sullivan (2015) pointed out teacher learning has reformed from a one-size-fits-all approach to a dynamic, highly engaging, interactive, applicable individualized learning session through the management and selection of content and co-construction of knowledge. Teacher learning takes place at various levels and, through evolved methods, can move teacher-learners from understanding instructional theory to the practical application of pedagogical skills (Korthagen, 2017). Twitter provides teachers access to various professional learning networks comprised of individuals who share their knowledge and experience through the reconstruction of topics and practices. Although plugged into a network, Missouri secondary teachers are consumers more often within the network than contributors. Teachers desire personalized and relevant content not bound by geographic limits. Teachers as learners find value in developing their personalized learning network through connections to like-minded practitioners willing to share resources and ideas.

CHAPTER ONE

INTRODUCTION

Professional development includes the process of teachers engaging in professional learning activities that will shape an educator’s skillset to create impactful learning for all students (Learning Forward, 2020). Professional learning is a passive implication to describe professional development and is essential to increasing student learning (Teräs & Kartoğlu, 2017). Teachers’ attendance in professional learning activities alone does not guarantee cognitive change or advancement in instructional practices (Learning Forward, 2020). An essential element to the professional learning component of teaching is the intent; thus, the learning is sustainable and is aligned with the teacher and district goals, applies to teacher content and grade level, and provides for teacher collaboration (Owens, Sadler, Murakami, & Tsai, 2018). For this study, professional learning pertains to the process of engaging in professional learning activities. The phrase professional learning will be used to describe the acquisition and application of new knowledge and skills.

Professional development is the process of teacher learning that is not only suggested but also required for teachers who wish to obtain and maintain teacher certification in Missouri. According to the Missouri Department of Elementary and Secondary Education (MoDESE, n.d.), teachers who hold professional certification and career education certificates must participate in a minimum of 30 hours of professional learning per year during Years 1 through 4 to secure an initial certification (MoDESE, n.d.). Suppose a teacher who holds an initial certification does not acquire the next higher degree. In that case, they must participate annually in 15 hours of professional learning to

stay on the career certification level (MoDESE, n.d.). Although the guidelines to keep teacher certification in Missouri are specific, the types of professional learning opportunities available to Missouri are broad (MoDESE, n.d.).

Missouri's state education certification requirements lay the foundation for what is expected to obtain and keep current educator certification, but further teacher learning beyond that is dependent on the actions of districts and individual teachers. In the 2019-2020 school year, there were 48,500 secondary classroom teachers identified teaching in 912 secondary public schools in Missouri, and out of the 518 school districts, 70% were considered rural based on geographic location and small population size (MoDESE, n.d.; PriME Center, 2019). In addition, Lavalley (2018) found that teachers in rural schools participated in professional development at a lower rate than those who taught in nonrural schools. Therefore, rural school teachers did not receive ongoing opportunities to increase instructional effectiveness. This isolation and lack of continuing professional development lead districts and administrators to explore alternative modes of professional learning (Krutka & Carpenter, 2016; Zhang, Shi, & Lin, 2020).

Social media platforms such as Twitter have grown drastically and have moved beyond geographic and financial limits to open up the possibility for teachers to engage in self-driven, prioritized, and on-demand learning (Prestridge, 2019). In addition, the micro-blogging capabilities Twitter offers have the competence to align with standards of high-quality professional development by providing shared participation and an unlimited duration (Fischer, Fishman, & Schoenebeck, 2019; Tucker, 2018). Twitter, as a professional learning tool, has created a collaborative untethered space to gain access to information, resources, and other professionals (Fischer et al., 2019; Tucker, 2018). This

communal space has led to accessible, informal learning methods through the development of virtual professional learning networks (Alberth, Mursalim, Siam, Suardika, & Ino, 2018; Gao & Li, 2017).

Chapter One describes the required, and necessary means of professional development teachers need while presenting Twitter as an option for teachers to overcome a lack of resources or geographic boundaries to access resources for professional learning. The purpose of this study was to explore how Twitter and professional development can synthesize to provide teachers with professional learning. This study employed the theoretical framework of connectivism and personal mastery (Senge, 1990; Siemens, 2005).

Theoretical Framework

This study explored teacher perception of using Twitter as a professional learning tool through the lens of connectivism (Siemens, 2005) and creating personal mastery (Senge, 1990). The connectivism theory refers to a learner experiencing information through connections, having the opportunity to reflect on that information, and also reflect on the experience of the connection (Kropf, 2013). Through connectivism, the study explored how this learning theory provides a learning format that can lead to personal mastery or a specific level of proficiency (Senge, 1990). Senge (1990) described personal mastery as a discipline that encompasses learning and personal growth. The discipline of personal mastery is one of the five disciplines that contribute to a highly effective learning organization (Senge, 1990). The preceding theory of connectivism was dissected and described to better understand the use of Twitter as a professional learning tool.

George Siemens first communicated the theory of connectivism on his blog in 2004, then later updated in 2005 after receiving a year of feedback from others in the academic field (Utecht & Keller, 2019). Learning institutions have now adopted this learning theory and created the Massive Open Online Courses movement (Utecht & Keller, 2019). Connectivism is the second learning theory that is discussed and applied to the use of Twitter as a professional learning tool for teachers due to the capability of Twitter to provide connections between users. Since its introduction, connectivism as a learning theory has been discussed, analyzed, and expanded to be described as a theory of how networks support knowledge and learning through digital and online interactions (Downes, 2020). Siemens (2005) identified that behaviorism, cognitivism, and constructivism were all three learning theories to consider when discussing effective teaching and learning but found that these theories did not consider the growing use of technology. Although there has been criticism that connectivism is an instructional theory, most literature points to the thought that connectivism is, in fact, a learning theory (Dunaway, 2011). Bozkurt et al. (2016) supported that connectivism accounts for acquiring relevant information when needed. As connectivism developed, it was crucial to recognize the ever-changing impact technology has on the way we think and act and how it is also ever-changing (Černý, 2020). Siemens described connectivism as an heir to behaviorism, cognitivism, and constructivism but has told the limitations of these three theories to be the specific view of interpersonal learning. They do not acknowledge the learning capable of taking place within organizations and technology.

Goldie (2016) identified connectivism as the foundation of collaborative e-learning, and for learning to be a positive and student-centered experience, the facilitator

must use activities that apply networks. While many cognitive learning theories focus on the relationship between teacher and pupil, connectivism explores the learner's process of autonomously accessing the desired model without the limits of time or geography (Shriram & Warner, 2010). Bozkurt et al. (2016) added that connectivism supports convenience's positive impact on forming a community of learners. Connectivism includes a critical component where collectively, the group members assist one another with achieving a commonly identified goal (Kizito, 2016). These connections provide the educational learner with valuable, like-minded resources enabling conversation and fostering skill development. Downes (2008, 2020) included in connectivism that learning is the knowledge that can be put into action and noted that it occurs with interactivity, not only independently. Downes (2008) also found that learning connections allow for focus on independence and diversity. Connectivism, as a learning theory, for those seeking professional learning, can build their knowledge by connecting to what they need and the autonomy to manage those connections (Jirasatjanukul & Jeerungsuwan, 2018). Several studies have found that connectivism led participants to a higher motivation to seek more profound work and more independence due to increased academic self-efficacy and the ability to complete tasks (Downes, 2020).

Peter Senge's (1990, 2006) work described in *The Fifth Discipline: The Art and Practice of the Learning Organization* narrated personal mastery as one of the five disciplines that, when combined with the other four, are the foundation of learning organization theory. Senge explained that a discipline is a path of development to acquire a specific set of skills or abilities that may become mastered through practice and study. According to Senge (2006), if people have a high level of personal mastery, they can

consistently understand the results that matter most deeply to them and, in effect, approach learning as a lifelong commitment. Therefore, Senge (2006) concluded personal mastery is obtained through a commitment to ongoing learning.

The researcher built on the ideals of Siemens's (2005) theory of connectivism and Peter Senge's (1990, 2006) discipline of personal mastery to examine professional learning through Twitter. By using Twitter, educators can gain knowledge and skills through reinforcing behaviors, participating in a connected network, and living in a mode of continual learning. Educator professional learning is not only found in educational institutions anymore; therefore, it can be explored as an interactive experience that increases knowledge and skills (Alzain, 2019).

Problem Statement

The ongoing development of teaching skills is an element of the educational world that is important to the growth of a teacher and students. Ross, Maninger, LaPrairie, & Sullivan (2015) pointed out teacher learning has reformed from a one-size-fits-all approach to a dynamic, highly engaging, interactive, applicable individualized learning session through the management and selection of content and co-construction of knowledge. Teacher learning takes place at various levels and, through evolved methods, can move teacher-learners from understanding instructional theory to the practical application of pedagogical skills (Korthagen, 2017). According to Zhang et al. (2020), teachers indicated needing more than district-provided professional development to address state and even national standards to help them impact students' individual learning needs. Teachers also identified barriers such as financial costs, lack of incentives, and time as obstacles associated with current professional development

practices (Zhang et al., 2020). One of the most common barriers to effective professional development implementation identified by teachers is a lack of resources (Darling-Hammond, Hyler, & Gardner, 2017). This barrier most widely affects those educators who teach in high-poverty and financially strained school districts.

As teaching practices and student needs continuously change, it is necessary to provide teachers with adequate and up-to-date learning to support their role (Badri, Alnuaimi, Mohaidat, Yang, & Al Rashedi, 2016). Twitter use by educators was noted to provide learning based on individual needs and user-desired results (Carpenter, Kimmons, Short, Clements, & Staples, 2019). Social media websites such as Twitter promote the exchange of ideas, and this interaction supports the engagement of an expansion of insights and experiences (Krutka & Carpenter, 2016; Rehm & Notten, 2016). Twitter is an online social media platform allowing users to access other users' thoughts, ideas, and resources as quickly as desired. Twitter provides users with the availability of immediate feedback and can offer access to knowledge and collaboration that traditional professional learning sessions are limited in because of geography and time constraints (Carpenter et al., 2019). With 500,000,000 tweets being posted each day, 4,200,000,000 currently relate to education (Twitter, n.d.).

This study intended to gain insight into perceptions of public secondary teachers in Missouri who used Twitter as a tool for professional learning. The restrictions of money, time, and geographical isolation pose problems with implementing appropriate and effective professional learning for teachers (Krutka & Carpenter, 2016). Twitter is a free, web-based tool that addresses the three previously stated barriers in professional learning. This study is critical because it dissects literature and data illustrating how

teachers use Twitter to gain educational pedagogy knowledge and skills and their perception of its use. Learning Forward (2020) added that effective professional learning allows teachers to increase their knowledge base but can and should lead to improvements in student learning. Many different computer software will enable educators to connect, but there is a lack of research surrounding Missouri secondary school teachers' perceptions of Twitter (Malik, Heyman-Schrum, & Johri, 2019).

School administration, instructional coaches, and professional learning committees in charge of assigning or providing teachers and districts with professional learning can use this information to connect Missouri secondary educators to more meaningful, accessible professional learning opportunities. The process of creating compelling, relevant professional learning for teachers can be a complex, time-consuming task (Shirrell, Hopkins, & Spillane, 2019). Administrators can require teachers to attend face-to-face workshops. Still, that specific professional learning might not apply to the needs or the content's relevancy (Dehghan, 2020). Twitter allows for an individualized approach to access professional learning. Professional development committees and instructional coaching staff look for guidance when suggesting learning activities for teachers. While using a strengths and weaknesses inventory or teacher evaluation data, these groups need to know how teachers perceive the application of Twitter while collaborating and accessing new knowledge and skillsets before they guide them in the direction of web-based social media (Tucker, 2018).

Many pieces of research have been done on the availability and use of social media websites as a professional learning tool (Trust, Carpenter, & Krutka, 2017). With the demands of certification requirements specific to Missouri and the content knowledge

needed to implement middle and high school level state standards, teachers should be well equipped and supported in their growth. Still, many have not dissected the perception that public secondary teachers in Missouri have when comparing traditional professional learning limitations to the features of Twitter regarding quality time spent receiving professional training, accessibility to connect with other educators, and personalization of learning.

Purpose of the Study

The purpose of this narrative qualitative study was to explore the perceptions of using Twitter as an effective professional learning tool for public school secondary-level teachers in Missouri. For this study, Twitter use as an effective professional learning tool was generally defined as the tool that changes teacher practices and improves student learning outcomes. Also, the central phenomenon studied was generally defined as social media and professional development.

This study is important for the growth of teachers' knowledge and skills. Twitter offers a way for teachers to connect and become part of a professional network not bound by monetary resources, geographic location, accessibility, and schedules (Sturm & Quaynor, 2020). Any teacher who has access to the internet and a smartphone, computer, or tablet can utilize Twitter (Carpenter & Morrison, 2018). Although this tool is available to teachers, many are not using it (Carpenter et al., 2019). This study looked at the perception of teachers who used Twitter for professional tasks, what they found to be practical about the microblogging website, and what barriers they seemed to encounter. The data collected from this study will be valuable to school administrators or those site-based or district-based professional learning teams. As these teams encourage or require

professional learning that may or may not be readily accessible to teachers, district and building-level administrators may guide them toward a learning network on Twitter. Finding information through this study may provide feedback regarding how administrators, instructional coaches, and professional learning committees can advise Twitter for teachers.

Research Questions

This qualitative study attempted to answer the following research questions:

Central Question: How do Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration?

Research Subquestions:

1. To what extent do public secondary school level teachers use Twitter to participate in professional learning networks?
2. How does Twitter add to professional learning networks used by secondary school teachers?
3. What are the negative and positive teacher perceptions of using Twitter for professional learning compared to traditional professional learning structures?

Significance of Study

This narrative qualitative study was designed to explore the perceptions of public secondary school teachers in Missouri regarding the use of Twitter as an effective professional learning tool. The research was designed to identify how public secondary school teachers viewed the effectiveness of connecting with others, accessibility, and personalization of Twitter for professional learning. A worldwide focus has developed as

school systems explore new ways to provide educators with relevant and productive opportunities for growth (Shirrell et al., 2019). Barriers have been identified as school districts look to improve upon professional teacher learning and, therefore, the impact on increased student achievement (Badri et al., 2016). Teacher isolation has historically been found in the teaching profession and has harmful effects, especially on those new teachers needing increased support as they enter the education field (Krutka & Carpenter, 2016; Zhang et al., 2020). Different geographic locations of schools and educators can pose different types of barriers. As districts and building leaders look to design professional learning opportunities for their staff, this research has the potential to provide an additional resource for Missouri public school secondary educators to gain knowledge, connect with other educators, and apply new learning.

This study recognizes there are currently numerous works of research that have been conducted to examine perceptions of social media use for professional development purposes. This study explored only Twitter as the social media network used for professional learning by public secondary school teachers in Missouri. The study helped identify how the specific participant believed Twitter contributes to new learning, influences connections to other professionals, and differs from accessibility to traditional professional learning.

Definition of Key Terms

For the purposes of this study, the following terms were defined to help clarify descriptions and dissection of literature and data in this study.

Connectivism. A learning theory that recognizes the evolution of ever-changing learning networks, their complexity, and the role that technology plays in learning

networks through the facilitation of existing learning networks and the creation of new learning networks (Siemens, 2005).

Hashtag. Written with a # symbol and used to index keywords or topics on Twitter (Twitter, n.d.).

Professional Learning Activities. Learning activities in which educators engage in with the goal of improving educational pedagogy and that are content-focused, active, collaborative, and contextual; utilize modeling, coaching, and expert support; include feedback and reflection; and can be sustained (Darling-Hammond et al., 2017).

Professional Learning Network. Professional Learning Network (PLN) is a system of interpersonal connections, relationships, and resources supporting information learning (Goria, Konstantinidis, Kilvinski, & Dogan, 2019).

Secondary School. For the purposes of this study, the secondary school included any school serving Grades 6-12.

Self-Directed Learning. A process in which individuals take the initiative, without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and integrating appropriate learning strategies, and evaluating learning outcomes (Littlejohn, Hood, Milligan, & Mustain, 2016).

Social Networking Site. A website that allows subscribers to interact, typically by requesting that others add them to their visible list of contacts, forming or joining sub-groups based on shared interests, or publishing content so that a specified group of subscribers can access it (Donelan, 2016).

Tweet. The sharing of ideas and information within 280 characters on the social media website Twitter that can contain photos, graphics, videos, links, and text (Twitter, n.d.).

Twitter Chat(s). An online discussion about a specific topic on Twitter (Delello & Consalvo, 2019).

Limitations

As this study was collecting information through literature and data regarding how public secondary school teachers in Missouri perceived the use of Twitter as a professional learning tool, there were limitations to acknowledge. This study may have had limitations in the following areas:

1. The participants' school size and student population demographics may have been a limitation.
2. Data reported by participants were self-reported and may have been skewed due to personal experience, personal preferences, and knowledge of specific Twitter features.
3. Responses from the sample population may not have been evenly distributed throughout public school secondary grade levels.
4. A lack of prior research had been conducted on the topic based on grade level and geographic region.
5. The researcher's personal bias was based on the moderate use of Twitter for professional purposes.

Delimitations

This study had delimitations in the following areas:

1. Participants were selected based on those teaching only in public school secondary grade levels, and participation requests were communicated through building administration.
2. Only public secondary-level school teachers who had a Twitter account were identified as participants.
3. This study was geographically limited to the state of Missouri.
4. The sample size was restricted to public secondary school teachers in the state of Missouri.
5. Participants were delimited to only those who had a Twitter account and used it for professional purposes.
6. The study did not include other software or social media site use because Twitter was the only social media network examined.
7. This study was viewed through the lens of the theory of connectivism and Senge's Learning Organization Disciplines.

Assumptions

Assumptions made in this study were the following:

1. The answers provided by respondents were honest opinions of those teachers reflecting on their use of Twitter as a professional learning tool.
2. Participants were all public secondary school level teachers who taught Grades 6-12 and were appropriately certified in Missouri.
3. The criteria chosen to select participants were appropriate to determine an accurate sampling of public secondary school teachers' perceptions.

4. Participants' responses of the sample population reflect a generalized viewpoint regardless of the collected sample size.
5. This study refers to the information gathered from the survey questions. The questions included in the qualitative survey had the purpose of soliciting specific information that may have contributed to the study.

Design Controls

This study of teacher perception of Twitter as a professional learning tool was a qualitative study that measured teachers' attitudes regarding its usefulness, timeliness, accessibility, and effectiveness. Missouri public secondary school administrators' emails were accessed through the MoDESE open-access database. The researcher contacted public school secondary administrators and asked them to provide their secondary school teachers with the survey instrument. The survey requested honest responses based on participant perception. Respondents were asked if they utilized Twitter for professional purposes to gain accurate answers regarding its effectiveness and respondent demographic information. Respondents were also asked to identify the grade level(s) they taught to identify precise participant criteria. Teachers were asked to answer questions honestly and based on their first-hand experience.

The limitations of this study were identified to ensure validity. The initial questionnaire provided anonymity to ensure honest responses unless the participant chose to provide contact information used to select participants for the interview portion of the study. To gather an evenly distributed sample population, the researcher cross-referenced the respondent's geographic location, school size, and student population demographics when developing the participant pool used for interviews. To avoid researcher bias during

this study, the researcher refrained from using Twitter for professional learning and networking. The lack of research pertaining to Missouri and public school secondary teachers' use of Twitter for professional learning limited supportive literature on the topic; therefore, the initial questionnaire asked the respondent to identify the specific grade levels they taught.

The delimitations of this study were identified to clarify the boundaries and narrow the study's scope to public school secondary teachers in Missouri who used Twitter for professional learning, so the participants understood questions pertaining to specific Twitter use. Only public school secondary-level school teachers were asked to participate by requesting Missouri public school secondary principals via email to forward the survey instrument. The public school secondary principals' email information was obtained through the MoDESE school open access directory. Twitter was the only social media site that was examined, and therefore, if the respondent did not indicate they used Twitter for professional learning, the remaining responses were not included in coding to identify themes. The central phenomenon was examined through the lens of connectivism and Peter Senge's disciplines of personal mastery, team learning, and how those impact a learning organization. No other theories were considered due to the relationships between the connectedness provided by Twitter and the effects of effective professional learning components on a learning organization.

Assumptions could have caused the study to be unsteady and were considered by the researcher by using clear communication. In the original email sent to public secondary school principals, the researcher requested they forward the questionnaire only to their secondary teachers. Within the initial survey, respondents indicated why they

used Twitter for professional purposes to narrow down the specific activity they had when interacting with the online platform. The researcher chose a diverse set of participants to interview after the initial survey based on geographic location to address the assumption that the data collected represented all public school secondary teachers in Missouri.

This study explored types of professional learning accessible to secondary public school teachers in Missouri, teachers' perceptions of using Twitter for professional learning, how educators worldwide used Twitter to enhance their professional learning network, and how they used Twitter compared to traditional professional learning options. The researcher reviewed recent literature that defined and described traditional and nontraditional forms of teacher professional learning. The literature presented explained how educators worldwide use Twitter to produce new knowledge and skillsets, gain feedback from like-minded professionals, and provide feedback to professional peers.

Summary

Professional development is important to teachers because it enhances and supports instructional strategies, and pedagogy knowledge, and leads to higher student achievement (Zhang et al., 2020). In addition, professional development is the process of teachers learning new and effective ways to develop curriculum, deliver curriculum, and collaborate with other educational professionals (Darling-Hammond et al., 2017). In Missouri, professional development is also required to maintain teaching certification; therefore, it was an essential educational subject to explore. The research will fill the gap in literature where little to no information is found regarding the perceptions of Missouri

public school teachers who teach secondary grades and use Twitter as a professional development tool. Numerous studies have explored social media for professional growth and learning within the United States and worldwide. Still, specific to the region of Missouri and the public school secondary grade levels, a lack of information exists.

Connectivism explains that people can effectively learn independently by creating connections with like-minded resources that generate conversation and foster skill development (Downes, 2008; Siemens, 2005). Twitter supports this learning theory by providing a social media platform capable of generating and sustaining the use of peer feedback, as well as social connections that lead to effective learning. Teachers can participate in professional learning through Twitter by networking with other teachers and accessing peer feedback.

Panagiotopoulos, Zogopoulos, and Karanikola (2018) pointed out that personal mastery guides individuals to fill the gap in their present and preferred conditions. This journey requires individuals to examine their vision and focus on continuous improvement using professional development (Panagiotopoulos et al., 2018; Senge, 2006). Senge (1990, 2006) identified that personal mastery formats how one grows and learns, yet since he first published his idea of the five disciplines of a learning organization, the boundaries of learning have widened, therefore deserve a deeper dive while considering today's technologies (Cabrera & Cabrera, 2021).

The purpose of this narrative qualitative study was to explore the perceptions of using Twitter as an effective professional learning tool of public school secondary-level teachers in Missouri. Teachers are required to continue learning and are given more than

one way to access new information. Twitter is one format teachers can use to participate in professional learning.

This literature review focused on the use of Twitter as a social media platform for the benefit of professional learning for teachers, what methods were currently used to access professional learning, effective professional learning practices, and barriers of utilizing social media for professional learning by educators. This chapter is organized thematically with components defining current teacher professional learning, the tools and variations of current professional learning accessible to teachers, including formal, informal, and collaborative learning, and descriptions of those variations. Next, literature will be presented exploring professional learning networks, virtual professional learning networks, and how virtual professional learning networks are created with the use of Twitter. The final areas covered in Chapter Two include the social media website Twitter, and the benefits and drawbacks of using Twitter for teacher professional learning by exploring how Twitter is used amongst educational professionals.

The methods of this study will be outlined, describing research design, explanation of participants, the selection process, instrumentation description, data collection format, survey findings, and data analysis. Then, in Chapter Four, the researcher will present an analysis of the findings from the descriptive data and themes identified by the researcher from respondent demographic information. Finally, in Chapter Five, the researcher will present key findings, summarize the study, and make recommendations for future implications for educational professionals.

CHAPTER TWO

LITERATURE REVIEW

Introduction

With the recent education crisis generated by the COVID-19 pandemic, face-to-face activities, social distancing, and even school shutdowns have impacted teachers' learning (Alwafi, 2021). As a result, different technologies to combat teacher isolation and limited access to collaboration have become more prevalent than ever (Alwafi, 2021). Traditionally the call for educator professional development has been responded to with prescribed learning activities provided by school districts, but through dissection of current research, studies point to the effective option of social media networks as webs of teacher learning (Alwafi, 2021; Van Waes, De Maeyer, Moolenaar, Van Petegem, & Van den Bossche, 2017). The purpose of this study was to examine the perception of the use of Twitter as an effective professional learning tool for public school secondary-level teachers in Missouri. This study bears weight in the advancement of teacher professional learning because it synthesizes current literature and data illustrating how teachers use Twitter and what barriers keep them from using it. This study provides data and a review of literature that brings attention to the perceived gains of educational pedagogy knowledge and skills through Twitter.

Theoretical Framework

Connectivism was initially introduced by George Siemens in 2004 as a learning theory that explained the learning process with the emergence of new technologies (Downes, 2020). Siemens (2005) explained that learning can be chaotic, complex, and self-organized but can also reside outside of the individual and inside a shifting

organization or database. It focuses on the connections of specific sets of information and enables the individual to learn more due to the diverse opinions and sources of specialized information (Siemens, 2005).

Siemens (2005) observed significant learning trends that included learners shifting in and out of unrelated topics throughout their lives, informal learning as a significant experience within the learning process, learning as a continuous process, and technology as a tool that can define and reshape our thinking. He also found that organizational learning and individual learning are linked, technology can now support previous learning theories, and the learning has shifted toward knowing where to find information, not just knowing how or knowing what (Siemens, 2005). The principles of connectivism include that knowledge and learning reside in different opinions, and it is the process of connecting the different sources of information through nonhuman applications (Siemens, 2005). Connectivism stresses that the learner's capacity to discern more through observing connections between contents, fields of study, and thoughts is more important than what they currently know (Siemens, 2005). The remaining principles of connectivism include that acquiring accurate, up-to-date information is the intent of the learning process, which contributes to the decision-making of the application of new learning (Siemens, 2005). Connectivism begins with the individual and the particular knowledge they possess (Siemens, 2005). This individual learning contributes to the learning of the network, and then, in turn, the network feeds information back to the individual (Siemens, 2005). This pattern of connectedness and continuous exchange of knowledge can impact the limits of an individual learner (Siemens, 2005).

The personal decision and action of consistently engaging in learning depend on the ongoing activities of one clarifying what is important and what one's current reality is (Senge, 1990). The term personal mastery was first described by Peter Senge (1990) as one of five disciplines that, when combined accurately, will lead to a highly effective learning organization. Senge noted that organizations most commonly identify personal mastery as the most impactful five disciplines (Reese, 2020). Individuals within a learning organization who identify having high levels of personal mastery can view their learning in conjunction with change rather than combat the outside elements that influence their learning (Senge, 1990). As an individual begins to develop personal mastery, it is essential to understand that it is a discipline that requires principles and practice that are continually applied (Senge, 1990).

Educator Professional Learning

The emphasis on teacher professional learning dates back to the early 1900s. In 2001 the Elementary and Secondary Education Act was rewritten and identified as the No Child Left Behind (NCLB) Act (Remer, 2017). Through the reauthorization of this federal educator policy, the United States Department of Education extended the federal government's role in advising teacher credentials (Remer, 2017). This act included implementing state-standardized assessments and communicating the results on an annual basis (Remer, 2017). Through this policy, the term highly qualified teacher was identified (Remer, 2017). The qualifications of a highly qualified teacher include an educator who holds a bachelor's degree, and a state teaching certificate and exhibits subject matter aptitude (Remer, 2017). Beginning the 2016-2017 school year, the United States Department of Education adopted a new policy known as the Every Student Succeeds

Act (ESSA) (Remer, 2017). The major shift in this policy included state control of teacher certification qualifications and more concentration on student inputs instead of student outputs (Professional Learning Exchange Advisory, 2016; Remer, 2017). Outlined in the ESSA, teachers who meet state requirements for certification are automatically designated as highly qualified (Professional Learning Exchange Advisory, 2016).

Erickson (2020) found that educators, whether self-directed as intrinsically motivated learners or compliantly fulfilling requirements set by their employing districts and state departments, engage in professional learning throughout their careers. The blend of certification-compliant participation and the desire to increase teacher effectiveness creates a need to seek out the most desired type of professional learning (Erickson, 2020; Shirrell et al., 2019). Ultimately, through participation in professional learning, teachers can further develop their knowledge and skills essential to the teaching profession geared toward improving student learning (Shirrell et al., 2019).

Hargreaves et al. (2013) found that teachers committed to implementing newly learned classroom strategies established a desire to challenge themselves, leading to an increased longing to continue learning and improving. Teacher-identified needs should drive all aspects of professional development and consider how teachers feel they best learn, support their students, and continually evaluate the practitioner (Darling-Hammond et al., 2017). Educators who volunteer to pursue additional learning show a drive to obtain personal mastery and need to improve their current practices (Hargreaves et al., 2013). As an educator moves closer toward personal mastery of teaching skills and abilities, more personalized professional learning has been found to help educators

develop greater feelings of efficacy (Erickson, 2020). Teachers need to have the opportunity to engage in professional learning that focuses on improving instructional strategies and application and must be content specific (Kostina, 2017). Impactful professional learning opportunities afforded to teachers draw on the teachers' belief that they are not only consumers of information but also developers and must offer a reflection on practice and implementation (Banegas, 2019).

Effective professional learning is the foundation of improving an educational institution as it has the most direct impact on student learning (Alberth et al., 2018). Darling-Hammond et al. (2017) identified that to ensure educators are equipped to support the depth and complexity of student learning, professional development is an essential strategy and includes seven elements. The professional development should be content focused and consist of active learning strategies, collaboration, exemplars, coaching and expert support, feedback and reflection, and sustained duration. If these elements perform in conjunction, not in isolation, an overall improvement in the organization will occur. As society evolves and technology and policy emerge, it is vital to view professional learning as an organizational feature to increase functionality and success (Panagiotopoulos et al., 2018).

Informal professional learning. Formal learning has been the primary source of education from the time children enter school; however, the format for learning begins to change as learners move toward more advanced education. The decline in the percent of formal learning as students progress through education illustrates the importance of informal learning as educators go from preservice teachers to practitioners (Shirrell et al., 2019). Keay, Carse, and Jess (2018) identified several ways educators can participate in

informal professional learning, including reading professional texts, accessing web-based and digital platforms, implementing new strategies and structures in their classrooms, and participating in action research projects.

With the advances in technology, access to informal learning has increased (Shirrell et al., 2019). The increased availability of reliable internet and decreased cost of individual technology devices have steered growth in innovative learning environments and tools (Kuznetcova, Glassman, & Lin, 2019). These new types of circumstances include virtual networks, discussion-based boards with capabilities of image posting, blogs, conferencing, online communities, and virtual environments (Kuznetcova et al., 2019). The use of virtual technologies is not new. Still, its use in education continues to grow as it offers the capability to create a virtual environment and the potential to increase efficiency, reduce cost, and overcome other limited resources (Mumhure, Jita, & Chimbi, 2020). The use of informal learning platforms has also been found to bridge the gap between theoretical practice taught in preservice courses and existing teaching practices (Mumhure et al., 2020). Social media is an example of a web-based, digital platform that can potentially bridge formal and informal learning through digital cultures focused on specific academia (Kasperuniene, Zydziunaite, & Eriksson, 2017). In addition, blended and collaborative features of online professional development were found to aid in designing and strengthening appropriate educational strategies (Koukis & Jimoyiannis, 2020).

Most social media users create accounts for personal use, but many have found professional avenues to explore, tying together their personal and professional lives (García-Martínez, Tadeu, Montenegro-Rueda, & Fernández-Batanero, 2020). Littlejohn

et al. (2016) found that this informal method of professional learning centered around participants' desired needs. As a result, they implemented specific strategies more readily and adapted their approaches if needed. Kasperuniene et al. (2017) added that when a virtual environment offers positivity, can be self-regulated, and is highly motivating, it becomes conducive to accepting, absorbing, and distributing knowledge. Kuznetcova et al. (2019) agreed that using the emergent attributes of this adopted new way of learning has the competence to combine a specific type of knowledge while being autonomous and developing nonhierarchical groups of learners. An important factor contributing to successful informal learning is self-directed motivation (Hargreaves et al., 2013). During their study, Hargreaves et al. (2013) found that teacher attendance in voluntary professional learning sessions was higher by participants who self-identified as driven and seeking to improve their practice. The use of informal professional learning requires learners to act independently, which provides them with the opportunity to tailor their learning needs (Hargreaves et al., 2013).

Through informal professional learning, experimentation without reluctance was found, leading to an increased probability of learners trying new strategies or questioning current methods without fear of formal consequences (Kuznetcova et al., 2019; Tucker, 2018). Teachers identify many barriers to seeking out professional development, including time, outside of the classroom responsibilities, and time-sensitive tasks (Chen, Lowenthal, Bauer, Heaps, & Nielsen, 2017). Educators need to identify their individual needs to guide the direction and customization of professional development for the individual and the faculty (Desimone & Pak, 2017). Factors to consider when developing tailored approaches to professional learning that promote individual ownership include

discipline-based, flexibility, and the years of experience of the learner (Chen et al., 2017). Desimone and Pak (2017) also found feedback and active learning opportunities, content specificity, sustainability, and a monitoring system, including self-monitoring and collective approaches, crucial when designing effective informal professional learning.

Senge (1990, 2006) noted that collaboration is vital when developing essential learning within a community but must incorporate objective self-assessment to support the foundation of lifelong learning. Furthermore, Abel-maksoud (2018) found that compared to students who did not utilize networking collaboration, students demonstrated higher grades and levels of motivation. Finally, the work of Mumhure et al. (2020) dismissed the myth that educators cannot produce maintainable resolutions to the challenges they face during their classroom practice. Instead, with intentional development, they can adopt effective innovations outside of formal training (Abel-maksoud, 2018; Mumhure et al., 2020).

Participants who were not required to attend in-person collaboration could spend more time learning because they could access content and peers anytime and anywhere (Abel-maksoud, 2018; Krutka & Carpenter, 2016). The flexibility of the workspace and time also provided the opportunity to work through conceptual principles until they confidently understood them (Abel-maksoud, 2018). With workspace and time more flexible, this allowed participants to gain the confidence and motivation to approach tasks knowing they would have time and space to master the skill (Abel-maksoud, 2018).

Formal professional learning. Throughout decades, professional development offered to educators has generally been created and carried out by experts outside of the organization who served as advisors on the best practices to increase student learning

outcomes and teacher effectiveness (Courtney, 2018; Mumhure et al., 2020). Darling-Hammond et al. (2017) defined effective professional development as professional learning that is structured so that student achievement outcomes increase due to change in teacher practices. Teachers' high-quality professional learning opportunities are available formally and informally and begin during an educator's journey toward certification while obtaining an undergraduate degree through formal coursework, whether online or in person (Darling-Hammond et al.; Shirrell et al., 2019). For organizations to be effective, they should strive for all members to achieve personal mastery (Senge, 1990, 2006). While pursuing personal mastery, individuals actively grow personally and in their learning (Senge, 1990, 2006).

Examples of formal types of high-quality professional learning include professional learning programs, graduate courses, professional conferences or workshops, and mentoring or coaching sessions. The remaining types of formal professional learning are through academia while enrolled in university courses. Many colleges offer online and face-to-face classes focused on obtaining higher level degrees and building on teachers' academic knowledge and skillset while completing their undergraduate studies. Palvia et al. (2018) found valid concerns from students enrolled in online courses and institutions, ranging from isolation from peers and instructors, the expected level of mastery for new technologies, the undesirable viewpoint of online degrees by employers, and a lower quality of instruction compared to parallel in-person classes. Shirrell et al. (2019) found that teachers who participated in formal professional learning identified a change in their instructional beliefs but found no difference in their practices. Utilizing traditional forms of teacher learning has been found to inhibit innovative application,

leading to a transactional approach to the art of learning. It has led many researchers and educational administrators to investigate informal professional learning methods (Ngcoza & Southwood, 2019).

As models for educator professional learning shift, Alberth et al. (2018) found conventional forms of teacher training programs lack the component of continuing support. A typical format of teacher professional learning involves the presentation of information from the instructor, the participant consuming that information, the training ceases, and the participant is left to implement what they have learned during that time on their own (Alberth et al., 2018). Makindi, Aggleton, Adhiambo, and Gikuhi (2018) found that when professional development is facilitated by the building administration alone, it falls short of authenticity and individual teacher engagement. Dehghan (2020) added that this type of workshop model is often disconnected from the reality of the teachers' classroom due to the external expert leading the session. Also, the lack of social interaction within these models leads to a detrimental effect on teaching practices (Alberth et al., 2018). Students continue to enroll in traditional and online courses through degree programs, but with traditional and online courses comes a financial obligation to the new learning (Sprute, McCabe, Basko, Danuser, & Mandernach, 2019).

Just as there are different strategies to facilitate students' learning, there are different methods that facilitate teacher learning. Historically, teachers have participated in informal and formal professional learning activities, including professional learning programs, teacher collaboration, university courses, professional conferences, mentoring and coaching sessions, everyday communications, and individual learning activities (Courtney, 2018). However, Colognesi, Van Nieuwenhoven, and Beusaert (2020) found

contrary to common practice, the type of formal teacher support structures is less impactful than the quantity of knowledge exchanged during a professional learning process. When collaborative efforts are initiated by teachers and supported by building leadership, teachers feel a shared responsibility and are connected to one another's growth (Admiraal, Schenke, De Jong, Emmelot, & Sligte, 2021).

School bodies fit the framework of a learning organization and, to be highly effective, can apply Peter Senge's five disciplines to their systems (Panagiotopoulos et al., 2018; Senge, 1990). Senge (1990) described a learning organization as a structure of people who continually strive to increase their capacity to transform or grow. Senge's (1990, 2006) work, *The Fifth Discipline: The Art and Practice of the Learning Organization*, described the five disciplines of a learning organization as personal mastery, mental models, building shared visions, team learning, and systems thinking. When executed together, these lead to the forward movement of a learning organization.

Senge (1990) defined a learning organization as a body of continual expansion toward its capacity to impact its future directly but identified that an organization's learning must occur through individuals who learn. Senge also added that it is vital to understand that the individuals' learning alone does not ensure successful organizational learning. Senge pointed out that successful organizations understand how to identify and use individual members' commitment and aspirations to learning at all levels to improve the organization as a whole (Senge, 1990). Supporting the construction of individual capacity of the members of the learning organization and interdependence of growth of each member builds the foundation for collaboration and personal mastery (Senge, 1990). Learning how to learn together and nurturing collaborative thinking are crucial

components of the model. Senge added that for the collaborative learning environment to thrive, the individual must continue to move toward personal mastery and understand what results truly matter most deeply to them. The commitment to understanding one's priorities and learning goals requires lifelong learning and having clarity that the individual learning and progress directly impact the learning organization (Senge, 1990). The idea of "creative tension" is derived when the individual seeks to clarify what is essential through the lens of the current reality and can find resolution through this process (Senge, 1990). If this process is viewed as ongoing, it can clarify and deepen personal vision. This continual process prevents a reactive mindset that causes one to shift responsibility toward someone or something else (Senge, 1990).

Senge's (1990) idea of mental models is vital to explore when outlining professional learning and its impact on a learning organization. Senge described mental models as deeply rooted assumptions, general expectations, or images that impact the understanding one holds of the world around them while also acting upon those ideals (Senge, 1990). Mental models within a learning organization explain the need for an individual to look inward, identify their assumptions, and share those through learning conversations that steady analysis and support (Senge, 1990). For mental models to be examined and addressed, those deeply rooted ideals must be understood, broken down, and grasped (Senge, 2006).

Senge (1990) identified shared vision as the third discipline. Shared visions are significant because they offer a mutual idea and a sense of purpose for the learning organization by detecting familiar images of the future that convey authentic assurance and enrollment by participants and not just obedience. A shared vision is a collective

picture of what the learners seek to create together (Senge, 2006). The fourth discipline identified as team learning can be described as coordinated action to pursue a higher group capacity. This action strives to develop dialogue and team thinking to break assumption barriers and align all team members' mindsets (Senge, 2006). Senge's fifth discipline, systems thinking, brings all of the individual disciplines together to leverage the success of the four previous disciplines to move the learning organization toward success (Senge, 2006). The five disciplines are interrelated and must grow for the entire organization to grow (Senge, 1990, 2006).

The five disciplines support the idea that learning within professional development can look different and can be achieved in several different ways, but must support personal mastery while understanding mental models, shared visions, team learning, and ultimately be approached with systems thinking (Senge, 2006). Personal mastery can be functional for any person, as long as they want to learn, but it must be developed (Cabrera & Cabrera, 2021; Senge, 2006). This development must be approached with a clear path or template that outlines how the learner will meet the targeted results (Cabrera & Cabrera, 2021; Senge, 2006).

The continuous emergence of new technologies and paths of communication offers learning organizations and individuals ways to seek out and distribute professional learning through connections (Utecht & Keller, 2019). Connectivism applies the idea that technology can unite these learning paths and sustain the connection through ongoing interactions (Downes, 2020). The work of Darling-Hammond et al. (2017) reinforced the positive impact that seeking feedback, facilitating reflection, and sustainability have on teacher professional learning. By viewing formal and informal teacher professional

learning through the lens of connectivism, the feedback and reflection components are not only necessary but must be built into the learning (Darling-Hammond et al., 2017; Downes, 2020).

Professional development is required for teachers to have the necessary tools and implementation strategies to positively impact student achievement (Learning Forward, 2020). Teachers must be allowed to acquire these tools and collaborate with peers regarding integration practices (Learning Forward, 2020). As a premier guide to professional development, Learning Forward (2020) established a set of standards that outlines qualities of professional learning that reinforces effective instructional practices, student achievement, and leadership. Learning Forward designed seven standards: learning communities, leadership, resources, data, learning designs, implementation, and outcomes.

Effective professional learning is collaborative and designed with the needs of the learner in mind (García-Martínez et al., 2020; Learning Forward, 2020). The learning design should promote active engagement, allow for shared responsibility, and create alignment and accountability (Bedford, 2019; Learning Forward, 2020).

Collaborative Learning

Collaborative learning is identified as an effective means of organizing learning and implementing various learning formats that can increase performance compared to those who did not engage in a collaborative learning experience (Fakomogbon & Bolaji, 2017). Falcione et al. (2019) also described collaborative learning as an interdependent relationship between the individual and the group that relies on the success of independent preparation and members' willingness to work as a team. Collaborative

learning aligns with Senge's (1990) team learning discipline and is described as a team's approach to align and develop their efforts and desires toward a shared vision. The success of team learning is dependent on the individuals' work toward personal mastery because the group's success relies on the individual's success (Senge, 1990). For all of the elements of the system to work effectively, the individuals must have a high level of personal mastery (Senge, 1990).

Collaborative learning offers more than an environment where individuals can reflect on practices and provide professional feedback (de Jong, Meirink, & Admiraal, 2019). Collaboration provides learners an opportunity to safely develop and identify personal connections to content and vision, better supporting personal growth within a professional context (de Jong et al., 2019; Senge, 1990). What sets collaborative learning apart from other interactive learning formats is the asynchronous work combined with group interaction and problem-solving (Falcione et al., 2019). Mansfield and Thompson (2017) found those with limited colleague interaction and less opportunity to collaborate reported dissatisfied feelings toward professional development experiences that led to less engagement in implementing new teaching structures and strategies. For collaborative learning to occur, the right conditions must be present and can directly impact school improvement if it allows teachers to play an active role as educational leaders and provides less restrictive professional development (García-Martínez et al., 2020; Jensen, Sonnemann, Roberts-Hull, & Hunter, 2016). As teachers participate in collaborative learning, they have the potential to change and improve their practices, shift their attitudes, and develop collective efficacy (Dray & Brancard, 2017).

García-Martínez et al. (2020) identified collaboration as a factor in teacher empowerment and created internal organizational changes leading to school improvement. The process of participating in the collaborative activities encouraged the act of learning, reflecting with the goal of improvement, awareness, and a higher willingness to receive objective feedback (Mansfield & Thompson, 2017). Collaboration provides a robust learning environment and teacher change because it requires observation, dialog, reflection, and research or identification of best practices (de Jong et al., 2019).

For collaborative learning to be most effective, Jensen et al. (2016) found it must be embedded into teachers' daily actions and processes. It has also been identified that a critical form of professional learning includes a sustained interaction between members or groups of teachers (Lantz-Andersson, Lundin, & Selwyn, 2018). Over time, a high amount of interaction between collaborators leads to more embedded learning (de Jong et al., 2019). This commitment assists in forming teachers' understanding of new knowledge related to student learning, evolving from static learning to constructivist learning (de Jong et al., 2019). Historically, geographic and sequential factors have constricted collaboration opportunities with professionals in similar roles (Trust et al., 2017).

Senge (1990) found that the connection to others and learning becomes the priority during growth transformation. During this process, the uniqueness of the individual is not sacrificed but is empowered to become a larger piece of the influential, creative process (Senge, 1990). Specifically, Mansfield and Thompson (2017) found once participants engaged in rounds of collaboration, they observed changes in classroom

instruction, particularly in the depths of questioning, the intent of planning, and strategy. Among the perceived adjustment to classroom practices, participants noted an increased sense of community, trust, and safety when working with a teacher from other schools (Mansfield & Thompson, 2017).

With present-day research advancing in exploring the effectiveness of collaboration, education has been identified to be a genuinely collaborative profession (Jensen et al., 2016). When used effectively, social media sites provide educators a direct line to communicate and collaborate outside of the walls of a building (Mpungose, 2020; Tucker, 2018). Connectivism places importance on leveraging these connected learning environments to host collaboration because it supports active and interactive learning practices (Falcione et al., 2019; Utecht & Keller, 2019). By applying connectivism, social networks can be viewed as the medium that facilitates effective collaboration due to a balance of human connections and nonhuman sources (Alzain, 2019).

Professional Learning Networks

Goria et al. (2019) described professional learning networks as environments of professionals with the shared goal of developing knowledge and skill through peer interactions that support reflection and feedback. This web of professional development comprises individuals who bring their knowledge base and experience to reconstruct topics and practices to structure an environment where participants learn from and with one another (Ngcoza & Southwood, 2019). Oddone, Hughes, and Lupton (2019) identified that the entirety of the learning process could be viewed as a connected experience through networked learning. Therefore, networked learning supports the idea that teaching is a network made up of micro connections of shared knowledge and skill.

By the learner connecting and willingly participating in the professional learning network, the idea of the individual having significantly higher control of their learning emerges while maintaining emotional, social, and cognitive abilities to grow in their craft (Lantz-Andersson et al., 2018; Trust, Krutka, & Carpenter, 2016). One engaged in professional learning using a professional learning network creates an opportunity to participate across public, personal, and pedagogical designs while reshaping their teaching and learning through the myriad of professional learning network activities (Oddone et al., 2019; Trust et al., 2016). Trust et al. (2016) found teachers who executed new strategies reported feelings of redefining roles and targets.

Ngcoza and Southwood (2019) found that teachers feel a pull to conform to policy demands and new practices, but a co-construction of knowledge and technique is formed when teachers learn within a network. Trust et al. (2017) and Trust et al. (2016) identified that professional learning networks are comprised of individuals who seek out and advocate for collaboration, feedback, emotional support, and feedback. Professional learning networks support avenues that allow teachers to build professional identities, knowledge, and skills (Ngcoza & Southwood, 2019; Trust et al., 2016). Experts can absorb, progress, and theorize their practices with the flexibility and ease of modification through professional learning networks (Trust et al., 2016). Changes in behaviors such as increased productivity, social efficacy, and empowerment are noted to occur during participation in professional learning networks, along with sustained engagement (Krutka & Carpenter, 2016; Trust et al., 2016).

Teacher networks require proper management to fulfill the often assigned teacher professional development mandate. Still, Bautista, Yau, and Wong (2017) found that the

professional learning network must be managed by teachers, leaving most clusters with practical organizational challenges. Although barriers to an effective professional learning network exist, it is essential to understand that personalized learning is at the core. Because of that, the focus should continue to be on the uniqueness of the individuals who range in skill level and experience (Trust et al., 2017). Effective teachers are learners themselves, and for learners in a professional learning network to gain the benefits of networked learning, they must be self-directed and empowered to make choices that control the personalization of their learning (Forbes, 2017).

A professional learning network's complex system of interactions consists of unique people, resources, and digital tools that support ongoing individual and group growth (Trust et al., 2016). Not only does networking afford the sharing and reflection of practices, but also curriculum development. Increased engagement is observed when collaborative opportunities are present (Krutka & Carpenter, 2016; Ngcoza & Southwood, 2019). Professional learning networks initiate prospects for practice improvement and can respond to planning and implementation (Ngcoza & Southwood, 2019). Goria et al. (2019) found that teachers in a professional learning environment who participated in a professional learning network experienced an increase in awareness of services, tools, and connections that support learning and their influence on their students' experiences. Participants also found they were more mindful of their current formal and informal learning practices when asked to join the collaborative conversation (Tucker, 2018). As technology continues to advance, the space within which members can interact and engage in professional learning networks broaden as well. These include face-to-face, virtual, synchronous, and asynchronous spaces and provide the opportunity

for the social interactions online to lay a foundation for developing a strong community of learners (Kuznetcova et al., 2019; Trust et al., 2017).

Professional learning networks can redefine co-constructed knowledge, and by applying the concept of connectivism to this practice, learners have the capability to engage in limitless ways (Tham, Duin, Veeramoothoo, & Fuglsby, 2021). Connectivism offers the theory that learning is the development of connecting specific information groups or information sources (Tham et al., 2021). The learning that has the potential to take place within a professional learning network can increase exponentially when the barriers of geographic location are removed by taking it online (Shrivastava, 2018).

Virtual Professional Learning Networks

Not only has the limitlessness of technology influenced how we interact, process information, and access entertainment, but also social media has built a structure that enables educators to connect with others outside of the limited geographic areas who might have never had the chance to meet face-to-face (Palvia et al., 2018; Trust et al., 2017). The use of social networking platforms for teaching purposes has increased; therefore, the opportunities for teachers to develop virtual professional learning networks have also increased (Fox & Bird, 2017). The virtualization of professional learning networks proves to create an expansive, on-demand environment that promotes the whole teacher's diverse needs and interests (Trust et al., 2016). By accessing social media, professionals can broaden their feedback and resource pool (Trust et al., 2017). For a virtual platform to effectively create a virtual professional learning network, all participants must understand and appreciate the importance of the context of the community and the diverse views of the participants (Moodley, 2019; Trust et al., 2016).

Educators have reported finding exciting, new, and relevant information by forming connections they initially were not seeking. After connecting, a wide variety of their learning came from the professional learning network (Trust et al., 2017). Connecting with other professionals on a virtual platform offers the advantage of communicating in real-time, sharing and reviewing resources, tracking news, and engaging in the profession without geographic boundaries (Forbes, 2017; Trust et al., 2016).

Educators who participated in virtual professional learning networks found them flexible and allowed more adaptation to their learning experiences while considering the factors of work context, engagement levels, and the extension beyond institution walls (Nusbaum, 2020; Trust et al., 2017). Through virtual professional learning networks, professional knowledge was developed and distributed across diverse members (Trust et al., 2017). Members of the virtual professional learning network gained fresh ideas, practical application of teaching strategies, and specialized content knowledge (Gao & Li, 2017; Trust et al., 2017).

Bedford (2019) found through the study of virtual learning networks, four themes emerged. These themes included technology, contributions, relationships, and design (Bedford, 2019). When examining the effectiveness of professional virtual learning networks, it is vital to look at the type of technology used, the members' contributions, the strength of the relationship between members, and the overall design. The ability to personalize and use the technology-enhanced resource allowed members personalization and a sense of connectedness to the learning network. Participants found that the learning they engaged in outweighed their contributions. The significance of relationships was found to enhance community building, and participants reported an increase in efficacy,

verification of experiences, connectedness, and feelings of security (Bedford, 2019). The study concluded that the design of the themes allowed for a more strategic structure and permitted more significant amounts of participants (Bedford, 2019). The dialogue from online design creates an evolution from individual ideas to more powerful significant concepts (Bedford, 2019; Krutka & Carpenter, 2016). This personalized professional learning experience is connected to one's perception of strengthening knowledge base and, therefore, an efficacy-spiking learning experience (Erickson, 2020). Moodley (2019) added that the construct of the virtual professional learning network allowed the teacher's voice to be heard, where it was not always found to be during seated collaboration.

Compared to traditional professional learning, the use of virtual professional learning networks untied the limitations frequently brought on by the typical type of professional development (Adjapong, Emdin, & Levy, 2018). The work of Sancho-Gil and Domingo-Coscollola (2020) explained that educators' learning has the potential to occur in all spaces with the right combination of resources and people. Virtual professional learning networks are a supplemental resource to more conventional professional learning due to traditional professional learning being aligned with school and district goals and not specifically designed to meet the individual learner (Adjapong et al., 2018). Adjapong et al. (2018) also added that the widespread communication and engagement with the virtual learning network teachers required them to be more engaged learners and teachers. The study of participants was found to become more confident in developing the use of the virtual learning network once they utilized a specific hashtag or followed specific professionals rather than lurking and finding tweets randomly through search.

Booth and Kellogg (2015) found to reach the full potential of a virtual professional network, a deep understanding of the worth of each member is developed through their level of participation. Members with varying views can co-construct new learning experiences, and through this online dialogue, participants found higher levels of motivation because of the anytime, anywhere accessibility of the network (Booth & Kellogg, 2015; Tucker, 2018). Booth and Kellogg's (2015) work indicated that regardless of the topics discussed, members found enjoyment in participating in conversations with educators who were willing to share personal celebrations and challenges. In addition, members found immediate significance in conversations that allowed them to inquire about tips, community resources, and how to expand their current professional learning network (Booth & Kellogg, 2015).

Continuous learning and participation are supported by the uniquely personalized aspects of a professional learning network (Alberth et al., 2018; Krutka & Carpenter, 2016). Social media mediates professional interactions that otherwise might not be accessible and are attributed to the strategic selection of people, spaces, and tools while eliminating the construct of building walls and the limitations of work hours (Alzain, 2019; Krutka & Carpenter, 2016). Although the isolation many teachers reported feeling was diminished even with minimal participation like reviewing discussion threads, educators must be intentional about how they use the ever-changing set of social media and reflect how the online tool impacts their professional learning (Booth & Kellogg, 2015; Krutka & Carpenter, 2016).

The social space where virtual professional learning networks are found can be described as a space where flexible, fluid, and unbroken learning takes place

(Kasperuniene et al., 2017). This virtual social space can be unpredictable and include connections that emerge, disappear, and reappear again (Kasperuniene et al., 2017). Using a professional learning network that is housed virtually increases sustainability following new learning and adds support to continuous, long-term learning (Alberth et al., 2018; Krutka & Carpenter, 2016).

Through an interview conducted with Senge, he identified that the commitment to long-term learning must consist of finding the gap between one's personal vision and their current reality (Reese, 2020). Once both the personal vision and current reality are recognized, the individual must ultimately be willing to try to do something, whether it be using a new tool or a new process (Reese, 2020; Senge, 1990). This willingness to fail through application of skill, or knowledge is often what many individuals lack that then leads to stunted progress toward personal mastery (Reese, 2020; Senge, 1990).

How Professional Learning Networks Are Created Through Twitter

Through Twitter, communication and collaboration are created, and content is developed and disseminated rapidly and on a grand scale (Ricoy & Feliz, 2016; Tucker, 2018). Noted by educators, Twitter should be examined as a key tool for the informal communication that takes place with a professional learning network (Luzón & Albero-Posac, 2020). In addition, online networked learning allows teachers to integrate their own learning experiences and teaching processes by aligning content to a professional context (Donelan, 2016).

As previously discussed, traditional professional learning for teachers does pose a limitation of accessibility and further support created by geographic boundaries. Traditional professional development afforded to teachers is typically restricted by

specific schedules and space and notably a deficiency in ongoing maintenance following the training (Alberth et al., 2018). In addition, these orthodox professional development formats lack social connections during the facilitation process. Even when built into the workshop, the communication ceases after the time together (Alberth et al., 2018).

Alberth et al. (2018) noted that some formats of traditional professional development are practical but can be enhanced by the use of social media to provide ongoing conversation amongst contributors.

Alberth et al. (2018) supported the use of typical professional development pieces of training. Still, they found that by establishing virtual professional learning networks on social media, teachers are better equipped to combat teacher isolation and lack of follow-up support after the training (Carpenter & Morrison, 2018; Krutka & Carpenter, 2016).

Twitter can be viewed as an alternative faculty workroom where teachers can participate as formally or informally as they choose and can provide educators a way out of feeling isolated because they did not have to wait for a face-to-face meeting to access other professionals (Carpenter & Morrison, 2018; Krutka & Carpenter, 2016). Acceptance, rejection, and support of the professional learning network are three motives that lead educators to either discard or embrace the use of Twitter for professional growth (Tucker, 2018).

Social networking sites such as Twitter can serve as a stage for educators to increase social capital and strengthen collaboration between professionals at the regional, national, and international levels, but how interactions take place has yet to be truly explored (Alberth et al., 2018; Gao & Li, 2017). Twitter initiates and nurtures informal learning that is considered favorable for individuals seeking quick access to relational

resources. When an educator can plug into a Twitter conversation and make an impact in the conversation, the user is more likely to sustain that engagement over a longer duration (Krutka & Carpenter, 2016; Rehm & Notten, 2016).

Twitter not only makes professional development accessible to those whose locations interfere with attendance but Greenhow and Lewin (2016) found Twitter users who provided conference attendees with their Twitter handles during presentations believed it to be an effective tool to assist in delivering ideas and growing identity beyond the walls of the conference room. Greenhow and Lewin also found Twitter use was closely tied to users' attendance at in-person conferences and workshops and in an attempt to network with other educators, tweeting during the conferences afforded attendees the ability to bridge the community within the forum with other physical professional networks to which they belonged (Luzón & Albero-Posac, 2020). Rehm and Notten (2016) found that learners formed new connections of current knowledge and newly accessed information and therefore confirmed current practices or established new skills.

A hashtag acts as a facilitator to promote collective interaction while providing clarity to specific discussion topics and helps structure the group conversation (Czerkawski, 2016). The role of a facilitator is critical to learning, whether online or in person. Still, with the use of Twitter, the technology components available act as the road map with which users can navigate the types of learning in which they wish to engage in (Czerkawski, 2016). Furthermore, the learning initiated on Twitter is not controlled by one individual, nor a small group, but is distributed throughout the network of users and depends on the participants' interactions, experiences, and practices (Czerkawski, 2016).

By participating in professional exchanges via social media, educators can share what they have found to be successful and what has failed, and give a personal account of employing suggested practices (Alberth et al., 2018).

Delello and Consalvo (2019) found that when educators first participated in Twitter chats using a hashtag topic, some found it challenging but reported that it led to the enhancement of learning. The social existence provided by the “real-time” environment leads to a larger sense of community reported by participants (Delello & Consalvo, 2019). The interaction a collective learning community creates supports active decision-making and stimulates the informal learning process through speedy access to the excellent quality of information (Tucker, 2018). On the other hand, the virtual chats afforded by Twitter created a sense of stress for some participants due to the fast-paced, quick-fire environment demand (Delello & Consalvo, 2019). The use of informal platforms such as Twitter promoted the development of educator networks consisting of social interaction and redesigned the approach teachers took to seek out new knowledge and skills (Delello & Consalvo, 2019; Gao & Li, 2017).

The entirety of connectivism is based on the awareness that learning can form from networks or other unfastened connections taking place among people with comparable interests and understanding in somewhat impulsive or casual ways (Hsieh, 2017). When members of a learning network participate in connectivist learning, it is imperative they constantly reflect on what type of interactions will best support their own professional learning (Hsieh, 2017). By utilizing the catalyst of technology, connectivism offers the idea that knowledge is not only found in human applications but in nonhuman forms as well (Tham et al., 2021).

Twitter

The microblog Twitter is a social media platform that allows users to post tweets, retweet, like, share, or reply to tweets. Tweets are limited to 280 characters. Users can share a variety of media types, including videos, photos, documents, and links. Topics can be discovered in real-time by following specific hashtags, added to any tweet or retweet, and hashtags can serve as an index to connect others with a common topic (Greenhalgh, Rosenberg, Staudt Willet, Koehler, & Akcaoglu, 2020). The use of hashtags creates a collection of ideas that enable users to distribute information, curate responses, and connect dialogue on any subject. A user's content can be viewed by anyone who is following the person's username. As of January 2020, there were 397,000,000 active Twitter users (Mpungose, 2020). From these 397,000,000 active users, 500,000,000 tweets are sent out daily (Twitter, n.d.). In 2020, Pew Research Center reported 52% of adult internet users were using multiple social networking sites (SNSs), and 23% of those were actively using Twitter. The increase was 5% compared to what was found in 2013. The use of Twitter eliminates geographical borders, allows instantaneous sharing of ideas, and connects users globally. The global connection Twitter creates requires no reciprocation like many other social media websites. Twitter users have the option of following other users and can decide who is allowed to follow them. Users may also communicate using a private message; direct message only viewable by the specific user, a retweet; share someone else's tweet or alike; or positively acknowledging another user's tweet.

McArthur and White (2016) added that social networking sites, like Twitter, offer the prospect of an alternative setting to develop connections. These communities exist in

the digital realm and continue to be built daily by individuals or groups worldwide (McArthur & White, 2016). In addition, those frequently using online chat arenas are influencing online territories by the consistent synchronous conversations and content produced (McArthur & White, 2016).

Social media networks or applications that utilize social media capabilities are dependent on content generated by users. For the social media content on these networks to continue to evolve, it must not only originate on the platform but be organized, reviewed, and reconstructed by the collection of users (Kuznetcova et al., 2019). Therefore, it can be determined that the foundation of social media usage is contingent on the attitude held between the clusters of participants (Kuznetcova et al., 2019).

Twitter can be identified as a channel for professionals seeking to engage in work-related dialogue, distribute updates, and connect directly to related specialists and information (Pasquini & Eaton, 2019). Twitter holds parameters of unlimited posts containing no more than 280 characters and can include images, videos, and URLs (McArthur & White, 2016). Bastos, Piccardi, Levy, McRoberts, and Lubell (2018) observed that Twitter had shifted from the transmission of information to offering information consumption and community collaboration.

Continuous engagement in the act of participating in a Twitter chat community allowed experts to interact, add, and search for applicable assistance driven by their knowledge development (Quan-Haase, Martin, & McCay-Peet, 2015). The Twitter chat permitted a community for users to be self-directed as they sought out information, resources, and connections with others (Gao & Li, 2017; Quan-Haase et al., 2015). This

professional peer group offered methods to mentor and come across the needs in a timely and on-demand way (Quan-Haase et al., 2015).

Many learning theories place the focus on the learner or participant in this case, but connectivism stresses that the networks that are developed between the users are where the true construction of knowledge takes place (Hendricks, 2019). The features of Twitter provide facilitation and can house these networks that connect learners and users to knowledge distribution and consumption (Brandao & Algarvio, 2020). Connectivism explains the significance of a social media network like Twitter as the nonhuman element where learning can be found (Hendricks, 2019; Shrivastava, 2018).

Twitter Use Amongst Educational Professionals For Professional Learning

Staudt Willet (2019) identified two ways in which users can add to Twitter content. The first includes creating an original post that is autonomous and not mainly replying to other Twitter material. Second, a user can add to Twitter content by using addressivity by using the syntax @username to structure the direct tweets into coherent conversational patterns (Staudt Willet, 2019). Using tweet addressivity consists of replying to another user, responding to their own tweets to combat the 280-character limit, directing a post where the content is not a reply but addressing another user, and self-mentioning themselves (Staudt Willet, 2019). Similar to addressivity, retweeting can begin as an informal user bond by using a commonly decided on syntax (Staudt Willet, 2019).

Data collected by Xing and Gao (2018) suggested that academics who have a higher frequency of any type of social media use identify a wider range of motivations for continued use and a higher rate of successful outcomes. Donelan (2016) also found a

significant number of those who embedded any type of social media participation within their day noted a positive impact on their growth as a professional. Users who sought out broadcasts related to their profession did so for two main reasons, to grow their practice and develop their network. Once they began to not only consume information but interact, they organized their learning on Twitter into three themes: interactive, emotional, and associative, which was reciprocated by the groups they joined (Donelan, 2016; Nusbaum, 2020).

When educators utilize tools such as Twitter, their participation must be within the framework of their goal(s) as a professional (Forbes, 2017). Components that set Twitter apart from other online communities include usability that requires limited technical knowledge, personalization of content is personal to the user, low financial costs in that it is of no cost to the user, the depth of available information due to the diversity of the users, limited time commitment with the constraint of a 280-character limit, and real-time availability of new information (Fischer et al., 2019).

An understated amount of analysis has been conducted on how Twitter reflects characteristics of high-quality professional development but offers users engagement in a new context that can extend or support the workshop model (Fischer et al., 2019; Tucker, 2018). Twitter allows for a shift from top-down learning to bottom-up learning that is informal and personalized. This shift contrasts the “one-size-fits-all” approach included in many traditional professional development activities (Fischer et al., 2019).

Active, consistent engagement is essential to use Twitter for professional growth (Fischer et al., 2019). In addition, this process allows for follow-up reflection and dialogue in real-time to adjust instruction based on desired results (Fischer et al., 2019;

Tucker, 2018). Although resource collection was found to be the second greatest reason for teachers to engage in a Twitter professional learning network, a teacher's sharing of content knowledge rather than mere resources allowed for a more accurate prediction of teachers' belonging to the influence-based teacher groups (Fischer et al., 2019; Tucker, 2018).

The Twitter platform was found to be important to participants because of the lack of hierarchical leadership and participation structure and required a mind-shift of professional development being something that was forced upon them to an activity that they were in charge of and that allowed them autonomy (Fischer et al., 2019; Krutka & Carpenter, 2016). Many teachers who hold and contribute to Twitter chats were found not to contain significant leadership roles, and the intensities of participation varied greatly (Fischer et al., 2019; Gao & Li, 2017). Participants' types of interactions differed, and the topics varied, but how they interacted did not (Fischer et al., 2019; Gao & Li, 2017). These interactions suggested that users who were frequently proactive may not be satisfied with a discussion alone but inspired to seek acclaimed methods to enhance their practice and the practice of others (Gao & Li, 2017).

Fischer et al. (2019) established that Twitter affords different patterns of engagement depending on the teachers' content, professional desires, and learning styles. Fischer et al. added that Twitter allows flexibility while providing highly engaging and personalized content and that this leads to assorted experiences within Twitter communities based on user choice. Educators described using Twitter for various reasons and valued social media as a personalized way to interact and approach professional development (Krutka & Carpenter, 2016). This evidence points out the prospect that

virtual educator communities can offer elements for teachers to engage in networks of similar practices (Fischer et al., 2019; Krutka & Carpenter, 2016). Educators also felt the shared information was valuable and allowed them to connect with colleagues and leaders in education (Krutka & Carpenter, 2016).

Although found to have many benefits, the use of Twitter for professional learning also poses some drawbacks and barriers. For example, Ricoy and Feliz (2016) found when users first began to use Twitter, they were discouraged by the lack of feedback and interest they received, but as they progressively gained familiarity with the social networking tool, they believed learning improved. Users' ability to create original, creative content resulted from the restricted number of characters (280) they were allowed to use and created restrictive feelings when curating original content (Ricoy & Feliz, 2016; Staudt Willet, 2019). Lantz-Andersson et al. (2018) found that although teacher participation in online learning communities has increased, how they interact seems to vary significantly and is driven by a central set of users who contribute to most community interactions.

The work of Ricoy and Feliz (2016) identified an early outcome from a new Twitter user was a lack of originality, and users spent significant amounts of time searching for content within what they stated were loosely organized conversations (Ricoy & Feliz, 2016; Staudt Willet, 2019). Another drawback of Twitter use as a professional learning tool spoke to the change from traditional professional learning to online, informal training, and collaboration. As technology capabilities increase, regardless of age, teachers are demanded to keep pace and learn new tools to use in the classroom, teach students how to use, and employ themselves for professional learning

(Ricoy & Feliz, 2016). Other notable drawbacks of using Twitter for professional learning purposes include the lack of centralized search and focus, the credibility of users, and the lack of recognized verifiability of professional learning time (Ricoy & Feliz, 2016). Social media use for professionals is not fleeting but heavily relies on the user's openness to generate content, critique it, and reconfigure it for others to interact (Krutka & Carpenter, 2016; Selwyn & Stirling, 2016). Content-rich, dynamic, and interactive learning are imperative for effective professional learning, but peer coaching and intense feedback cycles must be featured in the learning system (Darling-Hammond et al., 2017; O'Keeffe, 2019). Darling-Hammond et al. (2017) argued that Twitter chat does not allow for other aspects of professional learning, including a feedback cycle that is clearly defined, a community of practice within the individual's school, and a hands-on approach. Educators felt rejected while engaging in Twitter because they could not find the precise material they were in search of, even with the use of specific educational hashtags (Staudt Willet, 2019; Tucker, 2018). Using hashtags offered educators excitement and helped them to identify similarities in topics but demonstrated an imbalance in user participation because some hashtags were used continuously, while other hashtags identified a specific time parameter (Veletsianos, 2017).

Very little is found to support that educators are using this method to check on others' emotional well-being, yet external inspiration and support are imperative for an educator to choose to address their current approaches and views through Twitter as a professional learning network (Staudt Willet, 2019; Tucker, 2018). To establish the most effective environment for professional learning via social media, the user must believe that the tool is easy to use, uncluttered, fluid, and provides collaboration (Haworth,

2016). In addition, educators should target the technical and implementation knowledge they want to acquire and be encouraged to interact, explore, and be visible within the virtual professional learning network (Krutka & Carpenter, 2016; Tucker, 2018).

The use of Twitter chats on Twitter is a method of professional learning where planned virtual conversations center around topics and include hashtags to organize dialogue (Krutka & Carpenter, 2016). Pasquini and Eaton (2019) identified the hashtag as a digital sign that can be used by professionals and peers to guide interactions with each other. Many studies follow specific educational hashtags, but there is little information regarding the distinct contributions each user provides to the conversation (Staudt Willet, 2019). In addition, these interactions created by the use of hashtags led to increased teacher collaboration (Krutka & Carpenter, 2016).

The components of a Twitter chat include original tweets, retweets, responding to questions, responding to other participants, and liking tweets (Staudt Willet, 2019; Sturm & Quaynor, 2020). Teachers engage in Twitter chats to form a community, network, share and acquire resources, have a virtual conversation, and access a structure for learning (Sturm & Quaynor, 2020; Tucker, 2018). Twitter chats allow teachers to bridge not only physical distance but also experiential distance as well (Hsieh, 2017).

Carpenter et al. (2019) identified through studying educator Twitter use that over 30% of tweets studied contained one or more hashtags, over 30% included hyperlinks, and over 10% were comprised of a combination of both. The variability of hashtags used is significant and pointed to the diversity of content or resources accessed through Twitter conversations (Carpenter et al., 2019). Particular to sharing and sifting through resources, teachers were found to share specific links to websites that support social

networking, images and videos, analytics, news, and grant opportunities (Carpenter et al., 2019; Krutka & Carpenter, 2016). In addition, teachers reported that sharing information and resources with colleagues had the most significant impact on professional practice (Tucker, 2018).

Staudt Willet (2019) found after studying the use of the Edchat hashtag that 90% of participants' activity included posting original content or retweeting their peers' tweets. Additionally, over 90% of participants retweeted their peers' content at least once (Staudt Willet, 2019). Very few users who participated in the Edchat hashtag retweeted their own tweets, replied, or directed their posts to a specific user (Staudt Willet, 2019). The purpose of a significant number of retweets from peers was to respond to original tweets, and many showed self-related ambitions (Staudt Willet, 2019).

Social media offered more opportunities to retrieve relevant, networked skills (Greenhow & Lewin, 2016). Those who used Twitter successfully for professional learning were self-motivated and had a straightforward process for interacting in the learning process (Greenhow & Lewin, 2016). Teachers with a higher level of efficacy with technology use were more willing to adopt online resources such as Twitter for even non-technology-related topics (Lantz-Andersson et al., 2018). Twitter provided additional information pathways, but it opened up more opportunities to discuss different types of technology implementation (Krutka & Carpenter, 2016).

Educators can define and refine their reputations and construct their professional identity by establishing a profile and intentional network (Carpenter et al., 2019; Tucker, 2018). Most teachers' profiles illustrated a division between personal principles and professional identities, but many identified they first began to use Twitter for personal

reasons, then adopted a more professional presence (Carpenter et al., 2019; Krutka & Carpenter, 2016). There seems to be little research available regarding secondary school teachers who use Twitter for professional learning. Still, a variety of social presence was found in secondary educators who used Twitter, from those who frequently interacted to those who would only seek out a one-way search of resources (O’Keeffe, 2019).

Vitoulis (2017) found that Twitter can enhance an educator’s opportunity to learn, but more importantly, can increasingly stimulate the process of their learning. Connectivism theorizes that this process is distributed among a network and not isolated by the individual (Hendricks, 2019). Knowledge is embedded within networks, and connectivism identifies that it is also stored in digital resources (Hendricks, 2019; Vitoulis, 2017).

Summary

The original and updated work of Siemens (2005) described the impact that technology has in developing and sustaining connections between learners and also housing the information exchange. Senge (1990) pointed out that the learning organization is directly affected by the individual learning journey of each person in the organization. Personal mastery requires a lifelong commitment to individualized learning (Senge, 1990). A team’s capacity to operate efficiently and effectively is dependent on each teammate's commitment to obtaining personal mastery and understanding how their personal vision aligns with the team (Senge, 1990).

The purpose of this qualitative study was to explore the perceptions of Missouri public secondary school teachers who used Twitter for professional learning. Chapter Two was a synthesis of current literature on educator professional development,

collaboration, professional learning networks, and the impact Twitter currently has on educator professional learning. With the development and sustainable use of new technologies, there is an opportunity for educator professional development to look different than in the past (Abel-maksoud, 2018; Adjapong et al., 2018). It is important to honor the best practices of traditional professional learning, but new tools and platforms should be considered when revising recommended learning practices (Colognesi et al., 2020; Zhang et al., 2020).

Chapter Three contains an outline of the approach and methodology for the narrative qualitative study. Chapter Four presents clear demonstration of the findings of survey results and interview responses. In Chapter Five, the researcher will summarize key findings, provide discussion, present significance, contribute implications of the findings for educational professionals, and produce recommendations for future studies.

CHAPTER THREE

METHODOLOGY

Introduction

The purpose of this narrative qualitative study was to explore the perceptions of public school secondary-level teachers in Missouri who used Twitter as a professional learning tool. Out of the possible 48,500 secondary public school teachers in Missouri, this study identified Missouri teachers who taught public school secondary grade levels and used Twitter for professional purposes. The survey instrument used in this study focused on the attitudes of teachers in Missouri who taught students in the middle and high school levels and used Twitter for professional learning. The objective of the survey and interviews was to determine how public school secondary teachers in Missouri were using Twitter for professional learning, their perception of how Twitter compared to traditional professional learning, and how their use of Twitter contributed to their professional learning network.

Purpose of the Study

The purpose of this narrative qualitative study was to explore the perceptions of public school secondary-level teachers in Missouri who used Twitter as a professional learning tool. This study sought the perception of teachers who used Twitter for professional use, what they found to be practical in developing a professional learning network through Twitter, and perceptions of Twitter compared to traditional professional learning. The data collected from this study are valuable to school administrators or those site-based or district-based professional learning teams because as they encourage or require professional learning that may or may not be readily accessible to teachers,

district-level and building-level administrators may guide them to a learning network on Twitter.

Research Questions

The researcher examined the results of an attitudinal survey completed by participants teaching public school secondary grade levels in Missouri. There was one central research question with three subquestions:

Central Question: How do Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration?

Research Subquestions:

1. To what extent do public secondary school level teachers use Twitter to participate in professional learning networks?
2. How does Twitter add to professional learning networks used by public secondary school teachers?
3. What are the negative and positive teacher perceptions of using Twitter for professional learning compared to traditional professional learning structures?

Participants and Sampling

The initial survey was sent through Missouri principals who lead public secondary schools. Principals of buildings containing any makeup of Grades 6-12 were considered secondary. These 1,138 principals received an email requesting to forward the survey to their teachers who taught any secondary students. Based on 2020-2021 MoDESE (n.d.) school statistics, 48,500 secondary school teachers in Missouri had the opportunity to participate in this study. Responses from participants regardless of age,

gender, education level, years of experience, content taught, school setting, years of experience, geographic location in Missouri, student enrollment of their school, and the number of teachers in their building who taught the same content and grade level were collected and used for sampling. Any answers from respondents who indicated they did not teach secondary students were collected but not used for the study.

Respondents who indicated they did not use Twitter for professional purposes were not included in the interview portion of the study. From the teachers who used Twitter professionally for resource acquisition or sharing, collaboration, or participation in Twitter chats, the researcher interviewed nine participants representing all regions of Missouri. The nine educators were selected from the contact information that was voluntarily provided and represented each of the Regional Professional Development Centers (RPDCs) geographic locations.

This study represents the attitudes of approximately 48,500 classroom teachers towards Twitter as a professional learning tool. In accordance with the guidelines of Southwest Baptist University regarding the protection of human participants, the researcher submitted a request for review to the Research Review Board (RRB) for approval to survey approximately 48,500 participants for this study. Before research and data collection, permission and approval (Appendix A) from participants and the RRB were obtained. After receiving RRB approval, participant recruitment and data collection began.

Research Setting

The research setting for this narrative qualitative study began with an email questionnaire sent from the researcher to approximately 1,159 public school secondary

principals. The email to public school secondary principals in Missouri requested that they forward the email questionnaire to their certified secondary teachers via email to complete. Respondents completed the survey virtually in the setting they identified as appropriate and convenient for them. The majority of qualitative research occurs in the field and requires researchers to meet with participants face-to-face in their work setting (Merriam & Tisdell, 2016). The research setting was limited geographically to Missouri. The researcher contacted nine questionnaire respondents via phone based on the volunteer contact information provided on the initial questionnaire and their indication of using Twitter for resource acquisition or sharing, collaboration, or participating in Twitter chats. The nine participants moved forward with individual interviews with the researcher. Interviews were chosen to solicit narrative data best to be later color-coded into themes (Butina, 2015). Participants were asked, based on comfortability, if they would prefer using the platform Google Meet or Zoom for the interview. Once a time and date were agreed upon between the researcher and interviewee, the researcher created a Google Meet or Zoom meeting link through which both participant and researcher accessed. During the virtual interview, the participant answered a series of questions that guided the researcher in answering the research questions.

Research Design

The researcher used a narrative qualitative study. The research design laid out a process to aid in looking at the perception of Missouri public school secondary teachers who used Twitter for professional use, what they found to be practical in developing a professional learning network through Twitter, and perceptions of Twitter compared to

traditional professional learning. The researcher also examined and identified thematic barriers to using Twitter for professional learning identified in the initial survey.

A narrative research approach was selected for this study because the researcher wanted to provide a picture of the behaviors and attitudes of Missouri public school secondary school teachers at a specific point in time (Mills & Gay, 2019). The researcher used triangulation to obtain a full picture of what was being studied through the use of an initial questionnaire (Appendix B), subsequent interviews (Appendix C), and researcher observation of interviewee activity on Twitter (Mills & Gay, 2019). The researcher began by sending an email to all public school secondary principals in Missouri that contained a request they forward the questionnaire, included in the email, to their teachers who taught any secondary grade level.

The researcher first collected information from participants regarding experiences and perceptions of using Twitter as a professional learning tool through the use of a questionnaire (Creswell & Poth, 2016; Merriam & Tisdell, 2016). The use of the questionnaire allowed the researcher to gather a large sample of data across Missouri in a rather inexpensive and quick manner (Mills & Gay, 2019). The questionnaire was used to also gather contact information from those willing participants to take part in individual interviews (Mills & Gay, 2019). Nine respondents were then selected by the researcher based on contact information that was provided and their geographic location to participate in structured interviews to obtain data that could not be acquired through questionnaire response alone (Mills & Gay, 2019). Once the nine respondents were chosen for interviews, the researcher sent a follow-up email, which explained the purpose of the study, the criteria for participant selection, and the arrangement of the interviews.

This method of research allowed for a diverse set of schemes to be identified through the use of structured interviews (Butina, 2015; Merriam & Tisdell, 2016; Mills & Gay, 2019). Through email correspondence, the researcher and participants agreed upon a date and time to conduct the individual interview. The set of interview questions (Appendix C) was also provided to the participant in a follow-up email that confirmed the date, time, and virtual interview access information. Gathering participant stories through interviews allowed the researcher to explore the individual experiences of the interviewees (Creswell & Poth, 2016).

By using a narrative research approach, the researcher was able to retell the stories in a way that followed a thematic framework based on participant responses (Creswell & Poth, 2016). This type of research allowed for the experiences and stories of nine public school secondary Missouri teachers to be collected by the researcher and then became the raw data used in the study (Butina, 2015).

Instrumentation

The key instruments for this qualitative study were an initial questionnaire, a set of interview questions, and a cross-reference use of participants' Twitter use. The components of the questionnaire and interview questions were created from the instrumentation used by Powers (2016), who examined barriers and best practices of Twitter for professional learning through the lens of principals in Missouri. The researcher obtained permission from the author to use this questionnaire with a new population, Missouri public secondary school teachers. Permission was obtained on Tuesday, August 27, 2019 (Appendix D).

The introductory section of the questionnaire was used to gather demographic information from each respondent. The nine demographic questions were studied to determine themes, concepts, or common occurrences found in the participants' responses. Demographic information collected by the researcher included age, gender, education level, years of experience, content taught, school setting, years of experience, geographic location in Missouri, student enrollment of their school building, and the number of teachers in their building who taught the same content and grade level.

Succeeding the demographic portion of the questionnaire were questions regarding Twitter usage. The researcher sought to gather information to conclude which respondents had a Twitter account and which did not, if and how long they had used Twitter for professional learning, how often they used Twitter, the professional purposes for using Twitter, and what other social media services respondents may use. In addition to the first set of questions, the researcher sought to determine what aspects of Twitter the respondent found most valuable for supporting their professional learning network and compared to traditional professional learning. The remainder of the open-ended questions asked participants to identify what barriers they found when using Twitter for professional learning, the specific hashtags used, the hashtags they used to engage in Twitter chats, and best practices for using Twitter for professional learning.

The third source of data used by the researcher was a cross-reference check of interviewee Twitter user information and Twitter use (Mills & Gay, 2019). The researcher conducted this check to confirm the information provided by the participant was reliable and accurate (Mills & Gay, 2019). Using the interviewee's Twitter

username, the researcher searched and examined the types of engagement the particular user exhibited on Twitter.

Validity and Reliability

The researcher probed further with one-on-one interviews after the initial survey results had been received. Identifying a small group of nine users, one from each of Missouri's RPDC regions, interviews with the researcher via Google Meet or Zoom were conducted. Responses that were collected from the initial survey, the interviews, and researcher observation of interviewee Twitter activity were the three sources of the triangulation of the data collected (Creswell & Poth, 2016). Triangulation is used to increase trustworthiness when multiple types of data collection are used (Kolb, 2012). To address validity and researcher bias, the researcher first utilized member checking (Butina, 2015). Themes or ideas identified by the researcher from each of the nine interviews were shared with the individual participant for review to verify accuracy (Butina, 2015). The researcher asked each participant if they would like to add or adjust any responses and the researcher honored or any modifications (Butina, 2015; Creswell & Poth, 2016). All interviews were recorded using Google Meet and Zoom as well to cross-reference transcriptions and researcher notes. The researcher's use of interview recordings, transcriptions, and data coding also ensured reliability (Butina, 2015; Creswell & Poth, 2016). The interviews explored the participant's specific use of Twitter to support their professional learning network, how they valued the tool compared to traditional professional learning, how they interacted on the social media platform, and as well as best practices. During each of the nine interviews, the researcher asked the interviewee to identify their Twitter username. This Twitter user information was used to

verify that the participant's engagement on Twitter aligned with their responses within the interview (Butina, 2015; Creswell & Poth, 2016). Verification of participants' Twitter activity was the final step in completing triangulation to address validity and reliability (Creswell & Poth, 2016).

Data Analysis

In order to discern what the qualitative data means, the researcher must immerse themselves in merging the data and focus on portions that can provide insight into answering the research questions (Butina, 2015). The researcher must then explore patterns or themes and determine what they mean within the parameters of the study (Butina, 2015). Once the 4-week initial survey (Appendix B) collection concluded, the researcher identified themes within the participants' responses. The data in this qualitative study were broken down using narrative, thematic analysis. This method was used to develop topics and patterns from the data results by coding and analyzing the responses (Butina, 2015).

The researcher began by organizing and preparing the data, then culminated an overall sense of the survey interview responses (Butina, 2015). The completed survey results were collected using QuestionPro. Participant responses that indicated they did not use Twitter for professional learning were collected to determine the thematic reason(s) that could be considered barriers to using the social media platform. The questionnaire responses were compiled and organized using Microsoft Excel and color-coded based on the number of times selected by respondents. Demographic data were further dissected to observe if themes emerged based on user location, gender, age group, education level, experience level, school size, grade and content level taught, and those in their school

buildings who taught the same content and grade level. The researcher used the same process of identifying significant themes for the remainder of the initial survey responses.

From the teachers who identified the use of Twitter for resource acquisition or sharing, collaboration, or participating in Twitter chats, the researcher interviewed nine participants, one from each of the RPDC regions in Missouri. All interviews were recorded and reviewed several times by the researcher, using Otter.ai. Each of the nine interviewees was provided the opportunity to review the transcriptions and offer any additional comments related to the interview questions if they chose to do so. The interviewer honored any adjustments or additions suggested by the interviewee.

The researcher began the next step of data analysis by listening to the interviews in their entirety and compiling any initial themes heard. Each interview was documented on its own file. The researcher then added the transcription from each interview to the same individual document of initial observations of thematic responses. Any portions of the transcriptions that included casual conversation were deleted (Butina, 2015). The coding process of identifying concepts and significant statements and quotes related to the concepts were color-coded in the transcribed data. Each color represented a specific theme or pattern. Categories and themes were then acknowledged, and interpretation of those themes took place (Butina, 2015). The coded thematic data were compressed into specific overarching categories then presented using tables and discussion (Butina, 2015).

Summary

The purpose of this qualitative study was to explore the perceptions of Missouri public secondary school teachers who used Twitter for professional learning. An initial survey was used to identify Missouri public school secondary teachers who used Twitter

for professional learning and those who did not. Once those were identified, the researcher chose respondents who would then complete interviews on nine geographic locations and their willingness to provide contact information. Interviews were conducted, and the researcher dove deeper into how the participants used Twitter professionally and how that impacted their professional learning network. The initial survey, interviews, and participant Twitter use verification were used as sources in triangulation to address reliability and validity. In Chapter Four, the researcher will present an analysis of the findings from the descriptive data and themes identified by the researcher from respondent demographic information. In Chapter Five, the researcher will present key findings, summarize the study, and make recommendations for future implications for educational professionals.

CHAPTER FOUR

FINDINGS

Introduction

This narrative qualitative study aimed to explore the perceptions of public school secondary-level teachers in Missouri who used Twitter as a professional learning tool. To discover how Missouri secondary school teachers perceived the use of Twitter for professional learning, the researcher identified nine Missouri secondary school teachers who provided representation from all nine RPDC regions in Missouri. The researcher then conducted one-on-one interviews with each of the nine teachers. Before the researcher conducted interview sessions, data were collected using an initial questionnaire that included participant demographic and Twitter user information. Chapter Four represents the examination of the responses from Missouri secondary school teachers who completed the initial questionnaire and themed responses from nine interview sessions regarding perceptions of using Twitter for professional learning.

In this chapter, the findings are presented from the results from the initial questionnaire (Appendix B) distributed to approximately 1,187 Missouri secondary school administrators who were asked to forward the survey purpose and provide access information to their teachers who taught any secondary-level students. Of the 298 teacher survey participants, nine were selected to examine teacher perception of Twitter use. The nine interviewees were selected based on the quickest response from each RPDC geographic location and their use of Twitter for resource acquisition or sharing, collaborating, or participating in Twitter chats. The researcher utilized the strategies presented in the methodology to select participants, ensure trustworthiness, and analyze

and interpret the descriptive results of the data. The researcher selected participants based on responses to an initial questionnaire sent via email through secondary public school administrators in Missouri. The researcher requested administrators to forward the survey to teachers they supervised who taught students in any of the sixth through 12th grades. The initial survey asked participants to share demographic information, identify their type of Twitter activity for professional purposes, and provide their email address if they were willing to participate in a follow-up interview with the researcher. Interview participants were then selected based on who responded first from each geographic location and used Twitter to acquire or share resources, collaborate, or participate in Twitter chats. Triangulation was used to ensure trustworthiness and included member checking, recording, transcribing, and data coding of interviews and verifying of interviewee-reported Twitter activity by obtaining Twitter usernames and comparing self-reported activity to actual Twitter engagement. The researcher analyzed and interpreted the descriptive data by narrowing down and identifying themes within the interview and survey responses.

Themes were identified for the teachers who used Twitter for professional use, what they found to be practical in developing a professional learning network through Twitter, and perceptions of Twitter compared to traditional professional learning. This chapter includes a description of participants who responded to initial survey questions and findings related to each research question.

From the 1,187 email requests to secondary administrators to distribute the electronic questionnaire and research purpose, 298 individuals responded. As shown in Table 1, of the 298 respondents, 67.36% indicated that they had a Twitter account, and

48.97% of Twitter user respondents specified that they used Twitter for professional learning. For the question “For what professional purposes do you use Twitter?” 22.01% of the respondents noted they used Twitter for resource sharing/acquiring, 7.89% of respondents selected they used Twitter for collaboration, and 8.3% identified they used Twitter for participation in Twitter chats.

Table 1

Professional Use of Twitter

Participants with a Twitter account	67.36%
Participant use of Twitter for Professional Purposes	48.97%
Resource Sharing/Acquisition	22.01%
Collaboration	7.89%
Twitter Chats	8.3%

These three types of Twitter engagement are activities that contribute to developing a professional learning network (Ricoy & Feliz, 2016; Tucker, 2018).

The nine follow-up interviews for this study were conducted during the COVID-19 pandemic. Due to geographic locations, virtual interviews were conducted to ensure the safety and health of the participants. Due to the design of this study to examine the perception of Missouri secondary-level teachers' use of Twitter for professional learning, the initial questionnaire, interviews, and subsequent data were as valid and dependable as if the interviews were conducted in person. The data analysis of this study was divided into four sections; the first section included participant sampling information. The second section outlined the process and procedures the researcher used to verify the validity and reliability of the data collection and analysis. The third section explored the themes and categories observed during the one-on-one interviews and data mining, specific to research subquestions one and two. Lastly, the fourth section includes a discussion of the

data concerning the third sub-research question. The discussion that follows incorporated both the 298 respondents from the initial questionnaire and the nine more in-depth interviews, which were participants selected randomly from that pool.

One central research question and three sub-questions were used for this narrative qualitative study:

Central Question: How do Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration?

Research Subquestions:

1. To what extent do public secondary school level teachers use Twitter to participate in professional learning networks?
2. How does Twitter add to professional learning networks used by secondary school teachers?
3. What are the negative and positive teacher perceptions of using Twitter for professional learning compared to traditional professional learning structures?

Participants

The researcher sent emails to 1,187 Missouri secondary school administrators with a request to forward the electronic survey link and information to teachers they oversaw who taught any students in Grades 6 through 12. As a result, 482 participants viewed the initial questionnaire, and the researcher received 298 responses from Missouri secondary school teachers.

Of the 298 respondents, 71.09% were female, and 28.91% were male. As shown in Table 2, of female respondents, 35.96% identified they did not have a Twitter account,

and 52.31% reported they did not use Twitter for professional learning. The remaining 47.69% of female respondents indicated they used Twitter for professional learning. In contrast to the female respondent data, of the male respondents, 23.81% indicated they did not have a Twitter account, and 46.88% shared they did not use Twitter for professional learning. This data equate to 53.12% of male participants who used Twitter for professional learning.

Table 2

Twitter Use by Gender

	Female	Male
No Twitter Account	35.96%	23.81%
Does Not Use Twitter for Professional Learning	52.31%	46.88%
Uses Twitter for Professional Learning	47.69%	53.12%

As shown in Table 3, of the 298 respondents, 27.49% were in the age group 18 to 34, while 61.86% were between the ages of 35 to 54, and 10.65% were 55 years or older.

Table 3

Age of Participant

18 to 34	27.49%
35 to 54	61.86%
55 or older	10.65%

In Table 4, 26.96% of respondents had obtained a bachelor’s degree, 42.32% a master’s degree, 16.72% a master’s degree and an additional 30-plus hours of college credit, 8.53% a specialist degree, and 5.46% a doctoral degree.

Table 4

Level of Completed Education

Bachelor's degree	26.96%
Master's degree	42.32%
Master's degree 30+	16.72%
Specialist degree	8.53%
Doctoral degree	5.46%

In Table 5, 7.52% of respondents taught Grade 6 students, 11.39% taught Grade 7 students, 12.14% taught Grade 8 students, 15.25% taught Grade 9 students, 17.83% taught Grade 10 students, 18.15% taught Grade 11 students, and 17.72% taught Grade 12 students.

Table 5

Grade Level(s) Currently Taught

Grade 6	7.52%
Grade 7	11.39%
Grade 8	12.14%
Grade 9	15.25%
Grade 10	17.83%
Grade 11	18.15%
Grade 12	17.72%

As shown in Table 6, 38.84% of respondents taught in a middle school or junior high school, 55.94% in a high school, and 5.22% in another configuration.

Table 6

Current School Setting

Middle school or Junior High school	38.84%
High school	55.94%
Other (PK-8, K-8, K-12, 7-12, etc.)	5.22%

As shown in Table 7, 18.37% of respondents had 1 to 5 years in education, 21.43% had 6 to 10 years, 20.07% had 11 to 15 years, 14.63% had 16 to 20 years, 15.99% had 21 to 25 years, 7.82% had 26-30 years, and 1.7% had 31 or more years in education.

Table 7

Years in Education

1-5 years	18.37%
6-10 years	21.43%
11-15 years	20.07%
16-20 years	14.63%
21-25 years	15.99%
26-30 years	7.82%
31+ years	1.7%

As shown in Table 8, of the respondents, 16.26% teach in a building with an approximate student enrollment of less than 200, 32.18% in a building of 201 to 400 students, 15.22% in a building of 401 to 600 students, 13.84% in a building of 601-800 students, 7.96% in a building of 801 to 1,000 students, 3.81% in a building of 1,001 to 1,200, 5.54% in a building of 1,201 to 1,400 students, 2.42% in a building of 1,401 to 1,600 students, 1.38% in a building of 1,601 to 1,800 students, 0.69% in a building of 1,801 to 2,000 students, and 0.69% in a building of 2,000 or more students.

Table 8

Approximate School Building Student Enrollment

Less than 200	16.26%
201-400 students	32.18%
401-600 students	15.22%
601-800 students	13.84%
801-1,000 students	7.96%
1,001-1,200 students	3.81%
1,201-1,400 students	5.54%
1,401-1,600 students	2.42%
1,601-1,800 students	1.38%
1,801-2,000 students	0.69%
More than 2,000 students	0.69%

In Table 9, 36.05% of respondents were secondary school teachers in the Southwest region of Missouri, 11.56% in the Southeast, 10.2% in the Central, 10.2% in the Northwest, 7.82% in St. Louis, 7.48% in the Northeast, 6.12 % in Greater Kansas City, 6.12% in South Central, and 4.42% in the Heart of Missouri geographic region. All nine geographic regions of the RPDC (Appendix E) were represented in this study and are noted in Table 9.

Table 9

Geographic Location

Central (RPDC 9)	10.2%
Heart of Missouri (RPDC 2)	4.42%
Kansas City (RPDC 3)	6.12%
Northeast (RPDC 4)	7.48%
Northwest (RPDC 5)	10.2%
St. Louis (RPDC 8)	7.82%
South Central (RPDC 6)	6.12%
Southeast (RPDC 1)	11.56%
Southwest (RPDC 7)	36.05%

Following the 4-week time period during which responses were collected from the initial questionnaire, the researcher contacted nine individuals to participate in one-on-one interviews. Interviewees were contacted if they selected in the initial questionnaire that they used Twitter for resource acquisition or sharing, collaboration, or participation in Twitter chats; if they voluntarily provided contact information; and represented one of the RPDC geographic locations. In addition, the researcher contacted the first respondent from each of the nine RPDC geographic locations via email who indicated they would be willing to participate in a follow-up interview and who identified using Twitter for professional resource sharing or acquisition, collaboration, or participation in Twitter chats. The one-on-one interviews were implemented to further investigate how the use of Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration.

Thirty-eight respondents indicated they used Twitter for professional learning network components and were willing to participate in a one-on-one interview with the researcher. Of those 38, the researcher selected four males and five females representing a different geographic locations in Missouri. Four of the interviewees taught in a middle school or junior high setting, with the remaining five teaching in a high school setting. Of the nine interviewees, the highest degree one had obtained was specialist degree, one a master's degree with an additional 30 hours, five a master's degree, and one a bachelor's degree. The years of experience of the interview participants ranged from one to 25 years. For this study and to ensure confidentiality, the teacher participants were identified as T1, T2, T3, T4, T5, T6, T7, T8, and T9.

The nine one-on-one interviews had an average duration of 8 minutes and 41 seconds and an average of three pages of transcription. In Table 10, the participants' interview times and the number of pages transcribed are designated as T1, T2, T3, T4, T5, T6, T7, T8, and T9.

Table 10

Interview Times and Length of Transcriptions

	Length of Interview Time	Number of Pages Transcribed
T1	6:36	2
T2	6:44	3
T3	6:23	3
T4	9:22	3
T5	14:20	4
T6	6:43	3
T7	8:27	3
T8	7:24	3
T9	9:50	3

Teacher 1.

Teacher 1 (T1) was a male between 35 and 54 years old and taught in Southwest Missouri. He had completed a master's degree and taught eighth-grade students in middle school/junior high school with an approximate student enrollment of 401 to 600. He had taught between six to 10 years, did not teach the same grade-level content as any other teacher in his building, and had used Twitter for professional learning for two to three years. In addition, he used Twitter for professional learning multiple times a day and resource sharing/acquiring.

Teacher 2.

Teacher 2 (T2) was a female between 35 and 54 years old and taught in Northeast Missouri. She had completed a specialist degree and taught 9th, 10th, 11th, and 12th-grade

students in a high school with an approximate student enrollment of 601 to 800. She had taught between 21 to 25 years and taught the same grade-level content as three other teachers in her school. She had been using Twitter monthly for two to three years and used it for resource sharing/acquiring and engaging with professional organizations.

Teacher 3.

Teacher 3 (T3) was a female older than 55 and taught in Northeast Missouri. She had completed a master's degree and taught 11th and 12th-grade students in a high school with an approximate student enrollment of 201 to 400. She had taught between 21 to 25 years and did not teach the same grade-level content as any other teacher in her building. She had been using Twitter daily for over five years for resource sharing/acquiring and collaboration.

Teacher 4.

Teacher 4 (T4) was a female between 35 and 54 who taught in Northwest Missouri. She had completed a master's degree and taught ninth, 10th, 11th, and 12th-grade students in a high school with an approximate student enrollment of 201 to 400. She had taught between six and 10 years and did not teach the same grade-level content as any other teacher in her building. She had been using Twitter monthly for five or more years for resource sharing/acquiring, collaboration, and emotional support.

Teacher 5.

Teacher 5 (T5) was a male between 18 to 24 years old and taught in South Central Missouri. He had completed a bachelor's degree and taught sixth-grade students in a middle school/junior high school with an approximate student enrollment of 801 to 1,000. He had taught between six to 10 years and taught the same grade-level content as two

other teachers in his school. In addition, he had used Twitter monthly for five or more years for participation in Twitter chats.

Teacher 6.

Teacher 6 (T6) was a female between 35 to 54 years old and taught in Southeast Missouri. She had completed a master's degree and taught 11th and 12th-grade students in a high school with an approximate student enrollment of 1,601 to 1,800. She had taught between 11 and 15 years and taught the same grade-level content as one other teacher in her school. She had used Twitter weekly for over five years for resource sharing/acquiring, collaboration, emotional support, and communication with teachers.

Teacher 7.

Teacher 7 (T7) was a female between 18 and 34 years old and taught in Missouri's Greater Kansas City area. She had completed a master's degree and taught eighth, ninth, 10th, 11th, and 12th-grade students in a high school with an approximate student enrollment of 201 to 400. She had taught between one to five years and did not teach the same grade-level content as any other teacher in her school. In addition, she had used Twitter monthly for one to two years for resource sharing/acquiring and collaboration.

Teacher 8.

Teacher 8 (T8) was a male between 18 and 34 years old and taught in the Heart of Missouri region. He had completed a bachelor's degree and taught seventh-grade students in a middle school/junior high school with an approximate student enrollment of 201 to 400. He had taught between one to five years and taught the same grade-level content as one other teacher in his school. He had used Twitter for seven months to a year, multiple times a day, or resource sharing/acquiring and participation in Twitter chats.

Teacher 9.

Teacher 9 (T9) was a male between 18 and 34 years old and taught in the St. Louis region of Missouri. He had completed a master's degree plus 30 hours of additional graduate courses and taught eighth grade in a middle school/junior high school with an approximate student enrollment of 601 to 800. He had taught between six to 10 years and taught the same grade-level content as five or more teachers in his school. In addition, he had used Twitter for five or more years weekly for resource sharing/acquiring and participation in Twitter chats.

Validity and Reliability

The researcher used the triangulation process of collecting three data sources (Mills & Gay, 2019). Triangulation allowed the researcher to capture a more comprehensive picture of the qualitative narrative study (Mills & Gay, 2019). The three data sources included responses collected from the initial survey, the interviews, and the researcher's observation of the interviewees' Twitter activity. To provide validity and address researcher bias, the researcher first utilized member checking, where themes from each interview were identified and then shared with the individual participants (Butina, 2015). Each interviewee was asked to review and verify the accuracy of the theme identification (Mills & Gay, 2019). With the review request, the researcher also asked each participant if they would like to add or edit any responses (Butina, 2015; Creswell & Poth, 2016). No interviewee requested any adjustments or contributed any additional responses. Secondly, all interviews were recorded and transcribed using Otter.ai and were cross-referenced with notes taken by the researcher. The researcher's use of interview recordings, transcriptions, and theme coding ensured accuracy (Butina,

2015; Creswell & Poth, 2016). The researcher's final component to ensure reliability and validity included verifying each interviewee's self-reported activity on Twitter. All interviewees indicated through the online questionnaire and the interview process that they used Twitter as a professional learning tool to share or acquire resources, collaborate, or participate in Twitter chats. After each interview, the researcher requested the participant to share their Twitter username. All participants shared their Twitter usernames for the researcher to verify the interviewee's engagement on Twitter aligned with their provided responses within the interview. The researcher reviewed interviewee responses and then searched through their individual Twitter activity to verify that the ways they reported using Twitter were accurate.

Data Analysis

The qualitative data analysis process must be done in an organized, thorough manner to ensure the most accuracy (Mills & Gay, 2019). Qualitative data analysis is the account of not only a story but themes that emerge within the description of the story (Creswell & Poth, 2016). Therefore, the analysis of qualitative data must be consolidated and focused and provide an understanding of the research questions (Butina, 2015).

The collection and analysis of qualitative data do not begin when all of the data collection is complete but begin during the first interview and observation (Butina, 2015). The researcher used thematic analysis for this qualitative narrative study (Butina, 2015). The research began with data organization and preparation, then concluded with a general impression of the information, utilized a coding process, categorized themes, and finally, interpreted the data (Butina, 2015). Data in the form of participant responses were recorded and transcribed using Otter.ai. Transcriptions were then revised to edit any

incorrect transcription or eliminate casual conversation, and individual interview transcriptions were transferred to separate documents. Interview responses that provided insight into the central research question and three sub-questions were then categorized under the specific research questions. Interview responses and initial questionnaire responses were printed and reviewed three times. After the researcher reviewed the data, specific phrases and words began to emerge based on the frequency of use. The researcher assigned a specific color to each phrase or word that appeared multiple times. The researcher counted the number of times words and phrases were used and compared them using an Excel spreadsheet. Themes that emerged included Twitter use for finding information or ideas, connecting with others, staying relevant or current, and sharing of ideas of information. Additional themes that emerged related to perceived barriers to using Twitter for professional learning included the large amount of content, users not having enough time, users' lack of confidence in the credibility of information or source, and the platform can be challenging to use. The themes that emerged related to aspects of Twitter found to be valuable included the accessibility, the lack of geographic limits, the personalization, and the variety or relevance of the content.

Transcription and data cleaning. The researcher conducted nine interviews in addition to the data collection of the initial questionnaire to understand the perception of Missouri secondary school teachers' use of Twitter for professional learning. The study included the analysis of dynamic text responses collected from the 298 initial questionnaire participants and interview responses among secondary school teachers with differing ages, years of experience, school locations, levels of education, levels of Twitter use, and reasons for using Twitter for professional learning. After reviewing the provided

consent form and confirming consent to participate in the study, the scheduled date and time were set based on convenience for the interviewee and researcher. Once the initial contact was made by the researcher and consent was received from the interviewee, the interview protocol was provided to participants (Appendix C).

Interviews were developed to further understand each Missouri secondary school teacher's perception of using Twitter for professional learning. Each interviewee chose to participate in the interview using Google Meet. Each interview was recorded using Google Meet, and audio was recorded and transcribed using Otter.ai. Once each transcript was generated, the researcher reviewed the text of the individual transcripts and revised any text that was incorrect based on listening to the audio recording. After cleaning the transcripts, the researcher emailed the individual transcript to the interviewee requesting the participant provide any revisions if necessary. There were no requests to make any adjustments to the original interview transcripts.

Interview and survey questions were used to conjure each participant's perception of using Twitter for professional learning. This study was explored through the lenses of Siemens's (2005) theory of connectivism and Senge's (1990) theory of personal mastery. The theory of connectivism describes that the learner experiences information through the development of connections (Kropft, 2013). By exploring Twitter's type of connective learning experiences, this study examined how these connections can lead to personal mastery (Senge, 1990). Personal mastery is described as one of the five disciplines of a learning organization and envelopes learning and personal growth (Senge, 1990).

User engagement verification. The researcher obtained the Twitter username of each interviewee after the individual interviews. The researcher then searched each

provided username. Upon finding the username, the tweets, retweets, and likes were observed to determine how participants engaged on Twitter. For example, one interviewee shared that she used Twitter to "...grab quick things she can use in her classroom." The researcher found the interviewee had "liked" several tweets that shared how to implement short and easy math warm-ups into the high school math classroom. Another interviewee stated, "I use Twitter to connect with teachers like me." The researcher found he had used addressivity to tag users in retweets who described themselves as middle school teachers. By investigating the types of tweets that were retweeted, liked, or tagged by the interviewees, the researcher was able to find how users engaged on Twitter. If an interviewee shared that they used Twitter to acquire resources and not necessarily share original content, the researcher was able to find evidence of the user liking or retweeting information. If an interviewee indicated using Twitter to participate in Twitter chats, the researcher found evidence of that user engaging in a Twitter chat. Table 11 displays participant responses to the question, "For what professional purposes do you use Twitter?" The researcher confirmed by observing tweets, retweets, and likes that all interviewees' responses were reliable and authenticated each teacher's use of Twitter.

Table 11

Interviewee Engagement Activity on Twitter

T1	Resource sharing/acquiring
T2	Resource sharing/acquiring, engaging in professional organizations
T3	Resource sharing/acquiring, collaboration
T4	Resource sharing/acquiring, collaboration, emotional support
T5	Participation in Twitter chats
T6	Resource sharing/acquiring, collaboration, emotional support, communication with teachers, participation in Twitter chats
T7	Resource sharing/acquiring, collaboration, backchanneling
T8	Resource sharing/acquiring, participation in Twitter chats
T9	Resource sharing/acquiring, participation in Twitter chats

Coding procedures and theme development. Once the 4-week data collection period from the initial questionnaire concluded, and interviews were completed, the researcher reviewed the responses three times, looking for themes. First, the researcher identified the themes found within each set of responses that addressed specific research sub-questions. Themes that emerged here that addressed Research Subquestion one were finding or gathering ideas or information, connecting with others, staying current or relevant, and sharing ideas or information. Themes that emerged here that also addressed Research Subquestion 2 were finding or gathering ideas or information, connecting with others, staying current or relevant, and sharing ideas or information. Research Subquestions 1 and 2 asked two different questions, but the researcher identified similar responses from survey participants and interviewees. The third set of themes that emerged answering Research Subquestion 3 were divided into two areas: barriers to Twitter professional use and aspects of Twitter professional use found to be valuable compared to traditional professional learning structures. The themes of barriers that emerged here were too much content, not enough time, difficulty to use, and the

credibility of the user or source. The themes of aspects found to be valuable that emerged included personalization, accessibility, variety of content, and the limitless of geographic location.

Next, the researcher assigned a color code to each theme. For example, for keywords or phrases that were found when examining to what extent public secondary school level teachers use Twitter to participate in professional learning networks, the researcher color-coded finding or gathering ideas or information purple, connecting with others was coded yellow, staying current or relevant was black, and sharing ideas or information was coded pink. The same themes emerged when examining how Twitter adds to professional learning networks used by public secondary school teachers, as was coded using the same color scheme. Responses that identified personalization as a valuable aspect of using Twitter for professional learning compared to traditional learning structures were colored blue, accessibility was coded pink, variety of content was coded light blue, and limitlessness of geographic location was coded red. Responses to the perceived barriers when using Twitter for professional learning were color-coded using light blue when the word or phrase too much information or content was used. Yellow was used as a code for not enough time, lack of credibility was code brown, and difficult to use was coded pink. Other phrases or words that were mentioned one to two times were also assigned a color but were not mentioned frequently enough to be considered a common phrase or word; therefore, they did not emerge as themes. Finally, the researcher color-coded each questionnaire response and interview transcription response during the third review. The color-coding system allowed the researcher to quickly categorize themed responses. The researcher conducted this process three times

to ensure all responses were included in the data analysis and accurately found within an identified theme.

The researcher organized the themed questionnaire and interview transcript data in an Excel spreadsheet as the keywords and phrases emerged. Questions asked of survey participants and interviewees were aligned to one of the three research subquestions. The themes, relative statements, and quotes were color-coded according to the connection to one of the three sub-research questions. Of the themes identified through themed analysis, the researcher examined the interview transcripts and questionnaire text through each sub-research question to comprehend any connections.

Research Subquestion 1

Research Subquestion 1 asked, “To what extent do public secondary school level teachers use Twitter to participate in professional learning networks?”

The researcher provided open-ended questions on the initial questionnaire and during the proceeding teacher interviews. After examining the survey responses asking participants to explain, “What aspects of Twitter do you find most valuable for supporting your professional learning network and why?” 60.20% of respondents identified finding or gathering ideas or information to be valuable, 23.47% of respondents used it for connecting with others, 17.35% used it for staying current or relevant, and 16.32% used it for sharing ideas or information. Of the nine interviews, eight teachers identified finding or gathering ideas or information to be valuable in supporting their professional learning network, seven teachers used it to connect with others, two used it to stay current or relevant, and one used Twitter to share ideas or information. The

themes that emerged from the survey respondents and the interview participants are outlined in Table 12.

Table 12

Teacher Themes of to What Extent Do Teachers Use Twitter to Participate in a Professional Learning Network

Themes	T1	T2	T3	T4	T5	T6	T7	T8	T9	Survey Respondents
Finding or gathering ideas or information	x	x	x	x		x	x	x	x	60.20%
Connecting with others		x	x	x	x	x	x		x	23.47%
Staying current or relevant		x		x						17.35%
Sharing ideas or information		x								16.32%

Finding or gathering ideas or information. According to participant responses, finding or gathering ideas or information was the most frequently noted and valuable for supporting teachers’ professional learning network. From the electronic survey results (Appendix B), finding or gathering ideas or information was described by 60.20% of respondents to be an aspect of Twitter that is valuable and supports their professional learning network. Survey data also illustrated in Question 4 (Appendix B) that 42.24% of respondents used Twitter professionally for resource sharing/acquiring. Eight out of nine teacher interviewees identified they used Twitter to find or gather ideas or information and that this supported their professional learning network.

Teacher 4 found that being the only Spanish teacher in the high school where she works, there was not an abundance of ideas or information for her to readily use. “I use Twitter to find more accessible ideas or strategies to support my teaching. Following the publishers and practitioners that I do, I’m able to see what they are doing and even interact if I have further questions.”

In Table 13, 28.77% of respondents indicated zero teachers taught the same grade-level content as them. Of the remainder of the respondents, 18.49% had one teacher in their building who taught the same grade-level content, 15.07 % had two 9.93% had three, 8.22% had 4, and 19.52% had five or more teachers in their building who taught the same grade-level content they did.

Table 13

Teachers in Building Who Teach the Same Grade Level Content

Zero teachers	28.77%
One teacher	18.49%
Two teachers	15.07%
Three teachers	9.93%
Four teachers	8.22%
Five teachers	19.52%

The number of teachers who taught the same grade-level content could contribute to this theme. For example, 4 of the 9 interviewees did not teach the same grade-level content as another teacher in their building, two interviewees taught the same grade-level content as one other teacher in their building, one taught the same as two other teachers, one taught the same as three other teachers, and one taught the same grade-level content as five other teachers in their building.

Teacher 1 described that “I will check Twitter daily to find things that I’m looking to do in my classroom. I continue to follow those (users) who will share quick tips and pointers to help me in my classroom.” Teacher 1 also shared, “I don’t really use hashtags to find information, but follow specific people who I like.” Teacher 2 shared, “I really get on Twitter if I’m looking for something to help me in my classroom; I’ll even screenshot the idea to save for later, but if I follow that user, I can go back if I need to.” Teacher 3

was also the only grade-level teacher in her building. She stated, “Twitter’s really good when I want to grab an idea to use in my classroom, and then I can adapt it based on what works.” Teacher 5 stated, “Even when I can’t find what I’m looking for, I can direct message a user who has posted something similar before to see what they might say.”

Connecting with others. The second most noted aspect of how Twitter supports a professional learning network included connecting with others. Seven of the nine interviewees shared that Twitter allowed them to connect with others outside of geographic boundaries, contributing to the support of their professional learning network. Of the open-ended responses provided by participants, 17.35% identified they found Twitter valuable in supporting their professional learning network by providing an opportunity for them to connect with others. Seven teachers who were interviewed used hashtags to connect to content or users. Teacher 1 and Teacher 3 preferred only staying connected to specific users.

Teacher 3 liked the “...aspect of being able to connect with others and that it is current.” Teacher 4 added, “It’s a great way for me to connect with other people who are doing different things.” She also mentioned that through the COVID-19 pandemic, “Twitter helped me stay connected with people like I did before.” The ease of making connections was another theme that emerged through survey results and interview transcriptions. Teacher 5 noted, “Twitter is an easy way to connect with people that are outside of your specific network a little bit easier, especially if you don’t want to go to another social media platform to find things.”

Teacher 5 shared, “I don’t have to have already been connected to that person. With other social media, often you’ve already had to have connected to them, or it’s part

of the algorithm. Even just asking a question can get you connected.” Teacher 7 found hashtags “...allowed me to connect to a specific group of teachers.” “There’s so many different people I never would have imagined being able to connect with” (T9).

Staying current or relevant. Two of the nine teacher interviewees indicated that an aspect of Twitter that supported their professional learning network was that it allowed them to stay current or have access to relevant information. Of the 298 survey respondents, 17.35% provided a response to Question 6 (Appendix B) that was categorized into the theme of staying current or relevant. A high frequency of academic and social media use embedded in everyday use shows a higher impact on professional growth (Donelan, 2016; Xing & Gao, 2018). In addition, communicating in real-time using social media allows an educator to stay current on relevant instructional practices and theories (Trust et al., 2017).

As shown in Table 14, 10% of respondents used Twitter multiple times a day, 21.33% used it daily, 28.67% used it weekly, and 40% used it monthly.

Table 14

Frequency of Twitter Use

Multiple times a day	10%
Daily	21.33%
Weekly	28.67%
Monthly	40%

A response provided on the initial questionnaire included, “Twitter is especially helpful when I’m searching for the most relevant and current practices to use in my classroom.” Another survey response was, “It’s important to me to stay current on what is being discussed in education outside of my area.” Teacher 4 identified, “Researchers

currently working share their research and ideas through Twitter. I'm able to see it or even ask for it and have it at my fingertips." Teacher 2 followed other school hashtags and said, "Following what other schools are doing allows me to see what is currently being practiced and allows me to reflect and see if those are other things that other teachers or schools are doing."

Sharing ideas or information. Banegas (2019) explored that teachers must not only be consumers of professional learning opportunities but be developers and reflect on practice and implementation. Only one of the interviewed teachers shared ideas or information to support their professional learning network. Using their school hashtag, Teacher 2 shared:

I post things we've done in class if it's something that the kids enjoyed and supports our school mission or vision. I post it with the school hashtag so others can see how they may be able to meet the expectations of our administration.

A survey respondent who contributed to the initial survey shared, "Twitter is an easy way to share ideas and information with many stakeholders." Another participant stated, "Twitter allows for professional learning where I can share my ideas and also get ideas from others." Of the 298 survey respondents, 16.32% identified they used Twitter to support their professional learning network by sharing ideas or information. An additional survey respondent added, "It's not just about sharing ideas, but resources as well."

Research Subquestion 2

Research Subquestion 2 asked, "How does Twitter add to professional learning networks used by public secondary school teachers?" The researcher provided open-

ended questions on the initial questionnaire and during the follow-up interviews. The researcher reviewed participant and interviewee responses to, “What aspects of Twitter do you find most valuable for supporting your professional learning network and why?”

Of the open-ended questionnaire responses, 60.20% of participants identified finding or gathering ideas or information to be valuable, 23.47% of respondents used Twitter to connect with others, 17.35% used it to stay current or relevant, and 16.32% used it to share ideas or information. In addition, 8.16% of questionnaire participants indicated Twitter was easy to use for supporting their professional learning network, and 6.12% identified Twitter to be speedy to use and encourages engagement due to how quickly information or resources can be accessed. Of the nine interviews, eight teachers identified finding or gathering ideas or information to be valuable in supporting their professional learning network, seven teachers used it to connect with others, two used it to stay current or relevant, and one used Twitter to share ideas or information. The themes that emerged from both Research Subquestion 1 and Research Subquestion 2 were similar and included finding or gathering ideas or information, connecting with others, staying current or relevant, and sharing ideas or information. Participants not only identified ways in which they engaged in Twitter and how that added to a professional learning network but also that the ability to engage in an easy and quick manner was an additional aspect that supported the use of their professional learning network. The themes that emerged from the survey respondents and the interview participants are outlined in Table 15.

Table 15

Teacher Themes of How Twitter Use Adds to a Professional Learning Network

Themes	T1	T2	T3	T4	T5	T6	T7	T8	T9	Survey Respondents
Finding or gathering ideas or information	x	x	x	x		x	x	x	x	60.20%
Connecting with others		x	x	x	x	x	x		x	23.47%
Staying current or relevant		x		x						17.35%
Sharing ideas or information		x								16.32%
Easy	x		x		x		x			8.16%
Quick	x	x			x	x				6.12%

Easy. Teacher 1 explained, “I feel like it’s just quick and easy; it’s something I can scroll through and find something and read it. Then I can use it how I see fit.”

Haworth (2016) found effective professional learning conducted through social media must be identified by the learner as easy to use and access. Teacher 3 stated, “I usually know what I’m looking for and can easily go to someone I follow to see what they are doing or what they’ve tweeted or retweeted lately.” Teacher 5 added:

Twitter is an easy way to connect to people outside your specific school network.

It’s also easy because you can send a quick message but also see what’s going on on a broader scale across the country if you want.

Teacher 7 confirmed a similar experience by stating, “Because I’m in a small district and teach multiple grade levels, it’s hard for me to find or go to professional development that meets my needs as easily as Twitter.” She also added, “ If my class struggled with a concept one day, I can hop on Twitter that afternoon and get ideas of how to adjust.”

Maksoud (2018) found by providing learners with an environment and experience that is positive and easy to navigate, their confidence in the learning increases.

Quick. Krutka and Carpenter (2016) and Rehm and Notten (2016) identified Twitter users seeking to find quick access to learning or information were able to do so by initiating engagement with other Twitter users or content found on Twitter. Teacher 6 stated, “I can find anything at any time, and I don’t have to already be connected to that person or take the time to form a relationship. I can click on something and find all the things I need.” Teacher 5 identified, “You can also find differing opinions on a topic quickly without having to go to different websites or different peoples’ profiles or pages. I can see what other people think about something all in one place.” Teacher 2 added, “Twitter is the place I can go to see more information as soon as I want to see it. I don’t have to wait for a professional development approval process, yet I can find valuable information.” Teacher 1 confirmed the similar belief that Twitter adds to a professional learning network because of how quickly it can be accessed and used by stating, “I can get so many quick tips and pointers, and sometimes it may just be quick and easy things that will help me in my classroom.” Nusbaum (2020) found that educators who used Twitter for professional learning purposes valued how quickly they could find previously viewed or shared resources and discussions and also how quickly they could index the information they found.

Research Subquestion 3

Sub-question three asked, “What are the negative and positive teacher perceptions of using Twitter for professional learning compared to traditional professional learning structures?” The researcher provided open-ended questions on the initial questionnaire and during the proceeding teacher interviews. After examining the survey responses, participants were asked to explain, “What aspects of Twitter as a professional learning

tool do you find most valuable compared to traditional professional learning?” The researcher identified the themes as personalization, accessibility, variety of content, and geographic location not being limits. Participants were also asked to explain, “What aspects of Twitter do you find to be barriers to professional learning?” The researcher again identified themes and color-coded responses based on these themes. The themes included too much content, too much time, difficulty to use, and not knowing if the source or information was credible.

Twitter for professional learning versus traditional professional learning. As shown in Table 16, 40.59% of survey respondents found the accessibility of Twitter most valuable compared to traditional professional learning, 21.78% identified the limitlessness of geographic location valuable, 14.85% found the personalization valuable, and 13.86% found the variety or relevance of content to be valued most compared to traditional professional learning.

Table 16

Themed Teacher Positive Aspects of Using Twitter for Professional Learning Compared to Traditional Professional Learning

Themes of Positive Aspects	T1	T2	T3	T4	T5	T6	T7	T8	T9	Survey Respondents
Accessibility	x		x	x	x			x	x	40.59% (120)
No Geographic Limits	x				x	x	x	x		21.78% (65)
Personalized		x	x	x					x	14.85% (44)
Variety or Relevance of Content		x		x	x	x	x	x	x	13.86% (41)

Accessibility. According to questionnaire participants, accessibility was the most frequently valued aspect of Twitter use for professional learning compared to traditional professional learning. Of survey respondents, 40.59% identified that the accessibility of content and connections was valuable compared to traditional professional learning. Six out of 9 interviewees also agreed that they valued the accessibility offered by Twitter compared to traditional professional learning.

A survey respondent identified that “It [Twitter] is easy, accessible, and allows access to a broad range of educators and ideas.” Thirteen additional survey respondents included “...easily accessible...” in their open-ended response to the question, “What aspects of Twitter as a professional learning tool do you find most valuable compared to traditional professional learning?”

Teacher 8 stated, “You don’t have to drive to a conference and sit at a table and talk to meet people or learn.” Teacher 7 added that having access to a “...short and sweet type of learning where I can grab something quick to implement in my classroom is best for me. Twitter provides that.” Teacher 5 stated it’s access to content and access to types of professionals that he found value in. “I can access other teachers and leaders across the country and even across the world. I can also direct message the users and ask them more in-depth questions, where in traditional professional development I wouldn’t have that access.” (T5).

No geographic limits. Five teachers who provided interview responses noted the geographic limitlessness of Twitter to be valuable to them compared to traditional professional learning. Of survey respondents, 21.78% indicated the lack of geographic limits is an aspect of using Twitter not offered by traditional professional learning.

During theme analysis, the researcher noted “anytime” or “anywhere” as common phrases provided by survey respondents.

One survey respondent stated, “With Twitter, you aren’t hindered by geographical location.” Another participant added, “Twitter can be used at your convenience and is not time or location bound.” A third survey participant identified, “You can get ideas from all experiences and locations.” Teacher 1 shared, “I don’t have to travel to professional development or miss a day of class to do stuff.” Teacher 5 added, “You can connect with people you’d never be able to because of where we are in the country.” Teacher 7 found, “You’re able to interact with such a big range of people because you don’t have to wait for a conference or wait for your district to host a professional development day.” Teacher 8 found Twitter to be more valuable than traditional professional learning “...because you can meet people throughout the state. You don’t have to wait for a conference.”

Personalized. Four of the 9 teachers interviewed found Twitter to offer a level of personalization that traditional professional learning does not. In addition to interviewee responses, 14.85% of survey respondents indicated that Twitter provides a more personalized learning experience than traditional professional learning. Bedford (2019) found that the more personalized learning was, the more connected the learner felt to the experience. One of the 298 respondents stated, “ I get to choose what I want to learn about, and my learning isn’t so general.”

Teacher 2 identified, “I can narrow down topics to what I’m looking for rather than sometimes, professional development is just so general you can’t get specific ideas.” Teacher 2’s response aligned with Teacher 1 and added:

You get to learn about what you want. I don't always find value in the professional development that is offered with traditional PD, but you feel obligated if you've paid for it and you have to stick it out. Twitter offers a short-term commitment to getting the content you need or want.

Teacher 3 stated, "I'm only getting what I feel like I need at the moment. With traditional training, you are in a room with 500 people who need zero of the same things."

Variety or relevance of content. Of the initial questionnaire respondents, 13.86% identified the variety or relevance of content found on Twitter to be valuable compared to traditional professional learning. Seven of the nine teachers interviewed also indicated they valued the variety of relevance of content Twitter offers compared to traditional professional learning. Trust et al. (2017) found that various learning sources or experiences can exist in a professional learning network. The real-time capability of a social media platform affords this opportunity.

A statement provided through the initial questionnaire identified that Twitter use for professional learning compared to traditional methods "provides access to a variety of ideas and conversations." Also added from a survey respondent on Twitter was this: "There are more relevant topics than the old topics that are presented to me during regular professional development." A third respondent shared, "The content is relevant to me because it's what I'm looking for."

Teacher 6 stated, "I have been able to find mentors who are relevant to the content I teach and that I don't even know on Twitter. I can't do that in a traditional PD setting. Teacher 9 added, "You may start out wanting to learn about one thing on Twitter, then change your focus based on your needs. There are so many different things you can

explore and so many different people you can learn from.” Teacher 8 shared, “There’s so many people outside of our areas that have different things to share and a variety of ways to teach something. Twitter helps me see the different perspectives and methods.”

Barriers to using Twitter for professional learning. As shown in Table 17, 25.4% of respondents identified the high content volume to be a barrier when using Twitter for professional learning, 16.67% had concerns with the credibility of content and users, 15.87% believed time to be a barrier, and 12.7% found the difficulty of use to be a barrier of using Twitter for professional learning.

Table 17

Themed Teacher Identified Barriers to Using Twitter for Professional Learning

Themes of Barriers	T1	T2	T3	T4	T5	T6	T7	T8	T9	Survey Respondents
Content Volume	x	x	x	x	x	x	x	x	x	25.4%
Credibility of Source or Content		x						x		16.67%
Time	x	x	x	x	x					15.87%
Difficult to Use									x	12.7%

Content volume. All nine interviewees identified the content volume on Twitter as a barrier to using Twitter for professional learning. Of the 298 survey respondents, 25.4% also indicated that Twitter’s content volume is a barrier to professional learning. However, through data analysis of initial questionnaire responses, the researcher found that 7.94% of participants indicated they found no barriers when using Twitter for professional learning.

Three survey respondents contributed “There’s too much to sort through.” to the open-ended question “What aspects of Twitter do you find to be barriers to professional learning?” Teacher 4 shared, “I have to really know what I’m looking for because there’s

so much information. I don't venture too far away from what I'm looking for because there's so much." Teacher 6 added when following a hashtag, if a user doesn't keep up with the hashtag activity, "You have to filter through the different tweets connected to the hashtag because there can be a lot." Teacher 9 did acknowledge the recent increase in remote professional learning due to the pandemic. Still, they stated:

Because Twitter is self-guided, I'm comfortable with the technology piece, but there are so many tools embedded into many tweets that take you to other places and resources. Even when I stay focused on what I'm looking for, there are many other informational pieces that distract me.

Credibility of source or content. Two interviewed teachers indicated the credibility of the source or content of posts as a barrier to using Twitter for professional learning. Of the questionnaire respondents, 16.67% found a barrier to using Twitter for professional learning to be a concern of the credibility of the source or the content of the post. Of the two interviewees who identified the credibility of a source or content of a post as a barrier, both offered advice to users to be "Be careful who you follow." Teacher 8 stated:

You have to be careful because if you click on someone and they aren't an educator but offering their opinion on a topic, they probably don't know what they're talking about. You have to be able to move on and screen people.

Teacher 2 added, "Many people are self-promoters, and there's no real data that backs up what they're doing." A survey respondent shared, "Tweets aren't always made by educators or professionals who post things that they say are research-based." Another questionnaire response included, "Many users post their personal views and handpick

references.” Further, identified by a survey respondent, “Information may not be valid or reliable, and I’m always concerned if the information is accurate.”

Time. Five of 9 interviewed teachers noted time to be a barrier to using Twitter for professional learning. Although 8.16% of survey respondents and 8 out of 9 interviewees found Twitter to be quick or easy to use, three interviewees shared they found themselves easily distracted when using Twitter for professional learning and spent time viewing content unrelated to their original intent. Of survey respondents, 15.87% indicated time as a barrier when using Twitter for professional learning.

One survey respondent stated, “I don’t have enough time to read more or always implement what I find on Twitter.” One respondent added that the back-and-forth dialogue “can suck you in by reading comments and replies.” In contrast, one respondent identified, “I would like lengthier dialogue, but understand that the other users or educators may not have time to continue to engage.” Another respondent shared, “I don’t have time to follow Twitter every day. If I read everything that was interesting, I wouldn’t have time for anything else.” Teacher 7 agreed, “With so many people doing different things, I don’t want to miss anything, so I end up reading a lot of posts and waste time.” Teacher 3 shared, “Twitter, like other social media, can suck you in and waste your time.”

Difficult to use. Only one teacher interviewee identified that Twitter’s ease of use is a barrier to professional learning. Although one interviewee designated this as a barrier to professional learning, 12.7% of survey respondents believed Twitter to be difficult to use and could be identified as a barrier. Two questionnaire respondents identified they

did not find Twitter difficult for professional learning, but identified colleagues shared they do not use it because it's "too hard to figure out." Or "it's difficult to navigate."

Teacher 9 identified, "Twitter can be difficult to use and therefore can't be sustained." One respondent to the initial questionnaire stated, "I find it difficult to use and navigate." An additional respondent shared, "I have difficulty finding material that applies to me." Seven survey participants identified that the character limit parameter on Twitter adds to the difficulty of use because tweets are often fragmented, or their content must be concise.

Summary

Chapter Four revealed the findings and themes that emerged through researcher analysis of initial questionnaire survey results and transcribed text that included responses to open-ended survey questions and interview quotes, as well as a cross-reference check of interviewee responses and individual Twitter activity. This qualitative narrative study aimed to examine the perceptions of Missouri secondary public school teachers' use of Twitter as a professional learning tool. This study sought the perception of teachers who used Twitter for professional use, what they found to be practical in developing a professional learning network through Twitter, and perceptions of Twitter compared to traditional professional learning.

To obtain a more comprehensive picture of the data collected by the researcher, the triangulated data forms utilized for validity and reliability included collecting responses and coding themes from the initial survey, a theme analysis of interview transcriptions, and verification of interviewee Twitter engagement. The researcher organized survey responses, transcription notes, and interviewee Twitter activity

information using Microsoft Excel spreadsheets. Individual Twitter activity from the nine interviewees was observed by the researcher and examined to determine the reliability of the participants responses. As shown in Table 18, T1, T2, T3, T4, T6, T7, T8, and T9 used Twitter to share or acquire resources and may have tweeted, retweeted, liked, or added addressivity or a hashtag to access or share information. Only T2 used Twitter to engage in professional organizations, but T2, T3, T4, T6, and T7 used Twitter to collaborate in some way. Twitter was used by T4 and T6 for emotional support, and T7 used it to backchannel. Only T6 used Twitter to communicate specifically with other teachers, and T5, T6, T8, and T9 used Twitter to participate in Twitter chats. Survey responses to open-ended questions related to participant Twitter use and interview transcripts were examined and color-coded based on keywords and phrases. Common keywords and phrases were then categorized into themes to best describe participants' perceptions of Twitter as a professional learning tool.

Table 18

Interviewee Confirmation of Twitter Use

	T1	T2	T3	T4	T5	T6	T7	T8	T9
Share or acquire resources	x		x	x		x	x	x	x
Engage in professional organizations		x							
Collaboration		x	x	x		x	x		
Emotional support				x		x			
Backchannel							x		
Participate in Twitter chats					x	x		x	x
Communicate with other teachers						x			

Chapter Five contains findings, conclusions, and the researcher's suggestions for further research. The researcher's recommendations and thoughts will be presented based on the qualitative analysis of initial questionnaire results, interview transcription data,

and Twitter activity of nine interviewees representing different geographic locations in Missouri.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This narrative qualitative study aimed to explore the perceptions of using Twitter as an effective professional learning tool for public school secondary-level teachers in Missouri. In addition, the researcher sought to find the perceptions of teachers who used Twitter for professional use, what they found to be valuable in developing a professional learning network through Twitter, and perceptions of Twitter compared to traditional professional learning. Participants selected for this study were Missouri public school teachers who taught students in any of the sixth through 12th grades. An initial questionnaire was sent through Missouri public secondary administrators. Then, one-on-one interviews were conducted with nine randomly selected individuals who provided contact information and indicated they used Twitter professionally for resource acquisition or sharing, collaborating, or participating in Twitter chats.

The theoretical framework for this study was based on George Siemen's (2005) learning theory of connectivism and how learning can occur through connections with an individual and a technology-based medium. Furthermore, this research included Peter Senge's (1990) personal mastery discipline, which describes the ability to learn at a specific level of proficiency and the development of personal growth. Both reviewed research theories served as the theoretical framework for this qualitative research.

Chapter Five contains a concise summary of the identified problem while exploring the study's limitations. Next, the researcher will discuss how triangulation guided the data analysis and describe the specific research methods used during the study.

Finally, implications for educational learning and practice are presented as well as recommendations for future research. At the conclusion of Chapter Five, an inventory of references is provided, and appendices of documents used throughout the study are included.

Research Questions

One central question and three sub-questions were used for this basic narrative qualitative study:

Central Question: How do Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration?

Research Subquestions:

1. To what extent do public secondary school level teachers use Twitter to participate in professional learning networks?
2. How does Twitter add to professional learning networks used by secondary school teachers?
3. What are the negative and positive teacher perceptions of using Twitter for professional learning compared to traditional professional learning structures?

Limitations

The researcher sought to collect honest, relevant data associated with secondary public school teachers' perceptions of Twitter use for professional learning and how specific Twitter activity supports one's professional learning network. Through delimitations, the researcher attempted to decrease the impact of external variables.

However, the researcher identified several limitations. The following limitations were recognized and included as aspects of the study that the researcher could not control:

1. The participants' school size and student population demographics may have been a limitation.
2. Data reported by participants were self-reported and may have been skewed due to personal experience, personal preferences, and knowledge of specific Twitter features.
3. Responses from the sample population may not have been evenly distributed throughout public school secondary grade levels.
4. A lack of prior research had been conducted on the topic based on grade level and geographic region.
5. The researcher's personal bias was based on the moderate use of Twitter for professional purposes.

Summary of Methods

The researcher sent an email to all secondary public school principals in Missouri that included an introduction, an explanation of the researcher's purpose, a request to forward information, and a survey link to all teachers they supervised who taught students in grades 6 through 12. The researcher collected responses from the initial questionnaire for 4 weeks. After 4 weeks, of the 298 survey respondents, the researcher reached out via email to the first nine participants who represented one of the nine RPDC geographic locations, provided contact information for further conversation, and used Twitter professionally to acquire or share resources, collaborate, or to engage in Twitter chats. The nine one-on-one interviews were conducted following the survey

response collection via Google Meet. The researcher utilized dynamic text response data from open-ended questions using QuestionPro and Otter.ai to record and transcribe all nine individual interviews.

Once all nine interview sessions were concluded and responses transcribed, the researcher cleaned up the transcriptions and deleted any conversational dialogue. Next, the researcher reviewed relevant responses from the online survey and interview responses three times to identify common themes in relation to the study's research questions. Each theme was identified, then responses were color-coded based on the themed category. Once survey responses were analyzed and each transcript reviewed three times, common themes emerged that provided answers to the research questions. The themes that emerged through researcher review included the accessibility of Twitter for professional use, participants found it quick to use, it allowed for connections regardless of geographic boundaries, and it allowed users to have the autonomy to choose what they wanted to learn about. The themes that emerged when reviewing the perceptions of how Twitter supports a professional learning network included the ability to connect with others, allows teachers to stay relevant or current, and offers finding ideas or resources for classroom or teacher use.

The use of triangulation ensured the reliability and validity of the thematic analysis as the researcher reviewed survey responses, each of the interviewee's transcripts, and the interviewee's Twitter engagement. In addition, the researcher used Microsoft Excel to compile and organize notes, thoughts, calculations, and annotations throughout the survey response analysis and interview process. Furthermore, the researcher reviewed each interviewee's Twitter activity to determine if the responses for

frequency of Twitter use, length of use, and purpose for using Twitter for professional learning were accurate.

Summary of Findings

The researcher recognized significant conclusions based on online questionnaire response data from Missouri public secondary-level school teachers, interviewee responses representing all nine Missouri RPDC geographic regions, and reliable confirmation of interviewee Twitter use. Survey response data and interview responses identified that finding or gathering ideas or information, connecting with others, sharing ideas or information, and staying current or relevant are the most common ways Missouri secondary school teachers utilize Twitter as a professional learning tool. One of the data analysis results was that Missouri secondary school teachers believed Twitter provides increased accessibility, no geographic limitations, personalization, and content variety or relevance compared to traditional professional learning. In contrast, barriers to using Twitter included the volume of the content, lack of credibility of source or content, the amount of time it takes to use, and that it can be challenging to use. This study recognized perceptions of Missouri secondary school teachers' use of Twitter for professional learning, how they use Twitter as a professional learning network, what aspects of Twitter support a professional learning network, the preferred aspects of using Twitter for professional learning compared to traditional professional learning, and the barriers found when using Twitter for professional learning. By comparing interviewee responses of Twitter use for professional learning to the corresponding Twitter activity of each participant, the researcher found all interviewees accurately described using Twitter

for reasons such as finding information or resources, connecting with other professionals sharing ideas or information, or staying current or relevant within the educational field.

Central Research Question. The Central Research Question asked, “How do Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration?” As the researcher analyzed the data from the initial online questionnaire and interview responses, then categorized themes under each of the three sub-research questions, eight themes emerged that identified how Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration: to access new information, connect with other professionals, stay current or relevant, share ideas or information, accessibility of content, lack of geographic limits, personalization of content, and variety of content relevance.

Research Subquestion 1. Research Subquestion 1 asked, “To what extent do public secondary school level teachers use Twitter to participate in professional learning networks?” The data from survey responses and sets of interview responses were analyzed. The researcher identified four major themes answering how Missouri public secondary-level school teachers use Twitter to participate in professional learning networks: to find or gather ideas or information, connect with others, stay current or relevant, and share ideas or information. Of the 298 survey respondents and nine interviewees, 60.20% of participants and 8 out of 9 interviewees used Twitter to find or gather ideas or information, 23.47% of survey respondents and 7 out of 9 to connect with others, 17.35% of respondents and 2 out of 9 interviewees to stay current or relevant, and 16.32% of respondents and 1 out of 9 interviewees to share ideas or information.

Nine of the 10 interviewees confirmed participant survey response data concerning resource or information acquisition by stating:

I will check Twitter daily to find things that I'm looking to do in my classroom. Twitter's really good when I want to grab an idea to use in my classroom, and then I can adapt it based on what works.

The second theme the researcher found through analyzing survey results, and that was commonly supported through interviews, was how Twitter was used to connect to others. That is an aspect of Twitter use that aligns with developing a personalized learning network. For example, one interviewee mentioned, "It's a great way for me to connect with other people who are doing different things." Another interviewee stated, "Twitter is an easy way to connect with people that are outside of our specific network a little bit easier, especially if you don't want to go to another social media platform to find things." A third interviewee added, "I don't have to already be connected to that person. With other social media, often you've already had to have to be connected to them." An additional statement provided through an interviewee included that Twitter "has allowed me to connect to a specific group of teachers."

The researcher identified that survey respondents used Twitter to stay relevant or current. Interviewee responses confirmed this similar theme, with one interviewee stating, "Twitter is especially helpful when I'm searching for the most relevant and current practices to use in my classroom." Another interviewee shared, "Researchers currently working share their research and ideas through Twitter. I'm able to see it or even ask for it and have it at my fingertips." An additional interviewee included, "Following what other schools are doing allows me to see what is currently being

practiced and allows me to reflect and see if those are other things that other teachers or schools are doing.”

In contrast to acquiring resources or information, fewer survey respondents indicated using Twitter to share ideas or information. This set of themed data was also confirmed through interviewee responses. One interviewee shared, “I post things we’ve done in class if it’s something that the kids enjoyed and supports our school mission or vision.” One interviewee shared that they don’t necessarily post content but will share ideas “...by sending a quick message and interacting by sharing my ideas that way.”

The researcher noted that only 16.32% of survey respondents indicated contributing content to Twitter, whereas 60.20% of respondents were consumers of information or ideas. The researcher concluded that Missouri secondary-level public school teachers do not commonly utilize Twitter as an exchange of ideas or information but utilize the online platform to seek out content. The researcher found this user data to be a one-sided framework for professional engagement. Fischer et al. (2019) and Tucker (2018) also found resource acquisition to be one of the most significant reasons teachers engage in a Twitter professional learning network, but noted a teacher must be willing to share ideas and resources as well to more effectively gain the desired results of a collaborative group.

Compared to using Twitter to acquire resources or information, fewer participants indicated they used Twitter professionally to connect with others. Of the 298 survey respondents, 23.37% identified using Twitter to connect with other practitioners, researchers, or leaders from other school districts professionally. Through a themed analysis, the researcher indicated the ability to connect with others as a way Missouri

secondary-level public school teachers use Twitter. Still, no common themes emerged regarding how participants define the term “connect.”

Research Subquestion 2. Research Subquestion 2 asked, “How does Twitter add to professional learning networks used by public secondary school teachers?” Similar to the findings that answer Research Subquestion 1, the common themes found by the researcher of how Twitter adds to participants’ professional learning networks included resource or information acquisition, the capability to connect to others, staying current or relevant, and the sharing of ideas or information. One interviewee shared, “Twitter is a great place to easily get professional development because I can find what I need.” Also, “I can get great ideas from other teachers and use those for my classroom, and even adapt them if I need to.” Although one interviewee stated that the development of connecting to others was one aspect of Twitter found to be valuable in supporting a professional learning network, she also mentioned, “I really like searching for how others do things and get side notes of information.” The interviewee did not share how she provided ideas or information during the online interactions. Interviewees consistently shared that obtaining ideas or information was an aspect of Twitter that supported their professional learning, but very few identified that they provided their ideas or practices.

In addition to these aspects that were found to add to a user’s professional learning network, the ease and quick use of Twitter contributed to enhancing participants’ use. Of the 298 survey respondents, 8.16% indicated that Twitter was easy to use, and 6.12% identified Twitter to be a quick tool for seeking out new information or resources. Four of the 9 interviewees also shared Twitter is easy and quick to use. The brevity of information and how quickly information can be accessed were components of the social

media platform that helped to add to participants' professional learning networks. Interviewees described how they accessed Twitter as "...hopping on..." "...logging on, real quick..." "...jumping on and seeing..." and "...checking out what other people are doing..." The researcher observed how interviewees described the brevity of utilizing Twitter for professional learning as significant because of the on-demand style of professional learning network access. One interviewee shared, "I can quickly and easily grab something that will help me in my classroom and can integrate it into my system." This quick access can increase Twitter use for professional learning as it can take place anytime and anywhere without a facilitator or structured framework.

Research Subquestion 3. Research Subquestion 3 asked, "What are the negative and positive teacher perceptions of using Twitter for professional learning compared to traditional professional learning structures?" Of the initial survey responses and interviewee responses, four common themes emerged regarding what participants perceived as positive aspects of Twitter use for professional learning compared to traditional professional learning: accessibility, no geographic limits, personalization, and the variety or relevance of content. From the online questionnaire, 40.59% of respondents and 6 of the 9 interviewees shared that the accessibility of Twitter was a feature they preferred over traditional professional learning. Teacher 1 shared, "I don't have to get a sub or miss one of my classes to learn about concepts or practices that would directly impact my students." Teacher 3 stated that with the content being at her fingertips, "I don't feel obligated to continue looking at information on Twitter because it wasn't something I paid for and that it's a short-term commitment." Teacher 4 said, "I can just type in anything I'm really trying to find where other people have had a similar problem

or have already had success in fixing the problem, and I can't get that with regular professional development." Teacher 5 also added, "Not only do I have access to all kinds of information I need, but I have access to other people and school organizations." Teacher 8 shared, "It's really handy to be able to reach out to someone virtually who may be far away instead of having to meet with them in person." Teacher 9 stated, "On Twitter, you can find something on anything out there, and for the most part, I'm able to find everything I need." Throughout 7 of the 9 interviews, participants continued to note that Twitter provided access to information and resources at a rate that did not compare to traditional professional learning structures. Responses from interviewees confirmed the work of Booth and Kellogg (2015) and Tucker (2018) that found with access to professional content anytime and anywhere, learners were more motivated to engage in learning experiences that would impact their effectiveness.

Following accessibility, 21.78% of survey respondents and five interviewees found the lack of geographic limitations to be a positive aspect of using Twitter for professional learning compared to traditional learning. All of the five interviewees who found value in the lack of geographic limits as a positive aspect referenced connecting with people outside of their areas, the state, and the country. For example, Teacher 8 referenced that by using Twitter for professional learning, "I don't have to drive somewhere or take the time to register to attend a conference." Teacher 1 shared similar information: "I don't have to worry about traveling to professional development to get something from someone on Twitter that can meet my needs." Teacher 7 took little time to think when responding, "I don't have to travel anywhere to find something I need. I can get out of my little local circle where it's easy to get stuck." Both Teachers 5 and 6

mentioned finding information or ideas from people from across the state, the country, and even internationally. Alberth et al. (2018) identified traditional professional development that is often provided to teachers is restricted by schedules, space, and travel. Engaging in professional learning without geographic boundaries provides the opportunity for professionals to connect in real time while sharing ideas and resources (Forbes, 2017; Trust et al., 2016).

The personalization Twitter offers was identified by 14.85% of survey respondents and four interviewees to be a valued component. Teacher 4 indicated, “I can scroll through what I want to see and read. I don’t have to sit through professional development that doesn’t have anything to do with what I teach.” Teacher 2 bluntly shared, “Traditional professional development spends too much time on the theory rather than how I can implement things in my classroom.” She also added, “I want my time to be useful, and if I can’t walk away from the learning experience with immediate ideas for my own teaching, it’s not worth it.” Teacher 9 was very quick to respond by stating, “Twitter 100% offers choice over traditional professional learning.” He went on to add, “Often my summers are filled with different workshops developed by the district that I had not input into helping create. Twitter gives me a variety of choice, and the choice is mine.” The ability for learning to be personalized increases the learner’s feeling of connectedness to the information; therefore, it directly has a positive impact on the efficacy of the learner (Erickson, 2020). Fischer et al. (2019) also found users valued the personalization of content offered by Twitter as a professional learning tool.

Shirrell et al. (2019) identified that creating material for compelling and relevant professional learning for teachers can be difficult while also time-consuming. Offering

educators a learning experience that provides relevant information to all learners in a single room or session has become a focus worldwide but has been identified as essential for teacher growth (Shirrell et al., 2019). Seven of the 9 interviewees and 13.86% of online survey respondents indicated the variety or relevance of content provided by Twitter users was an aspect they favored over traditional professional learning structures. A significant number of interviewees acknowledged that Twitter provides those seeking professional learning a platform to find relevant and current topics that fit their needs.

Teacher 4 stated:

Unlike traditional professional development, if I don't like it or it doesn't interest me, I don't have to waste a day sitting and listening to a presenter. I can say I've sat through a lot of professional development, and some of it is relatable, and some are not.

All interviewees referenced traditional professional learning as either a workshop, conference, or presentation type of format when asked to reflect on the use of Twitter for professional learning compared to a traditional structure. Teacher 9 shared, "I don't really follow any hot-button topics, but I like the variety of choice Twitter gives me." Teacher 2 added, "Sometimes sitting in regular professional development, it's just so general, and you can't get specific ideas for what you need." This study confirmed the work of Greenhow and Lewin (2016) by finding social media platforms such as Twitter provided opportunities to retrieve relevant information that can add to one's knowledge and skills.

In contrast to the perceived positive aspects of Twitter use for professional learning compared to traditional structures, users identified four barriers to using Twitter for professional learning: the volume of content, the credibility of the source or content,

the time it takes to access the desired content, and the perceived difficulty of using the platform. All nine interviewees and 25.4% of survey respondents indicated the large volume of content found on Twitter to be a barrier when seeking out resources, information, or connection. One interview participant shared, “I can find anything I want out there, but I primarily look at some of the more popular things because they tend to be trending and easier to find.” Another interviewee described a large amount of information on Twitter as “...noise.” He stated, “If it doesn’t have to do with education, you just have to move on, but I think it’s hard sometimes.” In addition to the large amount of content being a barrier to using Twitter for professional learning, one interviewee identified that it could also impact how one feels about themselves. He shared, “With so much out there and so many people doing different things, it can stop us from learning just because it makes us critique ourselves a little more in a different manner.” One interviewee described searching for information as “...going down a rabbit hole where I can get easily sidetracked away from my original reason I was hopping on Twitter in the first place.” Another interviewee stated, “It’s really hard to filter down for what you’re needing. There’s a lot of information.” The researcher commonly heard specifically knowing what a user is looking for is crucial to sifting through Twitter content. Users who are unsure what they want to learn about may struggle to find impactful ideas with the large amount of information that can be found.

Two interviewees and 16.67% of survey participants shared they were unsure of the credibility of sources or content found on Twitter. The lack of source or content credibility led to a decreased use due to the lack of research-based informational tweets, retweets, or uploaded media. One interviewee stated, “Because anyone can comment on

anything, I might see something that looks really good but may have just been copied and pasted from an unreliable source.” He also shared, “I feel half of the people on Twitter are just mad about something and then throw their angry comments out there.” Another interview participant added, “Someone may be posting about education, but not have anything to do with education, like not even be an educator.” She also stated:

So Twitter users are self-promoters, so you really don’t know if they believe in the information they put out there, especially if they don’t have any real data that backs up what they are saying or what they are doing.

Although 15.87% of questionnaire respondents and five interviewees identified that time was a barrier to using Twitter for professional purposes, many noted that social media use for professional learning, in general, was time-consuming because of the distractibility and additional components and content of social media platforms. Three interviewee participants identified that getting on any social media could be distracting. One interviewee called using Twitter “...a time-killer.” Another interviewee shared, “Sometimes I feel guilty getting on Twitter because even though I’m looking for things to help me teach or for my classroom, the fact I am on social media feels like I’m not being productive.” In addition, another interview participant shared, “I will follow someone on Twitter and see they have posted on other social media accounts, then I will find myself going on other social media to see if they post anything different there.”

Only one interviewee shared that Twitter use for professional learning could be complex but did not personally believe it is challenging to use. Of survey respondents, 12.7% indicated difficulty to use as a negative aspect of using Twitter for professional learning compared to traditional professional learning structures. The interview

participant shared, “I really think the technology piece is a barrier for a lot of people. It can be scary to someone who has been in education for a long time.” The interviewee compassionately stated, “I think some people don’t think they’ll get anything out of it because it is self-guided, and they don’t have the confidence to seek out what they think they need.”

Discussion

The researcher collected demographic information and responses to open-ended questions through an initial online questionnaire from secondary-level public school teachers in Missouri. The researcher then selected nine survey respondents who were first to indicate they would be interested in participating in a follow-up interview, fulfilled one of the nine RPDC geographic locations, and indicated they used Twitter for acquiring or sharing resources, collaborating, or participating in Twitter chats. The interview respondents participated in one-on-one interviews with the researcher to further investigate teacher Twitter use, perceptions of how Twitter supports one’s professional learning network, and professional Twitter use compared to traditional professional learning structures. The purpose of the survey response, interview transcription analysis, and interview Twitter use cross-reference was to evaluate common themes and patterns regarding perceptions of Twitter use for professional learning. In addition, this study recognized the significance of secondary-level public school teachers in Missouri having quick and easy access to a variety of relevant, personalized resources and information regardless of geographic limits, as well as the valued capability to connect with others while seeking out ideas or support for teaching.

Two theoretical frameworks from the work of Siemens (2005) and Senge (1990) were used for this study. The foundation for learning through a social media medium or e-learning lies in the networked connections that support the knowledge and learning of the user (Siemens, 2005). Connectivism helps explain the effectiveness of learning independently by developing connections with others and resources (Siemens, 2005). These connections can produce dialogue and deliberate action to support knowledge and skill development (Siemens, 2005). The researcher identified that teachers want professional learning to be readily accessible and convenient. Shirrell et al. (2019) found access to informal learning has increased as the advances in technology have increased. This growth in technological capabilities meets the needs of teachers as they seek out knowledge and skill growth. Whether for a first-year teacher or a teacher who has taught for decades, Twitter affords the same opportunities to connect theoretical practice and pre-service or previous training (Mumhure et al., 2020).

Downes (2020) shared that connectivism, since its introduction, has been widely discussed, investigated, and expanded as a way to support learning and knowledge through networked digital or online connections. Participants confirmed the significance of Siemens's (2005) research, acknowledging the two most common reasons for using Twitter for professional learning included finding or gathering ideas or information and connecting with others. One participant referred to using Twitter "...to get what I need when I need it. As long as I know what I'm looking for, I can usually find it. When I find ideas, that usually leads me to other professionals in the same field."

The researcher found participants' use of the networked connection to be significant in answering how Twitter and professional learning synthesize to support

teacher knowledge, skill, and collaboration. Connectivism is the foundation of online collaboration and learning that requires the application of networks (Goldie, 2016). One participant indicated:

The ability to just hop on and find who is knowledgably and doing some great things in their own classroom is great. I also know that if I need to follow up with them to ask questions, I can do that anytime.

In support of the work from Siemens (2005), Downes (2008) found that learning and knowledge are not simply transferred but shared through a personal network and can include conversations or inquiries. An interviewee shared, “Once I start following someone, I keep checking out what they have to say and what they are doing. I typically stick to the same people and check in to see what new ideas or resources they have shared.” Participants emphasized that although they may not always use the readily available opportunities to connect with like-minded users on Twitter, this is an option accessible anytime and is not hindered by geographic location. This finding confirms Siemens' work that the experience of learning through connections to human and nonhuman resources motivates interpersonal learning. Another interviewee mentioned, “It’s great that several of the people I follow have written books that I can go check out when I feel like it.” Connectivism explains how learners can add to their existing knowledge by developing connections to what they need when they need it (Jirasatjanukul & Jeerungsuwan, 2018). One interviewee stated, “I like the ease of being able to find anything I need at any time.” Participant perception of the positive aspects of using Twitter for professional learning compared to traditional professional learning structures included personalization and variety or relevance of content. Connectivism

describes the learner's connection to personalized content and information to be valuable but places significance on the personalization of the learner's technology use (Siemens, 2005). One study participant shared, "Although I do use other social media apps, I know how to use Twitter, and not much changes. I know what to click on and how to search what I need." Interview participants noted features specific to Twitter that allowed them to personalize their content and have the autonomy to determine how they accessed information.

The second theoretical framework used for this study was personal mastery, one of Senge's (1990) five disciplines of a learning organization. Personal mastery is described as not sacrificing the individual learner's uniqueness to the learning process but the empowerment of their contribution to the more extensive creative process (Senge, 1990). One interviewee stated, "I'm the only math teacher in our high school and need to find information that is specific to what I need, and Twitter allows me to connect to other educators like me." Personal mastery can provide the framework for growth and learning (Senge, 1990, 2006). Another interview participant shared, "I always want to be a better teacher and not become complacent. I want to find ideas that help me be better."

According to further findings by Cabrera and Cabrera (2021), with the broadened scope of recent worldwide technology, the idea of personal mastery should be further dissected and found in its relation to unlimited access to information and resources. Participants supported Senge's idea of personal mastery by acknowledging the accessibility, lack of geographic limitations, and personalization and how that positively contributes to their professional learning compared to traditional structures. One interviewee stated, "I don't have to wait around for my district to tell me what I need to learn about; I can just jump

on Twitter and find what is going to help me in my classroom whenever I want.” Senge (1990) found one must see the gap between their personal vision and current reality to progress toward personal mastery. As one’s current reality shifts, one must have access to the most current and relevant information and resources (Reese, 2020). Participants confirmed this need when identifying that staying current or relevant is one of the most valuable aspects of using Twitter to support their professional learning network. Additionally, survey participants and interviewees mentioned that their growth is unlimited with the amount of relevant and current content on Twitter. This data analysis supported the discipline of personal mastery because the connection to others and connection to learning must be a priority in the growth transformation as the learner closes the gap between personal vision and current reality (Senge, 1990).

Ricoy and Feliz (2016) and Tucker (2018) found Twitter offers the development and dissemination of content on a rapid and large scale but does not address those who are merely consumers. Donelan (2016) agreed that through an online network learning experience, learners could align information to their professional needs, but again only addressed learners as those finding and using content. Participant data confirmed this gap in Twitter use, with 60.20% of participants identifying the use of Twitter for finding or gathering resources and only 16.32% producing or contributing content. Bedford (2019) found member contributions to be one of four components that lead to effective participation in a virtual professional learning network. However, the common theme of minor to no member contribution found from participant responses contradicted best practices and utilization of a professional learning network. Through Bedford’s research,

he found the amount of learning gained by participants outweighed the number of contributions they made.

Colognesi et al.(2020) found that teachers prefer collaborating and learning from colleagues, peers, or professionals they trust, which significantly contributes to teachers' improvement of practices. This study's participants confirmed the importance of relationships and trust when participating in a professional learning network (Bedford 2019). Participants revealed a barrier to using Twitter for professional learning was that they did not know whom to trust or if posted instructional strategies or structures were research based. Also, many users were self-promoters, and not knowing if they were being provided incentives to promote specific content led to a distrust of content.

The researcher identified three findings that were not anticipated when the study was first described. The first unpredicted finding included the percentage of survey and interviewee participants who use TikTok to access resources, ideas, and support. Of survey respondents, 10.06% identified they also used TikTok, a relatively new social media platform for professional learning. The second unanticipated finding was the small number of survey respondents who utilized hashtags while using Twitter for professional learning. Of the 298 survey respondents, 34.9% of participants identified they did not use hashtags or only accessed specific users to follow rather than following or searching a specific hashtag. The third finding that the researcher did not anticipate was the percentage of participants who used Twitter professionally to acquire resources and information compared to those who added content. Eight of the nine interviewees found acquiring ideas or information most valuable in supporting a professional learning network. Only one of the nine interviewees identified that sharing ideas or information

was of value. Unfortunately, the researcher was unable to find further research supporting or contradicting the unpredicted findings of this study, but by observing interviewees' Twitter activity, the researcher was able to confirm that 8 of the 9 interviewees did not share original ideas or content via Twitter. By examining interviewees' Twitter engagement, the researcher was also able to confirm that although seven interview participants shared specific hashtags they had used in the past, they no longer used hashtags to participate in moderated Twitter chats.

The researcher found the use of TikTok by participants to be surprising because there is currently little research regarding the use of TikTok by educators for professional learning. TikTok is a social media application that allows users to create, share, and view small videos (Schellewald, 2021). The researcher found examples of studies regarding teacher use of Twitter, Facebook, online learning management systems, Wikispaces, or YouTube for professional learning through a review of current literature. Still, the use of TikTok did not arise when examining research because of its infancy. Fox and Bird (2017) found that specific social networking platforms to support teaching practices have increased and named several, but TikTok was not mentioned even though it was created in 2016 (Radin & Light, 2022). However, throughout interviews, participants acknowledged the use of TikTok as a frequently used tool to seek out teacher or classroom ideas. One interview participant shared, "I used to find Twitter really valuable because it was the only place I could get quick, professional development. Now I just open TikTok and scroll through my For You page." The "For You" page on TikTok is a content feed organized by an algorithm. The "For You" page is an unending stream of user clips combined using algorithms that attempt to identify a user's interests

(Schellewald, 2021). Another interviewee stated, “Twitter isn’t my go-to app for professional learning anymore because it’s like TikTok gives me the videos I want to see without me having to search.” The researcher noted although TikTok does have the capability for users to search for content like Twitter, the For You page on TikTok appears to be beneficial in eliminating the need for a user to take the time and effort to seek out desired information.

Since extending to an international audience in 2017, TikTok has been downloaded more than 2,000,000,000 times and contains over 800,000,000 users (Schellewald, 2021). The use of short videos or short bursts of learning allows users to access learning content in convenient ways. In addition, it supports the rise in new theories and technological approaches to teacher learning (Khlaif & Salha, 2021). TikTok has the potential to become an educational tool, but due to its infancy, it requires further investigation (Khlaif & Salha, 2021). The features contained on TikTok are similar to other social media networks that provide a virtual platform where users can exchange current and relevant information, connect with others around the world, and it eliminates the need to meet face-to-face to grow professional knowledge and skills. Erickson (2020) found this type of technology supports a personalized professional learning experience that can strengthen one’s knowledge base while supporting personal growth. This personalized learning experience also has the potential to close the gap between one’s current reality of knowledge and where one wishes to be (Senge, 1990).

Veletsianos (2017) found hashtags valuable for educators when using Twitter because of the accessibility of finding specific on-demand content. Still, participants in this study did not identify this feature as one that supported their professional learning

network or as a preferred component compared to traditional professional learning.

Although Staudt Willet (2019) and Tucker (2019) found that educators sometimes felt rejected when using Twitter and could not always find materials when using a specific hashtag, educators still attempted to use hashtags to engage in Twitter content.

Greenhalgh et al. (2020), Luzón and Albero-Posac (2020), Veletsianos (2017, and Staudt Willet (2019) studied the specific use of specific hashtags by teachers across Twitter. The narrowed focus of these prior studies contradicts the low frequency of hashtag use found by participants of this study. Although hashtags are tools that allow users to shift in and out of topics of interest and supports the theory of connectivism, the researcher found Missouri secondary-level public school teachers are not utilizing this feature (Siemens, 2005). Suppose teachers are not using hashtags to connect with the continuous exchange of information on Twitter. If that were the situation, this could impact the learner's limits and pose the question of what pattern teachers are using to connect to others and content (Siemens, 2005).

The researcher was surprised by the number of participants who developed and posted content on Twitter compared to those who identified themselves as seekers of information and did not add to the resources found on Twitter. Donelan (2016) and Nusbaum (2020) found that when users consumed and interacted on Twitter, those learners were able to grow and develop their networks. Forbes (2017) and Fischer et al. (2019) studied the participation of Twitter use by teachers but included how contributions must be aligned with their professional goals. The researcher found little literature that presented information on the disproportion of consumer versus producer activity on Twitter. Siemens (2005) found that the learner must engage in the exchange of

information for learning connectedness to be impactful (Siemens, 2005). The lack of content production from interviewees and survey respondents illustrated an imbalance in this exchange.

This study presented many limitations throughout data collection and analysis. The researcher assumed self-reported responses to the initial online questionnaire and interviews were truthful and honest as well as the researcher assumed all responses were authentic. The initial questionnaire provided anonymity to ensure honest responses unless the participant chose to include their contact information indicating they were interested in participating in a follow-up interview. Another limitation included skewed participant responses due to personal experience, preferences, and knowledge of specific Twitter features. Interviewees were given the opportunity to ask clarifying questions regarding Twitter features during the interview process. Demographic data were also collected that included the frequency and duration of Twitter use. An additional limitation was the uneven proportionality of the sample population based on geographic location and secondary grade levels. In order to gather more evenly distributed sample population data, the researcher cross-referenced the interviewee's geographic location, school size, and student population demographics when developing the interview pool. Furthermore, another limitation included a lack of prior research conducted using data from Missouri and public secondary-level school teachers. The initial questionnaire asked participants to identify the specific grade levels they taught. The researcher's final limitation was personal bias based on the moderate use of Twitter for professional purposes. To avoid researcher bias during this study, the researcher refrained from using Twitter for professional learning and networking.

This researcher found four significant reasons secondary teachers in Missouri prefer Twitter for professional learning: accessibility, lack of geographic limits, personalization, and the variety or relevance of the content. These preferred components of professional learning design can be applied to any professional learning environment or structure. Participants found the online, on-demand feature of Twitter enhanced their access to teaching ideas and information, which impacted their classroom. Not only did participants identify accessibility to be a supportive component of using Twitter, but also the information and resources were easy to access based on the design of the online platform. A lack of geographic limits was consistently noted as an aspect of Twitter use that supported participants' professional knowledge, skill, and collaboration. Using Twitter for professional learning eliminated the need to make travel arrangements, pay for travel, or prepare for being out of the classroom to participate in a learning experience. Significant amounts of on-demand, diverse information is at teachers' fingertips when the barrier of a geographic location is eliminated. Participants valued the personalization offered by Twitter for professional learning. By using Twitter to gain access to personalized instructional ideas and resources, teachers believed there was no need for them to sit in a "one-size-fits-all" professional development environment. Participants noted the variety and relevance of Twitter to be a supportive element when using Twitter for professional learning. Teachers can seek out topics of interest without committing to a full day of training and can attempt to implement an idea in their classroom that their district may not provide.

This study's findings also included what teachers value when seeking support for their professional learning network: sharing and acquiring resources, connecting with

others, and staying current or relevant. These findings are again transferable when designing seated or virtual opportunities for educators to grow and engage in their professional learning networks. The researcher found that teachers want the autonomy to choose professional learning applicable to the grade level and content they teach. Teachers want to interact with others who are like-minded and hold similar positions and interests. Educators also want to be provided with current and relevant information that supports how they operate and manage their classrooms.

The work of Ngcoza and Southwood (2019) confirms this study's finding that sharing and acquiring resources supports one's professional learning network. An effective professional network is composed of individuals who can present their knowledge and experience to others within the network to support the reconstruction of topics or practices (Ngcoza & Southwood, 2019). Learning within a network that allows access to new practices and techniques permits the network member to co-construct knowledge and skills that impact productivity and classroom pedagogy (Ngcoza & Southwood, 2019; Trust et al., 2016). Seeking out resources is also part of the process described as personal mastery (Senge, 1990). Personal mastery refers not to something that is possessed, but it is the process of seeking out information as an actionable discipline (Senge, 1990). Using Twitter to gain new knowledge and skills represented by participant responses within this study aligns with the pursuit of personal mastery (Senge, 1990).

Participants identified the capability to connect with others as an element of Twitter that supported their professional learning network. The opportunity to safely construct, share, and connect with others who have similar visions or missions, supports

personal growth and professional context (de Jong et al., 2019; Senge, 1990). Connecting with others supports one's professional learning network by creating interactive learning as members asynchronously work to solve problems and provide feedback (Falcione et al., 2019). Connectivism also describes this as the co-construct of ideas and skills through connecting human and nonhuman elements (Siemens, 2005).

Participants indicated that content found on Twitter was relevant and current and supported their professional learning network. Siemens (2005) found a learner's ability to make connections amongst contents or information was more valuable than their current knowledge. This study's findings identified the relevancy and timeliness of content were aspects of Twitter that supported the learning process. Twitter provides a specific variety of information to the learner (Siemens, 2005). A learner's content must be specific, current, and applicable to improving instructional practices (Desimone & Pak, 2017; Kostina, 2017). Personal connections to relevant content support the learner's personal growth and help the learner to see the current reality more clearly (de Jong et al., 2019; Senge, 1990).

Professional Implications

This study's professional and educational implications directly align with the research questions that directed this narrative qualitative study. According to Luzón and Albero-Posac (2020), exploring Twitter as an informal tool for communication within a professional learning network is key to determining the value Twitter offers as a professional learning tool. In addition, the practicality of traditional professional development can be enhanced by social media by providing a variety of contributors and dialogue (Alberth et al., 2018). This study aimed to explore the perceptions of using

Twitter as an effective professional learning tool for public school secondary-level teachers in Missouri. It is essential to view the effectiveness of Twitter as a professional learning tool through the lens of connectivism and the discipline of personal mastery and how those contribute to effective professional development (Senge, 1990; Siemens, 2005).

The researcher initially identified resource acquisition and sharing as a purpose for using Twitter for professional learning. However, upon themed data analysis of survey results and interview responses and perusal of participants' Twitter accounts, the researcher determined this component of Twitter use needed to be divided into two specific aspects of use: finding or gathering ideas or information and sharing ideas or information. Once these were divided, a clearer picture of teacher Twitter use for professional learning was developed.

Finding or gathering ideas or information, connecting with others, staying current or relevant, and sharing ideas or information were determined to answer, "To what extent do Missouri public secondary school-level teachers use Twitter to participate in professional learning networks?" The same four activities and the ease and quick use were identified to answer "How does Twitter add to professional learning networks used by public school teacher teachers?" According to teachers' use of Twitter for professional learning, they desire to find ideas or information that are relevant to them and are considered to be the latest research-based practices. In addition, teachers want to connect with others who can offer answers to their questions and have the opportunity to give feedback to those who have inquiries.

This qualitative narrative study indicated that public secondary school teachers in Missouri prefer access to professional learning relevant to their content and grade level in contrast to a one-size-fits-all approach to professional development. This finding implies the need to seek feedback from educators in the form of a needs assessment when planning professional learning for whole-staff environments. The opportunity to provide an educator voice and choice when developing seated professional development is not always available but is found to be impactful when educators are afforded the opportunity to provide input into their learning (Moodley, 2019). The choice of content was also an apparent benefit of professional learning in this study. The choice to personalize or provide differentiation that meets educators' needs should be considered when developing professional development (Forbes, 2017).

By reviewing the unpredicted findings of the study, TikTok was not found to be a social media tool used for professional learning in previous studies. Based on the percentage of Missouri secondary-level public school teachers using this platform for professional learning, it is a tool to be considered for further research to explore its impact. The research from this study also implied that educators are more often consumers than contributors to a virtual professional learning network. When provided an opportunity to collaborate or connect with like-minded teacher groups, educators are more focused on collecting ideas and information than providing resources to the group. As educators engaged in Twitter as a virtual professional learning network, there were no expectations or guidelines. Still, as teachers work with administrators to create professional learning structures, this study's data indicated that teachers would need to be

provided guidelines for the level of contribution expected when connecting in order for teachers to collaborate both as a consumer and a producer of information.

As a learning organization, the findings of this study demonstrated the need for secondary educators to find relevance and diversity in the types of professional content they are provided. With higher levels of diverse courses offered at the secondary level, organizations should be striving to provide secondary teachers the opportunity for feedback when constructing district- or building-level professional learning offerings. Suppose there is no opportunity to provide current and relevant professional learning content as an organization. In that case, there should be a system to aid educators in finding those opportunities outside of the district. Therefore, this could include a participatory session on a social media platform that includes specific connections to learning and implementation goals.

According to Siemens (2005), connectivism explains that learning resides within the learner and may also lie in an organization or database continually shifting. As a non-human medium for learning, Twitter provides a platform for generating and consuming information (Kuznetcova et al., 2019; McArthur & White, 2016). This study's findings are consistent and align with Siemens' work as it supports the theory that a nonhuman resource such as Twitter can initiate and provide meaningful learning. With the second most frequent use of Twitter for professional learning identified by participants as connecting with others, this study further illustrates the direct impact Twitter has on one's access to the learning process and learning processes of others. Connectivism emphasizes the shift of knowing where and how to access information and not just knowing what or how (Siemens, 2005). Participants concluded the most valuable way Twitter supported

their professional learning was through availability to find or gather ideas or information, which was more common than sharing their ideas or information. The ease and timely accessibility of information and ideas provide a learner with more frequent opportunities to engage in the development of skills and abilities that lead to personal growth (Senge, 1990). The researcher found teachers want access to a variety of personalized and relevant content compared to traditional learning. Twitter provides learners the space to consistently access learning that matters most deeply to them and supports their learning as a lifelong commitment toward the pursuit of personal mastery (Senge, 1990). Pursuing personal mastery requires the continual practice and application of new skills and knowledge (Erickson, 2020; Senge, 1990). This study's findings support the use of Twitter for professional learning exposing teachers to personalized collaboration and individualized learning, further leading to personal mastery (Senge, 1990).

Recommendations for Future Research

The researcher limited this study to Missouri secondary-level public school teachers who used Twitter for professional learning for sharing/acquiring resources or information, collaboration, or participation in Twitter chats. Interviewees provided representation of the nine RPDC geographic regions in Missouri and shared information specific to Twitter use. Although teacher perception data were gathered from all areas of Missouri, future research should consider broadening the participant location and further investigating the use of more recently growing social media networks. The use of TikTok was identified by 10.06% of questionnaire respondents as a tool used to access resources, ideas, and support. Still, little research can be found on how it supports professional learning or the scope of its use amongst educators.

The researcher also recommends further studies exploring why educators use Twitter or an alternative social media network more heavily for content consumption than as producers or developers of content. Thus, continued research could include examining the different types of activity specific to different social media platforms. Based on unpredicted findings, this could include a deeper dive into the type of teacher use of TikTok for professional learning or reasons educators use specific social media platforms to access professional learning.

In addition to investigating the motives that lead users to be consumers rather than contributing members, further research is suggested regarding educators' lack of hashtag use. Previous research indicated that using the hashtag provided educators with an exciting and easy way to compare and contrast topics and enhanced learning (Delello & Consalvo, 2019; Veletsianos, 2017). However, the researcher found a significant number of participants used addressivity rather than hashtags (Staudt Willet, 2019).

Summary

This narrative qualitative study aimed to explore the perceptions of using Twitter as an effective professional learning tool for public school secondary-level teachers in Missouri. One central research question and three research subquestions guided this study. The central research question was, “How do Twitter and professional learning synthesize to support teacher knowledge, skill, and collaboration?” The researcher found that Twitter directly supports a teacher’s professional knowledge and skillset by having a construct that enables the sharing of ideas and experiences by users. As a result, educators can seek information to fill in the gap between their current knowledge base and what they wish to know or be able to do. In addition, by using Twitter for

professional learning, teachers directly connect to various current and relevant practitioners, researchers, and companies with whom they can collaborate if they choose to be not only consumers but also originators.

The first research subquestion asked, “To what extent do public secondary school level teachers use Twitter to participate in professional learning networks?” Secondary-level public school teachers in Missouri participate in professional learning networks by using Twitter to acquire and share information, connect with others, and stay current or relevant. According to this study’s participants, teachers are supporting their professional learning network through Twitter by “seeing what others are doing because there are a lot of great teachers out there.” They are also “...looking for resources outside of the textbook and what the district provides.”

The second research subquestion included, “How does Twitter add to professional learning networks used by public secondary school teachers?” As teachers use Twitter, they are able to find other professionals who have solutions to classroom or instructional problems and also ideas to enhance what they are already doing. Teachers believe their professional learning networks become limitless when using Twitter. Regardless of the teacher’s district, building, or student enrollment size, the convenience of using Twitter to access a professional learning network to collaborate with those outside of their own community provides value to not only them but also their students as well.

The third research subquestion asked, “What are the negative and positive teacher perceptions of using Twitter for professional learning compared to traditional professional learning structures?” Teachers want professional resources and support to be accessible any time they need it. Traditional professional learning sessions are not

structured in such a way that allows for content to be accessed at the desired pace of the learner nor based on the learner's immediate needs. Traditional professional learning is typically confined by a geographic location or a specific time of delivery. Participants in this study referred to the "anytime" and "anywhere" features of Twitter as positive aspects of using Twitter for professional learning compared to traditional learning structures. Participants added that content found on Twitter offers a variety of supportive resources that a traditional conference or workshop does not always offer.

In contrast, to answer the second portion of the third sub-question, teachers identified the barriers they encounter when using Twitter for professional learning compared to traditional learning structures. Study participants noted the volume of content or information to be "overwhelming" and often "hard to filter through to find what you need." Teachers are not always sure if the source of the tweet or retweet is credible or self-promoting. When using Twitter to acquire information or resources, teachers also felt unsure if the content was reliable or research based, or in contrast, satire.

Two theoretical frameworks served as a guide for this study and included connectivism and personal mastery. Connectivism explains that a nonhuman application impacts learning (Siemens, 2005). This study supported the theory that a nonhuman application such as Twitter can impact the learning process by providing a platform for resource sharing and acquisition. It is a space for learners to connect and feel as if the information they are acquiring is relevant and current. Knowledge and learning reside not only in the process of learning but also in the balance of human connections and those nonhuman sources (Alzain, 2019; Siemens, 2005). Results of this study convey the

narrative that the process of embedded learning within connections is significant, rather than strictly providing learners access to information itself (Siemens, 2005). Rather than strictly providing teachers with the information, the learning must be embedded within connections. The researcher identified that access to others' ideas and practices, regardless of geographic location, was essential to teachers and aided in the connection to content information and other learners (Siemens, 2005).

Although the discipline of personal mastery can move beyond the acquisition of knowledge and skills, it also requires the learner to be inquisitive and approach learning as a lifelong commitment to seeing reality more accurately and feeling more connected to others (Senge, 1990). The study recognized the significance of the process of developing personal mastery as it connects one's action of seeking new and relevant information to gain ideas and resources for classroom use. To develop personal mastery, the learner must choose the path of growth; it must not be something that is forced upon a learner (Senge, 1990). Participants who indicated they used Twitter for professional learning had chosen to seek out information and connection that had not been required of them. No participants indicated they were required to access Twitter, yet all interviewees stated they used Twitter for professional learning monthly. All interviewees' intentional and independent choice supports the theory that the journey toward personal mastery must be genuine and a matter of choice (Senge, 1990).

This study intended to fill the gap in current research and literature by examining the perception of a more specified group of educators based on geographic location and student grade level. Two hundred and ninety-eight secondary public teachers in Missouri participated in an initial questionnaire. Of the 298 participants, nine were interviewed

who represented one of nine RPDC regions of Missouri and who identified they used Twitter for professional resource acquisition or sharing, collaboration, or participation in Twitter chats. The researcher interviewed these participants and collected responses from questionnaire participants to explore their experiences and attitudes related to Twitter use for professional learning, the connection between Twitter use to support a professional learning network, and Twitter use for professional learning compared to traditional professional learning structures. The researcher found that teachers want to access their professional learning network without the cumbersome restrictions of travel while also having the autonomy to choose the type of information they identify as needed for their classroom.

The researcher sought to explore how Missouri secondary-level public school teachers perceived the use of Twitter for professional learning. Twitter and professional learning synergize to provide teachers access to knowledge outside the school building walls. This knowledge is not only accessible but can lead to new skill development as teachers can quickly implement new strategies found on Twitter. Teachers can also connect with a wide range of professionals and researchers worldwide to collaborate on ideas and implementation techniques. Twitter provides teachers access to various professional learning networks comprised of individuals who share their knowledge and experience through the reconstruction of topics and practices. Although plugged into a network, Missouri secondary teachers are consumers more often within the network than contributors. Teachers' professional learning networks grow through Twitter, only by the user seeking out new content if they are not producing tweets or retweeting themselves. Teachers desire personalized, relevant content, and geographic limits that are not binding.

Teachers as learners find value in developing their personalized learning network through connections to like-minded practitioners willing to share resources and ideas. Teachers do not always need the structure of a traditional professional learning environment for this authentic interaction with people and information.

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APPENDICES

APPENDIX A

Informed Consent Form

Dear Participant,

You are cordially invited to participate in my qualitative narrative research to examine your perception of using Twitter for professional learning. This research has been approved by the Southwest Baptist University Research Review Board. You may contact Dr. Joe Sartorius, Chair of the Research Review Board at RRB@SBUniv.edu for any questions or concerns you may have related to this research. By participating in this research you have the opportunity to add to the research base related to understanding the perceptions a teacher has of using Twitter for professional learning.

The interview will consist of eight questions about your perception of Twitter as a professional learning tool. You will be given the chance to expand on any answers to clearly explain your perceptions. The interview will last approximately 30 minutes.

Your participation in this study is completely voluntary and there are no foreseeable risks associated with this research. However, you can decline to answer any question and you may withdraw from the interview at any point.

It is important to this research that I learn your opinions. Your responses will be completely confidential. Your information will be coded and your name will not be used. If you have any questions about the interview or your responses to the questions, you may contact Allison Dishman by email at allisonldishman@gmail.com.

In order to participate in this interview, your signature on the informed consent is required. If you agree to allow me to use your interview responses for research purposes, please sign below.

Signature of Participant

Date

APPENDIX B

Initial Questionnaire

Demographic Information

1. Gender: Female _____ Male _____ I prefer not to say _____
2. Age: 18-34 _____ 35-54 _____ 55+ _____ I prefer not to say _____
3. Level of completed education: Bachelor's _____ Master's _____ Master's +30 _____
Specialist _____ Doctorate _____
4. Current grade level(s) taught: 6th _____ 7th _____ 8th _____ 9th _____ 10th _____
11th _____ 12th _____
5. Current school setting: Middle School/Junior High _____ High School _____ Other _____
6. Total years in education: 1-5 _____ 6-10 _____ 11-15 _____ 16-20 _____ 20-25 _____
26-30 _____ 31+ _____
7. Approximate student enrollment in the building you teach: 0-200 _____ 201-
400 _____ 401-600 _____ 601-800 _____ 801-1,000 _____ 1,001-1,200 _____ 1,201-
1,400 _____ 1,401-1,600 _____ 1,601-1,800 _____ 1,801-2,000 _____ 2,000+
8. Number of teachers in your building who teach the same grade level content: 0 _____
1 _____ 2 _____ 3 _____ 4 _____ 5+ _____
9. Geographic location in Missouri: Central _____ Heart of Missouri _____ Kansas
City _____ Northeast _____ Northwest _____ St. Louis _____ South Central _____
Southeast _____ Southwest _____

The questions below are from Powers (2016). Permission to use this survey has been received from the author via email on Tuesday, August 27, 2019.

Twitter Use Information

1. Do you have a Twitter account: Yes _____ No _____
2. How long have you been using Twitter for professional learning?
_____ I don't have a Twitter account
_____ I have a Twitter account, but don't currently use it professionally
_____ 6 months or less
_____ 7 months to 1 year
_____ 1 - 2 years
_____ 2 - 3 years
_____ 3 - 5 years
_____ 5 or more years
3. Typically, how frequently do you use Twitter?
_____ I don't use Twitter
_____ Multiple times per day
_____ Daily
_____ Weekly
_____ Monthly
4. For what professional purposes do you use Twitter? Check all reasons that apply:
_____ I don't use Twitter
_____ Resource sharing/acquiring
_____ Collaboration with other educators

- Emotional support
- Communication with students
- Communication with parents
- Communication with teachers
- Participation in Twitter Chats
- Back channeling
- Other (Please list):

5. Aside from Twitter, what other social media services do you use? Check all that apply:

- I don't use any other social media
- Facebook
- Pinterest
- LinkedIn
- Instagram
- TikTok
- Other (Please list):

Why and How You Use Twitter

6. Please explain what aspects of Twitter you find most valuable for supporting your professional learning network and why.

7. What aspects of Twitter as a professional learning tool do you find most valuable compared to traditional professional learning?

8. What aspects of Twitter do you find to be barriers to professional learning?

9. Please list all the hashtags or usernames (e.g., #edchat) you regularly use or search to connect with other educators.

10. Please list all the hashtags (e.g., #edchat) for any moderated weekly/monthly chats in which you regularly participate.

11. What concerns do you have regarding using Twitter? Check all reasons that apply.

- My personal privacy
- Busy/not enough time
- Already get too many emails and online communications
- My school/district does not allow me to access Twitter
- I am concerned about mixing personal and professional information and relationships
- I am concerned my membership in a social network might lead to an incident that might jeopardize my job
- I don't receive any job or career credit for participating in online communities
- I don't know how to use Twitter
- Other – please list:

12. Please list what you consider to be your best practices for using Twitter as a professional learning tool.
13. Please include your First and Last name and email address if you are willing to participate in an individual or group follow-up interview regarding educators' use or non-use of Twitter for professional learning.

APPENDIX C

Interview Questions

1. Please explain what aspects of Twitter you find most valuable for supporting your professional learning network and why.
2. What aspects of Twitter as a professional learning tool do you find most valuable compared to traditional professional learning?
3. What aspects of Twitter do you find to be barriers to professional learning?
4. Please list all the hashtags and usernames (e.g., #edchat) you regularly use or search to connect with other educators.
5. Please list all the hashtags (e.g., #edchat) for any moderated weekly/monthly chats in which you regularly participate.
6. What concerns do you have regarding using Twitter? Check all reasons that apply.
 - My personal privacy
 - Busy/not enough time
 - Already get too many emails and online communications
 - My school/district does not allow me to access Twitter
 - I am concerned about mixing personal and professional information and relationships
 - I am concerned my membership in a social network might lead to an incident that might jeopardize my job
 - I don't receive any job or career credit for participating in online communities
 - I don't know how to use Twitter
 - Other – please list:
7. Please list what you consider to be your best practices for using Twitter as a professional learning tool.
8. Has the pandemic affected your use of Twitter for professional learning?
9. In what other ways do you use Twitter outside of professional learning?

What is your Twitter username?

APPENDIX D

Obtained Questionnaire



Allison Dishman <allison.dishman@republicschools.org>

Permission to use Survey tool

Powers, William T. <wtpowers@spsmail.org>
To: Allison Dishman <allison.dishman@republicschools.org>

Tue, Aug 27, 2019 at 8:41 PM

Hi Allison,

Year two at Kickapoo is off to a great start. I hope you are having a great year too.

Yes, you may use the tool. However, the original survey is from Carpenter and Krutka (2014). I did modify and make some changes to the tool to fit my needs.

I had two surveys so not sure which one you are referencing.

Let me know if you have any questions. You are welcome to email or call. My number is below.

Thanks,

Dr. Bill Powers

Principal

Kickapoo High School

3710 S. Jefferson Avenue

Springfield, MO 65807

Ph: 417-523-8510

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APPENDIX E

RPDC Geographic Regions

