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Exploring factors influencing teachers' self-efficacy in distance learning

Ioannis Berdousis[a1], University of the Peloponnese, Karaiskaki 70, Tripoli 221 00, Greece, berdousis@sch.gr

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Abstract

This study explores the complex dynamics shaping teachers' self-efficacy in the context of distance learning. Drawing on a sample of 85 educators from Greece, the research investigates the impact of prior experience with technology, professional development, communication, collaboration, administrative support, and data-driven practices on teacher confidence in online instruction. Findings reveal that teachers with extensive technological backgrounds exhibit higher self-efficacy. Ongoing exposure to professional development positively influences confidence, emphasizing its role in digital pedagogy. A collaborative culture, supported by administrators, emerges as crucial for teacher resilience. Furthermore, strategic use of student data correlates with heightened self-efficacy. The study underscores the importance of targeted support mechanisms, collaborative environments, and informed decision-making to empower teachers in the evolving landscape of distance learning.

Keywords: Distance learning; educational technology; teacher self-efficacy; professional development

* ADDRESS FOR CORRESPONDENCE: Ioannis Berdousis, University of the Peloponnese, Karaiskaki 70, Tripoli 221 00, Greece
E-mail address: berdousis@sch.gr

1. INTRODUCTION

The landscape of education has undergone unprecedented transformations in recent years, driven by advancements in technology and the global imperative to adapt to changing circumstances (Godsk & Møller, 2024; Abuhammad, 2020; Clark, 2020; Gupta et al., 2021; Schneider & Council, 2021). One of the profound shifts has been the widespread adoption of distance learning, necessitated by events that disrupted traditional modes of instruction (Almaiah et al., 2020; Li & Yang, 2021). As education systems continue to navigate the challenges posed by such disruptions, it becomes imperative to examine the factors influencing teachers' self-efficacy in the dynamic context of remote instruction. As educators grapple with the dynamic nature of remote instruction, many recent studies have delve into the contextual intricacies that shape their self-efficacy, their belief in their ability to achieve desired outcomes in the realm of distance education (Ashrafi et al., 2022; Callo & Yazon, 2020; Cardullo et al., 2021; Ma et al., 2021; Sadaaf & Council, 2021; Nordlöf, Hallström & Höst, 2019; Wray, Sharma & Subban, 2022).

The roots of distance learning can be traced back to correspondence courses in the 19th century, but the digital age has ushered in transformative changes. Today, distance learning encompasses a spectrum of approaches, from fully online courses to blended learning models that combine digital and traditional methods. The surge in its prevalence is not only a response to global events necessitating remote instruction but also a reflection of the evolving educational landscape (Gupta, Khan & Agarwal, 2021; Schneider & Council, 2021).

Distance learning offers unparalleled opportunities, such as increased accessibility, flexibility, and the ability to cater to diverse learning styles (Radović, 2023). However, it also introduces challenges, including the need for technological proficiency, the creation of engaging virtual learning environments, and the ability to navigate the complexities of remote collaboration. For educators, these challenges are intertwined with their perceptions of self-efficacy, and their confidence in leveraging digital tools and strategies to facilitate effective teaching and learning.

Bandura's (1986) social cognitive theory posits that self-efficacy, the belief in one's capabilities to organize and execute courses of action required to attain designated types of performances, plays a crucial role in determining how individuals approach tasks and challenges (Bandura, 1986). Applied to the context of education, teachers' self-efficacy influences their instructional decisions, persistence in the face of obstacles, and ultimately, the quality of the learning experiences they provide (Ma et al, 2021; Sadaaf & Council, 2021; Nordlöf et al., 2019; Wray et al., 2022)

As technology becomes increasingly integral to education, teachers' self-efficacy in navigating digital tools emerges as a critical determinant of their success in remote instructional environments (Vilarinho-Pereira et al., 2024). The rapid evolution of technology has created a digital divide among educators, with varying levels of prior experience and proficiency. This divide is not merely technical; it extends to the teachers' confidence and comfort in leveraging technology for pedagogical purposes (Ashrafi et al., 2022; Callo & Yazon, 2020; Cardullo et al., 2021).

In this rapidly evolving educational landscape, there is a pressing need to explore the factors that shape teachers' self-efficacy in distance learning. How does prior experience with technology influence their confidence in utilizing digital tools? To what extent does access to professional development opportunities impact their ability to implement effective online instructional strategies? How does the frequency of communication and collaboration influence their adaptation to remote instruction? Addressing these questions is crucial for informing policies and practices that support educators in meeting the demands of distance learning.

Understanding the dynamic interplay between self-efficacy and the evolving landscape of distance learning is not merely an academic pursuit but a pragmatic necessity. This research seeks to bridge the gap

between theoretical frameworks and practical implications. By examining the specific factors that influence teachers' self-efficacy, we aim to provide actionable insights that empower educators, inform professional development initiatives, and guide administrators in creating supportive environments conducive to effective distance learning (Ashrafi et al., 2022; Nordlöf et al., 2019; Wray et al., 2022).

In navigating the uncharted territory of remote instruction, educators are not only teaching subject matter but are also orchestrating an entire learning experience. The exploration of teachers' self-efficacy in this context is a foundational step toward equipping them with the tools, confidence, and support needed to navigate the complexities and uncertainties of distance learning (Cardullo et al., 2021Ma et al, 2021; Nordlöf et al., 2019; Wray et al., 2022; Cai et al., 2022).

Understanding the factors that influence teachers' self-efficacy in distance learning is crucial for the successful implementation of effective and sustainable remote instructional practices. The role of technology proficiency, the impact of professional development, the significance of communication and collaboration, and the influence of administrative support are dimensioning that merit exploration (Zhang et al., 2024). Unraveling these intricacies not only informs educational policies and practices but also contributes to the well-being of educators and, consequently, the quality of education for students engaged in remote learning environments (Blaushild et al., 2024; Ashrafi et al., 2022; Callo & Yazon, 2020; Cardullo et al., 2021Ma et al, 2021; Schneider & Council, 2021; Nordlöf et al., 2019; Wray et al., 2022).

1.1. Purpose of study

In this context, this research aims to investigate the various factors influencing teachers' self-efficacy in the context of distance learning. By examining the interplay of prior experience with technology, the impact of professional development opportunities, the importance of communication and collaboration, and the influence of perceived support from school administrators, we seek to provide insights that inform evidence-based strategies for enhancing teachers' confidence and competence in remote instructional settings.

The study is guided by the following research questions:

- To what extent does teachers' prior experience with technology correlate with their self-efficacy in utilizing digital tools for effective distance learning?
- What is the relationship between the availability of professional development opportunities related to distance learning and teachers' self-efficacy in implementing online instructional strategies?
- How does the frequency of communication and collaboration with colleagues during distance learning impact teachers' self-efficacy in adapting to and managing challenges associated with remote instruction?
- What is the influence of perceived support from school administrators, such as clear communication and resource provision, on teachers' self-efficacy in navigating and overcoming obstacles in the distance learning environment?
- To what extent does the use of student performance data and feedback in the context of distance learning relate to teachers' self-efficacy in assessing and addressing individual student needs?

This paper is organized as follows: the Method section details the research design and data collection process, the Results presents the findings of the study, and the Discussion offers an analysis of the results with implications for practice. The paper concludes with a comprehensive reflection on the study's contributions and avenues for future research.

In exploring the intricate relationship between teachers' self-efficacy and the multifaceted landscape of distance learning, this research contributes to the broader discourse on effective instructional practices in

the evolving educational environment.

2. METHOD AND MATERIALS

2.1. Research Design

This study employs a quantitative research design to systematically investigate the relationships between key variables and teachers' self-efficacy in the context of distance learning.

2.2. Participants

The study includes a purposive sample of 85 teachers from both educational levels in Greece (Primary and Secondary Education) who are actively engaged in distance learning. Participants were selected based on their willingness to participate and their diverse backgrounds in terms of prior experience with technology, exposure to professional development opportunities, and teaching levels.

2.3. Data collection tool

A structured survey instrument was designed to collect quantitative data. The survey consists of validated scales and items to measure the variables presented in Table 1.

Table 1

Variables

Independent Variables:	**Dependent Variable:**
Prior Experience with Technology (measured on a scale)	Teachers' Self-Efficacy in Distance Learning (measured on a scale)
Availability of Professional Development Opportunities (measured on a scale)	
Frequency of Communication and Collaboration (measured on a scale)	
Perceived Support from School Administrators (measured on a scale)	
Use of Student Performance Data (measured on a scale)	

2.4. Procedure

The survey was distributed electronically to the selected participants using an online platform (Google Forms). Participants were provided with clear instructions and a timeframe for survey completion. Reminders were sent to maximize response rates. The data were collected from January 2023 to April 2023.

Participants responded to Likert-scale items on the survey, providing quantitative data on their perceptions of technology proficiency, professional development, communication and collaboration, perceived administrative support, use of student performance data, and self-efficacy. In particular, teachers had to answer the following questions.

Prior Experience with Technology: On a scale of 1 to 5, where 1 is "No experience" and 5 is "Extensive experience," rate your prior experience with technology tools commonly used in distance learning. *Professional Development*: How often have you participated in professional development programs specifically focused on distance learning in the past year? (1=Rarely, 2=Occasionally, 3=Regularly, 4=Frequently, 5=Very Frequently). *Communication and Collaboration*: Indicate the frequency with which you engage in communication and collaboration with colleagues, students, and administrators in the context of distance learning. ((1=Rarely, 2=Occasionally, 3=Regularly, 4=Frequently, 5=Very Frequently). *Support from Administrators*: To what extent do you feel supported by your school administrators in implementing effective distance learning strategies? (1=Not at all, 2=Somewhat, 3=Moderately, 4=Very

much, 5= Extremely). *Use of Student Performance Data*: How frequently do you use student performance data to inform your instructional decisions in the context of distance learning? (1=Rarely, 2=Occasionally, 3=Regularly, 4=Frequently, 5=Very Frequently). Overall Self-Efficacy: On a scale from 1 to 100, where 1 indicates very low confidence and 100 indicates very high confidence, rate your overall self-efficacy in distance learning.

2.5. Data Analysis

2.5.1. Descriptive statistics:

Descriptive statistics, including means, standard deviations, and frequencies, will be calculated for each variable to provide a summary of the data.

2.5.2. Correlation analysis

Pearson correlation coefficients will be computed to examine the relationships between independent variables (prior experience with technology, professional development, communication and collaboration, perceived administrative support, and use of student performance data) and the dependent variable (teachers' self-efficacy).

2.5.3. Regression analysis

Multiple regression analysis will be employed to identify the predictors of teachers' self-efficacy. This analysis will explore the unique contribution of each independent variable to the variance in self-efficacy.

2.6. Limitations

While quantitative methods provide valuable insights, there are limitations to consider, such as the potential for response bias and the reliance on self-reported measures. Additionally, the generalizability of the findings may be limited due to the specific characteristics of the sample.

3. RESULTS

3.1. Descriptive statistics

Descriptive statistics were calculated to provide an overview of the participants' responses. Table 2 presents the means, standard deviations, and ranges for each variable.

Prior Experience with Technology: The mean score was 3.8, with a standard deviation of 1.2, indicating a moderate level of prior experience with technology among the participants. The range spanned from 1 to 5.

Professional Development: Participants reported an average score of 4.2, with a standard deviation of 1.0. The responses reflected a generally high level of exposure to professional development opportunities, with scores ranging from 2 to 5.

Communication and Collaboration: The mean score for communication and collaboration was 4.5, with a standard deviation of 0.8. Participants indicated a high level of engagement in communication and collaboration, as reflected by scores ranging from 3 to 5.

Support from Administrators: Participants reported a mean score of 4.0 for perceived support from school administrators, with a standard deviation of 1.3. The responses varied, with scores ranging from 1 to 5.

Use of Student Performance Data: The mean score for the use of student performance data was 4.2, with a standard deviation of 0.9. Teachers reported a high level of engagement in utilizing student performance data, with scores ranging from 2 to 5.

Teachers' Self-Efficacy: The mean score for teachers' self-efficacy in distance learning was 70.3, with a standard deviation of 8.7. The responses varied, with scores ranging from 50 to 90.

Table 2

Descriptive statistics

Variable	Mean	Standard Deviation	Range
Prior Experience with Technology	3.8	1.2	1-5
Professional Development	4.2	1.0	2-5
Communication and Collaboration	4.5	0.8	3-5
Support from Administrators	4.0	1.3	1-5
Use of Student Performance Data	4.2	0.9	2-5
Teachers' Self-Efficacy	70.3	8.7	50-90

3.2. Correlation analysis

Pearson correlation coefficients were computed to examine the relationships between independent variables and teachers' self-efficacy. The results are presented in the correlation matrix (Table 3):

Prior Experience with Technology and Self-Efficacy: A strong positive correlation was found ($r = 0.65$, $p < 0.01$), indicating that teachers with more extensive prior experience with technology tended to report higher self-efficacy in distance learning.

Professional Development and Self-Efficacy: A significant positive correlation emerged ($r = 0.58$, $p < 0.01$), suggesting that teachers who had more exposure to professional development opportunities tended to exhibit higher self-efficacy.

Communication and Collaboration and Self-Efficacy: A positive correlation was observed ($r = 0.49$, $p < 0.01$), indicating that teachers who frequently engaged in communication and collaboration reported higher self-efficacy.

Support from Administrators and Self-Efficacy: A strong positive correlation was found ($r = 0.62$, $p < 0.01$), suggesting that teachers who perceived stronger support from administrators tended to have higher self-efficacy.

Use of Student Performance Data and Self-Efficacy: A positive correlation was identified ($r = 0.53$, $p < 0.01$), indicating that teachers who actively used student performance data tended to report higher self-efficacy.

Table 3

Correlation Analysis

	Prior Experience	Professional Development	Communication & Collaboration	Support from Administrators	Use of Student Data	Self-Efficacy
Prior Experience with Technology	1.00	0.65*	0.42*	0.30*	0.53*	0.68*
Professional Development		1.00	0.35*	0.28*	0.45*	0.58*
Communication & Collaboration			1.00	0.42*	0.37*	0.49*
Support from Administrators				1.00	0.28*	0.62*
Use of Student Data					1.00	0.53*
Self-Efficacy						1.00

(*$p < 0.01$)

3.3. Regression analysis

Multiple regression analysis was conducted to identify the predictors of teachers' self-efficacy. The results are summarized in the regression Table 4.

Table 4

Regression Analysis

Predictor Variable	Beta Coefficient	Standardized Beta Coefficient	t-value	p-value
Prior Experience with Technology	0.45	0.30	5.23	< 0.01
Professional Development	0.32	0.20	3.65	< 0.01
Communication & Collaboration	0.18	0.15	2.80	< 0.05
Support from Administrators	0.29	0.25	4.10	< 0.01
Use of Student Data	0.25	0.22	3.45	< 0.01

Prior Experience with Technology: A significant positive beta coefficient was found ($\beta = 0.45$, $p < 0.01$), indicating that prior experience with technology was a strong predictor of self-efficacy.

Professional Development: Professional development made a significant positive contribution ($\beta = 0.32$, $p < 0.01$), suggesting that exposure to professional development opportunities independently influenced self-efficacy.

Communication and Collaboration: A positive beta coefficient ($\beta = 0.18$, $p < 0.05$) indicated that frequent communication and collaboration contributed significantly to self-efficacy.

Support from Administrators: Strong support from administrators made a significant positive contribution ($\beta = 0.29$, $p < 0.01$), highlighting its independent impact on teachers' self-efficacy.

Use of Student Performance Data: Actively using student performance data positively contributed to self-efficacy ($\beta = 0.25$, $p < 0.01$), emphasizing the role of data-driven practices in shaping teacher confidence.

Overall Model Performance: The overall model was statistically significant ($F(5, 79) = 34.78$, $p < 0.01$), indicating that the combined effect of prior experience with technology, professional development, communication and collaboration, support from administrators, and use of student performance data explained a substantial portion (69%) of the variance in teachers' self-efficacy.

4. DISCUSSION

The results of this study shed light on the complex interplay of factors influencing teachers' self-efficacy in the context of distance learning. Our examination of prior experience with technology, exposure to professional development, communication and collaboration patterns, support from administrators, and the use of student performance data offers valuable insights into the nuanced dynamics of teacher confidence in the online instructional environment.

Foundation of Technology Proficiency. The foundational role of prior experience with technology is evident from the strong positive correlation ($r = 0.65$) and significant beta coefficient ($\beta = 0.45$) observed. Teachers with a more extensive history of navigating technological landscapes reported higher self-efficacy. This finding underscores the importance of cultivating technological proficiency as a precursor to fostering teacher confidence in the digital realm.

Impact of Professional Development. The current study highlights the positive impact of professional development opportunities on teachers' self-efficacy. The significant correlation ($r = 0.58$) and beta coefficient ($\beta = 0.32$) demonstrate that ongoing training and exposure to instructional strategies in a digital

context contribute independently to teachers' confidence. The implication here is that investment in targeted professional development can be a strategic approach for educational institutions seeking to enhance teacher efficacy in distance learning.

The Role of Communication and Collaboration. The positive correlation ($r = 0.49$) and significant beta coefficient ($\beta = 0.18$) between communication collaboration and self-efficacy underscore the importance of fostering a collaborative environment. Teachers who frequently engage in communication and collaboration with peers, students, and administrators tend to report higher self-efficacy. This finding aligns with the notion that a sense of community and shared responsibility positively influence teacher confidence in navigating the challenges of distance learning.

Administrative Support as a Catalyst. The strong positive correlation ($r = 0.62$) and significant beta coefficient ($\beta = 0.29$) for support from administrators emphasize the pivotal role of leadership in shaping teacher confidence. Teachers who perceive strong support from school administrators in the implementation of distance learning strategies tend to have higher self-efficacy. Administrators play a critical role in providing resources, guidance, and a supportive infrastructure that empowers teachers to navigate the digital landscape with confidence.

Data-Driven Practices and Teacher Confidence. The positive correlation ($r = 0.53$) and significant beta coefficient ($\beta = 0.25$) for the use of student performance data indicate that teachers who actively utilize data-driven practices report higher self-efficacy. Engaging with student data enables teachers to tailor their instructional strategies, address individual student needs, and make informed decisions, contributing positively to their confidence in the distance learning environment.

Implications for Educational Practice. The findings have practical implications for educational institutions aiming to enhance teachers' self-efficacy in distance learning. First and foremost, investing in professional development programs that target technological proficiency and digital pedagogy is crucial. Additionally, fostering a collaborative culture and providing strong administrative support can create an environment conducive to teacher confidence. Encouraging the use of student performance data as a pedagogical tool can further empower teachers to make informed decisions and adapt their strategies to meet the diverse needs of their students.

5. CONCLUSIONS

In this study, the researcher delved into the intricate landscape of teachers' self-efficacy in the realm of distance learning, exploring the influences of prior experience with technology, exposure to professional development, communication and collaboration patterns, support from administrators, and the strategic use of student performance data. Our findings offer valuable insights into the multifaceted aspects influencing teachers' self-efficacy in the dynamic landscape of distance learning. The findings carry significant implications for educational policies, professional development initiatives, and administrative practices, aiming to empower educators and enhance the overall effectiveness of remote instruction.

The foundational role of prior experience with technology emerged as a cornerstone of teachers' self-efficacy. Those with a rich history of technological engagement demonstrated higher levels of confidence in navigating the challenges of distance learning. This underscores the importance of cultivating technological proficiency as a fundamental component of teacher preparedness for digital pedagogy.

Professional development emerged as a potent catalyst for enhancing teacher self-efficacy. Ongoing training and exposure to instructional strategies in a digital context were positively associated with increased confidence. As educational landscapes continually evolve, investing in targeted professional development programs becomes imperative for fostering teacher efficacy in distance learning.

The significance of communication and collaboration cannot be overstated. Teachers who actively

engaged in collaborative endeavors, both with peers and administrators, reported higher self-efficacy. This emphasizes the role of a supportive community in bolstering teacher confidence and resilience in the face of the unique challenges posed by distance learning.

Administrative support emerged as a linchpin for teacher confidence. Strong support from school administrators was positively associated with higher levels of self-efficacy. Administrative leadership, by providing resources, guidance, and a supportive infrastructure, plays a pivotal role in empowering teachers to navigate the digital landscape with confidence.

Strategic use of student performance data proved to be a noteworthy factor influencing teacher confidence. Teachers who actively utilized data-driven practices reported higher self-efficacy. This underscores the value of informed decision-making and tailored instructional strategies in the online instructional environment.

6. RECOMMENDATION

The practical implications of our findings are profound for educational institutions seeking to foster a culture of teacher confidence in distance learning. The current study advocates for:

Targeted Professional Development: Educational institutions should invest in professional development programs that focus on enhancing teachers' technological proficiency and digital pedagogy. Ongoing training opportunities can empower educators to stay abreast of evolving instructional strategies and technologies.

Fostering Collaborative Environments: Creating a collaborative culture within educational institutions is crucial. Encouraging communication and collaboration among teachers, administrators, and other stakeholders can contribute significantly to teacher confidence and resilience.

Administrative Empowerment: School administrators play a pivotal role in shaping teacher confidence. Providing strong administrative support, both in terms of resources and guidance, can create an environment where teachers feel empowered to navigate the challenges of distance learning.

Promoting Data-Driven Practices: Encouraging the strategic use of student performance data as a pedagogical tool can enable teachers to tailor their instructional strategies, address individual student needs, and make informed decisions. This can positively impact teacher confidence and student outcomes.

6.1. Limitations and Suggestions for Future Research

While this study provides valuable insights, it is not without limitations. The cross-sectional design restricts our ability to establish causal relationships, and the reliance on self-reported data introduces the potential for bias. The regional specificity of the sample also limits the generalizability of our findings.

Future research endeavors could employ longitudinal designs to explore the temporal dynamics of teacher self-efficacy in distance learning. Additionally, in-depth investigations into the specific mechanisms through which professional development, collaboration, and administrative support influence self-efficacy could provide a deeper understanding of these relationships.

In conclusion, our exploration of teachers' self-efficacy in distance learning has unveiled a complex tapestry of factors that contribute to their confidence in the online instructional environment. As education continues to evolve, institutions must heed the call for targeted support and empowerment. By addressing the factors identified in this study, we believe that educational institutions can cultivate an environment that not only empowers teachers but also enhances the quality of distance learning experiences for students.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: The study adheres to the ethical guidelines for conducting research with human participants.

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