





Transitioning First-year Pre-service Teachers to Blended Learning Using Supplemental Instruction

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Abstract. Blended learning combines face-to-face and online instruction, gaining popularity for offering flexible, personalized learning experiences. This method enhances content delivery efficiency and effectiveness, as a result, blended learning has proven to be an effective tool in preparing teachers for the ever-evolving demands of modern education. This study investigates supplemental instruction (SI) within blended learning for first-year pre-service teachers, drawing upon the Technology Acceptance Model (TAM), the study reveals compelling findings. The diverse study population, mainly from public schools, highlights the inclusivity of the research, with a significant female representation among pre-service teachers. Results indicate that 79% of participants find SI helpful in navigating blended learning's challenges and improving academic performance, time management, and critical thinking. SI is especially beneficial for those from less digitally resourced backgrounds, enhancing digital literacy and confidence in technology use for education. Thus, SI, through the TAM lens, proves crucial for pre-service teachers in adapting to digital education, demonstrating its value for academic success and educational equity.

Keywords: Blended Learning, Academic Advising, Supplemental Instruction, Pre-service Teachers

1 Introduction

The blended learning approach is gaining popularity in institutions of higher learning. Belur *et al.* [1] explain, it blends face-to-face instruction with online tools to improve teaching and learning. This approach has been shown to improve student results, increase engagement, and provide more flexibility for both pre-service teachers and teacher educators [2]. However, Janse van Rensburg and Oguttu [3] caution that the

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successful implementation of blended learning requires developing and delivering alternate instructional formats and teaching tools. Equally, Moyo and Sibanda [4] argue that implementing blended learning in the classroom requires additional information and understanding for teacher educators. Transitioning to a blended learning environment can be challenging for first-year pre-service teachers, particularly those who have had limited exposure to digital resources [5].

To address this challenge, Adebola [6] suggests supplemental instruction can serve as an academic advising tool to support first-year pre-service teachers in maximizing their learning potential and successfully transitioning to blended learning. To elaborate further, researchers define Supplemental Instruction as a form of academic advising that focuses on providing targeted support and resources to students who need additional help [7][8][9]. Through supplemental instruction, students are provided with additional guidance and support so that they can navigate the complexities of blended learning and improve their academic performance [8]. It can be argued that this approach is particularly beneficial for pre-service teachers who may face digital divide challenges, as it provides them with the necessary resources and support to bridge the gap and thrive in a blended learning environment.

Pre-service teachers, in the context of this study, refer to students who are in the early stages of enrolling for a teacher education and training qualification. These are aspiring educators who are not yet certified teachers but are undergoing the process of becoming qualified for teaching roles. They typically enroll in teacher preparation programs, which may include coursework, teaching practice, micro-teaching, and other forms of professional development. The study focuses on first-year pre-service teachers, highlighting their status as soon-to-be novice educators on their way to becoming certified teachers [10]. In this context, "pre-service teachers" refer to individuals who are preparing to enter the teaching profession.

To enhance the role of supplemental instruction in assisting preservice teachers to bridge the gap and transition into blended learning the study seeks to answer the research question: *"How can supplemental instruction, as an academic advising tool, effectively facilitate the transition of first-year pre-service teachers to a blended learning environment, and what impact does this transition have on their academic success, particularly for those who face digital divide challenges?"* This research problem seeks to guide the investigation into the role of supplemental instruction in supporting first-year pre-service teachers as they adapt to the challenges of blended learning, while also addressing the potential digital divide issues. It further aims to understand how these supplementary resources contribute to their successful transition and academic outcomes in a digital-age educational setting. In this study, information gathered through questionnaires will be analyzed to reveal the specific areas where supplemental instruction can be most effective for first year pre-service teachers. In addition, it will also explore potential barriers or challenges faced by these student teachers in their transition to blended learning. Furthermore, the findings of this research have the potential

to inform educators and institutions on best practices for integrating supplemental instruction and addressing digital divide issues in teacher education programs.

2 Background

The landscape of education is continually evolving, influenced by technological advancements and the demands of the digital age. Blended learning, which combines traditional face-to-face instruction with online learning tools, has emerged as a promising educational approach [11]. Cronje [12] discovered that this pedagogical model provides a flexible and dynamic environment, enhancing student engagement and learning outcomes. However, the adoption of blended learning presents its own set of challenges, particularly for first-year pre-service teachers who may have limited exposure to digital resources [13]. As such, Jean [14] opines that teachers' educators and institutions have been exploring strategies to help pre-service teachers navigate this transition effectively.

As demonstrated by Jean [14] blended learning offers various advantages in terms of personalized learning and student engagement. In the same way, Eugenijus [15] states that it caters to diverse learning styles and allows for greater flexibility in the educational process. Teacher educators can leverage a wide range of online resources and tools, making the learning experience for pre-service teachers more dynamic and interactive. Nevertheless, Babalola and Fakoyede [16] argue that for first-year pre-service teachers who are new to the digital landscape, the initial transition can be daunting. A substantial number of pre-service teachers have not grown up in a digital-savvy environment and may find it challenging to adapt to the blended learning approach [17]. This digital divide among students may necessitate innovative strategies to ensure that all aspiring educators have equal opportunities for success in this evolving educational landscape [18].

In response to this challenge, supplemental instruction has emerged as a valuable academic advising tool [7]. Supplemental instruction provides the extra support that first-year pre-service teachers may need to confidently navigate blended learning [19]. These supplemental resources, whether in the form of mentorship, additional training, or targeted guidance, play a crucial role in bridging the digital divide and equipping pre-service teachers with the skills and confidence needed to thrive in the digital age of education. As the education field seeks effective methods to support pre-service teachers, exploring the impact of supplemental instruction becomes increasingly important, as highlighted in the study conducted by Gamede *et al.* [20].

3 Problem statement

The adoption of blended learning, characterized by the blend of traditional face-to-face instruction with online educational tools, has marked a significant shift in the educational landscape. This approach offers abundant benefits, such as increased student engagement, improved learning outcomes, and enhanced flexibility. However, transitioning to a blended learning environment poses a unique challenge for first-year pre-service teachers, particularly those with limited exposure to digital resources. The digital era requires educators to adapt to innovative teaching methods and technology integration, and thus, it is imperative to address the specific challenges faced by pre-service teachers during this transition [21].

First-year pre-service teachers often confront a steep learning curve as they navigate the complexities of blended learning, which may include mastering digital platforms, developing online teaching skills, and effectively integrating technology into their lessons. More of these individuals have not had extensive prior experience with digital resources, which can exacerbate the challenges they face during this transition. The digital divide becomes a significant barrier, potentially hindering their ability to provide quality education and effectively connect with their learners in the digital age [22]. This issue is particularly pronounced among those who come from underserved backgrounds or public school systems, where access to digital resources may be limited.

To ensure that all pre-service teachers can harness the benefits of blended learning and successfully adapt to the evolving educational landscape, it is crucial to explore effective support mechanisms. Scholars argue that academic advising tools, such as supplemental instruction, have shown promise in assisting first-year pre-service teachers in their transition to blended learning [23][24]. Nevertheless, the effectiveness of these tools in addressing the specific needs of pre-service teachers, especially those facing digital divide challenges, remains an area of investigation. Therefore, it is essential to conduct further research to examine the impact of supplemental instruction on the academic success and overall preparedness of first-year pre-service teachers as they navigate the challenges of blended learning.

4 Theoretical framework

The study preferred the Technology Acceptance Model (TAM) as the lens to guide the study. TAM is a widely recognized and extensively researched theoretical framework in the field of education that provides valuable insights for the study focusing on the adoption of blended learning by first-year pre-service teachers. TAM was initially developed by Fred Davis in 1986 and later extended by Fred Davis and Viswanath Venkatesh in 2000 [25]. TAM seeks to explain and predict how individuals accept and use technology, making it highly relevant to this study on pre-service teachers' transition to blended learning, which inherently involves the use of educational technology. TAM is

relevant to the study in various ways firstly it advocates for user acceptance of technology. TAM is designed to understand why individuals accept or reject technology, and Faqih [26] opines, that it provides a structured approach to examining factors influencing technology adoption. In the context of this study, it can help analyze how first-year pre-service teachers perceive and accept the digital tools and platforms associated with blended learning.

Additionally, Ghani *et al.* [27] believe it also focuses on the perceived usefulness of the technology. One of the key components of TAM is the concept of "perceived usefulness." This refers to the degree to which individuals believe that a particular technology will enhance their job performance. For pre-service teachers transitioning to blended learning, understanding how they perceive the usefulness of digital tools can be crucial in determining their acceptance of the technology. The Technology Acceptance Model (TAM) is highly relevant to this study as it provides a structured framework for investigating how these teachers perceive and accept educational technology, which is a fundamental aspect of their successful integration into the digital age of education. TAM's focus on perceived usefulness and ease of use, as well as its adaptability to the specific challenges posed by the digital divide, makes it a valuable tool for exploring the effectiveness of supplemental instruction in this context.

5 Research methodology and design

The study adopted a mixed-methods research design, combining both quantitative and qualitative research approaches to comprehensively explore the transition of first-year pre-service teachers to blended learning and the effectiveness of supplemental instruction. This design allows for a multifaceted analysis of the research problem, integrating statistical data with in-depth narratives obtained through thematic analysis [28].

5.1 Quantitative Component

The quantitative component of the research design focuses on gathering numerical data to examine the effectiveness of supplemental instruction and the experiences of first-year pre-service teachers. This component employs questionnaire-based research methods to capture data from Pre-service teachers. Thelwall [29] writes that the quantitative data is used to provide a quantitative understanding of the research problem, particularly in terms of the percentage of Pre-service teachers with certain characteristics and the extent to which supplemental instruction was perceived as useful by the Pre-service teachers.

5.2 Qualitative Component

The qualitative component of the research design investigates the narratives and deeper insights of the Pre-service teachers' experiences as they transition into blended learning.

This approach allows for the exploration of the underlying discourses and perspectives that shape the Pre-service teachers' views and experiences related to blended learning and the use of supplemental instruction. In addition to gathering numerical data, the research design also includes a qualitative component that focuses on exploring the experiences and perspectives of first-year pre-service teachers through in-depth discussions in the questionnaire.

Qualitative data allows for a deeper understanding of how supplemental instruction may impact the development of teaching skills and confidence among pre-service teachers. According to Thelwall [29], using both qualitative and quantitative data can provide a more comprehensive understanding of the research problem and can help inform future instructional approaches for pre-service teacher training. Drawing from both types of data will provide a more holistic view of the effectiveness of supplemental instruction and its potential implications for the professional growth of pre-service teachers. With the combination of both approaches, this research design aims to paint a rich and nuanced picture of how supplemental instruction can support first-year pre-service teachers in their journey toward becoming highly effective educators.

5.3 Data Integration

The quantitative and qualitative components of the study are integrated to provide a comprehensive understanding of the research problem. The quantitative data, such as the percentage of Pre-service teachers finding supplemental instruction useful, can be used to contextualize and support the findings derived from the qualitative analysis. This integration allows for a more robust examination of the research question and provides a richer portrayal of the experiences of first-year pre-service teachers during their transition to blended learning.

5.4 Population

The population for this study consists of pre-service teachers who were eligible to participate in the research. In this case, the population includes all pre-service teachers who attended the supplemental instruction (SI) sessions. The qualifying criteria for inclusion in the study are that these pre-service teachers attended the SI sessions, which means they engaged in this particular aspect of the academic advising tool.

5.5 Sampling

The sampling process involved selecting a subset of the population to participate in the study [30]. The total population includes all pre-service teachers who attended the SI sessions. This group initially comprised 50 pre-service teachers who accessed the online questionnaire using QuestionPro (Enterprise Survey Software). After excluding the non-completers, the final sample for the study consisted of 21 pre-service teachers who completed the study. These 21 individuals met the qualifying criteria as they had attended the SI sessions.

5.6 Ethical considerations

Ethical clearance, often referred to as ethical approval, is a formal process wherein a research proposal is reviewed by an independent ethics committee or board to ensure that the methods and practices adhere to established ethical standards [29]. This process primarily aims to protect the rights, dignity, and welfare of the research participants, ensuring that the research is conducted in a manner that respects and upholds ethical principles.

In the context of this study, even though it was not funded and thus did not seek formal ethical clearance, it still adhered to ethical guidelines. This adherence was demonstrated through the conscious decision to protect the identity of the participants. Instead of using real names, the study employed pseudonyms, referring to participants as PST 1-21. This practice is a crucial aspect of ethical research conduct, as it ensures the confidentiality and privacy of the participants, which is particularly important when handling sensitive data or when the disclosure of participants' identities could lead to harm or discomfort.

By using pseudonyms, the study maintained the anonymity of the participants, a fundamental ethical consideration in research, especially in studies involving human subjects. This approach aligns with ethical principles like respect for persons and confidentiality, which are essential regardless of the study's funding status or the requirement for formal ethical clearance. The use of pseudonyms shows a commitment to ethical research practices, prioritizing the protection of participants' identities and personal information.

5.7 Data Analysis

The study used thematic analysis to make sense of the data responses. Thematic analysis is a qualitative research method that involves identifying, analyzing, and reporting patterns or themes within a dataset of textual, visual, or other types of information [31]. Furthermore, Castleberry and Nolen [31] claim that thematic analysis allows researchers to systematically extract meaningful themes or patterns from the data, providing a structured framework for understanding the experiences, perceptions, and narratives of Pre-service teachers. Thematic analysis is a relevant analysis strategy for this study as it facilitates a comprehensive exploration of the qualitative data, offering valuable insights into how supplemental instruction influences the experiences of first-year pre-service teachers transitioning to blended learning. It provides a structured and rigorous approach to identifying and interpreting the themes that emerge from the Pre-service teachers' narratives, shedding light on the effectiveness of academic advising tools in the context of the digital age of education.

6 Findings and discussions

6.1 Demographics and Background

The study's demographics indicate a diverse group of Pre-service teachers, with 78% coming from public and rural schools, and close to 21% claiming to come from private schools. Additionally, a significant 56% proportion of the Pre-service teachers were female. This diversity is essential to understanding the varied experiences and challenges they might face during the transition to blended learning. This diversity in the study's demographics allows for a comprehensive and holistic view of the transition to blended learning. It brings in different perspectives and backgrounds that can shed light on the unique needs and strengths of individuals during this learning approach. Moreover, this diverse group of Pre-service teachers also reflects the real-world setting, where students from various backgrounds come together to learn and grow.

6.2 Perceived usefulness of Supplemental Instruction

The findings reveal a strong positive perception among the Pre-service teachers regarding the usefulness of supplemental instruction. Nearly 79% of them expressed that these instructions were highly effective in guiding them through the transition to blended learning, ultimately contributing to improved academic success. This suggests that pre-service teachers recognize the value of supplemental instruction in their learning journey. It is also worth noting that the study included Preservice teachers from different teacher education streams, ranging from Economics and Management sciences to mathematics, sciences, and technology. This mix of education qualifications streams adds depth and complexity to the findings, as each group may have unique needs and perspectives on blended learning. Furthermore, the Pre-service teachers came from diverse socioeconomic backgrounds, providing insight into how blended learning can impact students from various economic levels. This diverse sample truly reflects the unique makeup of today's classrooms and highlights the need for individualized and inclusive approaches to education. This was also reflected in the comment coming from open-ended questions in the questionnaire that said:

Respondent PST 1: "I was really afraid that I was gona fail this module as I struggled to access additional material on Blackboard, since I attended the sessions, things are better".

Sub-theme 1: Recognizing value and utility

Nearly 79% expressed that supplemental instruction was highly useful in guiding them through the transition to blended learning. Their perception of the usefulness of these instructions is a key driver for their engagement. The finding highlights that when academic advising tools are perceived as valuable by pre-service teachers, they are more likely to actively engage with them, leading to positive outcomes in their academic journey. In addition to the high levels of perceived usefulness, the study also found that pre-service teachers who utilized the supplemental instruction reported feeling more

confident and prepared in their blended learning experience. This confidence was reflected in their participation and active involvement in class discussions and activities. Furthermore, Pre-service teachers noted that these instructions helped them to better navigate the challenges of online learning and adapt to new technologies, ultimately improving their overall academic performance. With such positive results, implementing effective academic advising tools is crucial for the success of pre-service teachers in the ever-evolving landscape of education.

Sub-theme 2: Tangible academic Improvements

The study demonstrates that supplemental instruction plays a pivotal role in enhancing the academic success of first-year pre-service teachers. Through qualitative analysis of responses, it became apparent that those who engaged with supplemental instruction experienced tangible enhancements in their academic results. Those who attended the sessions were found to have performed better than those who did not attend the sessions. Some Pre-service teachers reported to have increased their level of achievement since the engagement with the SI sessions. Additionally, many students expressed their appreciation for the personalized attention and support they received during the supplemental instruction sessions. They found that the smaller group size allowed for more focused and individualized instruction, leading to a deeper understanding of course material. Furthermore, several Pre-service teachers shared that the discussions and activities in the sessions were not only informative but also enjoyable, making them more motivated to actively participate in their learning. This positive environment created by the SI sessions seemed to foster a sense of camaraderie and collaboration among students, further enhancing their academic experience.

6.3 Bridging the digital gap

Not only did the study showcase the positive impact of supplemental instruction on academic success, but it also shed light on the challenges faced by first-year pre-service teachers in a blended learning environment. Pre-service teachers noted feeling overwhelmed and unsure of how to utilize online resources in their coursework effectively. A noteworthy finding is the role of supplemental instruction in bridging the digital gap among Pre-service teachers, especially those from public schools. This digital divide can hinder effective participation in blended learning. Supplemental instruction addressed this challenge by equipping Pre-service teachers with essential digital literacy skills and strategies. They learned how to navigate digital tools and resources effectively, distinguish reliable online sources from misinformation, and gain the confidence needed to thrive in a blended learning environment.

***Respondent PST 8:** “I come from a farm school, and we didn’t have such tools, I was about to give up as this online access to learning material looked very difficult to work on”.*

Sub-theme 1: Bridging the educational divide

Bridging the educational divide focused on how supplemental instruction bridges the educational divide among Pre-service teachers. A significant portion of the Pre-service teachers came from public schools, where access to digital resources may have been limited. Bridging the digital divide highlights the inclusivity of academic advising tools, making blended learning accessible to individuals from diverse educational backgrounds. Supplemental instruction seems to serve as a bridge, ensuring that all pre-service teachers, regardless of their educational origins, can thrive in the digital age of education.

Sub-theme 2: Promoting equity in education

The diversity of Pre-service teachers and the success stories emerging from their engagement with supplemental instruction emphasize the role of this academic advising tool in leveling the playing field. Academic advising tools have the potential to promote equity by ensuring that all pre-service teachers have equal opportunities to succeed in the digital age, regardless of their educational backgrounds.

The thematic findings in this study seem to agree with the study conducted by Adeola [32] which revealed that Supplemental Instruction has improved the academic performance of first-year students while also reducing dropout rates. Furthermore, the findings highlighted that Supplemental instruction is critical in narrowing the digital divide for pre-service teachers, particularly those from public and rural schools with limited access to digital technology resources. Academic advising tools, such as supplemental instruction, foster inclusivity and ensure that all pre-service teachers, regardless of educational background, can thrive in the digital era of education. Success examples from supplemental instruction engagement illustrate its ability to promote equity by offering equal opportunity for all pre-service teachers to achieve in the blended learning setting.

7 Conclusion and Recommendations

The findings of this study highlight the pivotal role of supplemental instruction as an academic advising tool in facilitating the successful transition of first-year pre-service teachers to blended learning. The overwhelmingly positive perception of the usefulness of these instructions, in alignment with the Technology Acceptance Model (TAM), emphasizes their value in enhancing academic outcomes and bridging the digital gap. The narratives of Pre-service teachers reflect the transformative potential of these tools in empowering digital literacy, promoting inclusivity, and ultimately contributing to the academic success of pre-service teachers in the ever-evolving landscape of education. Moreover, the study revealed that supplemental instruction not only receives high praise in terms of perceived usefulness but also results in tangible academic improvements. They provide a structured pathway for pre-service teachers to navigate the digital landscape effectively, enhance their time management, and foster critical thinking

skills. The transformative power of these academic advising tools is evident in the narratives of Pre-service teachers who transition from initial apprehension about technology to gaining digital confidence.

Furthermore, the study highlights the significant role of supplemental instruction in bridging the digital divide, especially for pre-service teachers from public schools with limited prior exposure to digital resources. These instructions equip individuals with crucial digital literacy skills and strategies, ensuring that they can engage effectively with technology for academic purposes. In conclusion, the study highlights the value of supplemental instruction in empowering digital literacy, promoting inclusivity, and ultimately contributing to the academic success of pre-service teachers in the evolving landscape of education. These findings advocate for the continued development and utilization of academic advising tools, such as supplemental instruction, to ensure that pre-service teachers thrive in the digital age and that education remains an inclusive and equitable endeavor.

Given the strong positive perception of the usefulness of supplemental instruction among first-year pre-service teachers in the study, it is recommended that educational institutions and teacher education programs consider adopting the Technology Acceptance Model (TAM) as a guiding framework for implementing and improving academic advising tools. TAM, which emphasizes the significance of perceived usefulness, should be employed to assess and enhance the utility of instructional support systems. This means that the effectiveness of supplemental instruction can be further improved by ensuring that it aligns closely with the specific needs and expectations of pre-service teachers.

The findings suggest that supplemental instruction as an academic advising tool should be tailored to address the unique challenges and diverse backgrounds of first-year pre-service teachers. To achieve this, it is recommended that institutions design and deliver supplemental instruction that is highly tailor-made and contextualized. The TAM framework can guide this process by focusing on how well the instruction fulfills the perceived needs of individual pre-service teachers. Recognizing that a one-size-fits-all approach may not be effective, institutions should assess the specific requirements and digital literacy levels of their pre-service teachers and design supplemental instruction accordingly. With this in mind, the study's findings will have a more significant impact and relevance to the education system as a whole.

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