Instructional Hub: Bridging the Gap in Teacher Preparation for Online Instruction

Charity Beth Simmons

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INSTRUCTIONAL HUB: BRIDGING THE GAP IN TEACHER PREPARATION FOR ONLINE INSTRUCTION

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DEDICATION

This dissertation is dedicated to all of the teachers across the world who struggled with teaching during the COVID-19 pandemic and especially the teachers at Arts Academy High School. Because of your love and dedication, I chose this research topic to bring about educational change. To my daughter Natalie, I hope you will understand your Mommy is working hard so you will never have to struggle in life.
ACKNOWLEDGEMENTS

I would like to acknowledge the improvement team members for their dedication to my study. A special acknowledgment goes to the Principal and Assistant Principal of Instruction at Arts Academy, who recommended that I become a member of the Arts Academy High School Professional Development Focus Group, which motivated me to return to school. To my professional development fellowship liaison, Dr. Elizabeth Currin, thank you and the PDS Network for your support and guidance through this process. I appreciate your continuous support of the PDS Network to ensure my success. To Dr. Cunningham, thank you for always sharing your ideals and providing your unwavering expertise. To Dr. Hardie, thank you for your time, feedback, and assistance in supporting me through this process. To Dr. Peter Moyi, thank you for always listening to me and reminding me to take time out for myself and always to put my family first. I appreciate your patience, guidance, and continuous support.

A special thanks goes out to my family for their love and support throughout this educational process. Thank you for being so understanding and helping to support my dream. To my husband George, thanks for being my rock and motivation when I got frustrated and wanted to give up. I would like to thank God for giving me the strength to go back to school and pursue this degree.
ABSTRACT

In the spring of 2020, the coronavirus disease (COVID-19) reached pandemic status in the United States, leading to extended educational disruption and posing significant obstacles for teachers who were unprepared to teach in a virtual environment. Educators adjusted curricular materials, delivery, and assessment methods to accommodate and engage students while maintaining academic objectives and minimizing stress. Few teachers in District 8705, South Carolina had experience with distance instruction; thus, they had little to no adaptive knowledge on which to depend.

The purpose of this dissertation was to find a solution that could significantly enhance teacher preparation for virtual teaching through more intensive academic support and professional development. The objective was to develop an instructional hub to enhance their self-efficacy in virtual instruction. This intervention was designed to offer comprehensive support and professional development, with the aim of improving teacher readiness for virtual teaching.

Data collected through teacher surveys and empathy interviews informed three plan-do-study-act cycles from a phenomenological approach. The results of this improvement science action research suggest the instructional hub provided a strong basis for future learning opportunities. Introducing the hub as a professional development intervention demonstrated encouraging outcomes in tackling teachers’ low self-efficacy.
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CHAPTER 1
INTRODUCTION

When the COVID-19 pandemic prompted schools around the world to develop and implement virtual classes, this rapid shift challenged teachers who were unprepared to teach in a virtual environment while juggling multiple roles and responsibilities (Cutri et al., 2020; Ozamiz-Etxebarria et al., 2021). Teachers’ lack of preparation for online teaching during this transition, to the detriment of their students, is consistent with the findings of a 2018 PISA study that suggested teachers did not have the relevant knowledge and technical skills to use digital devices in their lessons (Westphal et al., 2022). Although students and teachers encountered difficulties adapting to remote learning (Hodges et al., 2020; Maatuk et al., 2022), the shift to distance learning during the pandemic significantly stressed teachers. Teachers’ preoccupation with navigating the digital teaching space hindered their ability to offer creative learning opportunities and tailored instruction to meet students’ needs (Anderson, 2021).

The primary aim of this improvement science research study was to create opportunities to better prepare teachers to teach in a virtual environment through professional development while also building teacher self-efficacy. The improvement was meticulously tailored to augment educators’ instructional capacity, encompassing a diverse range of instructional strategies, online resources, and opportunities for professional growth.
The Problem of Practice in a Broader Context

COVID-19 resulted in unexpected and swift changes to digital teaching for schools worldwide, leaving teachers with insufficient time to prepare (Bozkurt et al., 2020). With the rapid transition to online learning, teachers needed additional assistance and resources for effective virtual instruction, given their limited exposure to online instruction before the pandemic (Cutri et al., 2020). Studies have shown that many teachers consider themselves inexperienced in online teaching, as indicated by their self-efficacy beliefs (Pressley & Ha, 2021). The need to transition from their customary instructional approaches in response to the pandemic compounded their limited familiarity with online teaching methods (König et al., 2020), affecting student learning outcomes (Cutri et al., 2020). Access to reliable technology was also challenging (García & Weiss, 2020).

Furthermore, the new pedagogical approaches and requirements impacted teachers’ self-efficacy, particularly regarding instruction and student engagement (Pressley & Ha, 2021). One aspect that raised alarm among educators was the lack of connectedness, directly impacting their efficacy (Parker et al., 2021). As Parker et al. explained, the sudden transition to online learning created barriers. Teachers found it challenging to engage students due to reduced communication with their students, diminished accountability, and students’ struggles with self-motivation and self-directed learning, especially in collaborative learning environments.
The Problem of Practice in the Local Context

Arts Academy High School (AAHS) is a school in the 8705 school district situated in the northwestern region of South Carolina. Within District 8705, there are a total of 12 elementary schools, two intermediate schools, three middle schools, four high schools, one technical center, and one alternative school. The district places a strong emphasis on fostering professional development among educators, encouraging them to evolve into instructional leaders and supporting innovative research initiatives. Once known for high-quality education, cutting-edge technology, and qualified teachers, the district, like other U.S. school districts, has since faced significant educational and political challenges, some of which were caused by the pandemic: accusations of ethics violations concerning board members and teachers, parental hostility, and protests about wearing masks and returning to in-person instruction (McMahon et al., 2022; Tran, 2022). The challenges faced by District 8705, including the superintendent’s resignation, lawsuits against board members, and parental hostility amid the pandemic, prompt consideration of how factors such as “psychological” and “political factors” (Taylor & Asmundson, 2021, p. 3) may impact the effectiveness to improve professional development and teacher preparation initiatives at Arts Academy.

During the spring of 2020, when all schools in District 8705 were physically closed due to the pandemic, teachers faced the daunting task of transitioning to remote teaching. They utilized Google Classroom to share assignments for students to complete from home. However, this period of unstructured learning proved challenging, with many students needing more support in their studies. In response, teachers went above and beyond to support their students. They offered extra time and assistance as needed to
ensure that every student could keep up with their coursework and pass their classes successfully. Additionally, teachers had to provide paper copies of assignments for students without internet access, requiring them to maintain regular communication with students and their families.

In the fall of 2020, District 8705 faced a community outcry for students to return to face-to-face instruction. In response, the district adopted a hybrid instructional model by combining online and face-to-face instruction and used interchangeably with blended learning. However, upon the school’s physical reopening, more than 50% of Arts Academy students, with the majority being African Americans, opted for online learning. Figure 1.1 depicts this decline in school enrollment.

Figure 1.1: Enrollment PowerSchool Data
This decision was mainly driven by the fear of returning to face-to-face instruction, which was understandable given that the mortality rate for African Americans from COVID-19 was 3.4 times higher than that for non-Hispanic and White individuals, a disparity that was evident nationwide (García & Weiss, 2020; Wadhera et al., 2020) and across all age groups (Chatters et al., 2020).

The fear of returning to face-to-face instruction resulted in a significant decline in the student population. Of the 22 teachers reassigned in response to the high demand for virtual classes, half were notified the day before school, creating unexpected challenges for those unprepared to teach virtually. At first, teachers were asked to volunteer to teach online; however, teachers were reassigned without prior notice as the need increased. As elsewhere, inadequate preparation and fear greatly affected teachers’ self-efficacy beliefs about teaching in online environments (Pressley & Ha, 2021).

I was a family and consumer science teacher at AAHS during this time. I had the advantage of prior experience with online teaching during my part-time job. However, despite having 15 years of teaching under my belt, I faced challenges teaching in a hybrid setting using dual modalities. I remember this day like yesterday, watching a teacher pack her stuff in tears because she had just been told she would teach online. Heartbroken, I promised that teacher I would help her through this difficult time. I also observed other teachers’ challenges: integrating technology into lessons, developing virtual lesson plans, and keeping students engaged for 90 minutes of online instruction.

Even though we have overcome the COVID-19 pandemic and schools have reopened, the need for support in online teaching persists. Despite the return to in-person instruction, the experiences during the pandemic have left a lasting impact on many
educators. Compounding the heartbreaking frustration, I witnessed, teachers had legitimate concerns about COVID-19 safety and procedures. As Fránquiz et al. (2023) argued, their voices were not adequately heard or acknowledged. This lack of responsiveness could indicate a broader issue of diminishing respect for the profession, with educators feeling less control over what and how they teach (Tran, 2022).

However, it is important to highlight that not preparing teachers to teach in a virtual environment has an impact on their self-efficacy. Therefore, I used improvement science to address the problem of teachers’ lack of preparation to teach in a virtual environment. This dissertation showcases my efforts to set up opportunities to equip teachers with the necessary skills to effectively teach in a virtual environment. To accomplish this objective, my focus was directed toward finding a solution that would enable seamless professional development for educators.

**Improvement Team**

Given the difficult circumstances of online teaching, as evident from the pandemic experiences of AAHS teachers, understanding the level of digital teaching preparation provided to teachers was crucial to solving the problem. I organized an improvement team of AAHS educators and administrators to gain this understanding. Acting as thought partners, the team communicated throughout the 2020-2021 school year. It assisted with defining the problem while also proposing and implementing solutions to mitigate teachers’ lack of preparation to teach virtually. Before developing this improvement team, I had no close relationship with my five team members. I intentionally recruited due to the unique perspectives and areas of expertise each member brought. Each member of the team had previous experience with either teaching online or
understanding research methodologies, which I believed would be a vital asset to this work. In research, including diverse voices is essential when addressing problems (Sousa & Clark, 2018).

In addition to me, the team consisted of the assistant principal of instruction, who oversees instructional support; one special education teacher; one science teacher, who serves as department head; and one digital integration specialist, who provides technical support to AAHS teachers and teaches online courses for the district. The team also included a business education teacher who took notes during each monthly meeting. To incentivize participation and honor their time, I provided team members with $20 for attending each meeting. This incentive was self-funded because I wanted to compensate each member to show my appreciation for working outside of their regular working hours to assist me with this research. Money would also be a motivating factor to ensure that each member attended the meeting and provided meaningful feedback.

**Improvement Science**

Improvement science provides a structured approach to exploring practice using data, which is valuable for incorporating changes into intricate systems (Hannan et al., 2015). There are four models of improvement. The first focuses on knowing why you need to improve, and the second is having a way to get feedback to know if improvement is happening. The third is developing a change that will result in improvement. The fourth principle is testing the change before implementation.

Improvement Science uses systematic approaches to deal with complex problems, primarily in the healthcare and education industries. Improvement Science starts by
asking three fundamental questions, known as models of improvement (Langley et al., 2009). Those three questions are:

1. What are we trying to accomplish?
2. How will we know that change is an improvement?
3. What changes can we make that will result in an improvement?

Through a systematic approach known as the plan-do-study-act (PDSA) cycle, improvement science facilitates practical experimentation and optimal learning. The four-step cycle is a method for enhancing and perfecting procedures. The planning step entails deciding on the change to implement. Then, “do” refers to implementing the change on a small scale. Next, the studying step involves examining the outcomes of the change to determine whether it had an impact. Ultimately, acting means choosing whether to accept the change, make changes to it, or try something new. The cycle is then repeated with a subsequent plan, creating a never-ending cycle of improvement (Langley et al., 2009).

Through PDSA cycles, practitioners can implement changes within intricate systems and swiftly extract real-world insights (Bryk et al., 2015; Deming, 1986). In this improvement science action research, I adopted a systematic approach to investigate and propose practical solutions to enhance professional practice by utilizing methodical skills to analyze and address the identified problem (Perry et al., 2020).

**Evidence to Understand the Problem**

To gain a deeper understanding of the issue, I undertook empathy interviews. Conducting empathy interviews aims to pinpoint system-related concerns requiring attention, delving into the underlying community-based reasons behind a problem, and collecting insights that spark innovative, people-oriented solutions (Nelsestuen & Smith,
The participants included AAHS employees and the District 8705 virtual academy director. Empathy interviews help practitioners understand stakeholders’ perspectives (Hinnant-Crawford, 2020). Yielding participants’ firsthand accounts of the problem can be instrumental in a researcher implementing the PDSA cycle (Deming, 2000). In this case, I gathered qualitative data pertaining to the teachers’ preparation for virtual instruction.

Empathy interviews take the form of one-on-one conversations (Hinnant-Crawford, 2020). Using a protocol, the interviewer can pose open-ended questions to elicit anecdotes about experiences that aid discovery and delve more deeply into the stories as needed. This approach enables exploring how participants’ varied experiences are reflected in their decisions and actions (Nelsestuen & Smith, 2020).

Empathy Interview with the Virtual Academy Director

In my interview (Appendix A) with the director of the virtual academy, I learned that District 8705 staff gathered essential stakeholders, including the director of special services, chief of instruction, and superintendent, to develop ideas and build the program in the summer of 2021. Initially, the virtual academy expected to design virtual schedules for students within their school, but the district decided to create a master schedule and hire teachers specifically for the virtual academy. During the first year, the virtual academy served 5,000 students, requiring numerous teachers to teach face-to-face and virtual classes. The director of the academy stated that there were challenges in maintaining consistency across the program due to varying grading policies in different schools. However, these challenges helped uncover disparities within the district and initiate meaningful conversations about educational equity.
A significant number of teachers were new to the district or new to teaching because this was the first year of the virtual academy—the initial plan of having dedicated staff for the virtual academy. However, the unexpected influx of students led to the need for teachers from every school to be involved. Consequently, some teachers juggled face-to-face instruction and teaching in the virtual academy. The virtual director, who found the requirement to communicate with every school in the district stressful, also expressed frustration at the overwhelming number of emails, receiving at least 100–200 an hour. After the first 2 weeks, the director expressed the need for additional support, and the district hired elementary, middle, and secondary coordinators. The director expressed that one of the challenges was building consistency within the virtual program.

When I asked about preparing teachers for the virtual environment, the director acknowledged the strength of the district’s prior investment in technology and professional development. Teachers were encouraged, though it was not a formal requirement, to pursue Google Level 1 certification, which was aligned with the school’s expectations for technology proficiency. Despite being ahead of the game in some areas, the district had not offered any professional development on how virtual teaching should look, how to develop a virtual lesson plan, or how to implement those tools in a virtual setting. According to the director, online instruction’s novelty created challenges in determining the appropriate pedagogical approaches, resulting in teacher anxiety.

**Empathy Interviews with Teachers**

According to teacher respondents in the empathy interviews (Appendix B), teachers continued to struggle with teaching online during the pandemic because there
was no additional time for planning. Adapting to a new environment so quickly overwhelmed many teachers with the demands of their new workload responsibilities, and they needed more techniques to effectively meet their students’ needs in this digital environment (Robinson et al., 2023). Protests against the district’s on-campus instruction policy arose as teachers expressed concerns about the safety of in-person instruction.

When the superintendent requested to suspend the district reentry plan, the school board reverted to a hybrid plan with 2 days of in-person instruction a week.

At the start of the pandemic during the 2019–2020 school year, I distributed research participation flyers (Appendix C) and extended a letter of invitation to participate (Appendix D), and teachers who accepted received and signed a consent form. As Table 1.1 shows, I interviewed a diverse group of AAHS teachers across multiple disciplines with experience ranging from 3–25 years. Three participants were Black, and four were White. When the pandemic began, the teachers either taught virtually or used dual modalities because there were no alternative options.

Table 1.1 Participants’ Demographic Information

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Years of experience</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 1</td>
<td>M</td>
<td>13</td>
<td>business education</td>
</tr>
<tr>
<td>Teacher 2</td>
<td>F</td>
<td>25</td>
<td>business education</td>
</tr>
<tr>
<td>Teacher 3</td>
<td>F</td>
<td>4</td>
<td>special education</td>
</tr>
<tr>
<td>Teacher 4</td>
<td>F</td>
<td>14</td>
<td>early childhood education</td>
</tr>
<tr>
<td>Teacher 5</td>
<td>M</td>
<td>14</td>
<td>business education</td>
</tr>
<tr>
<td>Teacher 6</td>
<td>F</td>
<td>10</td>
<td>Spanish</td>
</tr>
<tr>
<td>Teacher 7</td>
<td>F</td>
<td>3</td>
<td>theater</td>
</tr>
</tbody>
</table>
Interviews were scheduled at a mutually suitable time during a 3-week period and occurred via Google Meet. I used a 10-question protocol covering the coronavirus outbreak, learning disruption, teachers’ experiences, professional development, remote learning, hybrid learning, teacher support, dual-modality instruction, and teachers’ voices (Appendix B). As a means of member-checking, I recorded each conversation and provided participants with transcripts for review and feedback (McKim, 2023). These interviews refined my understanding of the problem by helping me analyze the teachers’ experiences and level of preparation for teaching virtually. To make sense of the transcripts, the improvement team and I engaged in a collaborative review process (Bryk et al., 2015), examining the causes and effects of the teachers’ unpreparedness. This approach enabled the team to address conflicting data and reach a consensus around three major themes: the absence of professional development, the value of teacher support, and the importance of technology in facilitating online instruction.

When asked how the coronavirus outbreak disrupted their lives, two interviewees described how the COVID-19 pandemic significantly disrupted their teaching experiences. They mentioned challenges such as transitioning to remote teaching, a lack of resources, difficulty engaging and monitoring students, and the impact on their ability to interact with students and colleagues. The interviewees also indicated that their teacher preparation programs did not adequately prepare them for online teaching and suggested ongoing professional development either did not exist or was not comprehensive enough to address the unique challenges of virtual instruction (Cutri et al., 2020; Johle, 2022; Philippakos et al., 2022). They highlighted the need for more training and support to teach online effectively.
When asked how vital teacher support is when teaching virtually, all interviewees indicated it is very important. Three interviewees cited a need for increased support to navigate teaching in a virtual teaching environment. The participants also stressed the importance of ongoing professional development, clear communication, and resources to teach effectively in a dual-modality or virtual setting. They suggested additional training and support would enhance their teaching experience, mainly when using technology for online instruction, including videoconferencing, screen sharing, attendance tracking, and resource access. These perspectives, highlighted by previous researchers (García & Weiss, 2020), validate claims that technology has played a crucial role in enabling teachers to adapt their teaching methods and effectively engage with students in virtual settings and also helped to inform the fishbone and driver diagram.

**Summary of Insights from Empathy Interviews**

Overall, the insights gained from the director of the virtual academy shed light on the development and implementation of the virtual program within District 8705. The program was created due to the need for virtual instruction caused by the pandemic so the director could comment on its impact, articulating how the program served as an intervention. The director felt the virtual academy had a positive impact and met the needs of many students. However, there are ongoing challenges to address in preparing teachers to teach virtually. The interviews with the teachers highlighted the challenges they faced in adapting to virtual instruction, emphasizing the need for comprehensive professional development, increased teacher support, and effective utilization of technology. These insights provided valuable guidance for improving online teaching practices and ensuring quality education in virtual settings.
Root Cause Analysis

In the context of teacher improvement, conducting root cause analysis is essential for identifying the fundamental issues affecting teaching effectiveness and student outcomes, enabling targeted efforts for sustainable improvement (Meyers & VanGronigen, 2021). It helps educators prioritize resources and interventions, fostering a culture of continuous learning and growth in the teaching profession. To conduct a root cause analysis, the improvement team and I organized evidence of the problem using fishbone diagrams.

Multiple diagrams resulted from this process. The first fishbone diagram, which is informed by local data like empathy interviews, improvement team meetings, and literature (Hinnant-Crawford, 2020), illustrates the root causes identified by the improvement team (see Figure 1.2). In November of 2021, the improvement team and I met for the first time, and I introduced them to improvement science methods. During that initial meeting, the members of the improvement team and I identified our problem: a foundational cause was the teachers’ need for preparation to teach in a virtual environment. Because the improvement team members worked at the research site, they provided personal perspectives, and based on the analysis of the empathy interviews, we collaboratively identified which causes had a more significant impact. In the second meeting, the improvement team started reviewing the manuscript from the empathy interviews, which illuminated the cause of the problem in the first meeting. One team member played a crucial role by sharing literature to support these findings. At the same time, the Assistant Principal of Instruction was instrumental in sharing her expertise on what the local data revealed, drawing from reports from PowerSchool and
information from Board Meetings. Developing the fishbone diagram was a collaborative effort between the improvement team and me.

A thorough analysis of empathy interview transcripts was used to create the fishbone diagram. As an improvement team we coded the empathy interviews. Coding empathy interviews involves systematically analyzing qualitative data from interview transcripts to identify recurring themes and patterns. After transcribing the empathy interviews, a coding system was devised to categorize the text that corresponded to specific themes expressed by teachers. The improvement team then organized the themes into broader categories, facilitating the identification of key trends. The empathy interview findings served as a foundation for creating the fishbone diagram. When developing the fishbone diagram the improvement team and I embarked on the task of identifying the root cause as a cohesive team, drawing on the wealth of insights provided by teachers during empathy interviews and supplementing it with our collective expertise and prior experiences. This collaborative effort not only allowed us to effectively pinpoint the root causes, but also ensured that the resulting fishbone diagrams were tailored to address the specific issues raised in the interviews and were consistent with our own practical knowledge. In developing the fishbone diagram, the improvement team initiated the process by defining the problem and denoting it as the "fish's head." Subsequently, we identified major categories, referred to as the "bones," and proceeded to brainstorm potential causes within each category. To pinpoint sub-causes and analyze the root causes effectively, we maintained continuous monitoring and adjustment of the fishbone diagram throughout the research process. The improvement team analyzed every
component of the fishbone diagram and developed details to support the empathy interviews that would influence these causes.

Figure 1.2 Fishbone Diagram of Local Data

Figure 1.3 Updated Fishbone Diagram Based on Research

The second fishbone diagram identifies root causes informed by research (See Figure 1.3). The second fishbone diagram was updated in the second improvement
meeting. During this time, I shared with the improvement team my findings based on existing research to support the causes. One of my improvement members also shared helpful articles to support our findings. The findings from the literature revealed that the improvement team and I were on target when we identified causes associated with the lack of teacher preparation for virtual teaching.

Figure 1.4 Updated Diagram Combining the Causes

The fishbone diagram was updated by incorporating the causes identified through research, particularly the local data obtained from the empathy interview conducted by the improvement team. During an advanced dissertation preparation course in 2023, I delved deeper into the literature to find more articles to support these causes. The problem is teachers’ lack of preparation for virtual teaching (Ellis et al., 2020; Özüdoğru, 2021; Pressley & Ha, 2021; Sahoo, 2020; Schultz & Love, 2022). Researchers have
identified and addressed five causes, which include: lack of professional development (Al-Bargi, 2021; Atmojo & Nugroho, 2020); stress (Billet et al., 2023; Herman et al., 2021; Santamaria et al., 2021; Westphal et al., 2022), work–home imbalance (Kara, et al., 2021; Lizana & Vega-Fernadez, 2021; Unal & Dulay, 2022); the pandemic (Bellini et al., 2021; Onyema et al., 2020); and technology (Goldschmidt, 2020; Troisi et al., 2022; Whitelaw et al., 2020).

The third fishbone diagram combines all the causes (Figure 1.4). My improvement team and I discovered underlying issues when integrating the two fishbone diagrams. This enabled us to prioritize the fundamental reasons and understand the causes of teachers’ unpreparedness to teach in a virtual environment. We grouped relevant details under four categories: pandemic, technology, lack of professional development, and stress.

**Pandemic**

Lack of pandemic preparedness was a dominant theme in the team’s discussion of root causes. The lack of prior experience in dealing with a pandemic contributed to the unpreparedness of leaders and teachers. The sudden shift to online instruction due to the pandemic created significant challenges and uncertainties that many teachers could not handle, which, in turn, is not the teachers’ fault but rather the fault of our broken education system. Teachers were not equipped to handle these challenges because their schools had not prepared them. School systems provide teachers with guiding actions and are designed to maintain consistency within their structures (Singh, 2021). Therefore, because of the urgency to provide students with instruction, schools failed to adequately prepare teachers for virtual instruction.
Technology

Discussions of the root cause of technology surfaced in several subthemes. First, the theme recognized how limited access to technology for students and teachers posed a significant hurdle in transitioning to a virtual learning environment. Teachers faced difficulties delivering lessons effectively and engaging students in online platforms without adequate devices and reliable internet connections.

Additionally, the team discussed insufficient technology integration. Prior to the pandemic, schools lacked routine training to expose teachers to online teaching. Also, there were no standard practices in place to help teachers transition into a virtual environment. Without these systems in place, teachers were left on their own trying to adapt to this new method of teaching without prior training (VanLone, Pansé-Barone & Long, 2022). Therefore, teachers’ lack of skills and knowledge in integrating technology into their teaching practices hindered their ability to navigate digital platforms and utilize online tools effectively. This shortcoming led to a suboptimal learning experience for students and a struggle for teachers to adapt to the new virtual environment.

Professional Development

Teachers were ill-equipped to face the challenges brought about by the pandemic due to the lack of previous professional development programs or training specifically designed for virtual teaching and learning. Without adequate support and resources to enhance their online instructional skills, educators struggled to engage students and maintain the same level of effectiveness as in-person instruction. To support teachers’ professional development, I developed an instructional hub to enhance their self-efficacy in virtual instruction. This hub served as a professional development intervention to offer
comprehensive support and professional development to improve teacher readiness for virtual teaching. The idea of the instructional hub was based on feedback received from the teachers' empathy interviews and also on the findings from the literature and previous experiences with teaching classes online (Baran & Thompson, 2011).

**Stress**

The sudden shift to virtual instruction and the additional demands and pressures imposed by the pandemic resulted in heightened stress levels for teachers. Dealing with technological challenges, adapting teaching methods, and addressing students’ emotional and academic needs in a remote setting created significant stress, affecting their ability to teach in the virtual environment effectively.

**Overall Conclusion of the Root Cause Analysis**

In this improvement project, my initial emphasis was on the necessity for increased professional development. This focal point covered various aspects depicted in the final fishbone diagram (see Figure 1.4). Specifically, professional development could target the following areas:

- **Technology integration:** The rapid shift to virtual instruction exposed a gap in teachers’ skills and knowledge regarding the effective integration of technology into their teaching practices (Dhawan, 2020). Professional development programs can provide educators with training and support to enhance their technological proficiency, enabling them to utilize digital tools and platforms more effectively in the virtual environment (Al-Bargi, 2021).

- **Pedagogical strategies for online instruction:** Teaching in a virtual environment requires different pedagogical approaches than traditional classroom settings.
Teachers need professional development opportunities to learn and implement effective strategies for online instruction, such as utilizing interactive activities, promoting student engagement, and adapting assessments for virtual settings (Atmojo & Nugroho, 2020).

- **Online communication and collaboration:** Professional development can help teachers develop online communication and collaboration skills, which are crucial for fostering meaningful interactions with students and colleagues in a virtual environment (Johle, 2022). Educators can learn techniques for building relationships, providing feedback, and facilitating virtual discussions through targeted training and support.

- **Addressing student needs:** Professional development can equip teachers with strategies to address the unique needs of students in a virtual setting (Robinson et al., 2023). This may include methods for differentiated instruction, supporting students with limited technology access, and promoting equitable participation and engagement in online learning.

- **Stress management and well-being:** The increased stress levels experienced by teachers during the transition to virtual instruction highlight the importance of professional development programs that focus on stress management, self-care, and well-being (Darling-Hammond & Hyler, 2020). Educators can benefit from learning coping strategies, time management techniques, and approaches to maintain a healthy work–life balance in the virtual teaching environment.

Overall, teacher preparation to teach virtually plays a crucial role in empowering teachers to navigate the challenges of virtual instruction effectively. Providing ongoing training,
support, and resources can enhance teachers’ skills, confidence, and preparedness in delivering quality education in a virtual environment.

**The Driver Diagram**

The improvement team and I used a driver diagram, the third step in an improvement science approach, to develop a theory of practice improvement (Bryk et al., 2015). Leveraging points from the fishbone diagram illuminated what changes might happen, and the driver diagram provided a visual representation of the improvement team’s theory of practice for improvement (Perry et al., 2020). Identifying three primary drivers from the fishbone diagram that serve this study’s aims (i.e., professional development, instructional support, and technology), the improvement team hypothesized that teachers are prepared for instruction when they have instructional resources (see Figure 1.5). These resources might include (a) an internal hub to find virtual content area resources, (b) relevant curriculum resources, and (c) recorded lessons to support online instruction.

The primary and secondary drivers in the driver diagram are meant to guide the development of change ideas or interventions. The diagram helped the improvement team visually represent the relationships between drivers and the desired change, making planning and executing improvement efforts easier. Although several change ideas emerged, the driver diagram and the associated analysis of drivers led to the development of an intervention hub as a strategic approach to drive change.
This study focused on preparing teachers to teach virtually by providing an intervention to address teachers’ self-efficacy during virtual learning days. Through professional development, the team sought to equip educators with training, resources, and strategies that directly targeted the areas where they lacked confidence, thereby bolstering their belief in their own abilities to excel in virtual teaching settings. By offering personalized support and opportunities for skill development, the intervention could empower teachers, ultimately leading to increased self-efficacy and improved performance in virtual teaching environments.

**Theoretical Framework**

To inform my theory of improvement, I used Bandura’s (1977, 1986, 1997) theory of self-efficacy, a well-established framework. Bandura theory of self-efficacy refers to individual’s belief in their achieve a particular task. Bandura’s seminal work introduced the concept of observational learning or modeling and emphasized that
individuals could acquire new behaviors and information by observing others. This is not a passive process; it involves attention, retention, reproduction, and motivation. Bandura challenged the notion that learning occurs solely through direct experiences, highlighting the role of social influences in shaping behavior.

**Social Cognitive Theory**

Building upon social learning theory, Bandura (1986) delved deeper into the notion of self-efficacy. Self-efficacy refers to an individual’s belief in their ability to successfully perform a specific task or behavior. Bandura proposed that self-efficacy plays a crucial role in determining the choices people make, the effort they put forth, and how long they persist in the face of challenges. Introducing the concept of reciprocal determinism, Bandura emphasized the dynamic interplay between personal factors, behavior, and the environment. This triadic relationship suggests that these factors are not independent but influence each other bidirectionally.

**Self-Efficacy**

Bandura’s (1997) later work focused extensively on self-efficacy. Exploring the origins of self-beliefs and their impact on various aspects of life, ranging from academic performance to emotional resilience, he discussed how self-efficacy influences goal setting, effort expenditure, and perseverance in the face of obstacles. Bandura also examined the role of self-efficacy in coping with stress and adversity, illustrating its pervasive influence on human functioning.

**Triad of Reciprocal Determinism**

As noted earlier, Bandura (1986) emphasized the continuous interaction between personal factors, behavior, and the environment, proposing that these elements are not
isolated entities but are in a constant state of mutual influence. For example, an
individual’s thoughts (i.e., personal factors) influence their behavior, which, in turn,
affects the environment. Changes in the environment then feed back into shaping
thoughts and behaviors. This ongoing dialogue underscores the dynamic nature of human
functioning.

By incorporating these key insights into my theoretical framework, I intend to
provide a more detailed and nuanced understanding of how Bandura’s (1977, 1986, 1997)
work informed my theory of improvement. Bandura’s ideas align closely with the factors
influencing teachers’ self-efficacy. Self-efficacy beliefs are complex and dynamic,
varying according to the specific tasks individuals are engaged in (Rogers Haverback,
2020). As a tool that can drive positive outcomes, self-efficacy is regarded as necessary
and worth promoting, especially throughout the education continuum (Hajovsky et al.,
2020; Zee & Koomen, 2016). Teachers develop self-efficacy through a combination of
personal experiences, observation, feedback, and emotional regulation within the
educational context (Barni et al., 2019). As they gain mastery, receive support in the form
of training and professional development, and believe in the value of their work, their
self-efficacy beliefs can grow, leading to more effective teaching practices and positive
outcomes for them and their students.

Researchers have discovered that teachers benefit from firm self-efficacy beliefs,
which develop over time and manifest in flexibility when implementing new teaching
methods, comfort in redirecting students through mistakes, and student relationship
building (Hajovsky et al., 2020). In turn, high self-efficacy among teachers can positively
impact student outcomes and the quality of instruction (Klassen & Chiu, 2011).
According to Skaalvik and Skaalvik (2014), teachers’ beliefs about their efficacy generally fall into three domains: student engagement, instructional strategies and practices, and good classroom management.

Interestingly, all three areas may appear differently in virtual versus traditional classrooms. For example, engagement in a traditional classroom may reflect the use of communication techniques that are not available virtually (Rogers Haverback, 2020), such as nonverbal cues involving body language, facial expressions, and gestures. Additionally, skilled classroom management is an essential aspect of teaching that positively influences student and teacher outcomes. It leads to more instructional time, increased student engagement, and less time spent addressing student behavioral issues (Martella et al., 2012; Slater & Main, 2020). In a traditional teaching environment, controlling external factors that impact classroom management is likely more attainable, thus contributing to stronger self-efficacy.

At the time of COVID-19, teachers’ self-efficacy beliefs regarding their ability to teach virtually varied. These beliefs are worth considering in light of previous research. For example, healthy teacher self-efficacy is critical for students’ learning and has been linked to increased end-of-year student goals, innovative techniques, positive teacher practices and classroom policies, personal teaching achievement goals, and increased time with school and parental communication regarding test scores (Rogers Haverback, 2020). Because teachers’ physiological and emotional states also influence students’ self-efficacy beliefs, Rogers Haverback noted that in uncertain times, teachers are responsible for being as engaged and descriptive as possible in each interaction with their students. In
the case of online instruction, teachers must be knowledgeable enough about the virtual environment their students use to demonstrate confidence in it.

Given how the COVID-19 pandemic brought about rapid and significant changes to the mode of instruction that remains in operation post-pandemic, self-efficacy served as an appropriate theoretical framework for this improvement science study. Bandura’s (1977) concept of self-efficacy can shed light on the experiences of teachers who have encountered substantial personal impacts due to changes in their work and daily demands. Addressing the issue by investigating the impact of enhanced teacher preparation on participants’ readiness to teach in a virtual environment entailed assessing and endeavoring to boost their self-efficacy.

Bandura’s (1977) work informed my study in many ways. Self-efficacy theory provided a valuable framework for understanding and enhancing teacher self-efficacy, especially in the realm of online teaching. The study focused on applying this theory to illuminate how various factors, such as teachers’ prior experiences, observations, peer support, and emotional strength, collectively influence their ability to adapt to virtual teaching environments. A key intervention highlighted in the study is the instructional hub, rooted in Bandura’s ideas, aiming to equip teachers with the necessary resources for effective virtual instruction. This approach acknowledges that when teachers believe they have the instructional support needed, it enhances their self-belief, confidence, and skills in virtual teaching. The ultimate goal is to strengthen teacher competence and expertise in response to the challenges posed by the pandemic’s impact on the virtual teaching landscape. Recognizing that improved teacher self-efficacy not only benefits educators but also enriches the learning experience for students, particularly in these unprecedented
times, underscores the significance of applying Bandura’s self-efficacy theory in guiding interventions and shaping the future of virtual education. The theory of self-efficacy is a vital lens through which to examine the study, as it offers a deep understanding of how teachers’ confidence in their virtual teaching abilities directly influences their preparedness and adaptability during the unprecedented challenges posed by the pandemic. By leveraging Bandura’s framework, my study gains a solid foundation to explore the multifaceted sources of self-efficacy, ranging from prior experiences and observation to peer support and emotional resilience, all of which play a crucial role in determining how well teachers transition to virtual teaching environments. The theory not only allows for a nuanced examination of teachers’ self-efficacy but also informs potential interventions (i.e., the instructional hub in this study) and support strategies that can empower educators to navigate the complexities of virtual instruction effectively, ultimately benefiting both teachers and their students during this critical period.

The Appropriateness of the Problem

Addressing AAHS teachers’ low self-efficacy created opportunities for teachers to share their experiences, which in turn informed their instructional practices, consistent with improvement science (Perry et al., 2020). Pressley and Ha’s (2021) study revealed that teachers experience a smaller decline in success when they benefit from clear communication and explicit expectations from their school and district leaders. This study also found that when teachers received professional development that supported virtual instruction and had the opportunity to collaborate with other teachers, they had a stronger sense of success (Pressley & Ha, 2021). This problem was urgent because virtual education may continue to be the standard response to hazardous weather or other
incidents that previously resulted in cancelled classes. Therefore, teachers must be prepared for e-learning days. This problem was actionable because I was in a position to enact change at Arts Academy, and it was feasible due to the full support of the leadership team. However, one obstacle I encountered was the time limitation. Conducting the study within one academic year was not easy, so I strategically adjusted my timeline to ensure I could complete all aspects of the improvement project.

Furthermore, the problem is intricately tied to the practice of professional development and learning. By addressing this issue, this dissertation has the potential to shed light on educational practices and policies that support professional development for teachers, particularly in emergency situations like epidemics and other unforeseen circumstances. Moreover, examining how teachers were prepared to teach during a global pandemic can influence the design and reevaluation of teacher education programs to prepare future teachers. Ultimately, this research allows the world to hear the teachers’ silent cries, which are focused on how they survived such a turbulent time in education.

This dissertation addresses the problem of teachers’ lack of preparation to teach in a virtual environment. The research objective was to establish an instructional hub as an intervention. By addressing teachers’ low self-efficacy, professional development could improve teacher preparation for virtual teaching. The hub was designed to develop educators’ instructional capacity through the provision of instructional strategies, online resources, and continuous professional development.

**Improvement Question**

How can school leaders prepare teachers to effectively teach in a virtual environment and enhance their self-efficacy?
Searching for a Solution

To address the improvement question, I took a proactive approach, involving communication with the digital integration specialist, who was a member of the improvement team. Working with the digital integration specialist provided insight from a technology lens for the creation of the resource hub. Through this collaboration, a well-suited intervention emerged: an instructional hub dedicated to providing comprehensive tutorials on a range of essential tasks. The selection of this resource was not arbitrary; instead, it resulted from a systematic process that involved careful evaluation and consideration of various options.

The instructional hub’s relevance to the research objectives became apparent as it effectively aligned with the identified challenges, allowing for targeted skill development and knowledge enhancement. Its inclusion in the study was a well-justified decision, considering its potential to positively impact the research process and outcomes. Furthermore, the integration specialist involvement did not stop at the initial introduction; their involvement played an integral role throughout the journey, including check-ins to ensure consistent and personalized support. This ongoing guidance proved instrumental in optimizing the benefits derived from the instructional hub, making the entire experience highly beneficial to the research endeavor.

The study tested the change idea of introducing an instructional hub using the improvement science framework. This hub, which I discussed further in Chapter 3, emerged as a promising intervention aimed at enhancing teachers’ professional
development, particularly during virtual instruction. The inspiration for this instructional hub came from successful state-level implementations, as demonstrated by the South Carolina Department of Education in 2022. The instructional hub, envisioned as a technologically advanced learning platform, is equipped to provide teachers with specific strategies and valuable resources tailored for effective online teaching. This change concept, based on improvement science principles, emphasizes the recurrent method of making small improvements based on evidence and feedback. By posting assignments and accessing valuable resources, teachers can navigate online instruction more effectively, potentially alleviating stress and increasing self-efficacy (Pressely & Ha, 2022).

While acknowledging the significance of the instructional hub, I must also recognize its limitations. Despite its strengths, it may not encompass every possible aspect of the challenges faced, and other factors might also influence the research process. Nevertheless, this intervention, rooted in a systematic approach, bolstered the investigation and paved the way for potential solutions to the identified challenges.

**Researcher’s Positionality**

As a key member of the team, I brought my background and experience to bear on the study. For this study, I positioned myself as an insider. My participants were teachers at Arts Academy, where I was a teacher leader. As the researcher, I sought to study a problem in my setting, similar to an internal evaluation study (Herr & Anderson, 2005). Therefore, I closely engaged with the participants, exploring their experiences of needing to prepare to teach online. I negotiated my positionality through my improvement team, which assisted me with engaging in what they felt were potential problems.
As a teacher leader, I have taken on various educational roles, including classroom instructor, university adjunct professor, and online educator. Those roles and my four degrees do not truly define who I am. Deep down inside, I am an extremely caring and resourceful person who will go out of my way to help others. I am a giver of my time, my knowledge, and my resources. I am passionate about education and a true servant leader.

This study is also personal because I began teaching online a year before the pandemic hit. This new experience presented challenges as I had to adapt to the virtual environment, learn new platforms, and create online courses for my students. I was particularly overwhelmed at the time, as I had just given birth to my daughter and had to balance the demands of being a new mother with the responsibilities of teaching online. I felt a sense of fear and uncertainty, especially when working on multiple platforms. The 1-day training I received before teaching online did not adequately prepare me, despite my 14 years of teaching experience. The feeling of being overwhelmed persisted daily.

Given my experiences and the support I received, I felt compelled to share my story with my colleagues struggling to adapt during the height of the pandemic. When I saw that teacher crying that day, I felt a personal connection with her because I, too, at one point, felt the same fear that she felt. Therefore, I motivated teachers and assured them that I supported them every step of the way despite their difficulties teaching online. As a teacher leader at Arts Academy, I had a deeper understanding of the struggles many educators faced during this challenging time. I had a more significant impact because of my role as a teacher leader and my work with the administrative team. My role as a teacher leader fueled my passion for ensuring my colleagues had the support they needed.
and deserved in order to make a meaningful educational impact. I was determined to ensure that other teachers at Arts Academy and beyond were adequately prepared to teach in a virtual environment.

Witnessing the experiences of my colleagues and being able to relate to their challenges solidified my commitment to amplifying their voices and addressing their unspoken concerns. I promised myself that when given the opportunity, I would strive to make a difference, particularly by ensuring teachers are well-prepared to navigate the challenges of online teaching. Because virtual education is not going away, I felt a responsibility as a teacher leader to ensure teachers received the support they needed to succeed. My leadership role was vital to the success of this study. My position as a teacher leader helped to create a clear vision and communicate the importance of this study to the leadership team at Arts Academy and the teachers. I collaborated with other teachers, broke down silos, and encouraged ideas for best practices to ensure teachers were adequately prepared to teach in a virtual environment.

**Definition of Terms**

The following terms are used throughout this research and are, therefore, necessary to gain an understanding of this study.

- **Asynchronous learning**: An approach to learning by which individuals learn at their own pace and contribute at different times from different locations without the need for real-time interaction or scheduled class session. For example, discussion boards where students provide input to a given writing prompt and respond to their classmates’ posts.
• **Blended learning:** A formal education program in which a student learns in face-to-face classes and through online learning.

• **COVID-19:** A highly contagious acute respiratory virus found in humans caused by coronavirus strands. COVID-19 produces severe symptoms and, in some cases, death, mainly in older people and those with underlying health conditions. It was initially identified in China in 2019 and led to a global pandemic in 2020.

• **Hybrid learning:** Some combination of online and face-to-face instruction and will be used synonymously with blended learning.

• **Instructional hub:** A resource center or centralized online platform designed to provide teachers with a wide range of instructional materials, tools, and support to enhance their teaching practices and professional development.

• **Online learning:** Gaining knowledge and skills through synchronous and asynchronous learning applications. These applications are written and communicated, actively supported, and managed with the use of Internet technology. A term used interchangeably with e-learning.

• **Pandemic:** An outbreak of a disease spread across multiple countries, continents, and/or globally.

• **Remote learning:** A transition in the delivery of education to an alternative delivery model in which all teaching is conducted online (Hodges et al., 2020).

• **Secondary education:** Education beyond the elementary grades; provided by a middle school, high school, and/or college preparatory school.
• **Synchronous instruction**: A situation in which all participants in the learning environment can meet at the same time, achieved through web conferences to exchange dialog through a chat box and/or a microphone.

• **Teacher preparation**: Teachers’ training and support in a virtual setting. It is the process of equipping teachers with the necessary knowledge, skills, and resources to teach effectively in an online or remote learning environment.

• **Virtual learning**: An experience supported by computers both inside and outside of educational settings.

**Summary**

This introductory chapter provided an overview of the pandemic’s impact on teachers at AAHS and their state of readiness to teach in a virtual environment. This collaborative action research, using improvement science, is significant as teachers had limited exposure to online instruction, thus prompting the need for this research. Through the lens of Bandura’s (1977) self-efficacy theory and using improvement science methodology, I unpacked the problem of practice with empathy interviews and a root cause analysis supported by fishbone and driver diagrams. This chapter also discussed the statement of purpose, research questions, research limitations, my positionality, the significance of the study, and key terms.
CHAPTER 2

LITERATURE REVIEW

This literature review focuses on the issue of teachers’ inadequate readiness to teach in a virtual learning environment, evident in difficulty adjusting their instructional methods to the virtual setting, particularly during the COVID-19 pandemic. Analysis of various studies revealed factors contributing to this lack of preparation and the underlying causes, as presented in the fishbone and driver diagram frameworks in Chapter 1. A comprehensive analysis of the literature through these frameworks yielded insights to bridge the gap in teacher preparation for virtual teaching.

Distance Education, Online Instruction, and Emergency Remote Teaching

Distance education refers to a method of teaching where the learner and instructor are physically separated and engage in instruction at different locations and times (Shin & Hickey, 2021). Online learning, which originated from distance education, involves using technology tools and internet connectivity to facilitate the learning process. In online courses, the curriculum is specifically designed for delivery through online platforms, requiring careful planning and development over several weeks. Before the pandemic, distance education was not employed for emergency remote teaching, a term denoting a temporary shift in instructional mode during a crisis (Hodges et al., 2020). Any circumstance leading to a disruption in conventional educational practices can impact courses usually delivered in person or through a hybrid model involving both online and
in-person sessions. Following the resolution of the emergency, teaching reverts to its standard format.

While enrollment in online education has increased dramatically and is likely to continue, research on how online education affects learning at the K–12 level is limited. Morgan (2015) raised concerns about the expanded use of virtual instruction, highlighting its potentially negative impact on the academic performance of at-risk students. Despite the benefits of virtual instruction, Morgan questioned states’ extensive implementation of this approach. Understanding the pandemic’s impact on these existing trends warrants discussing the lack of teacher preparation for the shift to a virtual learning format (Basilaia & Kvavadze, 2020). Educators needed more time to plan and transition to online learning (Francom et al., 2021; Thomas & Rogers, 2020).

**COVID-19 Pandemic**

Within the realm of online instruction, the emergence of the COVID-19 pandemic presented a critical and formidable challenge. The novel coronavirus outbreak that originated in Wuhan, China, in late December 2019 rapidly escalated into a worldwide phenomenon. Officially known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), COVID-19 exhibits a broad spectrum of clinical manifestations, spanning from asymptomatic cases to severe respiratory distress (Ding et al., 2020).

A study conducted in the United Kingdom examined the 1957 Asian influenza epidemic to explore the effectiveness of school closures in controlling the spread of a respiratory virus (Vynnycky & Edmunds, 2008), yet research regarding the intersection of COVID-19 and education is somewhat limited or still in process. For example, Raffetti and Di Baldassarre (2022) suggested the anticipated health benefits of school closures
may not consistently materialize because children and adults continue to interact through informal daycare and non-school gatherings, even during closures. Despite older individuals’ heightened vulnerability to the virus, Viner et al. (2020) found that over 40% of grandparents are involved in providing childcare for their grandchildren. COVID-19 presented challenges to the education system that no prior catastrophic event ever had.

**Prior Catastrophic Experiences**

Prior catastrophic experiences had more minor educational impacts, forcing fewer students to adapt to new learning modes (González-Ramirez et al., 2021). For example, in 2008, various regions, including Bangkok, Hong Kong, the United Kingdom, and Australia, were affected by the H1N1 flu virus (Lewis et al., 2016). As schools closed in response, traditional educational practices were not sustained.

In addition to epidemics and pandemics, environmental crises and acts of terrorism have also had a profound impact on education in the classroom, directly affecting educators (González-Ramirez et al., 2021). When such crises occur, teachers often face unique challenges and disruptions to their teaching practices, including transitioning to online instruction. One significant event that highlights the challenges faced by educators in times of crisis is Hurricane Katrina, which struck in September 2005, leading to the evacuation and closure of schools across Louisiana. In response, the Orleans Parish School Board implemented unpaid disaster leave for teachers, allowing them to receive unemployment benefits (Lincove et al., 2015). However, the situation worsened in March of the following year when the Board terminated all employment contracts, resulting in a significant teacher exodus. Moreover, the district chose to let its
collective bargaining agreement with the United Teachers of New Orleans expire without attempting any renegotiation.

This historical example illustrates how previous school crises, whether due to weather or disease, have prompted education officials to suspend conventional teaching and learning methods. However, the COVID-19 pandemic presented a contrasting scenario, as education persisted even when physical schools were closed. Though teachers could retain their employment during this crisis, the uncertainty surrounding the return to physical classrooms led some to consider leaving the profession. As González-Ramírez et al. (2021) noted, crises, regardless of their scope, can significantly disrupt learning for all students and necessitate adaptations in teaching approaches and methodologies.

The Effects of the Pandemic on Students

The impact of COVID-19 differed from that of prior disasters because schools worldwide suddenly shifted to digital learning, requiring students to self-regulate, set their own pace, and demonstrate new engagement skills (González-Ramírez et al., 2021). According to Burgess et al. (2022), racially marginalized or economically disadvantaged students suffered the most from this shift to remote learning methods and prolonged school closures. Additionally, Brodeur et al. (2021) found that students from low-income households were less likely to engage in remote learning and needed more resources to support their learning, making the existing educational disparities worse.

According to a report by the Organization for Economic Co-operation and Development, the pandemic widened the achievement gap between privileged and less fortunate students (Bailey et al., 2021; Ludewig et al., 2022). Moreover, Rusch et al.
(2021) revealed that school closures significantly influenced students’ mental health and well-being, which may further impair their learning. Research has shown that each extra year of education can improve an individual’s lifetime earnings by an average of 7.5–10%, whereas missing one-third of a school year may reduce future earnings by about 3% (Hanushek & Woessmann, 2020). Moreover, Hanushek and Woessmann suggested that disruptions to student learning may influence the supply of competent employees required to maintain a healthy economy. Therefore, this scholarship highlights the economic need for schools to develop initiatives and resources to help disadvantaged students and minimize the pandemic’s harmful effect on educational achievement.

**School Leaders’ Lack of Prior Experience**

Among other factors contributing to teachers’ being unprepared to teach in a virtual environment during the pandemic, one is school leaders’ lack of prior experience with a pandemic. The pandemic pressured school leaders to multitask and make do with fewer resources, such as when developing plans to return to work that accommodated social distance measures for staff and students. Facing additional pressure from district leadership, they could not implement simple remedies or quick fixes to this one-of-a-kind predicament, instead making tough calls without the benefit of experience or guidelines (De Voto et al., 2023; Harris & Jones, 2020; Ramos-Pla et al., 2021). Making informed decisions for their schools and community during challenging circumstances, such as the uncertainties and disruptions caused by crises like the COVID-19 pandemic, presented significant obstacles. These difficulties directly influenced teachers’ lack of preparation to teach effectively in a virtual environment. When schools and education authorities faced rapid and unexpected transitions to remote learning, the absence of clear and timely
guidance hindered teachers’ ability to access appropriate resources, training, and support for virtual instruction. As a result, many teachers were left to navigate the unfamiliar territory of online teaching without sufficient preparation or guidance. Consequently, this lack of preparation impacted their online instruction, potentially leading to less effective learning experiences and increased challenges in meeting students’ educational needs.

**Implementation of Online Instruction**

Teachers played a vital role in implementing online learning for students, as they were responsible for creating and facilitating student virtual learning experiences (Nur et al., 2022). However, numerous constraints affected teachers, students, and guardians alike. In addition to limited internet access, Suci et al. (2021) cited teachers’ lack of technological proficiency as an obstacle to implementing virtual instruction. Technology plays a vital role in how teachers prepare lessons. The rapid transition to virtual education left some teachers behind because they did not have the professional development they needed or the instructional resources to attract student attention to virtual lessons. Therefore, exploring the impact of technology on teachers’ preparation to teach in a virtual environment is vital.

**Technology**

The transition to remote learning was widespread, with schools making efforts to optimize resources and adjust to the evolving situation. However, additional challenges and the pandemic affected teaching and learning. For example, citing a surge in plagiarism, Reynolds et al. (2020) emphasized the need to incorporate technology to minimize the likelihood of cheating. Further, teachers expressed that online teaching demanded more time and effort as they had to create PowerPoint presentations and
additional materials for their classes (Nambiar, 2020). Some teachers perceived the online mode as excessively formal, lacking a personal touch, and promoting passivity, which hindered students’ ability to generate ideas and teachers’ ability to assess students’ understanding. Teachers also faced challenges monitoring and controlling student behavior and experienced dissatisfaction due to distractions in the background and time constraints. Moreover, teachers struggled to ascertain whether students were mentally present as some students delayed joining the class. Demonstrating a lack of enthusiasm and participation in virtual classes, students offered various excuses for not attending, such as network issues, connectivity problems, and unsupportive learning environments.

Online teaching significantly transforms teacher–student interaction, and maintaining communication with students is one of the most challenging aspects (Johle, 2022). Technical difficulties and limitations of online teaching platforms, such as issues with system reliability and the absence of replay options (Vaterlaus et al., 2021), compound these struggles to communicate. In face-to-face teaching, educators employ various methods—lectures, discussions, group activities, and individual work—to inspire and engage students, fostering a sense of familiarity and connection. They may integrate digital content into instruction as a supplementary tool rather than the primary mode of delivery. Consequently, students generally perceive face-to-face instruction as significantly more effective compared to remote instruction (González-Ramirez et al., 2021). When high-quality online learning is critical, such as during the pandemic, teachers need access to platforms with rich interactive features that facilitate effective learning experiences for users.
Technology Features

Throughout the pandemic, teachers adapted to various online platforms and features, including WhatsApp Group, Zoom, Google Classroom, Google Forms, and YouTube. The extent to which the teachers used these platforms depended on their technological skills, and some educators had limited proficiency (Nur et al., 2022). As Singh et al. (2021) noted, teaching in an online setting also necessitates digital classroom management skills, including clear definition and communication of course expectations. Managing online courses involves addressing users’ diverse identities and distinguishing between teachers and students. Therefore, teachers and students require online platforms that effectively cater to the needs of all learners and foster a sense of comfort with technology. These platforms should offer mechanisms for teacher–student engagement.

Challenges in Implementing Virtual Learning for Students

Students’ challenges with virtual learning, including access, engagement, and digital literacy, also demand attention and resolution. Among these challenges, one prominent issue affecting students from disadvantaged backgrounds is equitable access to technology and the Internet (Barrot et al., 2021). Moreover, the absence of in-person interaction and face-to-face support can reduce student engagement and motivation (El-Deen et al., 2020). Like teachers, students also need digital literacy and technical skills to ensure successful implementation (Dhawan, 2020). While some students positively approach remote learning, not all are equally prepared.

Noting that underrepresented students may face obstacles related to accessing technology and participating in distance learning, Hughes et al. (2020) reported that some students received assistance during the pandemic in the form of free wireless connections.
and resources available at libraries. Despite the advancements in technology and the efforts made to optimize resources and adapt to the changing circumstances, various challenges persisted, affecting the teaching and learning process throughout this crisis. These challenges underscore the significance of addressing matters related to technology access, engagement, and digital proficiency to ensure all students can fully reap the benefits of virtual learning.

**Lack of Professional Development**

In addition to the glaring impact of the pandemic, the fishbone diagram also highlighted teachers’ lack of professional development, specifically related to online teaching. Adapting to an online environment was complex for many teachers. Scholars who studied teachers’ challenges with implementing online teaching methods during the pandemic recommended continuous professional development (Al-Bargi, 2021; Atmojo & Nugroho, 2020). Continuous professional development refers to a planned, lifelong process whereby teachers develop personal and professional qualities; improve their knowledge, skills, and practice; gain empowerment and agency; and improve the development of their organization and their students (Atmojo & Nugroho, 2020).

Al-Bargi (2021) emphasized how online training can assist and direct instructors in enhancing their online teaching abilities, suggesting institutions can provide such professional development while customizing the approach for each content area. Due to the lack of experience among educators and students with online instructional delivery approaches, the global shift to digital instruction during the early stages of the COVID-19 pandemic required the immediate provision of teacher professional development for online learning (Lockee, 2021). Lockee noted various factors influencing teachers’
professional learning, such as their motivation, emotions, anxiety, and adjustment to a new environment. These aspects took on heightened significance as teachers navigated their responsibilities amid the pandemic. Philippakos et al. (2022) found that 21% of teachers missed the opportunity to receive training on remote professional development. Surveyed teachers reported they felt unprepared for the shift to online teaching and confessed to needing more confidence. Additionally, many teachers had to invest extra hours in preparation, typically up to 3 more than usual, without additional compensation (Philippakos et al., 2022). Despite these challenges, they showed dedication and adaptability in the face of a new way of teaching.

**The Effects of Lack of Preparation**

Teachers’ lack of preparation for virtual instruction can have significant effects on various aspects of life, including work–home balance and the overall wellness of teachers, students, and families. The pandemic revealed schools’ reliance on face-to-face instruction, as teachers did not have the tools or guidance to adapt to online instruction (Chabbott & Sinclair, 2020; Ciuhan et al., 2022). Teachers faced challenges preparing students to learn in a virtual environment, prompting some to restructure their curriculum (Darling-Hammond & Hyler, 2020). Most considered themselves beginners with less than 4 hours of online instruction training before the pandemic (Cutri et al., 2020). Teachers had to learn to support students in a virtual environment and reinvent their usual teaching method overnight, which inhibited their ability to implement high-impact practices, especially when some students needed to join courses asynchronously or had subpar internet connectivity. Emergency remote instruction efforts sought to ensure teachers knew about resources (e.g., technology education and tutorials), provided hints
to stay successful, and advertised how to get support for handling remote work and self-care. Nevertheless, challenges persisted.

**Work–Home Balance**

Teachers experienced personal loss, change, and stress during the pandemic while engaging students in distance, blended, and hybrid learning (Darling-Hammond & Hyler, 2020). Teachers reported a lack of physical activity, exhaustion, panic, the loss of students’ cues that guided instructional decisions, concern for student well-being, and the uncertainty of not seeing students daily (Fagell, 2020; Gewertz, 2020). Additional personal consequences included strains on teachers’ and their families’ health, living habits, and financial situation (Vu et al., 2020). As schools grappled with an unprecedented situation, teachers’ struggle to balance home and work life led to a global problem of teacher burnout (MacIntyre et al., 2020). According to Pressley (2021), the pandemic’s impact on teachers’ mental health, the difficulties of balancing work and home responsibilities, or the constant media coverage of teachers and their return-to-learning plans may have lowered teachers’ self-efficacy.

**Teachers’ Self-efficacy**

Bandura (2010) highlighted the importance of self-efficacy and its impact on beliefs and behavior, defining the concept as people’s evaluation of their ability to perform specific tasks. As Mabalane (2022) explained, in the context of education, teachers’ opinions about their skills are deeply related to how they handle their teaching responsibilities. In other words, their confidence impacts their instruction.

Given the importance of self-efficacy, Pressley and Ha (2021) suggested that districts should provide teachers with professional development opportunities in areas
where they are struggling. Specifically, they recommended enabling teachers to learn from other teachers, ensuring they are prepared to teach in a virtual environment. Extensive research has provided solid evidence to support these assertions. Effective teachers demonstrate a strong sense of self-efficacy, which translates into confidence and a willingness to explore unconventional approaches to enhance student learning (Bloomberg & Pitchford, 2016; Horton, 2016). On the other hand, teachers with low self-efficacy need help to move past difficult circumstances and are less inclined to experiment with innovative instructional methods (Bloomberg & Pitchford, 2016; Horton, 2016). Lastly, teacher self-efficacy impacts student self-efficacy and vice versa.

Increasing teachers’ self-efficacy is vital to ensuring their students’ success. As Pressley (2021) argued, teacher efficacy is adversely linked with teacher burnout and favorably associated with instructional quality. Given the worry and stress associated with returning to teaching during the pandemic, Pressley recommended providing mental health days when school is not in session to reduce instructors’ anxiety or offering district-sponsored childcare for those with school-aged children to help them achieve work–home balance. Moreover, self-efficacy plays a vital role in how teachers adjust to challenges: when teachers are not stressed, they are more likely to experience success in moments of adversity (Pressley, 2020; Schultz & Love, 2022), such as responding to threats to students’ well-being.

**Student Well-Being and Its Impact on Teacher Preparedness for Virtual Teaching**

The COVID-19 pandemic had a profound impact on students’ mental health and overall well-being (Ozamiz-Etxebarria et al., 2021; Sipeki et al., 2022; U.S. Department of Education, 2021). The challenges of prolonged loss, grief, isolation, and uncertainty in
both online and in-person classrooms significantly affected students’ emotional and psychological states (Kidman et al., 2021). Parent surveys conducted during the pandemic revealed alarming rates of harm to children’s emotional and mental health, with a major challenge being the separation from teachers and classmates (Calderon, 2020). Suicidal ideation among children and young adults also increased during the pandemic, highlighting the critical importance of addressing student well-being (Hill et al., 2020).

In the context of my research on teachers’ unpreparedness for virtual teaching, I recognized that student well-being directly influenced the learning environment and the efficacy of teachers in remote teaching settings. Facing mental health challenges, such as anxiety, unhappiness, and lack of motivation, can significantly impact students’ academic performance and engagement (Sipeki et al., 2022). Moreover, teachers’ personalities and psychological states play a vital role in shaping students’ well-being and academic experiences (Diaz Lema et al., 2023). Teachers who exhibit supportive and motivating attitudes, while also acknowledging students’ emotions and individual characteristics, enhance learners’ psychological security, self-esteem, self-confidence, and self-image (Hattie, 2008).

Understanding the direct link between student well-being and teacher efficacy in virtual teaching is also crucial in addressing teachers’ lack of preparation for virtual instruction during the COVID-19 pandemic. When students are experiencing emotional and psychological challenges, teachers must be equipped with the necessary knowledge, skills, and support to address these issues effectively in an online learning environment. The usefulness of implementing an instructional hub as an intervention to enhance
teacher preparation can further contribute to promoting positive student well-being and academic success in the virtual teaching context.

**Interventions**

Interventions and programs to promote teaching quality and teachers’ professional growth throughout the career are becoming increasingly important (Dulo, 2022). This literature review surfaced several potential solutions to the problem of practice related to elements of the driver’s diagram from Chapter 1 (see Figure 1.4). These include ongoing professional development, teacher or professional learning communities, enhancing teaching practices through technology integration, integration of technological pedagogical content knowledge, and enrichment intervention.

**Ongoing Professional Development**

One effective solution involves facilitating ongoing professional development, a process of continuous learning and skill enhancement that teachers engage in throughout their careers. This approach allows educators to stay updated with the latest advancements, best practices, and relevant knowledge to their field. Effective professional development is ongoing, includes training, practice, and feedback, and provides adequate time and follow-up support for pre-service and in-service teachers (Murano et al., 2019). The challenges of creating online courses require quality professional development opportunities that provide teachers with meaningful ways to embrace innovation and apply online skills to their online curriculum (Dulo, 2022; Hinson & LaPrairie, 2005).

As An (2018) found, professional development experiences related to integrating technology are critical for teachers because of the relationships among technology,
content, pedagogical knowledge, and technological knowledge. An’s study offers evidence supporting the positive impact of professional development related to technological integration on teachers’ perceptions, attitudes, self-efficacy, and behavioral intentions. The research involved a graduate-level course for 21 teachers, with data collected through pre and post surveys and reflections on major assignments. The findings showed significant improvements in participants’ beliefs about the benefits of digital games in the classroom, including enhanced real-world skills. Additionally, the study the professional development experience’s positive influence on teachers’ intentions to integrate technology and digital games into their teaching practices. These results underscore the potential of well-designed professional development to enhance teachers’ readiness and effectiveness in utilizing technology tools, benefiting online teaching practices, and fostering positive attitudes toward technology integration in education. Previous studies also identified intervention programs’ positive influence on improving the technological pedagogical content knowledge perception of both in-service and pre-service teachers’ self-efficacy for integrating technology into teaching (Angeli & Valanides, 2009; Mishra & Koehler, 2006).

Teacher or Professional Learning Communities

Teacher learning communities have been identified as an intervention in previous research (Pan & Chen, 2023; Pan & Cheng, 2023). The concept revolves around the idea that teachers as professionals with shared attitudes and goals can enhance their teaching skills and, in turn, improve their students’ academic performance by engaging in regular meetings, exchanging expertise, and fostering collaborative efforts (Pan & Cheng, 2023).
Pan and Chen (2023) found that teacher engagement in learning communities had a notable impact on teachers’ willingness to change, which was influenced by their professional learning beliefs and behaviors. To delve deeper into the mechanisms behind this intervention, the researchers employed a theory-driven evaluation model. This model involved creating a program theory that explained how the teacher learning community program led to specific outcomes (Chen, 2015; Coryn et al., 2011; Rossi et al., 2018). In essence, the program theory aimed to articulate why the intervention worked by explaining the causal processes expected to bring about the desired outcomes. In their exploration of the underlying mechanisms, Pan and Chen (2023) identified self-efficacy as a critical factor affecting teacher outcomes and a potential mediator in the intervention process. Self-efficacy, the belief in one’s ability to achieve specific goals or tasks, has been linked to various aspects of teacher performance, including instructional quality (Holzberger et al., 2013; Poulou et al., 2019), strain or stress (Fathi & Derakhshan, 2019), commitment (Lee et al., 2011), and job satisfaction (Liu et al., 2021).

Instructional hubs are an example of teacher or professional learning communities. They are collaborative spaces where educators come together to share best practices, exchange ideas, and access resources related to instructional strategies and technology integration (Taylor et al., 2022). These hubs can be physical spaces within a school or district, or they can be virtual platforms that facilitate online collaboration and communication among teachers. In instructional hubs, teachers have the opportunity to participate in workshops, training sessions, and discussions that focus on improving their instructional practices, especially in the context of virtual teaching and technology integration. They can learn from their peers’ experiences, share successful strategies, and
seek support when facing challenges in their teaching journey. Instructional hubs foster a culture of continuous learning and professional development among teachers. By being part of a learning community, educators can stay updated with the latest advancements in educational technology, explore innovative teaching approaches, and enhance their skills to meet the evolving needs of their students. Through instructional hubs, teachers can build strong networks of support and collaboration, allowing them to learn from each other and collectively contribute to improving teaching practices and student outcomes. These communities also provide opportunities for teachers to reflect on their teaching methods, receive constructive feedback, and refine their approaches based on evidence-based practices and research findings.

Research has yielded evidence supporting the usefulness of an intervention involving the development of an internal instructional hub with online resources to support virtual instruction. For example, Johnson et al. (2016) found that 48% of the teachers they sampled indicated a desire for an online resource hub with links to information on how to transition to online learning. Additionally, studies show how facilitating connections among teachers to strengthen their learning processes is a fundamental aspect of an instructional hub, making it a critical component in the development of integrated networks (Hannah & Lester, 2009; Rienties & Hosein, 2015). This integration of networks within schools helps to connect teaching and learning cultures, discipline cultures, social infrastructure, knowledge production support systems, and knowledge exchange mechanisms, providing numerous benefits (Taylor et al., 2022).

Individuals or groups who use their access to information and diverse social networks can energize cross-connections, improve knowledge flow, and enhance learning
across microcultures (Hannah & Lester, 2009; Roxå et al., 2011). Although hubs are not a standalone educational development strategy, they are an essential element of a social networks approach to educational development that has not been fully explored (Taylor et al., 2022). Complementing formal educational development programs, another significant and sustained source of learning is rooted in practice and enabled by social interactions within a practice community (Boud & Brew, 2013). The integration of instructional hubs and the fostering of connections among educators can have a profound impact on teacher development and improve the quality of virtual instruction and learning outcomes.

**Enhancing Teaching Practices Through Technology Integration**

The integration of technology into classrooms is not something that is new. Prior to the pandemic, many schools were one-to-one with digital devices (Courtney et al., 2022). Therefore, teachers must be prepared to integrate technology into their lessons. In addition to training, teachers need the latest technology to provide effective instruction and engage all learners, yet many school districts are not meeting these now-vital needs. As Shen et al. (2008) found, educational technology must be cutting-edge to attract students’ attention. For example, in a virtual learning environment, teachers can use mobile learning systems that provide live classroom instruction on a student’s phone. In addition to making students’ adaptation to online learning easier, Shen et al. also found that such approaches in a blended classroom intrinsically motivated students to prepare for tests and participate in activities. According to Moore-Adams et al. (2016), teachers who are fluent with technology can organize information, create interactive activities, encourage responsible technology use, monitor interactions, and show successful leadership in online education.
Integration of Technological Pedagogical Content Knowledge

One possible intervention to address the problem is the integration of technological, pedagogical, and content knowledge (TPACK). TPACK is a framework that emphasizes the essential knowledge and skills teachers need to effectively integrate technology into their teaching practices while considering the content being taught and the pedagogical approaches in use (Angeli & Valanides, 2009; Mishra & Koehler, 2006). This framework equips teachers with the necessary skills to select suitable tools, effectively combine technology with content and pedagogy, and align pedagogical goals with technology integration. Earlier research has also highlighted the beneficial impact of intervention programs on enhancing the perception of TPACK and self-efficacy for integrating technology into teaching among both in-service and pre-service teachers (Angeli & Valanides, 2009; Mishra & Koehler, 2006). By incorporating TPACK into teacher training and professional development programs, educators can enhance their understanding of how to use technology meaningfully to support student learning. This integration enables teachers to leverage technology tools effectively, align them with the subject matter being taught, and implement appropriate pedagogical strategies to optimize the learning experience for their students. Ultimately, the goal of TPACK integration is to empower teachers with the necessary knowledge and skills to seamlessly integrate technology into their instructional practices, leading to improved student outcomes and engagement.

The TPACK framework, described by Mishra and Koehler (2006), encompasses pedagogical content knowledge, which involves understanding and employing appropriate teaching methods for a specific subject; technological content knowledge,
which entails knowing how technology can be utilized in innovative subject instruction; technological pedagogical knowledge, involving understanding how different technologies can be used in teaching; and technological pedagogical content knowledge, referring to teachers’ expertise in both subject matter and effectively integrating technology to support and enhance learning. These knowledge categories enable teachers to organize information, create interactive activities, encourage responsible technology use, monitor interactions, and demonstrate successful leadership in online education (Moore-Adams et al., 2016). Interventions aimed at enhancing teachers’ TPACK can lead to improved student engagement, enhanced instructional effectiveness, and the creation of a technologically enriched learning environment.

**Enrichment Intervention**

Research evidence also suggests other interventions are crucial to addressing the problem of practice revolving around enrichment measures tailored explicitly for teachers. Enrichment intervention is ongoing support to enhance teachers’ instructional practices. For example, Mabalane (2022) focused on online enrichment during COVID-19. The study’s findings revealed that teachers felt motivated and more confident in their work. The outcomes echoed another study by Bilal et al. (2019), in which enhancing faculty vitality in crucial aspects of teaching, assessing, research, professionalism, and administration was perceived to have a significant positive impact on the educational environment and enhance learners’ academic performance. In sum, enrichment interventions can prepare teachers for virtual learning environments and are thus transferable to my problem of practice.
Conclusion and Research Gap

This chapter reviewed how the pandemic exposed weaknesses in the education system and revealed inequities in access to resources for students, particularly those from low-income backgrounds. The COVID-19 pandemic has had far-reaching effects on various aspects of society (Anderson, 2021; Cutri et al., 2020). From the disruption of education and the workforce to the strain on work-home balance (MacIntyre et al., 2020), the pandemic’s impact is multifaceted and has required individuals to adapt rapidly to new circumstances (Harris & Jones, 2020; Ramos-Pla et al., 2021).

In navigating the challenges brought about by the pandemic, the lack of technological knowledge emerged as a significant hurdle (An, 2018; Westphal et al., 2022; De Voto et al., 2023). Educators and professionals found themselves grappling with the sudden shift to online environments, highlighting the importance of digital literacy (Ramos-Pla et al., 2021). Stress levels soared during the pandemic as individuals coped with uncertainties and disruptions (Darling-Hammond & Hyler, 2020). Balancing work and personal life became especially challenging, contributing to heightened stress levels (MacIntyre et al., 2020).

The literature underscores the significance of improving teacher self-efficacy as a key factor in enhancing instructional quality, reducing teacher burnout, and ultimately promoting student success. Building confidence and offering opportunities for growth are essential components of overcoming the obstacles posed by the pandemic (Mabalane, 2022). To address these challenges, it is crucial to consider issues such as lack of self-efficacy and the need for professional development (Al-Bargi, 2021; Atmojo & Nugroho, 2020; Barni et al., 2019; Pressley, 2020; Pressley, 2021; Pressley & Ha, 2021; Schultz &
Love, 2022). Strategies such as providing professional development opportunities, mental health support, and work–home balance solutions can contribute to bolstering teacher self-efficacy, enabling educators to thrive even in challenging circumstances like the COVID-19 pandemic (Darling-Hammond & Hyler, 2020).

Potential interventions include ongoing professional development for teachers to enhance their online teaching skills, the development of an instructional hub with online resources to support virtual instruction, and the use of social identification strategies to promote teachers’ capacity to teach online. The review also mentioned the importance of incorporating cutting-edge technology and blended learning approaches.

The instructional hub developed for this study aligns with existing research and extant literature on successful interventions in the field of education, particularly within the context of teacher professional development and technology integration. Instructional hubs are akin to teacher or professional learning communities (Taylor et al., 2022) that provide information and resources on transitioning to online learning (Johnson et al., 2016). Furthermore, research suggests that hubs can create opportunities for teachers to connect and collaborate (Hannah & Lester, 2009; Rienties & Hosein, 2015; Taylor et al., 2022). Overall, instructional hubs have the potential to be a valuable and effective intervention for supporting teacher professional development and the integration of technology in education. While teachers’ participation in learning communities like the instructional hub has been found to positively influence their professional learning beliefs and behaviors (Pan & Chen, 2023), there remains a significant gap in research regarding the impact of these hubs on self-efficacy in professional development. This study aimed to prepare teachers to teach in a virtual environment through professional development
while also building teacher self-efficacy. The instructional hub served as an intervention in enhancing professional learning beliefs and behaviors, with a particular emphasis on self-efficacy. As the next chapter elaborates, improvement science methods are appropriate for implementing and assessing the proposed interventions.
CHAPTER 3

METHODOLOGY

In this chapter, I explain the improvement science tools I employed for an efficient trial-and-learning methodology to document the improvement science process and the tools used, and the extent of the measurement to support the six skills of improvement (Langley, et al., 2009). Due to the constraints of the school year, I used one change idea and conducted three PDSA cycles to support our improvement efforts. The primary aim of this improvement science research study was to prepare teachers to teach in a virtual environment through professional development while also building teacher self-efficacy. The change idea centered on establishing and integrating an instructional hub designed to support teachers’ professional growth in the world of online learning. I used improvement science data collection tools during the disciplined inquiry phase (Bryk et al., 2015), consistent with the PDSA cycle to facilitate testing of the change idea.

Theory of Improvement

The theory of improvement drew from Bandura’s (1986, 1994) self-efficacy theory—that when someone has the ability to achieve success, they are more likely to excel in their instructional endeavors. Moreover, teachers’ capacities to establish a strong connection with their subject matter and to possess clear instructional visions play a pivotal role in the cultivation of their self-efficacy (Barni et al., 2019). The instructional hub served as a dynamic and supportive platform that not only equipped
teachers with the necessary skills for online instruction but also fostered teachers’ belief in their abilities to succeed in teaching virtually. By offering accessible resources, professional development opportunities, peer support, and feedback mechanisms, the hub was designed to nurture and enhance teachers’ self-efficacy, ultimately leading to more effective virtual instruction.

The improvement team, and I developed an instructional hub to address these crucial aspects, offering comprehensive support and professional development with the specific goal of enhancing preparation for virtual instruction. To address these crucial aspects, an instructional hub was developed, offering comprehensive support and professional development, with the specific goal of enhancing preparation for virtual instruction. Improvement Science was employed, by requiring an understanding of the system, including the roles of implementation and contextual factors, to answer the three critical Model of Improvement questions (Perry et al., 2020). listed below:

1. What is the aim of the improvement?
2. What changes will be made to achieve positive results?
3. How will the effectiveness of the changes be assessed to ensure they constitute an improvement?

In addressing the first question, this Improvement Science dissertation aimed to prepare teachers to teach in a virtual environment through professional development while also building teacher self-efficacy. The hub will serve as a professional development tool aimed at improving teacher preparation and self-efficacy. To address the changes required to achieve positive results, I used the PDSA cycle process, testing
the ideal changes to achieve positive outcomes. Regarding the last question, to ascertain that the changes were indeed improvements, teachers had the opportunity to access the hub, evaluate its effectiveness, and be educated on how to implement the resources in their virtual classes. Through this process, they could provide feedback on the practicality and impact of the implemented resources, aiding in the continuous evaluation and improvement of the instructional resource hub.

Improvement Science Principles Guiding this Study

Improvement science aims to address the inquiry: “What proves effective, for whom, and in what circumstances?” (Bryk, et al., 2015). This inquiry requires educators to embrace an improvement-oriented perspective and delve into investigations pertaining to their instructional practices for online teaching. Six guiding principles, as outlined by Bryk et al. (2015), offer valuable direction for the application of improvement science within the field of education.

• Principle 1. Make the Work Problem-Specific and User-Centered: This study adopts a problem-oriented approach within the context of improvement science, shifting the focus from traditional teaching methods to addressing the specific problem of enhancing teaching self-efficacy for online instruction.

• Principle 2. Focus on Variation in Performance: Improvement science recognizes the inherent variation in socially created systems. This variation serves as a starting point for understanding the system and identifying areas that can be improved, aligning with the goal of enhancing teaching self-efficacy.

• Principle 3. See the System that Produces the Current Outcomes: Before taking action, it is crucial to rigorously analyze the system, as suggested by Bryk et al.
This study utilizes empathy interviews and fishbone diagrams to uncover underlying factors contributing to the problem of teaching self-efficacy, ensuring a comprehensive understanding before proposing solutions.

- Principle 4. We Cannot Improve at Scale What We Cannot Measure: Measurement plays a critical role in improvement efforts. This study employs survey data, a practical measurement, to assess teachers’ challenges and self-efficacy beliefs in the context of online instruction, aiding in the evaluation of the effectiveness of the proposed change idea.

- Principle 5. Use Disciplined Inquiry to Drive Improvement: This study addresses the question: “How can school leaders prepare teachers to effectively teach in a virtual environment and enhance their self-efficacy?” The improvement team and I approached this inquiry systematically by conducting empathy interviews, using fishbone diagrams, constructing a driver diagram, and developing a working theory of action. We then implemented and measured the change idea through a series of PDSA cycles.

- Principle 6. Accelerate Learning Through Networked Communities: In the spirit of networked improvement communities, this improvement science dissertation can be a continuous process for district-wide initiatives to prepare teachers for online instruction.

In improvement science, the recognition of inherent variation within socially created systems serves as a foundational element. This variation provides a starting point for comprehending the intricacies of the system and pinpointing areas that are ready for improvement. It aligns with the overarching objective of enhancing teaching self-
efficacy. Improvement science recognizes the importance of using data from variations in implementation and setting as valuable sources of information (Lewis, 2015). To achieve this, it provides tools and methodologies to grasp and learn from this variation, allowing researchers and practitioners to redesign both the intervention and the system. By embracing variation, improvement science allows for the adaptive integration of interventions into diverse contexts (Bryk et al., 2011). This approach aligns with the reality that educational institutions are not homogeneous, and effective practices must be adaptable and responsive to local conditions (Bryk et al., 2015).

Furthermore, improvement science recognizes the importance of building shared ownership of improvement, detecting and learning from variations in practice, and motivating frontline innovators (Lewis, 2015). It acknowledges that knowledge resides not only in interventions but also in the system itself, including the routines and practices within educational institutions. This perspective encourages collaboration and knowledge sharing among practitioners, facilitating the identification and testing of improvement ideas (Bryk et al., 2011).

In conjunction with improvement science, the use of the PDSA cycle in action research can effectively build local knowledge in various settings. Action research, like improvement science, focuses on identifying and analyzing problems within specific contexts (Lewis, 2015). The PDSA cycle provides a structured approach for enacting and studying change, allowing researchers and practitioners to iteratively test and refine improvement ideas. This study describes an innovative approach using improvement science to comprehend how to establish necessary supports for teachers to be prepared to teach virtually. The justification for the use of improvement science methodology in this
action research lies in its ability to address the specific needs and challenges of teacher improvement through professional development as delivered through a resource hub. Traditional experimental science, emphasizing controlled trials and faithful implementation of programs, may not fully capture the complexities and variations inherent in educational settings (Lewis, 2015).

The PDSA cycle offers a systematic and structured approach for implementing and studying change initiatives. It allows researchers and practitioners to iteratively test and refine improvement ideas. Each stage of the PDSA cycle is crucial to its effectiveness:

- **Plan**: During this initial phase, a detailed plan is developed, which includes setting clear objectives, outlining the steps for implementation, specifying the data that will be collected, and identifying potential challenges or risks.

- **Do**: In the ‘Do’ phase, the planned changes are put into action within the chosen pilot group or setting. This step involves executing the steps outlined in the plan and monitoring the process closely.

- **Study**: The ‘Study’ phase is centered on data collection and analysis. Data is gathered to assess the impact of the changes. This includes examining both quantitative and qualitative data to understand how the change is affecting the targeted outcome. The data is then analyzed to identify patterns, trends, and areas where improvement is needed.

- **Act**: Based on the findings from the ‘Study’ phase, decisions are made in the ‘Act’ phase. If the change was successful in achieving the desired results, it may be scaled up to a larger group or implemented more widely. If
improvements are needed, adjustments to the plan are made, and the cycle begins anew.

Scaling considerations are essential in PDSA cycles, involving a careful assessment of whether changes that were effective in a small-scale pilot can be successfully implemented on a larger scale. This evaluation includes factors such as resource availability, organizational readiness, and potential challenges in scaling up the intervention. PDSA cycles are form of disciplined inquiry. They encourage a structured, evidence-based approach to improvement, where hypotheses are tested, data is gathered, and decisions are made based on the results. This disciplined approach ensures that improvement efforts are grounded in data and continually refined based on empirical evidence.

Data plays a critical role in PDSA cycles. It is collected and analyzed at each stage to inform decision-making. Data helps identify what worked and what didn’t, and providing evidence for refining and adjusting improvement ideas. By using the PDSA cycle, improvers can gather real-time data and insights about the usefulness of interventions in different settings. This iterative process enables learning from both successes and failures, promoting a continuous improvement mindset (Bryk et al., 2011). The PDSA cycle also encourages engagement and participation from stakeholders, fostering a sense of ownership and empowerment within the educational institution.

In conclusion, the choice to employ improvement science methodology is driven by its capacity to effectively tackle the complexities and inherent variations within the world of educational improvement. This study’s specific problem of
practice, the need to enhance teachers’ self-efficacy in a virtual learning environment, necessitates this approach that can adapt to diverse contexts and evolving challenges. While the findings of this study may not be broadly generalizable due to the unique characteristics of the educational setting, they hold significance in the context of the problem domain. This research contributes to the emerging body of theory on the application of improvement science in education, shedding light on its utility and adaptability in addressing the specific educational challenge (Lewis, 2015).

**Rationale for Choice of Improvement Science Action Research Design**

The decision to adopt an improvement science action research design was motivated by the need to gain insights into effective ways of enhancing teachers’ self-efficacy and preparing teachers to teach in a virtual teaching environment. The rationale for employing this design was to collect information from diverse qualitative sources and apply improvement science methods to enhance teachers’ self-efficacy and teacher preparation to teach in a virtual environment.

Action research takes place directly in participants’ settings, involving an iterative process that includes developing a plan, implementing interventions, and reflecting on the outcome. Through this cycle, adjustments and revisions can improve the identified problem or focus area (Mertler, 2021). The process of action research bears resemblance to the improvement science process, as both involve iterative cycles of planning, implementing, reflecting, and revising to drive improvement (Perry et al., 2020). In this improvement science study, the primary aim was to identify and address a specific problem of practice: preparation for teaching in a virtual environment and also provide professional development while improving teacher self-efficacy. This process involved
conducting a thorough review of existing literature, developing a theory of improvement to address the identified problem, creating appropriate measures to assess progress, and testing the theory within the specific context where the problem was observed. The objective was to bring about meaningful change by implementing and evaluating the theory in the real-world setting (Perry et al., 2020). The research design consisted of three phases, as illustrated in Figure 3.1.

**Figure 3.1. Research Design**

**Data Collection**

The selection of data collection instruments should align with a study’s improvement questions, ensuring consistency in the nature of the data (Creswell & Creswell, 2018). This section discusses the data collection methods aligned with the question: “How can school leaders prepare teachers to effectively teach in a virtual environment and enhance their self-efficacy?”

The four phases of data collection are discussed in detail in the following sections. Table 3.1 provides a comprehensive timeline of the study phases.
Table 3.1 Data Collection Phase and Timeline

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
<th>Timeframe</th>
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<tbody>
<tr>
<td>1. Data Collection I: Recruiting Participants</td>
<td>Obtaining approval/consent: (a) Obtaining approval from the university (b) Obtaining approval from the school district (c) Obtaining approval from the school principal (d) Identifying and selecting participants and informing them of the purpose of the research study (e) Obtaining consent from participants Developing improvement team</td>
<td>2 weeks</td>
</tr>
<tr>
<td></td>
<td>Conducting empathy interviews and analyzing data</td>
<td>2 weeks</td>
</tr>
<tr>
<td></td>
<td>Developing fishbone and driver diagrams</td>
<td>ongoing</td>
</tr>
<tr>
<td>2. Data Collection II: Professional Development</td>
<td>• Implementing change idea: instructional hub as a professional development intervention (PDSA Cycle) • Trial 1 • Trial 2 • Trial 3 • Observations</td>
<td>10 weeks</td>
</tr>
<tr>
<td>3. Data Collection III: Analyzing the Outcome</td>
<td>• Teacher survey</td>
<td>2 weeks</td>
</tr>
<tr>
<td>4. Data Analysis</td>
<td>• Identifying emerging themes • Coding and analyzing survey data</td>
<td>8 weeks</td>
</tr>
<tr>
<td>5. Sharing</td>
<td>• Sharing findings with stakeholders</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>

**Phase I: Recruiting Participants**

The research process started with obtaining consent from participants. To begin, I obtained approval from the school principal in December 2020, which took approximately 1 week. I spent another week in December 2020 obtaining consent from
the school district. In May 2021, I needed a more extended period of approximately 3 weeks to obtain university approval by completing the IRB application (see Appendix E). In November 2021, I set aside a 1-week period to identify and select participants for empathy interviews and develop the improvement team.

I sent emails (see Appendix G) to teachers and other school stakeholders, inviting them to join the improvement team. I established the improvement team, consisting of six members—three AAHS teachers, a digital integration specialist, an administrator, and me—to gain insight into the issue of teacher preparedness for virtual teaching. Participation in this process was voluntary, and each member received $20 for attending each meeting. Once participants agreed to take part, they received a second email containing links and Google invitations to all virtual meetings.

**Phase II: Understanding the Problem and Data Collection**

In November 2021, after establishing the improvement team, we had our first meeting. I introduced my research, explained improvement science principles, outlined meeting procedures, and clarified team roles. I also introduced the empathy interview process. For the empathy interview process, I employed a convenience sampling method by posting a flyer in the AAHS Google Classroom, inviting teachers to participate in the empathy interviews (see Appendix B). Convenience sampling was practical and feasible, whereas obtaining a random or representative sample during the COVID-19 pandemic would have been difficult due to time constraints. One of the main issues was the difficulty in collecting data from the entire population (e.g., all AAHS teachers), due to restricted access, safety concerns, or logistical difficulties (Jager et al., 2017).

Convenience sampling, a non-probability technique, is a practical, efficient, and cost-
effective means of gathering data (Andrade, 2021; Stratton, 2021). However, it does have limitations, as the selected sample of teachers may not fully represent all educators in the district or state. I comprehend that research findings obtained through convenience sampling are only applicable to the accessible population from which the sample was taken (Andrade, 2021). In other words, I understand that the findings and conclusions of my study are limited to the group of teachers who participated due to the convenience of access, and I should exercise caution when applying the results to the broader population. Moreover, I want to emphasize that this is an improvement science research study and I am aware of the limitations regarding generalizability when using non-probability convenience samples; such samples are prevalent in developmental science (Andrade, 2021; Jager et al., 2017).

The study participants were teachers and staff from Arts Academy. Among the participants, five identified as female, while two identified as male. In terms of racial diversity, two participants identified as Black, and five as White. The participants’ years of teaching experience varied, with two participants having between 0–5 years of experience, one participant having between 6–10 years of experience, three participants having between 11–15 years of experience, one participant having between 16–25 years of teaching experience. Each participant received a $10 gift card for their involvement, and all interviews were recorded and transcribed using Google. The director of the virtual academy was also invited but declined compensation. In total, eight empathy interviews were conducted: one with the director of the virtual academy on November 22, 2021, and seven with AAHS teachers between January 6 and January 12, 2022. To conducting members checking all of the interviews were recorded and transcribed using Google.
After reviewing the transcription, I edited the documents and then shared them with each respective participant to ensure that they accurately captured the interviews. Next, I shared the empathy interviews with my improvement team for their review. These interviews provided valuable insights, enabling a deeper understanding of the experiences and perspectives of those involved, and contributing to the investigation of the problem of preparing AAHS teachers for virtual teaching. Collaboratively, the improvement team engaged in identifying the underlying causes of this issue by utilizing fishbone diagrams. Figure 1.2 (Chapter 1) represents the first fishbone diagram constructed of empathy interviews during the initial stages of this dissertation in practice and recent events depicted in literature (Tran, 2022). The empathy interviews were thematically analyzed, and the themes generated from them were incorporated into the elements of the fishbone diagram. Figure 1.3 depicts the second fishbone diagram based on research findings. Subsequently, the team created a comprehensive and integrated analysis by combining the data from both fishbone diagrams, resulting in the development of a third and final fishbone diagram (see Figure 1.4).

During our second meeting in December 2021, we began to delve into the causes of teachers’ lack of preparation for virtual teaching. During this process, my improvement team and I utilized information from the empathy interviews with the director of the virtual academy and the seven teachers, along with theoretical perspectives, to dissect this problem. We integrated the findings into a fishbone diagram (See Figure 1.2), categorizing them into causes. As a team, we then analyzed the interviews and gathered literature to support my findings. This information was essential as we proceeded to the third phase of my data collection process.
After my review of relevant literature, the improvement team and I developed a driver diagram to illustrate the theory of how to improve teacher preparation. We utilized a fishbone diagram (Figure 1.3) to identify the key drivers: professional development, instructional support, and technology. During this step, as a team, we hypothesized that providing teachers with specific instructional resources, such as a central hub for virtual content, relevant curriculum materials, and recorded lessons, would enhance their instructional preparedness. The development of the driver diagram took place in January 2022. This illustration visually represents the relationships between these primary and secondary drivers and the desired change, thereby assisting in the development and implementation of change strategies (see Figure 1.5).

Initially, there were several change ideas, for instance teaching teachers how to use resources, providing exemplars and professional development to develop lesson plans, implementing strategies into lesson plans, teaching instructional strategies, getting people to record lessons, and feedback and evaluation. Because of the extensive nature of these change ideas and the limitations imposed by time constraints, we determined that the primary focus for change should be on professional development. In this improvement science research study, I chose to focus on one primary change idea, which revolves around collecting recorded lessons and establishing and integrating an instructional hub to support teachers’ professional growth in online learning.

Exploring only one change idea was appropriate due to the limitations posed by the school year and the specific timeframe of the improvement science research study. By focusing on the implementation and evaluation of this change, the study aims to provide valuable insights into its usefulness and potential impact on teaching practices.
Despite the limitations, the study can contribute to the broader understanding of how targeted changes can positively influence instructional approaches in the context of online learning.

The instructional hubs facilitated a sense of community and also contribute to the development of teachers’ self-efficacy (Johnson et al., 2016; Taylor et al., 2022). Importantly, this change idea directly aligns with the overarching objective of the driver’s diagram, which aimed to achieve teacher preparation for a virtual environment by the Spring of 2023. Specifically, the aim statement “by spring 2023, over 40% of teachers will be prepared to teach in a virtual environment” is operationally defined as teachers’ demonstrating a proficient understanding and application of virtual teaching tools and methodologies. This operational definition serves the purpose of providing clear criteria for assessing teacher readiness and ensuring that the intended outcome, which includes enhanced student engagement and successful learning outcomes in the online setting, can be measured and evaluated effectively within the research framework.

The initial change idea the improvement team and I implemented in this study revolved around leveraging the TPACK framework (Mishra & Koehler, 2006; Moore-Adams et al., 2016). This framework provided us with a common language to examine teachers’ experiences with online teaching tools and open educational resources. Currently, all the necessary information for teachers is consolidated within AAHS’s internal website. Recognizing the need for a dedicated space where teachers can easily access resources, I focused on developing recorded lessons within the instructional hub tailored to their needs.
The decision to prioritize the instructional hub was the result of a thorough review and subsequent update of the initial driver diagram. As the improvement team and I analyzed the interview findings and the fishbone diagrams, we reevaluated our goals and realized the instructional hub offered a comprehensive and efficient solution to address the challenges teachers faced in preparing for virtual teaching. The instructional hub stood out as a strategic choice because it could serve as a centralized platform for delivering professional development materials, relevant curriculum resources, and online teaching tools. This consolidation of resources and tools under one umbrella aimed to streamline teachers’ access to essential resources, simplify their preparation process, and enhance their overall readiness for virtual teaching. Initially, the diagram encompassed primary drivers such as professional development, instructional support, and technology implementation, with corresponding secondary drivers and change ideas. However, as my research progressed and I delved deeper into the data and feedback from teachers, I realized we needed a more focused approach.

The updated driver diagram reflects a more refined strategy. We recognized that placing a heightened emphasis on professional development, specifically through recorded lessons, was potentially a more effective means of achieving our aim statement. This decision was based on our analysis of teacher feedback and the observation that recorded lessons had a significant impact on teacher preparation for virtual teaching. Consequently, we streamlined our approach to prioritize professional development as the primary driver, supported by relevant curriculum resources. After updating the driver diagram (Figure 3.2).
Phase III - Professional Development

In January of 2022, I began the PDSA cycle process which required me to conduct four separate PDSA trials (see Figures 4.2, 4.3 and 4.4 Chapter 4) to collect the data needed for this study. During this process, I used data sheets to collect information on each trial. The trial sheets provided me with a simple way to observe and collect the data and develop a plan on how to act on my plan.

The PDSA Cycle 1 - Winter 2022

Step 1: Resource Gathering (November to December 2021)-Plan

During this phase, I began collecting online instructional resources for the internal hub. This involved searching for relevant materials and curating them for use in the hub.

Step 2: Improvement Team Meeting (January 2022)-Plan

In January, I convened a meeting with the improvement team. During this meeting, we collaboratively worked on the driver diagram, identifying drivers of change and focusing areas of improvement. We discussed strategies for implementing the instructional hub and identified additional resources required for its development.

Step 3: Teacher Engagement (January 2022)-Do
In the department meeting held in January, I introduced the plan to develop an internal instructional hub to teachers. I asked for volunteers to record a lesson for the hub. However, within a week, there were no responses from teachers.

*The PDSA Cycle 2 - Winter 2022*

Step 1: Observation (January 2022)-Plan

Since no teachers submitted lessons during this phase I decided that I would offer teachers compensation to participate. During this cycle teachers were asked why they did not participate and some responded that they did not have the time to do an additional task. In response to the absence of recorded lessons during this phase.

Step 2: Recruitment (January 2022)-Do

I emailed the teachers again. During this email I offered the teachers compensation. I offered teachers twenty dollars for their support of making the recorded lessons.

Step 3: Observation (January 2022)-Study

Teachers still did not submit any recorded lesson. During this cycle, it became evident that teachers were not submitting recorded lessons, and the realization struck that monetary incentives were not the driving force behind their motivation. Instead, it seemed the teachers were grappling with overwhelming day-to-day responsibilities, which hindered their capacity to fulfill additional tasks.

Step 4: Learning (January 2022)-Act

Reflecting on the act phase, I learned that the lack of recorded lessons could be attributed to this challenge. Engaging in collaborative discussions with team members further illuminated the intricacies of the issue, providing valuable perspectives and potential avenues for addressing the predicament.
The PDSA Cycle 3 - Winter 2022

Step 1: Observation (January 2022)-Plan

To encourage teacher participation, I continued to send emails and reach out to teachers from other departments to participate in recording lessons for the hub. To incentivize participation, I increased the compensation to $50, hoping that this would help to encourage participation. The idea is that by providing a higher level of compensation, there may be an increased motivation for teachers to submit lessons. The improvement hypothesis is based on the assumption that a more attractive incentive, in this case, financial compensation, would address the initial challenge of non-participation. The aim was to create a positive change in teacher behavior, encouraging them to overcome potential barriers, such as time constraints, and actively engage in the desired activity of submitting lessons.

Step 2: Outreach Efforts (January to February 2022)-Do

Unfortunately, I still received no responses during this period. Additionally, I faced challenges such as a student walk-out and a temporary change in the principal position, which may have contributed to the lack of response.

Step 3: Support Planning (February 2022)-Study

Recognizing that teachers were experiencing stress and uncertainty due to safety concerns, I returned to the improvement team for assistance.

Step 4: Alternative Approach (February 2022)-Act

I proposed an alternative approach to my improvement team to have teachers share recorded lessons from their Google Drive. The improvement team agreed to this strategy.
The PDSA Cycle 4 - Winter 2022

Step 1: Teacher Appeal (March 2022)-Plan

In the March department meeting, I asked teachers to share recorded lessons from their Google Drive for the instructional hub. To incentivize participation, I continued to offer a $50 compensation. This amount was paid by me.

Step 2: Lesson Review (March 2022)-Do

Three recorded lessons were received, two from business education teachers and one from a science teacher. I reviewed these lessons with the improvement team and concluded that teachers would benefit from accessing the instructional hub and viewing these lessons.

Step 3: Feedback Collection (March 2022)-Study

I shared the instructional hub and all related documents with the improvement team to gather feedback for further improvement. During the spring of 2022, I assumed additional responsibilities at Arts Academy to support the school principal, who was a member of my improvement team member after the previous principal took a leave of absence. Unfortunately, my research was put on hold for a year as I transitioned to a district-level position. During this time, I continued working with Arts Academy but with a broader perspective to support teachers district-wide.

Step 4: Instructional Hub (April 2022)-Act

In the spring of 2023, after I finalized the instructional hub, I took the final step of inviting participants who had accepted the invitation to take a survey for reviewing the instructional hub and recorded lessons (see Appendix D).

PDSA Cycle 4 (Lite) - Spring 2023
While the primary focus has been on receiving recordings, I realized that this outcome alone does not represent a systemic enhancement. The overarching goal of the PDSA cycles is to refine the teaching process within the instructional hub. Specifically, the team and I were working towards optimizing the efficiency of lesson delivery, fostering increased teacher engagement, self-efficacy and enhancing the overall effectiveness of the instructional hub as a cohesive system. The recordings served as a tangible indicator of progress, but the true systemic improvement lies in the iterative adjustments made to elevate the entire teaching experience within the established framework.

Step 1: Survey Creation (Spring 2023)-Plan

In Spring 2023, I initiated a new PDSA cycle. I created a survey to gauge teachers' perception of the instructional hub's impact on their preparedness for virtual teaching.

Step 2: Survey Announcement (April 2023)-Do

During this phase, I informed the department about the research study and requested their participation in the survey evaluating the internal hub. To incentivize participation, I offered a $10 compensation for completing the survey.

Step 3: Survey Completion (April 2023)-Do

During a department meeting, 10 out of 13 teachers present completed the survey and received the $10 compensation for their participation.

Step 4: Survey Analysis (April 2023)-Study

I analyzed the survey responses, emphasizing lagging and leading measures to evaluate the impact of the instructional hub. I applied Bryk et al.'s (2015) framework to assess the intervention's effectiveness and guide decision-making. During this step I
learned that instructional hub and the resources that it provided was and effective resources for teachers based on the evaluation.

Step 5: Implementation (April 2023)-Act

Based on the analyzed results from the survey, I made the internal hub live to the teachers at Arts Academy. I engaged in reflection and made necessary revisions as part of the "act" phase of the process. The incorporation of the PDSA cycle was instrumental in conducting my dissertation research, aligning it with the goal of improving the education system. As Bryk et al. (2015) emphasized, rather than constantly introducing new programs, change agents must focus on understanding the underlying work systems that contribute to unsatisfactory outcomes. Hence, by employing a PDSA cycle, I aimed to implement the recorded lessons for the instructional hub professional development intervention, with the ultimate objective of providing support for teachers’ continued growth and progress.

Analyzing the Outcome Using Survey Research

Collecting quantitative data through a survey (Elliott, 2005; Tashakkori & Teddlie, 1998) captured teachers’ perceptions of how the instructional hub will improve their self-efficacy in enhancing online instruction. The quantitative data underwent a transformation process where numerical findings were converted into narrative representations—concepts or themes (Teddlie & Tashakkori, 2009). This technique was used to make the data more relatable, which can aid understanding abstract data. The survey, designed to assess the usefulness of the instructional hub in preparing teachers for virtual instruction, consisted of 10 questions pertaining to various aspects related to the instructional hub (Appendix H). The 10 AAHS teachers who took part in the survey were
asked to rate the hub itself, the resources within the hub, their experiences with virtual
teaching, their belief in the hub’s potential to enhance teachers’ self-efficacy in online
instruction, and their perception of the hub’s usefulness during the COVID-19 pandemic.

Therefore, this study centers on two primary aspects of focus as its outcomes:

1. Teachers’ perception of the hub’s usefulness: This outcome refers to how teachers
   view the hub in terms of its usefulness and helpfulness in supporting their virtual
teaching during the COVID-19 pandemic. It encompasses their overall
   satisfaction and evaluation of the hub’s functionality and resources.

2. Enhancement of teachers’ self-efficacy: The survey aimed to understand how the
   hub contributes to enhancing teachers’ self-efficacy in online instruction. In this
   context, self-efficacy refers to the confidence and belief that teachers have in their
   ability to teach online, which is influenced by their participation in professional
   learning activities.

Teachers’ perception of the hub’s usefulness can directly impact their self-efficacy in
online teaching. Positive experiences and successful use of the hub’s resources may lead
to increased confidence in their virtual teaching abilities, while negative experiences or
limitations in the hub’s usefulness might hinder their self-efficacy. The survey also
included demographic inquiries. The questions in the survey were categorized as either
nominal responses or ordinal scales. All questions were presented in a multiple-choice
format.

Data Analysis

The improvement science framework centers on six fundamental principles of
improvement (Lewis, 2015). These principles guided the research design and approach in
this study, and helped me frame the research questions, collect data, and make decisions throughout the process. In the context of my problem of practice, teachers’ lack of preparedness for virtual instruction, the core challenge of this study was to improve teacher preparation in a virtual environment. To address this challenge, I identified key drivers of change and established a primary aim of improving teaching practices through recorded lessons: establishing and integrating an instructional hub designed to support the professional growth of teachers in the world of online learning through recorded lessons.

As illustrated in Table 3.2, data analysis occurred in three phases, mirroring the three data collection phases. Phase 1 involved gathering information from teachers to inform Phase 2, which focused on the implementation of the change idea. Phase 3 involved administering a survey to understand teachers’ perceptions of the usefulness of the instructional hub survey (Appendix H). Overall, I took a thematic approach to analysis (Braun & Clarke, 2006). Thematic analysis is a qualitative research method used to identify, analyze, and interpret patterns or themes within qualitative data, such as interviews, focus groups, surveys, or textual documents.

Thematic analysis involves systematically organizing and categorizing data to uncover recurring ideas, concepts, or patterns of meaning that provide insights into the research question or topic. The process involves coding the data, grouping codes into categories, and identifying overarching themes that capture the essence of the data and contribute to the research objectives (Braun & Clarke, 2006). I opted for a thematic approach to analysis because it allowed me to delve into the rich qualitative data collected during this study in a way that emphasized identifying and examining recurring patterns, themes, and insights (Braun & Clarke, 2006). The thematic analysis was
instrumental in uncovering and interpreting the nuanced experiences, challenges, and
successes of teachers prior to their engagement with the instructional hub and in eliciting
their self-efficacy beliefs and the challenges they faced when teaching online. While it
may not provide a holistic view of the entire educational system, the thematic analysis
was a vital tool in pinpointing areas where I could make specific interventions and
improvements.

Table 3.2 Data Analysis Methods

<table>
<thead>
<tr>
<th>Phase</th>
<th>Source</th>
<th>Approach</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Empathy interviews</td>
<td>Thematic analysis</td>
</tr>
<tr>
<td>2</td>
<td>PDSA cycle observations</td>
<td>Qualitative observations</td>
</tr>
<tr>
<td>3</td>
<td>Instructional hub survey</td>
<td>Descriptive data analysis using Microsoft Excel and Analysis Toolkit (Happ et al., 2006). Open coding techniques and thematic analysis</td>
</tr>
</tbody>
</table>

During Phase 1, I utilized a series of improvement science tools to clarify the root
causes of the problem. I conducted empathy interviews and utilized a fishbone diagram to
analyze the root causes to inform the development of an initial theory of improvement.
This theory of improvement served as my guiding framework to conduct quick iterative
cycles of inquiry, enabling me to learn more about the problem and make progress toward
resolving it (Bryk et al., 2015). The root cause analysis also yielded a driver diagram to
guide improvement efforts.

Following the literature review in Chapter 2 and the thematic analysis of the
empathy interviews introduced in Chapter 1, I decided on adopting an instructional hub
for targeted instructional resources to support teachers during online teaching. Also,
within this hub, the selection of curated websites was a meticulous process guided by
specific criteria. Analyzing the literature on potential professional development opportunities involved evaluating their relevance to our educators' needs, ensuring alignment with the instructional hub's goals, and assessing the credibility of the content providers. Additionally, I sought input from educators, ensuring that the chosen resources resonated with their preferences and addressed the challenges they faced. This collaborative approach, coupled with a thorough examination of the content's quality and applicability, informed the strategic choices made in populating the instructional hub with websites that not only offered rich professional development but also directly catered to the unique requirements of our teaching community. This approach aimed to enhance functional skills effectively, empower teachers to change their mindset, and equip them with the necessary skills and tools to apply in real-time situations.

Phase 2 time was utilized to understand the problem though the development of drivers diagrams and testing changes ideals based off of empathy interviews and conducting root cause analysis and the reading of literature to fully understand the problem. Phase 3 consisted of four trials of PDSA cycles. The phased approach facilitated a gradual transfer of responsibility. It enabled the implementation of a PDSA process to assess needs, provide support, and determine the next course of action.

The realization that recording lessons was not effective for teachers unfolded through a systematic process of observation. Recording required the use of a camera connected to a laptop, and teachers had to create engaging content such as PowerPoint slides and demonstrate computer simulations. However, despite offering financial incentives, we swiftly discovered that this approach was not effective for teachers and did
not yield the desired outcomes in the first cycle. From discussions among teachers, I realized they struggled to keep students focused on a virtual classroom. Unlike a traditional classroom setting, where teachers can walk around to supervise and engage with students, virtual instruction limited this interaction. I overheard teachers discussing how students’ distractions during online learning were affecting their ability to fully understand instructional concepts. Teachers expressed concerns about their inability to gauge student understanding in real-time and provide immediate feedback, which are essential elements of effective teaching.

In response, I shared these insights with the improvement team to find alternative approaches to prepare teachers for virtual instruction. Our discussions led us to suggest interactive platforms, learning tools, and more live synchronous sessions that may encourage active participation and minimize distractions. By leveraging the collective knowledge and experiences of virtual instruction, the teachers expedited the improvement process with their feedback, allowing the improvement team to develop resources to help teachers engage students by using virtual instructional strategies. Hence, continuous feedback and iteration remained integral to the improvement efforts as we strived to enhance the virtual learning experience for all stakeholders.

During the study phase of the PDSA cycle, I evaluated and measured the progress of the cycle. There were a total of three PDSA cycles, as presented in Chapter 4. To gauge this progress, I analyzed the survey responses obtained from teachers who had reviewed the instructional hub. This survey served as a valuable tool in assessing whether teachers believed the instructional hub would benefit their colleagues during emergency e-learning days. By adhering to the improvement science framework and the PDSA
cycle, I gained meaningful progress in enhancing teacher preparation for virtual instruction. The continuous learning from each iteration of the cycle played a crucial role in guiding the improvement efforts and ensuring the intervention would have a positive impact on teachers and their ability to navigate the challenges of remote teaching. In the first cycle, I had to adapt the process because of the lack of participation. During this cycle, I first increased the incentive, thinking that it would encourage participation. During the second cycle, there was no participation. During the third phase, I adjusted my recruitment and asked teachers to share a recorded lesson that they already had in the cloud. Three teachers participated and shared recorded lessons.

According to Bryk et al. (2015), analyzing the data, observing the actual outcomes compared to the expected ones, and extracting valuable insights for the subsequent phase are crucial steps. Phase 3 was explicitly designed to assess the impact of the provided professional development opportunities on teachers. During this phase, I gathered valuable insights that could guide the development of professional development strategies that integrate technology and pedagogically appropriate methods for virtual instruction. Acquiring recording lesson enhances virtual instruction by providing teachers with an example of how to effectively teach and virtual class.

Quantitative data collected through teacher surveys encompassed demographic inquiries and assessments of the instructional hub’s efficacy and the potential advantages of professional development in virtual teaching. Following the collection of survey data, I first used descriptive statistics to look at the data. After that, I moved on to checking the quality of the data using methods suggested by Elliott (2005) and Tashakkori & Teddlie (1998). Specifically, narrative analysis techniques gave me deeper insights from the
quantitative results. As Figure 3.3 illustrates, the quick reference dashboard for Arts Academy where the instructional hub can be quickly accessed by teachers. The instructional hub go beyond simply acquainting teachers with technology and its usage. It endeavors to foster a sense of community and enable teachers to create more authentic and relevant virtual learning experiences. Within this hub, I provided teachers with recorded lesson plans, allowing them to visualize effective virtual instruction. Moreover, I developed a collection of how-to guides and online instructional resources to support teachers during their virtual teaching journey.

![Quick Reference Dashboard](image)

**Figure 3.3 Quick Reference Dashboard**

The findings presented in the following chapter detail the problems the teachers encountered, how the instructional hub enabled professional learning, and how professional development affects teachers’ self-efficacy regarding using the hub for online teaching.
Rigor and Trustworthiness

Using the PDSA model necessitated regular examination of data to gauge the progress of interventions, which played a crucial role in establishing trustworthiness within the study. According to Lincoln and Guba (1985), trustworthiness encompasses credibility, transferability, dependability, and confirmability, all of which determine the value of a research study. I focused on building trustworthiness by empowering teachers receiving the intervention to take the lead. They had the opportunity to identify the problem of practice and subsequently develop and implement the PDSA cycle. To enhance the credibility of the study, I actively sought input from teachers who shared their ideas, concerns, and suggestions, thereby contributing reliable and trustworthy data. To ensure convergence across methods, I employed data triangulation by incorporating survey, interview, and observation data (Creswell & Poth, 2017) and carefully examined the collected data to identify recurring themes and trends.

The transferability of findings refers to their applicability in other studies (Lincoln & Guba, 1985). The activities conducted in this study were designed to enable the transfer of research outcomes to other schools and districts, both within and beyond the state. This transferability only requires willing participation from teachers in participatory research and the opportunity to test interventions aimed at addressing everyday problems of practice using improvement science tools. Dependability involves assessing the stability of data over time (Lincoln & Guba, 1985). Establishing clear processes, procedures, and confidentiality measures improved the study’s dependability. The accuracy of the collected data relied on teachers’ responses and their willingness to be honest about the challenges and successes they encountered during the transition to
virtual instruction. In the context of transferability, an example of adaptation for a different context could involve implementing the instructional hub model in a school district facing unique challenges such as a high proportion of English language learners (ELLs). In this adapted context, the hub could be customized to provide targeted resources and professional development tailored to support ELL teachers in virtual instruction. The adaptation recognizes the diverse needs of teachers and students within that specific context, addressing language barriers and instructional strategies for language acquisition. This approach showcases the flexibility of the instructional hub model, demonstrating how it can be modified to suit the distinct characteristics and challenges of different educational settings, ultimately enhancing the transferability of the research outcomes.

To address potential biases, I gave participants the opportunity to review the study results and assess the validity, reliability, and credibility of the research. Additionally, I employed member checking to reinforce the accuracy of qualitative findings, as participants reviewed their semi-polished interview transcripts to determine their agreement (Creswell & Creswell, 2018; McKim, 2023). Confirmability ensures clearly defined findings (Lincoln & Guba, 1985). To uphold confirmability, I meticulously maintained an audit trail, documenting the data collection process, analysis, and interpretation. This approach mitigates potential biases in data collection, such as those arising from influencing participant responses to interview questions (Miles et al., 2014).

**Ethical Concerns**

To uphold ethical standards, I adopted specific measures to ensure the confidentiality and security of the data (Creswell & Creswell, 2018). I intend to retain
raw data and associated materials for a period of 5 years, stored in a locked file cabinet and on a password-protected computer. This approach aims to safeguard the privacy and integrity of the information. To address potential ethical concerns related to data sharing, I provided participants and stakeholders with copies of reports. This transparency allows them to have access to the findings and contributes to maintaining trust and accountability in the research process. However, I intentionally omitted participants’ names and identifying information to ensure confidentiality. Importantly, participation in the research study was entirely voluntary. Participants had the freedom to withdraw from the study at any time and for any reason, without facing any negative consequences.

By conducting this study, I aimed to provide teachers with a platform to express their voices and potentially bring about educational change. Recognizing teachers’ desire for educational improvement, I sought to create an environment where their perspectives are valued and incorporated. This approach aligns with the ethical principles of respect, beneficence, and justice, as it promotes the betterment of education based on the input and experiences of teachers.

**Improvement and Research Principles Learned**

Throughout my academic journey, I have had the privilege of delving into various research principles, with a strong emphasis on improvement science methods and leadership for improvement. Among these principles, the six key principles of improvement have profoundly influenced my approach to research and leadership. Here, I reflect on the valuable lessons I’ve learned:

- Principle 1: Make the Work Problem-Specific and User-Centered. I adopted a problem-oriented approach, rooted in improvement science, which shifts the focus
from conventional teaching methods to addressing the specific problem of enhancing teaching self-efficacy for online instruction. This principle taught me the importance of addressing the core issues that matter most to users.

- **Principle 2: Focus on Variation in Performance.** Improvement science acknowledges the inherent variation in socially created systems. This understanding guided me to identify areas for improvement, particularly in enhancing teaching self-efficacy, by recognizing and addressing variations in performance.

- **Principle 3: See the System that Produces the Current Outcomes.** Before taking action, I learned the significance of rigorously analyzing the system. This involves conducting empathy interviews and using fishbone diagrams to uncover underlying factors contributing to the problem. This principle underscores the need for a comprehensive understanding before proposing solutions.

- **Principle 4: We Cannot Improve at Scale What We Cannot Measure.** Measurement is a cornerstone of improvement efforts. Therefore, I employed practical measurement through surveys to assess teachers’ challenges and self-efficacy beliefs in the context of online instruction. It reinforces the importance of measurable outcomes.

- **Principle 5: Use Disciplined Inquiry to Drive Improvement.** The question of how to professionally prepare teachers for effective virtual instruction and enhance their self-efficacy is approached systematically. I conducted empathy interviews, employed fishbone diagrams, constructed driver diagrams, and developed a theory
of action to guide my inquiry. The process of disciplined inquiry was instrumental in driving improvement.

- Principle 6: Accelerate Learning Through Networked Communities. Embracing the spirit of networked improvement communities, our improvement team met to collaborate, share insights, and build trust. By adopting innovations tested by colleagues, we accelerated our progress in enhancing teaching self-efficacy for online instruction.

One of the most significant milestones in my journey was that the action research provided hands-on experience in applying these principles. I had the opportunity to form an improvement team, tackle a real-life problem at Arts Academy, and contribute to ongoing improvement initiatives. This experience not only honed my leadership skills but also equipped me with the knowledge and skills necessary to be an effective leader for improvement. In conclusion, these principles and lessons in improvement have not only enriched my academic experience but also prepared me to make a meaningful impact in my professional endeavors, fostering positive change in the educational landscape.

**Leading Improvement**

As a leader in driving improvement, I embraced the responsibility of ensuring the successful execution of this research study. To fulfill this role, I needed a deep understanding of the problem at hand and unwavering confidence in my ability to effect positive change. Building trust among the teachers and school leaders at Arts Academy played a pivotal role in navigating the various challenges we encountered, as it fostered a culture of continuous learning and leadership development. To lead improvement effectively, securing the buy-in and commitment of all participants was essential, as was
my awareness that the process of improvement takes time and does not offer quick fixes. By leading this research study rooted in improvement science, I had the opportunity to grow as an instructional leader. Little did I know at the time that this experience was preparing me for an even greater impact at the district level.

The driving forces behind my commitment to this improvement initiative were rooted in my desire to make a difference and my unwavering faith and belief in the power of helping and teaching others. I deeply empathized with the feelings and doubts experienced by many of the teachers since I had been in their shoes not too long ago. This genuine understanding and connection fueled my sense of purpose and motivated me to effect meaningful change. I firmly believe that when you have a true calling to make a difference, it becomes your personal goal and part of your life’s purpose to effect positive change. Education and the opportunity to support and empower others have always resonated with me as my true calling. I am grateful for the opportunity to conduct this improvement science research study and have a positive impact on the teachers and leadership staff at Arts Academy. It has affirmed my belief in the transformative power of education and has further strengthened my resolve to continue making a difference in the lives of others.

**Summary**

I used the improvement science action research design described in this chapter to explore the experiences of educators’ preparedness to teach online during the pandemic and assess the professional development provided by the instructional hub. In summary, the methodology employed in this improvement science research study highlights the effectiveness of improvement science action research in addressing educational
challenges arising from the pandemic. It demonstrates that improvement science practices can shed light on broader issues in education and offer teachers a valuable platform to share their experiences during the COVID-19 era. The primary objective of this study was to prepare teachers to teach in a virtual environment through professional development while also building teacher self-efficacy. As a result of their participation, both the study participants and the members of the improvement team were empowered to act and implement educational changes.
CHAPTER 4

FINDINGS

This chapter provides a detailed overview of the findings of my improvement science action research. It addresses teachers’ need for preparation in teaching in a virtual environment. This chapter outlines the findings of Phase 1, followed by a discussion of how those findings influenced the instructional hub during Phase 2. Finally, the findings of Phase 3, the final evaluation of the hub, are also presented.

Problem of Practice

During Phase 1, as presented in Chapter 1, I focused on understanding the problem of practice, applying thematic analysis (Braun & Clarke, 2006) to data derived from a series of empathy interviews. The initial round of data collection (i.e., empathy interviews and developing fishbone and driver diagrams) was instrumental in developing the participants’ and my comprehension of the challenges and teachers’ unpreparedness when making the sudden transition to online learning. It also provided insights into the teachers’ experiences and their level of preparation for virtual instruction. By analyzing the data together, we aimed to gain a deeper understanding of the challenges and opportunities associated with this new teaching environment. From our discussions of the Phase 1 data, three major themes emerged: the absence of professional development, the importance of teacher support, and the importance of technology in facilitating online instruction. These themes emerged from analysis of the improvement science approaches and tools employed during this phase, which included developing the improvement team.
(i.e., Principle 6: accelerate learning through networked communities), conducting empathy interviews and analyzing data (i.e., use disciplined inquiry to drive improvement), and developing fishbone and driver diagrams. The identified themes shed light on the system that produced the current outcomes. To visually represent this system, we constructed fishbone and driver diagrams, aligned with the principle of seeing the system that produces the current outcomes. These diagrams helped us comprehensively analyze the underlying factors contributing to the absence of professional development, the need for teacher support, and the role of technology.

**Theme 1: Absence of Professional Development**

One of the major challenges that emerged from the data was the absence of adequate professional development for teachers transitioning to virtual instruction due to the COVID-19 pandemic. Many teachers found themselves suddenly thrust into an online teaching environment without the necessary training and support to effectively navigate the digital tools and strategies required for remote instruction. Teachers expressed “frustration” and feelings of being “ill-prepared” to handle the unique demands of virtual teaching. They highlighted a lack of knowledge about online pedagogy, effective use of instructional technology, and strategies for engaging students in a virtual setting. Without proper professional development, teachers struggled to adapt their instructional practices and ensure meaningful learning experiences for their students. Furthermore, the absence of professional development hindered teachers’ ability to address specific challenges associated with online instruction, such as student engagement, assessment, and providing personalized feedback. Teachers felt they needed “targeted training” and
ongoing support to develop the skills and expertise necessary for effective virtual teaching.

This theme directly informed the improvement steps and efforts. Recognizing the importance of addressing this issue, the improvement team and I integrated it into our improvement project as a central focus. To bridge the gap identified in professional development, we designed and implemented an instructional hub. These efforts were aimed at addressing the absence of professional development and enhancing teachers’ skills and self-efficacy in virtual teaching.

**Theme 2: Importance of Teacher Support**

A crucial finding that surfaced from the data was the significance of teacher support during the shift to virtual instruction. The teachers expressed the need for “enhanced assistance in navigating virtual instructional environments” and the “resources” essential for teaching effectively in both dual-modality and virtual instructional scenarios. It was apparent that the presence of supportive teachers significantly contributed to the successful adaptation to the virtual learning environment.

Teachers emphasized the need for strong support networks, both within their schools and among their colleagues, to help them navigate the complexities of online teaching. Teachers who had access to supportive administrators and instructional coaches reported feeling more confident and better equipped to handle the challenges of virtual instruction. However, they wanted collaborative planning sessions and opportunities for professional dialogue to share experiences, strategies, and resources. Such support networks were required to develop a sense of community, alleviate feelings of isolation, and foster a collaborative learning environment. Additionally, teachers expressed the
importance of support from their colleagues. Sharing best practices, troubleshooting technical issues, and brainstorming creative solutions together helped alleviate some of the stress and anxiety associated with virtual instruction. They felt that peer support networks, whether formal or informal, were invaluable in creating a sense of solidarity and promoting professional growth among teachers.

The theme “Importance of Teacher Support” directly informed and guided the improvement steps and efforts by emphasizing the need for personalized support, professional development enhancement, and resource allocation. These efforts were aimed at enhancing teacher self-efficacy and effectiveness in the virtual teaching environment.

**Theme 3: Importance of Technology in Facilitating Online Instruction**

The data also highlighted the crucial role of technology in facilitating online instruction during the pandemic. Teachers recognized the transformative potential of digital tools and platforms in engaging students and delivering quality instruction remotely. According to the teachers, technology had the potential to help them create engaging lessons. They felt that technology can play a crucial role in “facilitating online instruction,” such as “monitoring attendance,” “accessing resources” and “providing immediate feedback” to their students. However, they lacked experience in “managing virtual classrooms,” for instance utilizing “video conferencing tools to deliver content,” “facilitate discussions,” and “handle assignments.” Due to insufficient training, teachers did not feel confident or skilled enough to effectively use these technologies, which impacted their ability to engage students and create meaningful learning experiences.
Teachers also noted the challenges associated with the reliance on technology. Issues such as access to reliable internet connection, availability of devices for all students, and technical glitches created barriers to effective online instruction. Teachers stressed the need for equitable access to technology and resources to ensure all students could fully participate in virtual learning.

Overall, the themes that emerged from the data underscored the critical need for professional development, teacher support, and the effective use of technology in facilitating successful online instruction, reinforcing existing literature. Al-Bargi (2021) and Atmojo & Nugroho (2020), highlighted the challenges teachers faced during the pandemic and the need for continuous professional development. Lockee (2021) and Philippakos et al. (2022) emphasized the timely provision of professional development for online learning, echoing our findings. In terms of teacher support, Taylor et al. (2022) proposed instructional hubs, aligning with my emphasis on collaborative learning communities. Mabalane’s (2022) work on online enrichment during COVID-19 supports ongoing support for teachers. Regarding technology, Nur et al. (2022) and Singh et al. (2021) discussed teachers’ adaptation to online platforms and the importance of digital classroom management skills. In this study, the change idea we proposed is the instructional hub to address these issues and to help teachers navigate the complexities of virtual teaching. With these considerations in mind, the subsequent section delves into the exploration of teachers’ perceptions of the instructional hub and its influence on professional development and teacher self-efficacy. This examination is particularly relevant to my improvement efforts, where I utilized PDSA cycles to implement and test the instructional hub.
Phase 2: Instructional Hub

During Phase 2, I addressed the improvement question of how can school leaders prepare teachers to effectively teach in a virtual environment and enhance their self-efficacy? After conducting the root cause analysis, the improvement team and I proceeded to the next step in the improvement science approach, which involved the use of a driver diagram. This diagram served as a tool to develop a theory of action based on the insights gained from the fishbone diagram. By leveraging the key points identified in the fishbone diagram, the driver diagram provided a visual representation of the improvement team’s theory of practice for driving positive change and eventually led to the creation of an instructional hub to enhance teachers’ instructional practices and self-efficacy in the virtual environment.

In the second stage of the research, I developed the change idea based on the findings from the empathy interviews, review of literature, and discussions with the improvement team. Informed by the findings from Phase 1, this phase encompassed development of the instructional hub focused on building teacher self-efficacy, specifically targeting instructional strategies and ways to adapt teaching methods for online instruction. These experiences during Phase 2 significantly influenced the data collected in Phase 3, when I used a survey to investigate teachers’ perceptions of the instructional hub’s impact.

An essential aspect of applying improvement science to guide inquiry involves employing the PDSA cycle to test a proposed change idea. The PDSA cycle (Figure 4.1) served as a valuable data source, guiding the improvement efforts throughout the intervention. After developing a theory of practice improvement and selecting a high
leverage change idea for implementation, the next step is to identify or create an appropriate measure to assess the usefulness of the change idea in bringing about improvement. In total, I documented 13 steps in PDSA cycles, each serving as a systematic approach to test and refine the change idea, ensuring progress toward the desired outcome (see Table 4.1).

![PDSA Cycle Process](image)

Figure 4.1 *PDSA Cycle*

Table 4.1 provides a comprehensive summary of the iterative PDSA steps completed collaboratively with the improvement team. Initiating the PDSA cycle, our approach commenced with meticulous planning, emphasizing the testing of change ideas. Notably, a significant focus was placed on adapting and evolving strategies, particularly in response to challenges encountered during the recorded lesson phase. Recruitment strategies were employed, including the creation of a detailed flyer and utilizing the school's Google Classroom for increased visibility. Despite these efforts, an initial lack of response from teachers prompted a thoughtful reflection on adaptive strategies. Recognizing the non-traditional nature of improvement science, the process unfolded with a keen observation of teacher responses and non-responses. This adaptive learning
journey was marked by persistent efforts to understand the factors influencing participation.

The iterative process unfolded through distinct phases. Each phase brought valuable insights, prompting a thorough study of outcomes and a collective formulation of the next steps by engaging the improvement team. Decision-making within the cycles involved critical choices, such as whether to adapt, abandon, or proceed with a particular idea. The active involvement of the improvement team played a pivotal role in this decision-making process, offering diverse perspectives and collective problem-solving. This dynamic and responsive approach allowed for continuous adaptation and refinement based on observed outcomes. Subsequently, the next cycle witnessed the implementation of a revised hub, fueled by insights gained from the previous cycle. This iterative process, rooted in persistent learning and collaborative problem-solving, facilitated continuous improvement and optimization of the instructional hub.

Table 4.1 Improvement PDSA Cycles

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Resource Gathering: Started gathering online instructional resources for the internal hub in November and continued until the end of December.</td>
</tr>
<tr>
<td>2</td>
<td>Improvement Team Meeting: Met with the improvement team in January to work on the driver diagram, identify drivers of change, and determine focus areas. Discussed implementation strategies and additional resources for the hub.</td>
</tr>
<tr>
<td>3</td>
<td>Teacher Engagement: Shared the plan to develop an internal instructional hub with teachers in the January department meeting. Requested teachers to volunteer to record a lesson for the hub but received no response within a week.</td>
</tr>
<tr>
<td>4</td>
<td>Outreach Efforts: Continued sending emails and reaching out to teachers from other departments to participate in recording lessons for the hub. Increased the compensation to $50 but still received no response. Also dealt with a student walkout and a temporary change in principal position.</td>
</tr>
<tr>
<td>5</td>
<td>Support Planning: Recognizing teachers’ stress and uncertainty due to safety concerns, returned to the improvement team for assistance. Suggested teachers’ sharing recorded lessons from their Google Drive as a solution. The team agreed to this approach.</td>
</tr>
<tr>
<td>Step</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>6</td>
<td>Teacher Appeal: In the March department meeting, asked teachers to share recorded lessons from their Google Drive for the instructional hub. Offered $50 for participation.</td>
</tr>
<tr>
<td>7</td>
<td>Lesson Review: Received three recorded lessons from business education and digital art and design teachers. Reviewed the lessons with the improvement team and predicted teachers would benefit from accessing the instructional hub and viewing the lessons.</td>
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<tr>
<td>8</td>
<td>Feedback Collection: Shared the instructional hub and all documents with the improvement team to gather feedback for further improvement.</td>
</tr>
<tr>
<td>9</td>
<td>Survey Creation: Started the PDSA cycle process again in Spring 2023. Created a survey to gauge teachers’ perception of the instructional hub’s impact on their preparedness for virtual teaching.</td>
</tr>
<tr>
<td>10</td>
<td>Survey Announcement: Informed the department in April 2023 about the research study and requested their participation in a short survey evaluating the internal hub. Offered $10 compensation for completing the survey.</td>
</tr>
<tr>
<td>11</td>
<td>Survey Completion: During the department meeting, 10 out of 13 teachers present completed the survey and received the $10 compensation for their participation.</td>
</tr>
<tr>
<td>12</td>
<td>Survey Analysis: Studied the survey responses, focusing on lagging and leading measures to evaluate the change brought about by the instructional hub. Utilized Bryk et al.’s (2015) framework to assess the intervention’s effectiveness and inform decision-making.</td>
</tr>
<tr>
<td>13</td>
<td>Implementation: Made the internal hub live to the teachers at Arts Academy based on the analyzed results from the survey. Engaged in reflection and made necessary revisions as part of the act phase of the process.</td>
</tr>
</tbody>
</table>

As mentioned in Chapter 3, I initiated the PDSA cycle, necessitating the execution of three distinct PDSA trials (see Figures 4.2, 4.3, and 4.4) to gather the requisite data for this investigation. Throughout this undertaking, I used data sheets to systematically record information pertaining to each trial. The primary objective of these trials was to investigate the process of building an internal online hub at a high school and specifically assess the strategies employed to engage teachers in the construction of this hub.

While the initial strategy may have been the evaluation of the utility or impact of the hub itself, I must emphasize that the trials were designed to test the effectiveness of the implementation process, specifically by understanding the dynamics of how to
effectively involve teachers in the creation of the instructional hub. The data collected during these trials, as depicted in Figures 4.2, 4.3, and 4.4, are oriented toward gathering insights into what works in encouraging teachers to actively participate in the development of the online hub. The use of data sheets facilitated the systematic observation and documentation of relevant information from each trial, providing a foundation for assessing needs, offering support, and determining subsequent courses of action within the PDSA cycle.

In the first trial (see Figure 4.2), our objective was to have teachers record lessons to support teachers during virtual instruction. We planned for teachers to record virtual lessons that other teachers could consult in their virtual teaching endeavors. The trial was scheduled for January 2022 at the Arts Academy, involving both teachers and members of the improvement team. Contrary to our initial prediction, we did not receive any recorded lessons from the teachers after a week. This unexpected lack of participation indicated the need for revisions in our approach. There are a few potential reasons why we did not receive any recorded lessons from the teachers after a week, contrary to our initial prediction. One possibility is that the teachers may have faced the fear of the unknown based on school threats, school vandalism, and the school principal taking an unexpected leave of absence. Perhaps they also had competing priorities or time constraints that prevented them from engaging in this particular task. This unexpected lack of participation highlighted the need for revisions in our approach, and addressing these potential issues was crucial in ensuring the success of our project moving forward. To collect the qualitative data essential for the study, we decided to adapt our plan and restart the process to achieve our goal of developing a valuable instructional hub. The
decision to adapt and preserve the concept of the instructional hub was influenced by feedback gathered from empathy interviews. During these interviews, teachers expressed the need for sample lesson plans and strategies to enhance online instruction. Consequently, their feedback served as a strong motivator for me to create a resource that could make a meaningful impact in supporting teachers during virtual instruction. Adapting our plan instead of abandoning recognized unforeseen challenges faced by teachers, such as heightened concerns and time constraints, prompting a strategic reevaluation. Moreover, the qualitative observational data revealed that despite financial incentives, the initial approach of having teachers record engaging virtual lessons using cameras and laptops was ineffective. Teachers expressed challenges in maintaining student focus during online learning, citing limitations in interaction compared to traditional classrooms. These insights prompted collaborative discussions within our improvement network, leading to the suggestion of interactive platforms, gamified tools, and increased live sessions to enhance engagement and mitigate distractions. This adaptive approach reflects our commitment to refining strategies, enhancing engagement, and persisting in our goal of developing a valuable instructional hub despite complex contextual factors.
For the second trial (see Figure 4.3), our goal remained the same—to build an online school-based hub by having teachers record lessons to support teachers in virtual instruction. We aimed for teachers to record virtual lessons as valuable resources for their colleagues. This trial was also scheduled for January 2022 at the Arts Academy, involving teachers and members of the improvement team. Initially, I predicted teachers would be motivated to contribute lessons due to compensation and the desire for positive change. I believed this approach would be effective in providing diverse recorded lessons for a better understanding of virtual instruction. The feedback from the empathy
interview and teachers desire to have a sample of what online instruction should look like supported my belief. This belief stemmed from our initial discussions, surveys, and observations where teachers indicated a readiness to contribute lessons, citing their eagerness for positive change and the motivating factor of compensation. Additionally, feedback from informal conversations highlighted a shared interest among teachers in creating a collaborative repository of instructional materials to enhance virtual teaching practices.

Despite increasing the compensation from $20 to $50 and sending email invitations highlighting the study’s benefits and its impact on virtual instruction, we received no recorded lessons even after a week. This unexpected outcome prompted a closer examination of contextual factors. Conversations with teachers revealed heightened stressors related to ongoing challenges in the school environment, including recent security concerns, disruptions due to school vandalism, and the absence of the school principal. These factors likely contributed to a reluctance among teachers to engage fully in additional tasks, despite the increased compensation and study benefits. This outcome deviated from my initial prediction, indicating the need to revise our approach to gather the required qualitative data. Therefore, I decided to adapt the plan and make necessary revisions to increase participation and collect the necessary data. The decision to adapt the plan was rooted in the belief that the identified contextual barriers could be mitigated through strategic modifications. Abandoning the plan would risk losing valuable insights into the potential success of the instructional hub initiative. By adapting the approach, we aimed to navigate and overcome these challenges, ensuring a more informed and successful implementation moving forward.
Figure 4.3 Trial 2 Data Sheet

In the third trial (see Figure 4.4), the objective remained unchanged. In other words, the change idea was to develop an instructional hub that supports teachers during virtual instruction. The plan involved teachers’ sharing a recorded lesson from their Google Drive—one they believed exemplified excellent teaching and could be included in the hub. The trial was conducted in February 2022 at the Arts Academy, with teachers participating and improvement team members collaborating.
Analyzing the Outcome

Drawing insights from the PDSA cycles and observations, I realized motivating teachers to actively contribute to the hub involved recognizing their perceptions of its potential rather than concrete evidence of its impact on practice and efficacy. This phase of the study focused on understanding teachers’ perceptions using a survey (Appendix H) of the impact of professional development opportunities (i.e., PDSA Steps 9–12). I began by examining the demographic particulars from the survey results (see Table 4.2).
Table 4.2 Demographic Characteristics

<table>
<thead>
<tr>
<th>Survey item</th>
<th>Option</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>female</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>male</td>
<td>3</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>White</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>6</td>
</tr>
<tr>
<td>Teaching experience in years</td>
<td>0–5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>6–10</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>11–15</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>16–20</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>21+</td>
<td>2</td>
</tr>
</tbody>
</table>

Analyzing the demographic characteristics of the participants, as presented in Table 4.2, I must underscore the significance of this information in understanding the varied perspectives and experiences brought to the instructional hub initiative.

Recognizing the diversity in gender, ethnicity, and teaching experience was integral, as it allowed for a more nuanced exploration of how different educators may engage with and benefit from the hub. The variation in demographic factors was particularly pertinent when considering the notion of variation discussed earlier in this dissertation.

Understanding how teachers with different backgrounds, experiences, and teaching durations perceived and utilized the instructional hub provided valuable insights into the potential adaptability and effectiveness of the hub across diverse contexts. It is noteworthy that all participating teachers were actively teaching science and English language arts (ELA). This commonality not only ensured the relevance of the hub to their subject areas but also allowed for a more focused examination of the hub’s impact on instructional practices within these disciplines. The alignment of subjects further enriches
the data, enabling a targeted exploration of the hub’s potential influence on both science and ELA teaching methodologies.

To assess the instructional hub and its impact on professional development, I designed survey items to gauge teachers’ perceptions of the hub’s usefulness and its potential to enhance their self-efficacy for virtual instruction. Elaborating on the process of introducing teachers to the hub to ensure a comprehensive understanding of their survey responses is essential. I initially introduced the hub to teachers through a department meeting, providing them with a thorough understanding of its features and functionalities. Subsequently, I encouraged them to explore and engage with the hub independently. This approach aimed to ensure that teachers were appropriately prepared to provide informed and reflective responses in the survey, drawing on their firsthand experiences with the hub.

Apart from the demographic questions (i.e., 1–3), the survey also included seven Likert-scale and dichotomous questions. After all the participants had completed the instructional hub survey, I started analyzing the data. I carefully reviewed and examined the survey responses, paying special attention to the questions tagged in Google Forms, which served as points of interest, guiding my attention toward aspects that participants themselves considered noteworthy. This comprehensive analysis approach not only allowed for a nuanced exploration of the data but also facilitated a deeper understanding of the diverse viewpoints and experiences of the participants. The results are depicted in Figure 4.5.
I entered the closed responses into Microsoft Excel and used the Analysis Toolkit to examine the descriptive data. The purpose of this analysis was to determine the frequency of the data. However, this study is qualitative in nature, so rather than generate statistical information, I used the quantitative analysis to complement the qualitative (i.e., PDSA cycle observations and data collected through empathy interviews). I carefully examined the range of responses, even when they were expressed numerically. By
analyzing the frequency of these responses, I gained insights into participants’ perspectives, which helped me develop a descriptive profile of the study population. I was able to complement the qualitative findings from PDSA cycle observations and empathy interviews. The examination of numerical responses was integral to gaining a comprehensive understanding of participants’ perspectives. Analyzing the frequency of responses provided a quantitative lens through which I could discern patterns, identify common themes, and quantify the prevalence of certain viewpoints. It also facilitated a more nuanced interpretation of the data. By triangulating quantitative and qualitative data, I gained a holistic view that informed targeted improvements in the instructional hub.

Transforming quantitative data into narrative representations, a process referred to as qualitising (Elliott, 2005; Tashakkori & Teddlie, 1998), has the potential to uncover valuable insights that might otherwise be obscured or hidden within quantitative analysis and reporting (Sharland et al., 2017). To create these narrative descriptions, I manually coded the numerical data, and the initial themes that emerged served as a basis for further exploration.

The survey findings indicate that all teachers, regardless of their gender, ethnicity, or teaching experience, had a positive experience with the instructional hub. In this context, “experience” refers to teachers’ subjective views on the hub’s usability, effectiveness, and impact on virtual instruction practices. The teachers highly rated both the instructional hub itself and the resources it provided, selecting 5 to denote Excellent on the Likert scale. This outcome suggests they perceived the instructional hub as highly effective and valuable for professional learning. Additionally, the teachers expressed
confidence that the resources in the hub would help them improve their virtual
instruction. This outcome indicates they found the content and materials to be relevant,
practical, and beneficial for enhancing their teaching skills in an online setting. This
positive perception of the resources further emphasizes the usefulness and quality of the
instructional hub.

Moreover, the teachers believed the instructional hub would enhance their self-
efficacy in delivering online instruction. Self-efficacy pertains to an individual’s
personal conviction and confidence in their capacity to effectively accomplish specific
tasks or engage in activities (Bandura, 1986). It encompasses a person’s belief in their
own capabilities and competence to successfully navigate and perform in various
situations. By expressing confidence in the instructional hub’s ability to improve their
own teaching skills, the teachers demonstrated a belief that the hub would contribute
to their effectiveness in virtual instruction, thereby increasing their confidence and
competence in this domain.

The survey also revealed that the teachers who had used the instructional hub in real-time were willing to continue using it in the future, specifically on emergency
e-learning days. This outcome indicates a high level of satisfaction and confidence in
the hub’s ability to support their teaching needs during challenging circumstances. By
expressing their intention to utilize the hub again, the teachers reinforced their positive
experiences and perceived value of the instructional hub as a reliable resource in times
of emergency.

To make sense of the data and identify any emerging patterns, I used thematic analysis
and generated six themes. I began the thematic analysis by reviewing the surveys related
to the instructional hub. Using Microsoft Excel and the Analysis ToolPak, I initially generated codes to capture key aspects of the data. I imported the survey data into Excel, ensuring each response was in a separate row. Next, I established a new column for recording codes or themes that represented emerging patterns in the survey responses. After completing this step, I manually examined each response, consistently applying keywords or phrases to assign themes in the designated column. To enhance organization, I utilized Excel's sorting and filtering functions for the themes. Following this process, I identified commonalities and proceeded to summarize the six key themes used the responses to generate initial codes and looked for patterns before generating themes.

- **Usefulness of the instructional hub**: The teachers’ positive ratings and belief in the instructional hub’s ability to improve virtual instruction highlight its effectiveness. This theme emphasizes that the hub serves as a valuable resource for professional learning.

- **Perceived value of resources**: The teachers highly rated the resources within the instructional hub, indicating they found them to be useful and beneficial. This theme emphasizes the importance of high-quality and relevant resources in supporting effective teaching practices.

- **Confidence and self-efficacy**: The teachers expressed confidence that the instructional hub would improve their self-efficacy in teaching online. This theme underscores the importance of self-belief and confidence in one’s ability to deliver effective virtual instruction.

- **Intention to continue use**: The teachers indicated their willingness to use the instructional hub again, particularly on emergency e-learning days. This theme
highlights the hub’s reliability and its potential as a go-to resource in challenging situations.

- Broad applicability: The positive responses from teachers of different genders, ethnicities, and levels of teaching experience suggest the instructional hub is perceived as beneficial and relevant across diverse backgrounds. This theme emphasizes the hub’s inclusivity and ability to support a wide range of teachers.

- Benefits of professional development: The teachers believed that professional development, in conjunction with the instructional hub, would help them teach virtually more effectively. This theme underscores the importance of ongoing training and support for teachers to enhance their instructional practices.

These themes collectively indicate the positive impact of the instructional hub on teachers’ professional learning, self-efficacy, and virtual instruction skills. The findings suggest the hub, with its resources and potential for professional development, can benefit teachers in various contexts. Overall, the findings suggest that the instructional hub, as an intervention, not only provides a valuable space for collaborative problem-solving but also contributes to system improvement by enhancing teachers’ skills and confidence in diverse educational settings. The survey was a practical measurement tool embedded in the work that teachers already do through a department meeting. This practical measurement also helped to break down the four additional questions related to improvement science research:

1. Did it work?
2. Is it working?
3. How is it working?

The results of the survey led me to conclude that the implementation of the instructional hub was working. The instructional hub is an internal link on the landing page of the quick resources of Arts Academy. Therefore, teachers have the opportunity to use it at their convenience. The instructional hub and the recorded lessons are working as intended to build teachers’ self-efficacy and to prepare teachers to teach online.

**Conclusion**

In conclusion, this improvement project sheds light on the challenges faced by teachers when they transitioned to virtual instruction and the impact of professional development on their self-efficacy. The findings reveal that traditional professional development was insufficient in addressing these challenges. However, the intervention in the form of an instruction hub provided a valuable space for teachers to discuss daily teaching challenges with peers. The study participants demonstrated increased self-efficacy (see Table 4.3, Question 8) in instructional strategies.
CHAPTER 5
DISCUSSION, IMPLICATIONS, AND CONCLUSION

Throughout this improvement science dissertation, I gained a deep understanding of improvement science. Realizing the importance of continuous personal growth and development was enlightening. This endeavor, supported by a highly skilled and dedicated team, deepened my understanding of collaboration’s critical role in conducting a successful study. Commitment to the principles of improvement science has allowed me to explore and test my ideas for change. It has enabled me to develop a solid plan that will ensure the future success of the educators of Arts Academy. Applying this scientific approach opened the door to new possibilities and gave me the tools to improve the educational environment continuously.

The focus of my improvement, of ensuring that teachers are prepared to teach in a virtual environment through professional development while also building teacher self-efficacy, underwent several revisions and refinements. By understanding my problem and diligently researching it, I eventually arrived at a clear and concise topic: Instructional Hub: Bridging the Gap in Teacher Preparation for Online Teaching. My commitment to the teachers at Arts Academy was to give voice to their untold stories and shed light on the challenges they faced during the unprecedented pandemic. Equally important, I aimed to create a resource to address future unexpected disruptions to the school day, such as transitioning to e-learning. The stories and experiences shared by the teachers during the pandemic hold a special place in my heart. Our shared struggles brought us closer
together, fostering a strong sense of support and camaraderie. Now, I have a responsibility to share their powerful stories with the world, ensuring this improvement work becomes a beacon of hope for educators facing similar challenges in the future.

**Overview of Study Development**

The purpose of this improvement science research was to design and implement an effective preparation for teachers to be prepared to teach in a virtual environment through the development of an instructional hub to equip teachers with the necessary skills and knowledge to succeed in a virtual learning environment. In this improvement study, I delved into the issue of teachers’ being ill-equipped for virtual teaching and presented a solution through the introduction of an instructional hub and professional development. With the global onset of the COVID-19 pandemic, schools worldwide underwent sudden changes, catching teachers off guard in their transition to online instruction. The lack of prior experience and available resources for virtual teaching and a lack of self-efficacy had a negative impact on teachers’ confidence in their abilities and ultimately affected student learning outcomes. Furthermore, within the specific context of District 8705 in South Carolina, additional challenges such as administrative problems, protests, and the disproportionate impact of COVID-19 on African American students further compounded the difficulties. As a family and consumer science teacher as well as a researcher, I personally witnessed these challenges and sought to address them by establishing ways to prepare teachers for virtual instruction through an instructional hub and professional development opportunities. The main focus of this dissertation was to explore the implementation and effectiveness of these interventions in improving teachers’ preparedness for virtual teaching and improve teacher self-efficacy.
To gain a comprehensive understanding of the issue at hand during the initial phase of the study, I conducted empathy interviews with seven teachers from the Arts Academy and the director of the virtual academy. This approach yielded valuable insights as I delved deeper into the experiences and perspectives of those directly involved. Subsequently, I used an instructional hub designed to support teachers during virtual instruction. Within this hub, I utilized PDSA cycles and teacher self-efficacy as a structured framework for testing and guiding change, enabling a systematic approach to continuous improvement. Lastly, I employed survey questions to gather feedback from 10 teachers, specifically focusing on how targeted professional learning initiatives influenced their perceptions.

In the following sections, I discuss my findings related to the improvement questions, considering existing bodies of scholarship. The findings shed light on practical implications for educational institutions, policymakers, and teacher professional development programs. Additionally, I acknowledge the limitations of the study, suggesting areas for further research and potential considerations when interpreting the findings.

**Discussion of Findings**

The instructional hub literature offers valuable insights into the significance of effective teacher preparation (Pan & Chen, 2023; Pan & Cheng, 2023). Literature suggests an instructional hub can play a crucial role in improving teachers’ learning experiences by facilitating connections between them (Taylor et al., 2022). In the current study, the instructional hub brought together different aspects of education, such as teaching methods, TPACK, social interactions, and systems that support the creation and
sharing of knowledge. This research shows that when smaller groups of teachers come together in central meeting places, they can form integrated networks (Taylor et al., 2022). These networks provide a space for teachers to learn from each other about using technology in virtual classrooms and share their knowledge and skills. This collaboration among teachers benefits not only the individual educators but also the entire school community.

In aligning with Bryk et al.’s (2015) principles of improvement science, this study specifically employed the principles of continuous inquiry and the use of disciplined inquiry methods. By systematically analyzing the challenges faced by teachers and students through the lens of improvement science, I aimed to identify root causes effectively. The iterative nature of improvement cycles allowed for ongoing refinement of interventions within the instructional hub. This adherence to improvement science principles facilitated a nuanced understanding of the identified problem and contributed to the comprehensive illustration of the system establishment process in the realm of teacher professional learning.

I delved into the intricacies of identifying the root causes of the problem this study identified. In doing so, I attempted to gain a comprehensive understanding of the challenges faced by the teachers and the students they serve. Therefore, this study makes a valuable contribution to the realm of teacher professional learning by presenting a comprehensive illustration of the process involved in establishing such a system.

My approach of engaging various stakeholders employed the phases of improvement science. Empathy interviews with educators and a teacher survey revealed potential challenges schools and the district would have to confront, such as teachers’
lack of preparation for online instruction. I was encouraged to find that the teacher collaborators were knowledgeable about the components of effective teacher professional learning and supportive of aligning the instructional hub’s professional development opportunities (Darling-Hammond et al., 2017).

**Virtual Instructional Hub**

The purpose of this instructional hub was to enhance teacher preparation for virtual teaching through academic support and professional development while also building teacher self-efficacy (Figure 5.1). This hub encompassed a diverse instructional strategies and online resources, providing ample opportunities for professional growth. The instructional virtual hub was constructed using Canva, an online graphic design platform known for its user-friendliness. When conceptualizing the hub’s design, my primary aim was to create a resource that was effortlessly usable for teachers, requiring no specialized training to access its resources. To achieve this, I implemented template features that provided direct access to the specific tools teachers needed. Furthermore, I wanted to ensure that teachers could easily find support if necessary, so I made sure that the features were clickable, leading users directly to individuals who could assist with technology or instructional support.

Recognizing the importance of keeping the hub user-friendly and avoiding potential frustration, I employed a cohesive and visually appealing color scheme while also ensuring inclusivity across various content areas. The development process spanned approximately one month, during which I leveraged the expertise of a digital integration specialist on my team. Her contributions were instrumental in formatting features correctly and ensuring that the template's colors pictures visually appealing to users.
The virtual learning instructional strategies (Figure 5.2) encompassed active learning for online classrooms, encompassing eight strategies aimed at enhancing online instruction, and providing professional development on online instructional strategies.

The array of technology tools for online lessons (Figure 5.3) encompassed guidance on using Google Classroom, exploring Jamboard functionalities, leveraging district Google tools, engaging in district technology courses, navigating SC Remote
Learning, mastering technology basics, accessing instructional resources, and utilizing virtual learning tool platforms for a diverse range of online activities.

Figure 5.3 Technology Tools for Online Lessons

Figure 5.4 Lesson Planning Resources

The comprehensive lesson planning resources (Figure 5.4) included resources
organized by department, including English, Math, Science, Social Studies, Career and Technical Education (CTE), World Languages, Music, Physical Education (PE), and Special Education. These resources feature recorded lessons, live lessons, a versatile lesson planning template, and a unique offering—Last Minute Live Lesson. This last-minute option provided educators with immediate classroom coverage solutions, allowing them to select from our Live Lesson catalog up to 24 hours before the scheduled lesson. Additionally, educators could access sample recorded lessons for further support and inspiration.

The curated collection of virtual learning activities (Figure 5.5) encompassed engaging options to enhance student learning. These activities span virtual school activities, offering various opportunities to foster motivation and active participation in online learning environments.

Figure 5.5 Virtual Learning Activities

Teachers discovered a wealth of Curriculum Resources featuring a range of Open Educational Resources (OER) from platforms such as OER Commons, Discovery
Education, and We Are Teachers. These resources offered valuable tools and materials to enrich your teaching and enhance the learning experience.

![Curriculum Resources](image)

**Figure 5.6 Curriculum Resources**

The website enabled teachers to explore effective strategies for Classroom Management in a Virtual Setting, where the Power of Persistence takes center stage (Figure 5.7). It provided insightful examples, encouraging active student response practices. It was designed to elevate teachers’ online teaching experience with focused online engagement techniques to create an interactive and dynamic virtual learning environment.
The Professional Development Virtual Learning Toolkit (Figure 5.8) empowered educators with effective strategies for virtual and hybrid planning. They explored diverse modalities tailored for virtual and hybrid teaching scenarios, coupled with best practices for online instruction. Besides, teachers could dive into the dynamic world of educational technology through EdTech Reels, and consider enrolling in the district technology classes for a comprehensive learning experience.
The Peer Support Feedback (Figure 5.9) feature offered valuable links to digital integration specialists specific to the user's content area or department, facilitating targeted and department-specific feedback.

**Limitations of This Dissertation in Practice**

Improvement science is an approach aimed at solving problems through rapid cycles of change, utilizing knowledge of a particular context and research (Bryk et al., 2015). However, there are certain limitations inherent in the design of improvement science research. The present study exhibits several limitations that could affect the interpretation of the findings. Firstly, personal bias is a potential limitation because I was a member of the community in which the study occurred. This personal bias could have influenced the data collection, analysis, and interpretation processes. For instance, in the data collection phase, my familiarity with the community might have influenced my selection of participants or the questions posed during interviews. My preexisting understanding of local dynamics could have potentially guided my interactions, leading to unintentional biases in the data. Additionally, my role as an instructional leader might
have influenced participants’ responses, as they may have felt more comfortable or hesitant to share certain perspectives based on our shared context. During the data analysis phase, unconscious assumptions or preconceived notions related to community dynamics could have influenced how I interpreted participants’ responses. Furthermore, my own experiences and beliefs could have shaped how I interpreted the results, potentially emphasizing certain aspects while overlooking others that might not align with my familiarity. To mitigate these potential biases, I maintained reflexivity throughout the research process, continually reflecting on my personal position and its potential impact on the study.

To mitigate these limitations, the improvement science research design included a comprehensive root cause analysis, a literature review, examination of past events, and empathy interviews. By design, improvement science is tailored to specific settings (Bryk et al., 2015), so generalizability is not a primary concern within this framework. The intervention developed in this study was based on the identified problem of practice at Arts Academy, but it is possible to transfer and apply the intervention to other contexts. Additionally, improvement science emphasizes rapid cycles of change, although the period between intervention and implementation in this study was relatively short and did not significantly impact the results. Nevertheless, the study yielded several implications for practice.

Implications for Practice

Education is constantly changing, and researchers are focused on finding the best methods to educate students. Alongside this aim, they must also consider effective ways of developing teachers’ self-efficacy and TPACK (Mishra & Koehler, 2006; Moore-
Adams et al., 2016). This study sheds light on the experiences of teachers in District 8705 in South Carolina, presenting an opportunity to improve their professional development experiences. The findings suggest that taking a personalized approach when addressing teachers’ needs is crucial, and involving teachers in the development of professional development programs is essential. This involvement can include collaborative workshops, feedback sessions, and surveys, allowing educators to contribute their perspectives, preferences, and expertise. By tailoring professional development initiatives to the specific needs and preferences identified by teachers themselves, institutions can create more effective and engaging programs that resonate with the unique challenges and contexts of their educators. Interventions such as the use of instructional or professional development hubs is conducive to yielding short-term achievements and elevating teachers’ levels of self-efficacy.

The outcomes of this improvement research provide valuable insights that can guide the decisions and initiatives of district leaders, school administrators, and mentors committed to establishing lasting enhancements in the support provided to novice educators. By acknowledging the unique challenges faced by novice educators during the transition to virtual instruction, this research aims to provide nuanced and context-specific recommendations for fostering their professional growth and success. These key stakeholders can leverage the findings to formulate targeted strategies, structured programs, and actionable initiatives that directly target the unique requirements of new teachers. This approach will contribute to not only augmenting their professional advancement but also fostering their effectiveness and achievements within the broader education framework.
According to Bryk et al. (2015), improving teaching is not simply about working harder, but about working smarter. Along those lines, this study may inspire other districts to identify similar challenges and implement improvement strategies using data and methods from improvement science. Replicating this study in different districts and states can help systems evaluate new approaches to engaging teachers in professional development. Ideally, this study could be replicated in schools and districts nationwide to identify trends in challenges and create more opportunities for professional development. The problems highlighted by the participants in this improvement work may resonate with teachers in similar settings, providing additional intervention options. Regardless, districts can utilize teachers’ input in instructional hubs to identify problems and develop suitable strategies to address them.

In addressing the challenges of unprepared teachers, system leadership provides targeted professional development, encourages collaboration, and supports students’ social and academic well-being. Embracing failure is crucial for growth, and having a strong support system is essential for maintaining resilience during challenging times. Surrounding oneself with individuals who believe in the vision, offer guidance, and provide encouragement becomes a source of strength and inspiration. While focusing on strategies to assist unprepared teachers, the implications for system leadership play a central role in shaping a comprehensive approach.

**Impact of PDSA Cycles**

The PDSA cycle process offers a structured framework that helps individuals and organizations approach change systematically and adaptively. It provides a framework other can use to continuously improve their own practices. By following the PDSA
process, one can navigate through the complexities of change, increasing the likelihood of achieving meaningful and sustainable outcomes. It serves as a valuable guide for those seeking to implement change, offering a clear roadmap that emphasizes planning, taking action, studying outcomes, and making informed adjustments. Embracing this process allows others to understand that change is an iterative journey, where lessons learned from each cycle pave the way for successful and impactful transformations.

In reflection on the PDSA cycles, the transformative journey has deeply influenced my leadership approach. As I navigated the transition from a classroom teacher to a district office role, the iterative nature of improvement science imparted profound lessons. Primarily, I have learned the paramount importance of silence and active listening. This newfound emphasis on listening to the voices of those involved has become a guiding principle. It has taught me that understanding the perspectives of individuals on the ground is invaluable in making informed decisions.

Collaboration emerged as a central theme in this leadership evolution. Building and nurturing a cohesive team, where everyone holds ownership and responsibility, has proven to be a beautiful and effective strategy. This collaborative component not only fosters a network but also instills a deeper appreciation for the entire improvement process. Perhaps most significantly, the experience instilled in me the virtue of patience. In a leadership role, where deadlines and pressures abound, learning to patiently navigate the complexities and uncertainties has become a cornerstone of my approach.

In summary, the PDSA cycles have shaped me into a leader who values active listening, collaboration, and patience. These principles, acquired through the lens of
improvement science, continue to guide my leadership journey, ensuring a more informed, inclusive, and resilient approach.

The following section delves into the broader scope of educational leadership, and the significance of organizational strategies and collaboration to ensure sustained progress and holistic development, implication of the study for teachers, future directions and monitoring and recommendations.

**Implications for System Leadership**

Local education leaders, including principals, department chairs, and school district administrators, play a pivotal role in implementing the key findings of this study. The emphasis on an instructional hub tailored to teachers’ needs suggests that local leaders can proactively allocate resources and funding within their districts. This includes prioritizing access to professional development opportunities that align with teachers’ needs, as underscored by the importance of the hub in enhancing teacher self-efficacy, especially in rural areas with historically marginalized students (Vijayavarathan et al., 2022).

The study highlights the value of teacher-centered professional development and effective classroom management strategies. Local leaders should prioritize implementing such training within schools and districts, recognizing its impact on teacher self-efficacy, as evidenced by the reported increase in self-efficacy among teachers who completed the intervention. Integrating these strategies into local professional practices is crucial for fostering a supportive and growth-oriented teaching environment.

For optimal impact, local leaders should invest in the training of instructional hub facilitators, ensuring that the benefits of the hub extend to more teachers. While the study
presents initial findings from a limited sample, expanding professional development and hub facilitation locally can enhance teacher self-efficacy. Local administrators must recognize the value of ongoing professional development and to integrate it seamlessly into the fabric of district-level practices.

Additionally, local leaders, including principals and department chairs, can directly address teacher workload challenges. Strategizing and implementing ways to reduce teacher workload at the local level, based on the specific challenges identified in the study, is essential. School leaders can significantly impact self-efficacy and contribute to a supportive environment that aids teacher retention by evaluating and adjusting workload expectations, especially for new teachers (Ortan et al., 2021). Educators can effectively translate the study’s implications into actionable strategies within the immediate educational context by focusing on local leadership.

**Leadership Development and Impact**

Throughout the journey of this improvement science dissertation, the profound understanding I gained in improvement science has not only influenced the research process but also has transformative implications for leadership development. Recognizing the significance of continuous personal growth and development has been an enlightening aspect of this experience. The collaborative efforts of a highly skilled and dedicated team deepened my comprehension of the critical role of collaboration in conducting a successful study.

The commitment to the principles of improvement science has served as a guiding force, allowing exploring and testing transformative ideas for change. This commitment has facilitated the development of a robust plan aimed at ensuring the future success of
educators at the Arts Academy. Applying this scientific approach has not only opened the door to new possibilities but has also equipped me with the tools necessary for the continuous improvement of the educational environment.

As leadership principles unfolded in the context of improvement science, the focus of the research underwent several revisions and refinements. From the broad objective of enhancing teacher preparation for online teaching during the COVID-19 pandemic, the study crystallized into a clear and concise topic: "Instructional Hub: Bridging the Gap in Teacher Preparation for Online Teaching."

Explicitly connecting the lessons learned in leadership development to improvement science principles becomes imperative. The commitment to teachers at Arts Academy was not merely about solving a problem but giving voice to their untold stories. Understanding the challenges faced during the unprecedented pandemic and diligently researching solutions led to creating a comprehensive plan. This plan addresses the immediate need to prepare teachers for online teaching and positions itself as a guide for future disruptions, such as transitioning to e-learning.

**Implications for Teachers**

In the context of this study, the focus is not solely on instructing teachers about reassignment or changes but rather engaging in meaningful face-to-face conversations that acknowledge their individuality, personal lives, and careers. It is a departure from the conventional approach of simply informing teachers about reassignments without providing context or considering the impact on their lives. The study emphasizes the importance of treating teachers as individuals with families, careers, and personal responsibilities. This shift in perspective encourages leaders to step into the shoes of their
teachers, fostering a deeper understanding of their unique circumstances. Additionally, the study advocates for transparent communication, explaining the reasons behind potential changes and highlighting the significance of these decisions. By taking a more empathetic and communicative approach, the study aims to enhance the overall experience for teachers, recognizing them not just as professionals but as individuals deserving of understanding and consideration.

**Future Directions and Monitoring**

Delving into future directions and implementing continuous monitoring is vital for the ongoing development of this study. This aligns seamlessly with the recommendation discuss future avenues, including assessing the developed website's effectiveness and gaining insights into its user base. The website, born out of the necessity to provide support and resources during a challenging period, now stands as a valuable tool. This dissertation provided the space to discuss the ongoing monitoring strategies that can be implemented to assess the impact of the website. This includes evaluating who is using it, why they are using it, and the effectiveness of the resources provided. The continuous assessment of its utility will not only contribute to its refinement but will also inform future initiatives.

In essence, the instructional hub provides a different approach versus the website. The instructional hub is frequently updated to help support teachers with online instruction. It can serve as a springboard for future leadership development and strategic planning in the ever-evolving landscape of educational challenges.
Recommendations for Future Improvement Work and Research

In addition to policy recommendations, the current study suggests several areas for future research. Firstly, future studies could involve participants from multiple schools to gather a more diverse group with varied experiences and challenges. This approach would provide a broader perspective on the problems teachers face. Secondly, investigating the impact of different teacher preparation programs on teachers’ professional development needs and the specific challenges they encounter would be valuable. While there is a lack of adequate research focusing on virtual learning, delving deeper into this subject through subsequent research could unveil valuable insights into the specific forms of support that teachers need. This comparison could also shed light on the self-confidence levels of teachers who underwent alternative certification. Another research approach could involve comparing in-service teachers (i.e., those already teaching) with pre-service teachers (i.e., those still in training) to understand similarities and differences in the problems they face and the interventions discussed in instructional hub settings. Research could also lay emphasis on school–university partnerships for teacher professional development and enhancing self-efficacy (e.g., Bebas, 2016). Lastly, a study focusing on pre-service teachers enrolled in a traditional teacher preparation program that implements professional development would be beneficial (e.g., Bamrungsin & Khampirat, 2022). This study could explore whether participation in professional development programs supports a smoother transition into the teaching profession.

Building upon the current study, the next steps for enhancing the online hub and its connection to teacher practice and efficacy involve a targeted focus on implementation
and continuous improvement. Firstly, conducting regular needs assessments with teachers who actively engage with the hub will help identify evolving challenges and preferences. This ongoing feedback loop can inform iterative updates to the hub’s content and features, ensuring its continued relevance. Secondly, implementing a mentorship or peer support system within the online hub can further enhance its impact. Creating a space for teachers to share best practices, seek advice, and collaboratively problem-solve can foster a sense of community and deepen the hub’s integration into daily teaching practices.

Additionally, exploring the feasibility of integrating real-time collaborative features within the hub, such as virtual workshops or interactive forums, could elevate the hub’s role as a dynamic platform for professional growth. This would provide teachers with opportunities for real-time collaboration and shared learning experiences. Lastly, evaluating the longitudinal impact of the hub on teacher practice and efficacy over an extended period would contribute valuable insights. Tracking teachers’ professional development journeys and correlating hub engagement with measurable improvements in teaching practices and self-efficacy can provide evidence of the hub’s long-term effectiveness.

**Leading Improvement**

Having delved into the implications and recommendations derived from the study, I would like to reflect on the dissertation in practice journey that has proven to be simultaneously demanding and deeply rewarding. I have come to understand that in improvement science, there are no instant solutions to problems. Rather, it is about making consistent and gradual progress over time. The beauty of this approach lies in its flexibility, allowing for adjustments to the plan if the current approach is not yielding the
desired results. This adaptability benefits every member of the improvement team, providing a sense of empowerment and collaboration. Although I must acknowledge that dedicating time to finding solutions and ensuring the proper implementation of change can be demanding, the long-term benefits far outweigh the challenges in the pursuit of continuous improvement. Witnessing this study’s positive impact on teachers at Arts Academy inspired me to keep pushing forward, knowing our efforts will continuously impact change for teachers and students alike in the future.

This improvement science dissertation has been a transformative journey. It has allowed me to delve into the depths of improvement science and understand the significance of continuous growth and professional development. With the support of an efficient improvement team, I have explored change ideas, created plans, and shared teachers’ powerful stories of the COVID-19 pandemic. Embracing continuous improvement principles has further enriched this experience, empowering us to make a lasting impact on the lives of educators and students alike. I am eager to see how this research will pave the way for preparing educators to face future challenges with resilience and innovation.

Throughout this process, my team and I focused on continuously improving our approach. We closely examined the problem at hand and actively sought out solutions. I consider myself fortunate to have had a team that wholeheartedly believed in my vision. Their leadership experience and unique perspectives allowed us to generate ideas and brainstorm ways to enhance the conditions at Arts Academy, ultimately creating a positive impact for educators in the future. Our team clearly shared a strong belief in the greatness of Arts Academy as an exceptional learning environment for all students. This
shared commitment to continuous growth proved to be an invaluable asset for our research. When considering how to implement change, one must have a team with a change mindset and individuals who can dedicate the necessary time and effort to make change happen.

In the context of my improvement setting, I played the role of an insider. As an educator at Arts Academy and a member of the leadership team, I had a seat at the table to provide feedback on instructional practices at the school. This insider perspective greatly influenced how I approached and led this research study. One of the most significant lessons I learned about leadership during this time was the importance of recognizing that what may seem like a great idea to me may not resonate with others. It was a valuable reminder to remain open-minded and receptive to diverse viewpoints. Additionally, I learned the significance of embracing failure as a learning opportunity. Improvement science allowed me to fail, adapt my plans, and adjust my ideals until I discovered what truly worked. Furthermore, I recognized the importance of actively listening to others on my team who supported my vision. While being a visionary leader is admirable, having contingency plans and actionable steps in place to navigate challenges and setbacks is equally important. There were moments throughout this process when I felt compelled to give up, but my promise to the teachers involved in this research motivated me to persevere and fulfill the plan we had set in motion.

Moving forward, the next steps for the improvement team involve continuing our work on the internal hub and consistently adding resources to assist teachers in online teaching. Given the unpredictable nature of weather-related e-learning days or safety
threats, teachers must be well-prepared to teach online. This ongoing effort will provide educators with the vital tools they need to navigate the ever-evolving field of education.

**Conclusion**

The findings from this improvement science action research indicate that the instructional hub served as a solid foundation for future professional learning. Implementing an instructional hub as an intervention for professional development has shown promising results in addressing teachers’ low self-efficacy. This improvement work offers valuable insights into the practices established in the field of improvement science and high-quality professional learning, presenting a roadmap for educators to implement activities that contribute to the creation of a systemic professional learning framework through an instructional hub. Although this research does not provide empirical evidence of efficacy or effectiveness, through improvement science action research, the study presents a disciplined methodology for developing models of strategies and activities that can ultimately lead to the establishment of professional learning systems, such as instructional hubs, tailored to meet the specific needs of local and regional contexts.

The pursuit of improvement research is not a short-term endeavor; it requires dedication and a long-term perspective. Progress takes time, and the changes we make today may not yield immediate results. Nevertheless, knowing our efforts will have a positive impact on future generations serves as a powerful motivator. It fuels our determination to push forward, to overcome obstacles, and to continuously seek ways to make a meaningful difference. In this pursuit of a better future, one must be prepared to dedicate their life to the cause. Improvement research is not merely a job; it becomes a
way of life. It demands commitment, perseverance, and an unwavering belief in the potential for positive change. It requires a passion that goes beyond personal gain and a willingness to contribute to something greater than oneself. Reflecting on my journey of continuous improvement and research, I realize how transformative it has been. It has challenged my preconceived notions, expanded my perspectives, and pushed me to explore new possibilities. With the support of my dedicated team, I identified and addressed challenges at Arts Academy, paving the way for growth and progress.

As I look to the future, my commitment and dedication remain unwavering. I recognize the evolving landscape of education and the need to equip teachers with the necessary resources for effective online teaching. By enabling teachers to share their experiences and processes, I aimed to assist teachers in navigating the challenges they faced with not being prepared to teach online through fostering improvement at Arts Academy. Moreover, I understand the value of a system leadership approach that fosters collaboration, empowers individuals, and drives innovation across the entire educational ecosystem. In conclusion, the path of improvement research is not without its obstacles, but with a mindset that embraces failure, a strong support system, and an unwavering commitment to creating a better future, practitioners can overcome challenges and make a lasting impact. Together with my improvement team, I have continued to push the boundaries of what is possible, inspire change, and contribute to a world where improvement and progress are constant.
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APPENDIX A

DIRECTOR OF THE VIRTUAL ACADEMY INTERVIEW QUESTIONS

1. Why was the Virtual Academy developed?
2. What was the hiring process to fill positions?
3. How did you prepare teachers with no virtual experience?
4. Presently, how is the Virtual Academy doing?
5. What were your challenges as the principal of the Virtual Academy as related to teacher support?
APPENDIX B

TEACHER EMPATHY INTERVIEW QUESTIONS

The following list of questions was used as an outline for the empathy interviews. Where appropriate, the interviewees were asked to expand upon their answers.

1. How much, if at all, has your life been disrupted by the coronavirus outbreak?
2. Would you say that your teacher preparation program adequately prepared teachers to facilitate online learning?
3. How relevant has the professional development you received since the start of the coronavirus outbreak been in relation to teaching online?
4. How was your experience teaching students from home as compared to teaching at school?
5. How important is the role of technology in remote learning?
6. How important is teacher support when teaching virtually?
7. Did you receive training and support for teaching using the dual-modality method?
8. If you received additional training and support, do you believe it would have been more effective with your teaching?
9. Did you have any voice in the environment that you taught in during the 2020–2021 school year?
10. Did your school provide you with support with teaching in a virtual environment?
APPENDIX C

RESEARCH PARTICIPATION FLYER

Have You Had Problems Teaching in Multiple Settings?

Volunteer to participate in a research study at the University of South Carolina on Instructional Hub: Bridging the Gap in Teacher Preparation for Online Instruction

The purpose of this dissertation was to find a solution that could significantly enhance teacher preparation for virtual teaching through more intensive academic support and professional development.

To be eligible to participate in this research study, you must have taught in a virtual environment and be willing to participate in a 30-minute interview.

ALL PARTICIPATES WILL RECEIVE A $10 Gift Card

For more information please contact Charity Simmons (###) ###-#### or email xxx@xxx.com
Dear Ms. Simmons,

Thank you for considering our district for your research study. You do not need our permission to survey our staff. Please be reminded that [the district] has not endorsed your survey and research study. Survey links cannot be forwarded by our staff. Our district staff directory is available online: [redacted URL]. Please be reminded that our staff has the right to decline participation in your study. If you have any questions, please contact me at your earliest convenience.

Best wishes!

[name redacted]
Coordinator of Assessment, District Test Coordinator
Office of Planning and Administration, Department of Accountability
APPENDIX E

IRB APPROVAL LETTER

Re: Pro00108909

Dear Charity Simmons:

This is to certify that the research study Teachers Perceptions and Experiences with Teaching in a Hybrid and Virtual Setting during the COVID-19 Pandemic was reviewed in accordance with 45 CFR 46.104(d)(2) and 45 CFR 46.111(a)(7), the study received an exemption from Human Research Subject Regulations on 5/24/2021. No further action or Institutional Review Board (IRB) oversight is required, as long as the study remains the same. However, the Principal Investigator must inform the Office of Research Compliance of any changes in procedures involving human subjects. Changes to the current research study could result in a reclassification of the study and further review by the IRB.

Because this study was determined to be exempt from further IRB oversight, consent document(s), if applicable, are not stamped with an expiration date.

All research related records are to be retained for at least three (3) years after termination of the study.

The Office of Research Compliance is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). If you have questions, contact Lisa Johnson at lisaj@mailbox.sc.edu or (803) 777-6670.

Sincerely,

Lisa M. Johnson
ORC Assistant Director and IRB Manager
APPENDIX F

PARTICIPATION LETTER: TEACHERS

Dear [Recipient’s Name],

Greetings,

I am Charity Simmons, a doctoral candidate within the Educational Leadership and Policies Department at the esteemed University of South Carolina. With the utmost respect for your expertise, I extend to you an invitation for scholarly collaboration.

My current research focuses on understanding teachers' perceptions and experiences in virtual teaching during the COVID-19 pandemic. As part of this endeavor, I am humbly inviting you to contribute your valuable insights. Your participation would involve completing a brief survey and engaging in a virtual interview. The interview, to be conducted via Google Meet, will allow us to delve deeper into your experiences with virtual teaching. Your comfort is paramount, and you are under no obligation to answer any questions that make you uncomfortable.

Your busy schedule is deeply appreciated. The interview session will be held at a time convenient for you during the 2021-2022 school year. Rest assured, the interview will be recorded solely for transcription purposes and will be deleted once the study concludes. Your privacy and confidentiality are of paramount concern; your identity will be protected at all times. No identifying information should be added to any study materials.

In recognition of your time and expertise, a $10 Visa Gift card will be extended as a token of gratitude for your participation. If you have any inquiries or concerns, both I and my faculty advisor, Dr. Peter Moyi, are readily available to address them. Feel free to reach out to me at (###) ###-#### and/or XXX@XXX.com, or contact Dr. Moyi at (###) ###-#### and/or XXX@XXX.com.

Should you choose to embark on this scholarly voyage, kindly accept the Google invitation for the survey and sign the attached consent form. Upon completion, you may coordinate the interview time at your convenience.

Your potential contribution to this study holds immeasurable value. I extend my heartfelt appreciation for your thoughtful consideration.

Warm regards,
Charity Simmons
APPENDIX G

IMPROVEMENT TEAM EMAIL INVITATION

From: charity simmons <charity_simmons@yahoo.com>
Date: November 3, 2021 at 9:38:06AM EDT
To: [redacted email addresses]
Subject: Research Improvement Team
Reply-To: charity simmons <charity_simmons@yahoo.com>

Good morning,

I would like your assistance in serving on my research improvement team. I am conducting an improvement science research study that will explore teachers' perceptions and experiences with teaching in a virtual environment during the COVID-19 pandemic. To serve on this improvement team would require you to attend monthly virtual meetings and analyze data to help inform our virtual instructional practices. Teacher preparation is a topic that is dear to my heart and I believe that we can make a positive impact in the lives of teachers if we teach them how to use the instructional tools they need to be successful. If you agree to participate in the improvement team please respond to this email. Please contact me if you have any questions or concerns. I look forward to hearing from you soon.

Charity Simmons, Ed.S.
[redacted school name]
Foods and Nutrition Teacher
APPENDIX H
INSTRUCTIONAL HUB SURVEY

1. Gender
   Male
   Female
   Nonbinary

2. Ethnicity
   Black
   White
   Hispanic
   Asian American
   Biracial
   Other

3. Years of teaching experience
   0–5
   6–10
   11–15
   16–20
   21 or more

4. On a scale from 1–5, rate the instructional hub, 5 being the highest rating.
   1-Poor
   2-Needs Improvement
   3-Fair
   4-Great
   5-Excellent

5. On a scale from 1–5, rate the resources in the hub, 5 being the highest rating.
   1-Poor
   2-Needs Improvement
   3-Fair
   4-Great
   5-Excellent

6. Do you feel like the resources in this instructional hub will help to improve virtual instruction?
7. Do you have any experience teaching virtually?
   Yes
   No

8. Do you believe this instructional hub will improve teachers’ self-efficacy to help improve online instruction?
   Yes
   No

9. Do you think you will use this instructional hub for the next emergency e-learning day?
   Yes
   No
   Maybe

10. Do you believe you will benefit from an instructional hub and professional development to help you teach virtually?
    Yes
    No
    Maybe
APPENDIX I

INSTRUCTIONAL HUB FLYER

Would you like to increase your virtual teaching instructional strategies?

Volunteer
to participate in a research study at the University of South Carolina on Instructional Hub: Bridging the Gap in Teacher Preparation for Online Instruction

The purpose of this dissertation was to find a solution that could significantly enhance teacher preparation for virtual teaching through more intensive academic support and professional development.

To be eligible to participate in this research study, you must have taught in a virtual environment and be willing to review an instructional hub and complete a survey.

ALL PARTICIPANTS WILL RECEIVE A

$10 Visa Gift Card

For more information please contact Charity Simmons
(###) ###-#### or email xxx@xxx.com
APPENDIX J

IMPROVEMENT MEETING NOTES

December 13, 2020

All members present

Improvement Science: identifying underlying problems, identify potential changes, test potential solutions

Research Topic: Teacher perceptions and experiences with preparation to teach in a virtual environment during the pandemic.

The Five Whys: Repeatedly asking why to get to the root of the problem.

Why were teachers unprepared to teach in a virtual environment during the COVID-19 pandemic?

● The pandemic was unprecedented, had never happened before.
● Technology was only used in a supporting manner before the pandemic, teachers did not know how to adapt it to be the focus.
● No professional development or training around virtual learning – was planned for the year after the pandemic began.
● Teachers’ home settings and environments were not prepared to support a whole family working and learning at home.
● Some teachers were uncomfortable with using technology in the classroom, and were very unprepared for using technology with students remotely.
● Teachers were not trained to engage unmotivated students virtually.
● Students were not given expectations before going virtual due to the nature of pandemic.
● No blueprint or schedule for the future.
● Some classes (science especially) are not set up to conduct labs virtually due to resources and safety concerns.

Fishbone Diagram: on Google Slide from today’s meeting

January 10, 2021
All members present

- Improving Teacher Preparation in a virtual environment
  - Virtual content area resources (located on school Google website)
    - Contains lesson plans for subs/other teachers to access
    - Not content specific - all areas open to all teachers (especially beneficial to special ed/resource teachers who work with their students across all subjects)
    - Virtual page on Google site for easy access/proximity to all other resources
    - Library of exemplary virtual lessons (both written plans and recorded meet video) for new teachers to have as they create their virtual plans
    - Notes/instructions on how to apply virtual strategies to all subjects/content areas
  - Virtual emergency lesson plans PD (skinny robin sessions)
    - Consider which type of virtual learning needs planning for (e-learning vs. synchronous, live instruction)
    - Teachers required to create plans for 1 day of each virtual learning types at beginning of year for emergency/unplanned/last minute virtual days
    - Establish school wide standards for what virtual learning should look like for both teachers and students
      - Expectations for student engagement, time on Google Meet, type of assignment, etc.
    - Implement “practice” days similar to fire drills - conduct school “virtually” while students are present and in building to establish expectations, work out kinks/problems, troubleshoot any issues before they occur in a virtual setting
  - Teacher support with technology leaders
    - Establish a web of support - contact information, planning periods, locations, specific information regarding technological/virtual learning support - for teachers to access.
    - All information in one place, provides resources for new teachers/personnel new to school

February 10, 2021

Introduction to PDSA Cycle

Plan
- Theory to test
  - Effect of teacher preparation on student engagement
- Prediction
  - Student engagement in the virtual classroom will mirror classroom engagement
How do we measure student engagement?

- Must be quantifiable
  - Percent of students completing work/raising hand/messaging in chat/etc.?
  - Create a formula for student engagement to effectively measure success - remember that engagement looks different in every classroom/content area/teacher/student

March 31, 2021

Do

- Recorded lessons - having trouble getting from teachers
  - How to solicit lessons from teachers?
  - Time issues at end of year - no one has extra time to find/send/pull together virtual plans
- Practice E-Learning day in Fall in order to establish expectations for teachers and students regarding e-learning/virtual learning
- Bundling virtual lessons/emergency lesson plans by department for easy access by all teachers across all content areas
  - Utilize Google site? Already established and everyone has access
    - Could use a Google Classroom to collect information/lessons to upload to Google site
  - Any teacher can access any content area
  - Allows new teachers to access already done, executed lessons that we know work instead of expecting them to come up with exemplary virtual lessons
  - Allows teachers covering other classes to access lessons to not waste instructional days
- Reframe emergency lesson plans/emergency virtual plans from being another thing teachers have to do to creating resources to help and reduce workload
  - Teachers can submit now and reduce time used at beginning of year workdays for emergency lesson plans.

April 4, 2021 (Meeting Cancelled)

May 10, 2021

Faculty Meeting next Tuesday
- Presentation on Instructional methods for virtual and e-learning days
- Sharing teacher expectations for the Fall of 2021 for classroom instruction, virtual learning and e-learning

Round robin sessions will be held in August 2021 during teacher in-service sessions (mini-PD)
Carrabba’s Dinner Celebration- Improvement team final celebration Tuesday 5.17

Survey for teachers at the end of skinny robin session
  • Focused on determining whether teachers feel they can successfully develop and teach virtual lesson plans after the round robin session in Fall 2021

April 25, 2023

Welcome Back!
  • Updates and Feedback from COMPS
  • Action Plan (Reviewing the current three lessons)
  • Completing the Instructional Hub
  • Survey of the Hub- who will review the hub? How many participants do we want to complete the survey? CTE Teachers will review the hub and survey since they are already familiar with the research study.
  • Redo flyer for second round of recruitment
    -(name redacted) will post it in the CTE Google Classroom

May 16, 2023

  • Survey Finding- Findings from the survey’s-teachers found the hub to be beneficial.
  • Next Steps- Share the findings with the Admin team
    - In August 2023 share the live Hub with (name redacted) staff.
  • PDS-Proposal submitted for the PDS conference in Oct.