Rethinking Teacher Education: The Impact of a K-12 Online Learning Curriculum on In-Service Teachers

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Abstract: This action research study examines the integration of K-12 online learning curriculum in a graduate instructional technology course aimed at preparing in-service teachers for online teaching environments. Through a cycle of curriculum implementation, data collection, and analysis, the study highlights the evolution of teachers' perceptions, identifying both the benefits and challenges of online education. Findings suggest that curriculum changes can significantly impact teachers' understanding and attitudes, though the study is limited by its small sample size and single-site context. Despite these limitations, the study offers valuable insights for teacher education programs seeking to incorporate online teaching components. Future research should consider expanding to multiple sites and updating curriculum content to reflect post-pandemic experiences in digital learning environments.

Keywords: teacher education, online learning, higher education innovation, digital learning curriculum, graduate education, instructional technology, online learning curriculum

Repenser la formation des enseignants : L'impact d'un programme d'apprentissage en ligne, pour les niveaux préscolaire, primaire et secondaire, sur les enseignants en exercice

Résumé: Cette recherche-action étudie l'intégration d'un programme d'apprentissage en ligne allant du préscolaire au secondaire dans un cours de technologie éducative de niveau supérieur destiné à préparer les enseignants en exercice aux environnements d'enseignement en ligne. À travers un cycle d'implémentation du programme, de collecte et d'analyse de données, l'étude met en lumière l'évolution des perceptions des enseignants, identifiant à la fois les avantages et les défis de l'éducation en ligne. Les résultats suggèrent que les modifications curriculaires peuvent influencer significativement la compréhension et les attitudes des enseignants. Bien que l'étude soit limitée par la taille réduite de son échantillon et son contexte unique, elle offre des perspectives précieuses pour les programmes de formation des enseignants souhaitant intégrer des composantes d'enseignement en ligne. Les recherches futures devraient envisager d'étendre l'étude à plusieurs sites et de mettre à jour le contenu du programme pour refléter les expériences post-pandémiques dans les environnements d'apprentissage numérique.

Mots-clés: formation des enseignants, apprentissage en ligne, innovation dans l'enseignement supérieur, programme d'apprentissage numérique, formation supérieure, technologie éducative, programme d'apprentissage en ligne

Introduction

The COVID-19 pandemic caused the largest education system disruption in history, forcing many schools to rapidly transition to remote instruction. This abrupt shift highlighted significant gaps in teacher education related to developing skills necessary for effective teaching in digital environments (Johnson et al., 2023; Trust & Whalen, 2021). While it is important to acknowledge the difference between *emergency remote learning* and the intentionally planned and executed online learning that has developed over decades (Barbour et al., 2020), the pandemic exposed an insufficient teacher knowledge base for the implementation of effective practices in K-12 online teaching and learning (Azukas, 2020; Barbour et al., 2020; Johnson et al., 2023; Trust & Whalen, 2021). This lack of preparedness for implementing effective practices in K-12 online teaching during emergency remote learning has had serious consequences. Numerous studies have identified learning loss and an increase in dropout rates post-pandemic (Donnelly & Patrinos, 2022; Engzell et al., 2021; Moscoviz & Evans, 2022).

This deficiency in teacher skill sets for online instruction should not have been unexpected. Over the past 15 years, research has consistently indicated that very few teacher preparation programs offer coursework or field experiences related to online teaching (Johnson et al., 2023). This long-standing gap has left many educators unprepared to effectively design and deliver online instruction, which is likely to have a negative impact on students. Although the

pandemic has passed, school districts continue to use remote instruction when schools are unable to open (Barbour et al., 2020; Digital Learning Collaborative, 2014). Additionally, many school districts developed their own online programs during the pandemic and have to hire qualified staff to operate them (Gile, 2021). Finally, although there are challenges with determining the exact number of students exposed to online education, the data we do have indicates that enrollment in online education and participation in digital learning activities continues to increase (Digital Learning Collaborative, 2024). All of this underscores the urgent need for curriculum reform in teacher preparation programs to address online teaching and learning. One way to address this need for reform, at least at a local level, is through a cyclical process designed to continually improve curriculum—such as the action research process (Craig, 2009; Stringer, 2004).

In this article, we outline the ongoing initiative to improve the preparedness of K-12 teachers for online teaching and learning by adding a K-12 online learning curriculum to a graduate instructional technology course. We begin with a review of the literature on K-12 online teacher preparation and an overview of previous iterations of the study. We then present findings from the sixth cycle of this action research project. Finally, we discuss the implications of these findings, highlighting their potential to influence future iterations of the study and contribute to the broader field of teacher education.

Literature Review

Over the past few decades, K-12 online learning has expanded rapidly, with millions of students now participating in some form of online or blended instruction (Barbour, 2019; Digital Learning Collaborative, 2024; Schroeder, 2019). Gulusino and Miron (2017) reported that enrollment in full-time blended learning schools increased from 2,500 students in 2009 to over 25,000 students in 2014. Today, most schools in the United States have used some form of online or blended instruction, at least on a limited basis, such as for a single course type or as an emergency alternative to in-person instruction (Johnson et al., 2023). Projections suggest online and blended learning will continue to expand post-pandemic, driven by the significant investments in infrastructure and digital resources many districts made during COVID-19 (Short et al., 2021). This trend highlights the importance of preparing teachers who are skilled in delivering effective instruction across various modalities.

Despite the growth of online and blended learning, teacher preparation programs have been slow to adapt their curricula to equip pre-service and in-service teachers with the skills needed for teaching in online environments (Archambault et al., 2016; Archibald et al., 2020; Kennedy & Archambault, 2012a; Franko, 2021; Johnson et al., 2023). This disconnect became starkly apparent during the COVID-19 pandemic, when schools were forced to shift to remote instruction with little notice, leaving many teachers feeling unprepared to meet the needs of their students in an online setting (Cavanaugh & DeWeese, 2020;

Clausen, 2020). Teachers reported challenges in areas such as maintaining student engagement, managing online communication with families, and addressing student isolation, all of which require specialized skills not traditionally covered in teacher preparation programs (Clausen, 2020; Woo et al., 2023).

Research has shown that teaching online requires some distinct skills and competencies compared to traditional face-to-face instruction (Barbour, 2012; Barbour et al., 2013; Clausen, 2020; Friend & Johnston, 2005). Online teachers need to master asynchronous communication, manage student engagement without physical oversight, and foster a sense of community in the absence of in-person interaction. However, there is still limited empirical research defining the specific skills needed for effective online teaching and validating these competencies (Martin et al., 2023; Moore-Adams et al., 2016). Early efforts to address this gap included initiatives such as Good Practice to Inform Iowa Learning Online (ILO) and Teacher Education Goes Into Virtual Schooling (TEGIVS), which used case studies of exemplary online courses to introduce pre-service teachers to different roles in virtual schooling (Davis & Roblyer, 2005; Davis et al., 2007). Some universities also began offering virtual field experiences and graduate certificates in online teaching (Kennedy & Archambault, 2012b; 2013). However, these efforts remained relatively isolated (Franko, 2021).

Multiple studies over the past 15 years have found that only a small percentage of teacher preparation programs offer any field experiences or

coursework related to K-12 online learning. For example, Kennedy and Archambault (2012a) and Archambault et al. (2016) reported that only 1.3% to 4.1% of responding teacher education programs offered online field experiences. Additionally, Rice and Dawley (2017) found that less than 40% of K-12 online teachers received any training specific to online instruction before beginning to teach online. A more recent survey by Webb et al. (2021) reported that only 24% of teachers surveyed had received any preparation in this area. Studies outside of the United States have supported these findings (Archibald et al. 2020). This lack of preparation leaves many teachers without the essential skills needed to teach effectively in online environments, despite the growing prevalence of these settings.

The COVID-19 pandemic highlighted the critical need for changes in teacher education. Studies during the pandemic found that many teachers, even those with prior educational technology training, struggled to adapt to fully online instruction (Farhardi & Winton, 2021; Francom et al., 2021; Howard et al., 2021; Lahr & Welch, 2023; Trust & Whalen, 2021). The abrupt shift exposed issues around student isolation, relationship-building, and inequities that teacher preparation programs need to address (Woo et al., 2023).

Some researchers have argued that the pandemic presents an opportunity to reimagine teacher education more broadly. Suggestions include preparing candidates for short-term adaptations to crises, integrating technology throughout preparation rather than in standalone courses, and addressing issues

like mental health and equity that became more prominent during remote learning (Hill et al., 2020; Van Nuland et al., 2020). Moving forward, researchers emphasized the need to apply insights from the pandemic experience to improve teacher preparation for online and blended learning environments (Bartlet, 2022; Crompton et al., 2022; Reich, 2021; Woo et al., 2023). This could involve shorter, more varied field experiences rather than adding separate online components. It may also require broader negotiations between stakeholders to modernize teacher education regulations and accreditation standards (Al-Ansi, 2022; Hill et al., 2020). However, expanding teacher education programs to include these competencies requires balancing a range of competing demands. Programs are already tasked with meeting rigorous standards across multiple domains, including classroom management, subject-specific pedagogy, and cultural competency, making it challenging to add more requirements without overwhelming pre-service teachers (Graziano & Bryans-Bongey, 2018).

While the pandemic created many challenges for teacher preparation, it also generated new research and highlighted the importance of preparing educators for technology-mediated instruction (Johnson, 2023). As online and blended learning continue to grow, teacher education programs will need to evolve to equip new teachers with the skills to be effective in diverse instructional settings. To address these challenges, Hodges et al. (2022) outlined six key steps that better prepare teachers for online instruction:

1. Develop and adopt research-based standards for online teaching.

2. Create validated instruments to assess online teaching competencies.

3. Provide pre-service teachers with more experiences as online learners.

4. Incorporate specific coursework on online pedagogy into teacher preparation.

5. Require online field experiences for teacher candidates.

6. Include online learning preparation in accreditation standards.

This paper aims to advance these goals by examining how an online learning curriculum implemented in a higher education setting impacts pre-service and in-service teachers' understanding of online learning environments.

Methodology

This study builds on an ongoing action research project examining the addition of K-12 online learning curriculum materials in a graduate level technology course entitled Internet in the Classroom. The course is an elective for graduate instructional technology programs. In the Midwestern state where the course is taught, the course is mandatory for a graduate certificate in online teaching and the K-12 teaching endorsement in educational technology. The research employs an iterative cycle of data collection, analysis, and course revision, with this study representing the sixth cycle. Table 1 outlines the cycles of data collection.

Table 1: *Data Collection Cycles*

Cycle	Year	Semester	Instructor
Cycle 1	Year 1	Winter	Instructor1
Cycle 2	Year 2	Winter	Instructor1
Cycle 3	Year 2	Summer	Instructor1
Cycle 4	Year 3	Winter	Instructor1
Cycle 5	Year 4	Winter	Instructor1
Cycle 6	Year 4	Summer	Instructor2

Previous cycles of the research have been reported in separate articles (Azukas & Barbour, 2021; Barbour & Siko, 2020; Barbour & Unger, 2009; Barbour & Unger-Harrison, 2016; Siko & Barbour, 2022).

This study explores two main questions:

1. *What are in-service teacher perceptions of K-12 online learning?*
2. *How do those perceptions influence future course design?*

The first question, initially proposed during the study's inception (Barbour & Unger-Harrison, 2016) was replicated from Compton et al. (2010), which focused on a similar intent and content. As action research became a focus in subsequent course offerings, the second question was added. Action research is an appropriate research methodology for this study due to its inherent cycle of

data collection, analysis, and revision aimed at improving educational practices (Mertler, 2020; Stringer & Aragón, 2020).

The Setting

The study took place in a large, urban public research university in a Midwestern state. The graduate course, which was offered in an online format, was one of five courses required for the state's educational technology teacher certification endorsement. The state's technology standards had been revised to reflect the need for K-12 teachers to have more education related to K-12 online learning. The course was framed around the roles teachers might find themselves performing in the K-12 online learning environment: designer, teacher, and facilitator.

The course focused on social media tools as they related to online learning environments. The K-12 online learning content was based on curricular materials developed as part of the following:

- ILO case studies designed to explore the role of the online teacher;
- TEGIVS scenarios designed to explore the role of the online local facilitator; and
- Local versions of case studies based on online teachers in the Midwestern state.

Participants and Data Collection

Data collection was consistent with previous iterations of the study, and data sources included course artifacts and course evaluations. All learners completed reflective blogging based on class readings, an individual project using TEGIVS scenarios, ILO case studies, readings, independent sources, and a group project requiring learners to produce a presentation and a short, written report about a fictionalized scenario. Five of the seven pre-service teachers enrolled in the course, two females and three males, consented to have their data used in the analysis. Pseudonyms were used in presenting the results. Additionally, course evaluations consisting of both selected-response and open-ended questions were used. Evaluations were optional for learners to complete.

Data Analysis

Data were analyzed using inductive coding to identify themes and patterns within data without preconceived categories or hypotheses (Boyatzis, 1998). This approach allowed the themes to emerge organically from raw data, ensuring that the analysis was grounded in the participants' perspectives and experiences. The first step in this process was data familiarization. The researcher began by reading all of the collected data multiple times to become familiar with the data, and to begin identifying potential themes and patterns. Next, the researcher began generating initial codes from the data by highlighting significant segments of the data and assigning them labels and

codes. A *good code* is one that effectively captures the qualitative richness of the phenomenon (Boyatzis, 1998, p. 1).

Once the initial codes were generated, the researcher grouped the codes into potential themes. Themes were broader patterns that capture important aspects of the data in relation to the research questions. Boyatzis (1998) defined a theme as "a pattern in the information that at minimum describes and organizes the possible observations and at maximum interprets aspects of the phenomenon" (p. 161). After identifying potential themes, the researcher reviewed and refined them, checking the themes against the data to ensure they accurately represented the underlying patterns. Finally, the researcher defined and named the themes through a detailed analysis of each theme, paying careful attention to the scope and focus of the themes to ensure they capture the nuances in the data.

Results

The qualitative results of this study reveal a nuanced evolution in the perceptions of in-service teachers regarding K-12 online learning. Initially, the in-service teachers exhibited a lack of awareness and predominantly negative views about online education, coupled with misconceptions about the demographics and capabilities of online learners. As the course progressed, however, exposure to the TEGIVS scenarios and the case studies led to a notable shift in attitude and understanding. Themes that emerged from the data highlight a growing recognition amongst in-service teachers of the benefits of

online learning, including enhanced access, flexible scheduling, and improved communication with instructors. Their increased understanding prompted the in-service teachers to identify key success factors for online learning. Despite recognizing some of the affordances of online learning, the in-service teachers identified concerns and challenges such as the need for hands-on experience in certain subjects and the need for adequate technological resources. Additionally, they expressed concerns related to the mandated expansion of online learning and the funding of for-profit schools without additional research.

The sections that follow address the five themes that emerged from the data analysis including:

- Initial lack of awareness and negative perception of online learning;

- Affordances of online learning;

- Challenges associated with online learning;

- Online learning success factors; and

- Healthy skepticism, caveats, and a call for further research.

Initial Lack of Awareness and Negative Perception of Online Learning

Prior to enrolling in the technology course, the in-service teachers demonstrated a lack of familiarity with online learning at the K-12 level. Their understanding of the diverse student body that engages in online courses was

markedly limited, and they held predominantly negative views toward this educational modality. For instance, Calvin admitted in his initial blog post, "I do not currently know much about K-12 online learning." This sentiment was echoed by Rachel who noted, "I'm not entirely sure of how it's done." Ed admitted that his idea of K-12 online learning was completely shaped by his own experience in using Blackboard for an online course. These initial reflections highlight the in-service teachers' limited awareness of K-12 online learning, which led to misconceptions about the nature of online learners and their educational experiences.

The in-service teachers harbored misconceptions about the demographics of online learners, believing them to be primarily students with severe health issues, those recovering from academic failures, or exceptionally gifted students seeking advanced credits. Highlighting a common stereotype, Dave wrote in his blog, "often students who take online courses are those hoping to earn credit for a previously taken class in which credit was not earned." Similarly, Callie added, "I think there are primarily two types of students who participate in virtual schooling—those who have been less successful in a traditional school setting and those who have been extremely successful and wish to get ahead, earn more credits, and/or graduate early." Rebecca echoed this sentiment, noting her experience, "I do know that my school has had students who had to leave at semester due to health-related issues, and they were able to take online classes to get credit towards graduation." These perceptions illustrate the

narrow, and often inaccurate, views the in-service teachers held about the diverse population of online learners.

These preconceived notions extended to their impressions of online learning tools such as Khan Academy. Callie critically observed, "Khan recorded thousands of lessons and put them online. Anyone has access to them and can 'learn' content . . . To me, it seems like this is no better than a lecture." This was supported by Rachel's observation of a coworker using Khan Academy, "While the kids enjoy it, it makes me feel that I'm teaching while he is showing videos of someone else's work." These comments reveal the in-service teachers' skepticism and limited understanding of the potential benefits and applications of online learning tools.

Finally, the in-service teachers' initial negative impressions were reinforced by their experiences or observations of specific online programs perceived as unsuccessful. Rachel's remark about the unsuccessful online Mandarin course offered at her school underscores the skepticism, "I know that my school offered online Mandarin one year and it was not successful." Similarly, other teachers shared anecdotes of online programs perceived as having failed to meet educational goals or effectively engage learners. Ed expressed this sentiment in his blog post, "I can recall teachers telling me it would never catch on and that the quality of education was not sufficient." These experiences contributed to the in-service teachers' initial distrust and negative perceptions of online learning programs.

Affordances of Online Learning

After being exposed to information about online learning through readings, the TEGIVS scenarios, and case studies, the in-service teachers perceived several distinct advantages of online learning. The benefits highlighted by the teachers included adaptable content, increased access, flexible scheduling, cost-effectiveness, skill development for global competitiveness, and enhanced communication with their instructors. The in-service teachers appreciated the dynamic nature of digital content over traditional static materials. For instance, Calvin emphasized the adaptability of digital resources in his blog post, "unlike a static paper textbook, digital content and courseware has the luxury of being adaptable." Rachel supported this viewpoint, acknowledging the flexibility digital content offers. Furthermore, in his individual project, Evan outlined multiple advantages related to adaptability and flexibility, such as the "ability to deliver more content in a variety of ways" and the constant availability of learning materials that can "be offered 24-7." Evan stated that as a result, he believed digital content "produces positive academic results" and "prepares students to work in the global economy." Similarly, in her individual project, Rachel emphasized global competitiveness by stating, "online schooling also provides students the chance to have educational opportunities more in line with what is happening in other parts of the world."

Rebecca and Caprice added to the discussion on the flexibility of online learning, noting in their group project, "students can also take a wide variety of

elective courses, like foreign languages or literature classes that are currently not in our curriculum." In her individual project, Rebecca also emphasized the freedom from constraints with online learning, stating, "Students are not bound to a specific place or time. Their educational opportunities don't stop when they walk off school grounds!" Additionally, Rebecca and Caprice highlighted the preparatory value of online courses in their group project, explaining, "Online classes are common at the college level, and it would be very helpful for students to have online experience prior to college so that they have the skills necessary to successfully complete online coursework in their post-secondary education." These reflections indicate a substantial shift in the teachers' perceptions, from initial skepticism to recognizing the multifaceted benefits of online education. This newfound appreciation demonstrates the impact of intentionally integrating online learning curriculum into their technology course.

The in-service teachers frequently highlighted enhanced access to education as an important benefit of online learning. For example, in their group project, Calvin, Dave, and Evan stated, "with this program students and parents can access a variety of education resources, including online textbooks and class assignments, from anywhere with an Internet connection." This sentiment was echoed in the anonymous comments related to Part 3 of the case study, where one teacher expressed, "the accessibility of information, specialized coursework, and expert teachers makes it so that all students have a chance." In addition, another teacher noted:

I think this will have a tremendous impact on students who may be in remote areas, who may not live in a wealthy part of town where the schools are stocked with good teachers and supplies—instead, the opportunity to have an involved, knowledgeable instructor will be available for all students.

Moreover, in her individual project, Rachel stated, "online schooling offers students to take a wide variety of classes that might not otherwise be available, whether those are AP [advanced placement], credit recovery, or just more eclectic electives." These observations reflect a growing appreciation among the teachers for the accessibility and inclusivity online learning can provide. Exposure to the TEGIVS scenarios and the case studies helped the in-service teachers understand how online education could democratize access to diverse educational resources and opportunities.

The in-service teachers also viewed communication between students and instructors as a benefit of online learning. In her individual project, Rachel noted, "enhanced communication" as a positive aspect of online learning. She reported, "they can communicate via text, microphones, possibly also through message boards or e-mail. They can communicate as often as they wish, since they can communicate both synchronously and asynchronously." Other teachers also saw value in online communication. Two anonymous responses to Part 2 of the case study echoed this sentiment. This mode of interaction is viewed positively by other teachers as well, as illustrated by anonymous feedback in which one

teacher praised the structured yet flexible communication in online group discussions, saying that it helps manage the overwhelm that can occur in large class settings. Additionally, another teacher thought the online environment might encourage students to participate, stating, "some students do not feel comfortable addressing the teacher in a traditional classroom whether it's because of shyness with the adult or the concern of the other students' perceptions." These reflections indicate that after engaging with the TEGIVS scenarios and the case studies, the in-service teachers recognized the potential of online platforms to facilitate more effective and inclusive communication. They appreciated how online learning environments could support diverse communication needs and promote active participation.

Challenges Associated with Online Learning

Despite their predominantly favorable attitude toward online learning after exposure to the readings, TEGIVS scenarios, and case studies, the in-service teachers still highlighted challenges associated with the modality. One concern was related to a lack of hands-on experience for assignments and content areas that require it. For example, in his individual project, Evan noted, "Mr. Frisch's trips for laboratory assignments were limited." Rebecca echoed this concern in her project, asking, "how can science students do labs?" In an anonymous post in response to Part 2 of the case study, a student stated:

> As for the negative aspects, I would say that the lack of actual lab work
> for the science courses would be a drawback. The simulations are of

course a close second—and a plausible alternative, but being able to

conduct the tests and work with a team to see fungus growth or test

chemicals is science—the doing is science. (emphasis in original)

Additionally, Corey commented in his blog post, "I would have expected that courses like art, phys. ed., and music would NOT be available as online courses," referring to the challenges associated with these types of *hands-on* courses.

Another area of concern for the teachers was that online learning requires access to appropriate resources and technology. Evan, in his individual project, pointed out the necessity for districts to provide and maintain essential elements of technology. He stated, "computer hardware devices such as printers, modems and routers must be provided and maintained by the district." He also noted the importance of district-provided technology support. Similarly, teachers voiced concerns about the financial capacity of districts to afford to purchase and maintain such technology. Moreover, the teachers highlighted the need for sufficient resources for online learners. In his blog post, Calvin stated, "a significant component of online learning is having the necessary resources to participate. A dinosaur laptop with dial-up Internet will not cut it. And wifi at Starbucks may not be enough either." Corey added to this concern, explaining, "The site school is expected to provide a computer for student use at least one period per day. It is recommended that students have a computer to use outside of the regular school day as well." These reflections emphasize the

critical role of adequate technological support and resources in the effectiveness of online learning programs.

Online Learning Success Factors

The in-service teachers identified several key factors necessary for the success of online learning. First, they highlighted the need for proper preparation and support, including adequate training for teachers guiding students in an online environment. Evan emphasized in his project that "teachers need to be willing to modify their teaching styles and adapt to online learning. They will need to attend additional workshops or take classes to upgrade their technology skills in order to service the students." Echoing this sentiment, Callie pointed out in her blog, "I think being a teacher of an online course requires an entire set of organizational skills that one might not have in a traditional classroom setting. If teachers aren't being trained for this, I think it's a limitation." In his blog, Corey reinforced this perspective, "It is essential that teachers not only understand the curriculum they are teaching but also the technology that they are using to teach it. This requires ongoing training and professional development." Furthermore, several teachers stressed the importance of teacher commitment, especially in terms of one-on-one interactions and providing timely, high-quality feedback.

Additionally, the in-service teachers emphasized the importance of the role of liaisons in traditional schools for supporting students in their online courses. An anonymous contributor noted in response to Part 1 of Scenario 2,

"because students have more responsibility to manage their online courses—and because their teachers are not in the same room—a local facilitator or liaison is the person at the local school who can be the students' anchor." The teachers argued that this support person helps monitor day-to-day progress, motivates students when they falter, and reviews work before publication, acting as a crucial advocate for the students' learning and success. The in-service teachers also discussed the importance of other support roles, such as instructional coaches, school counselors, and technology specialists. Rachel highlighted the critical role of involving principals in student support. In response to one of the case study scenarios, a teacher noted, "A liaison or facilitator is the glue that keeps the student connected to the online program. Without that connection, it's too easy for students to drift." Collectively, these insights emphasize the teachers' belief that successful online learning environments depend not only on skilled teachers, but also on a comprehensive support system that includes various educational stakeholders committed to the students' academic and personal growth.

The in-service teachers clearly emphasized, that to excel in the online environment, online learners needed to master soft skills. They highlighted self-motivation, self-regulation, and self-direction as essential attributes for navigating the digital learning space effectively. Additionally, they pointed out the importance of having strong organizational and time management skills, which are fundamental in managing coursework and deadlines effectively. Calvin

stated in his individual project, "Self-discipline is key in an online environment. Without the physical presence of a teacher, students need to have the drive to stay organized and manage their time effectively." In her project, Callie also emphasized this need for self-management, stating, "Online learning demands a level of responsibility that's higher than in traditional settings. Students need to know how to prioritize tasks and stay focused without constant oversight." Evan further highlighted the importance of advanced communication skills. He argued that these skills are crucial for maintaining proper online etiquette and fostering collaboration among peers. This capability is necessary to ensure that online collaborations are respectful and productive, leading to successful collaborative projects. In her project, Rachel also stressed the importance of effective collaboration. She noted, "if students do not know how to collaborate effectively, the project can end up being sub-par." Further, the teachers suggested that incorporating soft skills into online learning curricula would greatly enhance the effectiveness and outcomes of online education.

In addition to enhancing soft skills, the in-service teachers emphasized the critical role schools and online programs play in providing comprehensive online safety training. During a discussion on Scenario 2, a teacher pointed out, "because students will be using a variety of tools to collaborate and interact with their virtual teacher and classmates, they must be equipped with knowledge about appropriate behaviors and the necessary actions to take if they encounter rule violations." To address this need, the in-service teachers

advocated for integrating mandatory online safety modules within the curriculum, which would promote responsible and secure online interactions. Furthermore, they proposed that such training should include strategies for managing unforeseen situations, such as encountering strangers in chat rooms. Rachel, in her project, underscored the urgency of preparing students to handle such scenarios, "Students need to be prepared to deal with strangers who may enter into a chat room uninvited, ensuring they can protect their privacy and safety effectively." Corey reinforced this perspective in his individual project, stating, "We can't assume students know how to act safely online just because they use social media. Specific training is required to help them navigate educational tools responsibly." Overall, the teachers' insights suggest a growing recognition of the need for structured and proactive measures to equip online learners with the safety education to foster a secure and positive digital learning environment.

Healthy Skepticism, Caveats, and a Call for Further Research

The in-service teachers were presented with completion data for various online schools, with one institution reporting a 95% completion rate. The teachers found this completion rate impressive, but it raised questions about the metrics used to define such success. In her blog post, Callie expressed her reservations:

I also was impressed by the engagement/pass rates but wonder what they used to determine this—was it all students who started the course,

all who made it to a certain date, or those who made it to the end. Also,

how did they determine "engaged," was it self-reported?

Echoing Callie's concerns, Calvin commented, "I too wonder about quality controls in online courses and data results from self-reporting surveys. Those completion and pass rates did seem very high." Dave questioned the underlying reasons for these high rates, pondering whether they were due to actual student engagement, effective teaching methods, or specific policies such as tuition/full-time equivalent reimbursement contingent upon course completion.

The blog discussion also touched on the role of for-profit online schools using tax dollars and teachers expressing critical views on their operations. Calvin argued in his blog post, "it is wrong to allow ANY for-profit institution to be funded by tax dollars OR be allowed to play by different rules than its competition" (emphasis in original). Additionally, Rachel questioned the ethics of such funding, asking, "why should tax dollars go to support a) private companies manipulating data to make a quick buck, or b) private school students whose tuition to their schools should pay for the cost of online education?" These comments reveal the teachers' apprehensions about the ethical and financial complications and consequences of for-profit online education.

When discussing pending state legislation that would require students to take online courses, the in-service teachers acknowledged the benefits, but emphasized the need for rigorous research to determine the most effective

models. They also expressed concern about regulatory oversight. Rachel inquired, "who is going to oversee these online schools to make sure they are complying with state standards and requirements?" In an assignment in which she was asked to write to her state legislator, Rachel urged careful consideration of these issues before enacting any laws requiring students to participate in virtual schooling. Calvin's stance was also cautionary, "It is far too early to make sweeping changes to [virtual school] laws. Michigan's SB-619 will create limitless opportunities for students to fail and for corporations to profit." Corey echoed this viewpoint, noting, "I certainly believe that virtual school options should move forward in Michigan with an increase in offerings. However, only successful models should be allowed to go on." This collective skepticism among the in-service teachers demonstrates their desire to employ evidence-based practices in online education to ensure it effectively serves students rather than commercial interests.

Implications for Course Design

The full set of K-12 online learning resources includes ILO, TEGIVS, Michigan teaching cases (the Michigan version of ILO), and the Michigan scenarios (the Michigan version of TEGIVS). Round six of data collection was the second time this full set was used in the Internet in the Classroom course, but the first time the full set was used in a summer offering of the course. During the summer semester, the course is offered over a 7-week period, as opposed to a 15-week period during the fall and winter semesters. As such, this was the first

opportunity for students to evaluate the course and its current content in this context. While only five of the seven students in the course completed the end-of-course evaluations, and none of the students provided any qualitative feedback, there was some useful feedback for the purposes of future course design.

Interestingly, while the students rated the instructor favorable, almost all of the items related to actual course content were among the items rated lowest by students. For example, statements such as the following were scored more negatively than positively by students:

- "This course was well organized."
- "The instructor's use of examples and/or illustrations helped me understand the subject matter."
- "Other assignments contributed to my understanding of course content."

While not included in the end-of-course evaluations, several comments in blogging discussions and student assignments questioned the relevancy and currency of the Iowa-based content (the TEGIVS and ILO material)—particularly when Michigan-based content provided similar material. This feedback suggests that the program might consider excluding these Iowa-based items, at least during the condensed summer semester.

Discussion

Several main themes emerge from the findings of this sixth round of data collection. First, the online learning focused on K-12 curriculum impacted a shift in the in-service teachers' perception of online learning. Initially, students had limited awareness and negative perceptions of K-12 online learning, consistent with research in the field (Carver, 2016; Tawfik et al., 2021). However, after exposure to the curriculum, the views of in-service teachers became more positive, recognizing various advantages of online learning. This kind of change is actually quite common, as Ersin et al. (2020) demonstrated when they provided a planned learning experience for pre-service teachers focused on online pedagogy.

Specific advantages or affordances of online learning recognized by the in-service teachers are adaptable content, increased access to education, flexible scheduling, cost-effectiveness, skill development for global competitiveness, and enhanced communication between students and instructors. These advantages or benefits of K-12 online learning have long been identified in the field (Barbour & Reeves, 2009; Clark & Berge, 2005). Conversely, as the in-service teachers became more aware of the nuances of K-12 online learning, they were also better able to identify specific challenges needing to be overcome. Examples of challenges include a lack of hands-on experience for certain subjects such as science labs, art, and music; technology access and support issues; and the need for adequate resources and

infrastructure. Many of these challenges also have a long history in the literature (Barbour & Reeves, 2009; Clark & Berge, 2005). However, some of the challenges—such as issues around the digital divide—were highlighted in recent years during the dramatic shift to online and remote learning due to the pandemic (Machusky & Herbert-Berger, 2022; Mann et al., 2021; Ong, 2020).

More importantly, a greater understanding of K-12 online learning allowed in-service teachers to identify individual factors that contribute to student success such as the following:

- Proper preparation and support for teachers;
- The role of liaisons and support staff in traditional schools;
- Development of students' soft skills such as self-motivation, self-regulation, and time management; and
- The importance of online safety training.

For example, Hodges and his colleagues outlined six steps teacher education programs like the one in this study could do to better prepare teachers to design, deliver, and support online learning to ensure students success in those environments (Barbour & Hodges, 2023, 2024; Hodges & Barbour, 2024; Hodges et al., 2022).

Finally, even with increased knowledge about K-12 online learning, the in-service teachers continued to hold a level of skepticism and called for further research into the topic. In particular, the in-service teachers raised concerns about what is known about the high completion rates reported and the metrics

used, for-profit online schools using tax dollars, and the need for rigorous research to determine effective instructional models. Interestingly, researchers in the field have raised several of these same concerns. For example, Barbour (2020) outlined the following limitations in existing literature:

- Confusing and ill-defined terminology of K-12 online learning;
- A lack of understanding of instructional models based on other modalities of K-12 distance learning;
- An absence of reliable and valid metrics to measure K-12 online; and
- A lack of frameworks to guide K-12 online instruction.

The skepticism of in-service teachers and their desire for more research led them to caution against hasty implementation of mandatory online learning policies. However, overall, these themes reflect a complex and evolving understanding of K-12 online learning among the in-service teachers, highlighting both the potential benefits and the need for careful consideration of the implementation and oversight of K-12 online learning.

Conclusions and Implications

This study has limitations, including a small number of participants and a single site, which restricts the generalizability of its findings. However, the purpose of action research is to undertake a cyclical examination designed to improve an educational experience based on systematic data collection and analysis—as such, the findings are not designed to be generalizable. Having said that, the findings in this particular case may offer transferrable value to teacher

education programs aiming to integrate curriculum components that address online teaching and learning (Mertler, 2020). Additionally, since the action research process includes implementing curriculum changes, collecting relevant data, and analyzing this data to inform future decisions; it may serve as a useful model for other programs.

Previous research has consistently shown that teacher education programs do not adequately address online teaching and learning, yet the COVID-19 pandemic and the subsequent rise in online learning programs and participation underscore the urgent need for these changes (Archambault et al., 2016; Kennedy & Archambault, 2012a). Curriculum modifications have the potential to make a significant impact. This study clearly demonstrated that the curriculum influenced students' knowledge and perceptions of online learning. Additionally, students exhibited a desire to thoughtfully implement these changes and called for further research, highlighting the importance of cultivating critical thinking skills in educators.

Future research should consider incorporating updated curriculum information, as the pandemic has led to increased exposure to digital environments, albeit often through emergency remote learning, which may not have been a positive experience for all students. Expanding the study to include additional sites and larger numbers of students could provide a more comprehensive understanding of the effectiveness of these curriculum changes.

In conclusion, while this study's findings are not broadly generalizable, they provide valuable insights for teacher education programs seeking to better prepare educators for online instruction. The action research model used here can guide other programs in developing and refining their own curricula to meet the evolving needs of online and blended learning environments. By addressing these gaps in teacher preparation, educational institutions can ensure that future educators are equipped with the necessary skills and knowledge to effectively navigate and succeed in digital teaching landscapes.

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