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The role of self efficacy and school climate in motivation for technology integration in education

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Highlights

- Participants perceive low levels of school climate but has relatively high self-efficacy and outcome expectancy.
- School climate, self-efficacy and outcome expectancy are related.
- Self-Efficacy and school climate contributed to motivation.

Abstract

This study aims to explore the influences of self-efficacy and school climate on motivation for technology integration in education. Albert Bandura's Social Cognitive Theory was used as the theoretical framework. Outcome expectancy was used as a central motivational factor. A foundational model was constructed to explore the relationships among school climate, self-efficacy, and outcome expectancy. The participants were 224 teachers from diverse high schools in Bursa, Turkey. Results revealed that participants perceive low levels of school climate/support but has relatively high self-efficacy and outcome expectancy. Gender-based analyses revealed no significant differences among males and females in terms of all variables. Correlation analysis results revealed significant relationships among the three variables. Furthermore, regression analysis revealed that both school climate and self-efficacy significantly contributed to predicting motivation. More importantly, school climate affected motivation directly and indirectly through its influence on self-efficacy. These findings suggested that the proposed foundational model can serve as a valuable framework for understanding teachers' motivation for technology integration in education.

Article Info: Research Article

Keywords: Technology integration, self-efficacy, outcome expectancy, school climate

1. Introduction

Technology integration in education has been a central focus in Turkish educational system, particularly with initiatives such as the Basic Education Project, which included opening information technology classrooms in many schools. Subsequent efforts, such as the Internet Access Project and Let No School Stay Without Computers, were aimed at enhancing technology infrastructure in schools. Specifically, the FATIH Project, initiated in 2010, aimed to equip classrooms with modern technologies and provide essential training on their effective use. All of these efforts align with the 21st-century skills. (Kocaoğlu & Akgün, 2015; Eryılmaz & Uluyol, 2015).

It is important to note that the success of technology integration in education is not solely dependent on these efforts. It also depends on teachers' willingness to embrace change and their beliefs about technology (Niederhauser & Lindstrom, 2018). Therefore, it is important to investigate both internal and external factors influencing teachers' acceptance of technology to facilitate a more effective integration of technology in education.

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The research conducted by Hsu and Kuan (2013) underscores the importance of both teacher-level and school-level factors in influencing teachers' technology integration behaviors. These researchers found that beliefs and training hours at the teacher level, combined with perceived school support at the school level, contributed significantly to teachers' technology use. This aligns with the classification proposed by Ertmer (1999), who came up with two categories of barriers impacting technology integration in education: (a) First-level barriers and (b) Second-level barriers (Ertmer, 1999). First-level barriers, also known as external barriers, are related to issues such as insufficient resources beyond the teacher's control (Kelley, 2015). Second-level barriers are internal barriers associated with teachers' beliefs. The lack of resources (first-level barrier) in schools may affect teachers' beliefs regarding technology integration (second-level barrier). This means that even if first-level barriers are removed, teachers' beliefs about technology integration in education may not necessarily be high. In other words, success in technology integration in education depends on addressing both external and internal factors (Niederhauser & Lindstrom, 2018).

The term "school climate and support" coined by Papanastasiou and Angeli (2008), refers to external factors that influence technology integration in education. These researchers developed a 2-dimensional scale (motivational support and technical support) to assess school climate/ support and established its validity and reliability with teachers in Greece. Tezci (2011a) expanded upon this scale in Turkey by adding three more items. In a study involving 1540 teachers, this researcher found a moderate correlation between school climate and the level of technology use in the classroom. Moreover, Tezci (2011b) found that school climate predicted knowledge and the use of ICT.

Gürfidan and Koç (2016) conducted a structural equation study with 396 teachers and found that school culture, a concept close to school climate/support, influenced technology integration level indirectly through its influence on leadership and support services. Raygan and Moradkhani (2020) conducted a study involving 209 English teachers in Iran and found a positive relationship between school climate/support and attitudes toward technology integration and suggested that school climate influences the use of technology through its impact on attitude. In a case study with 70 English teachers in universities, Önalan and Kurt (2020) identified low levels of technology infrastructure and instructional incentive perceptions of teachers. This indicates that the existing technology infrastructure and the incentives provided for instructional purposes were not perceived favorably by the teachers. Eteklous (2008) explored the relationship between school climate and attitudes toward technology use in a study involving teachers in Cyprus and found that school climate significantly predicted both attitudes and the level of technology use of teachers. These studies collectively underscored the importance of school climate in shaping teachers' attitudes toward technology integration and influencing their use of technology in education. In other words, a positive and supportive school climate may contribute to fostering favorable attitudes and practices regarding technology in education.

Albert Bandura's Social Cognitive Theory, particularly the concept of self-efficacy, plays an important role in understanding individual behaviors, including teachers' technology integration behaviors. It is defined as an individual's belief in their ability to accomplish a given task and serves as a key motivational variable (Bandura, 1986). In the context of technology integration, self-efficacy refers to a teacher's confidence in their capabilities to successfully employ technology in the classroom (Wang et al., 2004).

Outcome expectancy is the second motivational variable in the Social Cognitive Theory and can be defined as the anticipated outcomes of a behavior (Lent et al., 1994). For instance, an individual with high self-efficacy in swimming may have positive outcome expectancy such as enjoying swimming. On the other hand, someone with low self-efficacy may have negative outcome expectancy, such as fearing drowning while swimming (Bandura, 1986). Applied to technology integration, an individual with high self-efficacy in using technology may have positive outcome expectations such as increasing effectiveness in the classroom as a teacher. In contrast, a teacher with low self-efficacy may anticipate negative outcomes, such as experiencing technical problems which he/she cannot solve immediately. Therefore, teachers with higher self-efficacy are more likely to approach technology use with confidence

and positive expectations, which in turn, contribute to a more successful and effective technology integration in their teaching practices.

Several studies conducted in Turkey shed light on the technology integration self-efficacy level of teachers and pre-service teachers. Birişçi and Kul's study (2018) revealed high levels of technology integration self-efficacy of pre-service teachers. Kocaoğlu and Akgün (2015) found moderate levels of self-efficacy beliefs, particularly regarding technologies associated with the FATIH project. Ünal and Türker (2018) adapted the Technology Integration Self-Efficacy Perception Scale into Turkish and demonstrated its validity and reliability with pre-service teachers. Şimşek and Yazar's (2018) study involving 3932 teacher candidates revealed that technology use, access to resources, experiences in technology education, and attitudes toward technology significantly predicted technology integration self-efficacy and accounted for 54% its variance.

Several studies explored the relationship between technology acceptance, self-efficacy, and expectations of teachers. Aktürk and Delen (2020) found a significant relationship between technology acceptance and self-efficacy in a study involving 157 teachers from various departments. Joo, Park, and Lim (2018) found that self-efficacy, perceived ease of use, and perceived usefulness collectively influenced university teachers' technology integration intentions. Semiz and İnce (2012) found a moderate correlation between technology integration self-efficacy and outcome expectancy in a study involving 1090 physical education pre-service teachers. Şahin (2008), in a path analysis study at a Turkish university, identified moderate relationships among self-efficacy, outcome expectancy, and technology integration intentions and found that self-efficacy influenced intentions indirectly through its influence on outcome expectancy. Cengiz (2015) increased the self-efficacy and outcome expectancy of pre-service teachers majoring in physical education in Turkey through a 12-week training program.

The existing literature underscores the importance of school climate/ support and the key motivational factors of Social Cognitive Theory, namely self-efficacy and outcome expectancy in understanding teachers' technology integration behavior in the classroom. Given that first-level barriers, including school climate/ support, influence second-level barriers such as beliefs (e.g. self-efficacy, and expectancy), it becomes necessary to uncover the interrelationships among school climate, self-efficacy and outcome expectancy. Despite extensive research on these variables in isolation, there seems to be no study that concurrently examines the relationships among these factors. To address this gap in the literature, the current study was conducted.

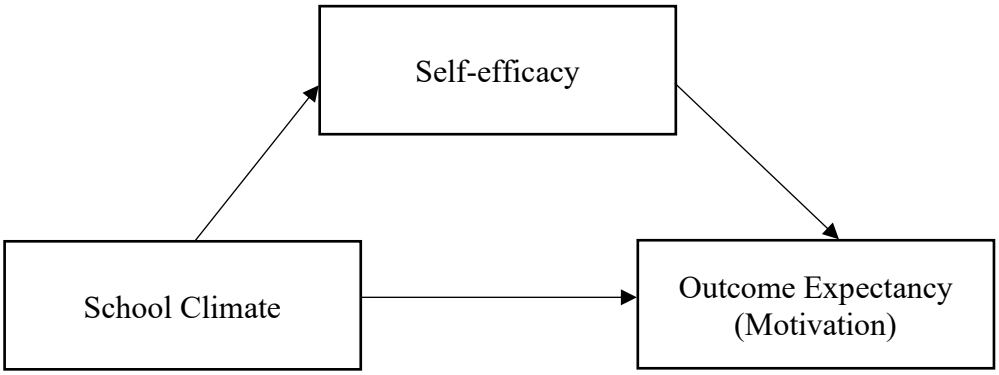

Fig 1. Proposed Model

The primary objective of this study is to assess teachers' perceptions of school climate, self-efficacy, and outcome expectations related to technology integration in education, and to explore the interrelationships among these three variables. To accomplish this objective, a fundamental model based on Social Cognitive Theory, as depicted in Figure 1, was developed and tested. According to this model, school climate affects outcome expectancy both directly and indirectly through its influence on self-efficacy. The inclusion of these paths is grounded in theory and prior research. Bandura's Social Cognitive Theory

emphasizes the role of environmental factors, such as school climate, in shaping individuals' beliefs and behaviors, including self-efficacy and expected outcomes. For example, supportive environments are known to enhance self-efficacy by providing opportunities for mastery experiences and reducing perceived barriers (Bandura, 1986).

Empirical studies further support these relationships. Tezci (2011a) found that school climate positively influenced teachers' beliefs and use of technology, suggesting a direct link to outcome expectancy. Additionally, prior research has established that self-efficacy serves as a mediator between environmental factors and motivational outcomes. For instance, studies by Semiz and İnce (2012) and Joo, Park, and Lim (2018) demonstrated that higher self-efficacy leads to more positive outcome expectations regarding technology integration. By integrating these theoretical and empirical foundations, the model captures both direct and indirect effects of school climate/support on outcome expectancy, aligning with established frameworks in educational research.

This study aims to answer four specific research questions:

1. What are the levels of teachers' perceptions of school climate, self-efficacy, and outcome expectancy regarding technology integration in education?

2. Is there a significant relationship among school climate, self-efficacy, and outcome expectancy?

3. Are school climate significant and self-efficacy significant predictors of technology integration motivation?

4. Does school climate have a direct influence on motivation?

2. Methodology

2.1.Participants

This study involved teachers from 17 high schools in Bursa during the first semester of the 2020-2021 academic year. Schools were selected using stratified random sampling to ensure representation across varying levels of resources, teacher experience, and school size. Within each selected school, teachers were invited to participate voluntarily, resulting in a total of 224 participants (150 females and 74 males), representing a response rate of 85% of those invited.

Participants were from diverse departments, including mathematics (20%), language arts (18%), sciences (15%), social sciences (12%), computer education (10%), physical education (10%), and other disciplines (15%). The teachers had a wide range of professional experience, with teaching tenures ranging from 1 to 30 years ($M = 8.2$, $SD = 6.5$). Most teachers (65%) reported having some prior training in integrating technology into their classrooms, while 35% had no formal training.

The stratified sampling method was used to ensure variability in the sample, allowing for the study's findings to be generalizable to similar high school contexts in urban and suburban areas. Factors considered for stratification included school size (small, medium, large), technology infrastructure levels (low, medium, high), and geographical location within Bursa. This comprehensive approach ensured a diverse participant pool reflecting the educational landscape of the region.

2.2. Research Instruments

The Technology Integration Self-Efficacy and Outcome Expectancy Scale utilized in this study was initially developed by the author and validated with 93 pre-service teachers in the United States (Author, 2008). The scale was later adapted to Turkish by the author. Its cultural validity was stabled using a sample of pre-service teachers from Turkey, Spain, and the United States (Author, 2016).

In this study, technology integration self-efficacy was defined as teachers' beliefs in their ability to use instructional technologies effectively in the classroom. The scale consists of six items. Sample items included "I believe I have the knowledge and skills necessary to use instructional technologies effectively in the classroom" and "I can easily prepare lesson plans that require the use of instructional technologies."

Technology integration outcome expectancy was defined as the possible outcomes resulting from teachers using instructional technologies in the classroom. The scale consists of nine items. All items begin with "If I use technology as a teacher in my future class..." Examples included "... my performance will improve" and "... I will do a more satisfying job."

School climate was defined as teachers' perception of the support received from the school while acquiring technology integration skills. The scale, originally developed by Papanastasiou and Angeli (2008), was adapted to Turkish by Tezci (2011), who added three more items, resulting in a total of 15 items. The Cronbach's Alpha value for the scale was reported to be 0.90. A sample item from this scale is "Our school organizes seminars and workshops to better learn technology integration in the classroom."

Participants rated their responses on a scale ranging from 1 (strongly disagree) to 5 (strongly agree) for each scale. The average of the participants' responses for each scale was calculated, with scores ranging from 1 to 5. Higher scores indicated stronger self-efficacy, more positive expectations and more perceived support in the self-efficacy, outcome expectancy and school climate scales, respectively.

2.3.Data Analysis

The data analysis began with an assessment of the reliability of the scales used to measure self-efficacy, outcome expectancy, and school climate/support. Cronbach's Alpha values were calculated for each scale to ensure internal consistency. Following this, average scores for the scales were computed for the overall sample, as well as separately for male and female participants. To explore potential gender-based differences, independent samples t-tests were conducted with a significance level set at $p<0.05$.

To examine the relationships among the study variables—school climate, self-efficacy, and outcome expectancy—Pearson correlation analysis was conducted. This analysis aimed to identify the strength and direction of the relationships between the variables, which served as a foundation for subsequent analyses.

Next, a stepwise regression analysis was conducted to determine the predictive utility of school climate/support and self-efficacy on outcome expectancy. The stepwise approach involved iteratively adding and removing predictors based on their statistical significance. Variables were included in the model if their p-value was below 0.05 and removed if their p-value exceeded 0.10. This method ensured the final model included only the most significant predictors. Finally, path analysis was performed to test the theoretical model proposed in the study, which was based on Albert Bandura's Social Cognitive Theory and empirical research.

3. Findings

The reliability analysis, as indicated by Cronbach's Alpha values, demonstrated strong internal consistency for the responses on the self-efficacy, outcome expectancy, and school climate/support scales, with values of 0.92, 0.89, and 0.82, respectively. Table 1 provides descriptive statistics for the participants' scores. Participants were found to possess high outcome expectancy and self-efficacy levels while school climate was at a moderate level. The t-test results revealed no significant differences between males and females across these variables.

Table 1.
Descriptive statistics

Variable	Mean (SS)	Females	Males
School Climate	3.57 (.85)	3.54 (.83)	3.61 (.88)
Self-efficacy	3.82 (.71)	3.87 (.61)	3.76 (.83)
Outcome expectancy	3.83 (.69)	3.75 (.66)	3.91 (.71)

Table 2 illustrates the correlation values among the study variables, indicating significant relationships among school climate, self-efficacy, and outcome expectancy at the 0.01 significance level. School climate were correlated with self-efficacy and outcome expectancy at the same magnitude (r = .30) whereas a more robust correlation of 0.44 was found between self-efficacy and outcome expectancy.

Table 2.
Correlations among variables

Variable	1	2	3
1.School Climate			
2.Self-efficacy	.30		
3.Outcome Expectancy	.30	.44	

The results of the stepwise regression analysis indicated that school climate and self-efficacy collectively accounted for 24% of the variance in outcome expectancy. Self-efficacy alone accounted for 20% of the total variance. The school climate contributed an additional and significant 4% to the regression equation. This finding suggested that school climate/support influences outcome expectancy directly and indirectly through its influence on self-efficacy. To further explore this, the model in Figure 2 was tested.

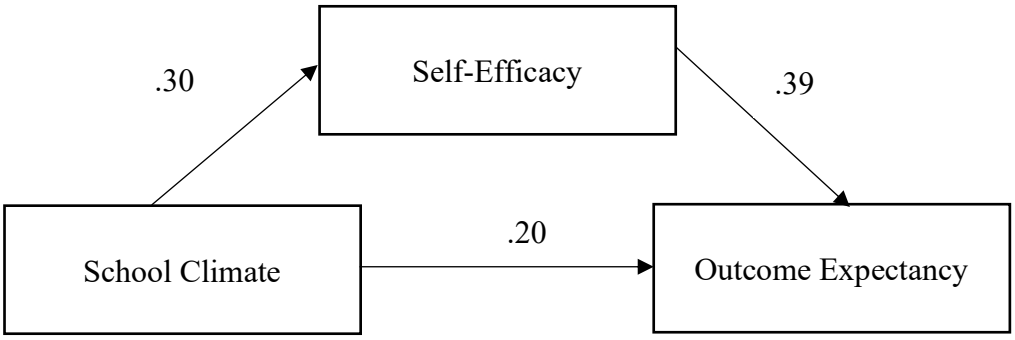

Fig 2. Path Coefficients in the Model

All path coefficients were found to be statistically significant. The highest path coefficient was found between self-efficacy and outcome expectancy, indicating a strong influence of self-efficacy on outcome expectancy. Moreover, the significant path coefficient between school climate outcome expectancy suggests that school climate impact motivation (outcome expectancy) both directly and indirectly through its influence on self-efficacy. Overall, this model emphasized the valuable roles played by self-efficacy and school climate in shaping teachers' expectations regarding technology integration in education.

4. Discussion

This study aimed to assess teachers' perceptions of self-efficacy, outcome expectancy, and school climate related to technology integration, and to uncover the interrelationships among these variables. The findings revealed that while teachers generally demonstrated high self-efficacy and outcome expectancy, their perceptions of school climate were moderate. These results emphasize the complex interplay between internal beliefs and external environments in shaping teachers' motivation to integrate technology into their classrooms.

In practical terms, the findings highlight that enhancing school climate can play a pivotal role in motivating teachers to integrate technology effectively. For instance, deficiencies in infrastructure, access to technological resources, and administrative support—factors reflected in less favorable perceptions of school climate may hinder teachers' confidence and willingness to utilize technology. Addressing these issues could involve targeted investments in technology infrastructure, creating more robust technical support systems, and fostering a culture of collaboration and encouragement among educators. For

example, schools could implement mentoring programs where experienced teachers share their strategies for integrating technology successfully, thereby fostering both a supportive environment and observational learning opportunities.

The findings also suggest that teachers with higher self-efficacy tend to have more positive outcome expectations regarding technology use. This underscores the need for professional development programs that not only provide technical training but also build teachers' confidence through mastery experiences, peer modeling, and constructive feedback. Training workshops could incorporate augmented reality simulations or hands-on projects to help teachers practice integrating technology in realistic classroom scenarios. Such initiatives can help create a "can-do" mindset, where teachers feel equipped and motivated to embrace digital tools in their pedagogy.

Despite its contributions, the study has limitations that must be acknowledged. One notable limitation is the non-random sampling method, which may restrict the generalizability of the findings to broader teacher populations. Future studies should consider employing randomized or stratified sampling techniques to enhance representativeness. Additionally, the study focused solely on three variables—self-efficacy, school climate/, and outcome expectancy—leaving other potentially influential factors unexplored. For instance, personality traits, goal-setting behaviors, and access to ongoing support systems may also play critical roles in shaping teachers' technology integration practices. Future research could expand the model by incorporating these variables to gain a more comprehensive understanding of the factors influencing technology integration.

Another area for future exploration involves longitudinal studies to examine how changes in school climate and self-efficacy over time influence teachers' motivation and technology use. This approach could provide deeper insights into the sustainability of interventions aimed at improving these factors. Moreover, qualitative studies, such as interviews or focus groups, could offer richer, contextualized perspectives on the challenges and enablers of technology integration from teachers' viewpoints.

In conclusion, the findings of this study underscore the critical importance of fostering a supportive school climate and enhancing teachers' self-efficacy to promote successful technology integration. While moderately high levels of self-efficacy and outcome expectancy are promising, the less favorable perception of school climate highlights areas for improvement. Policymakers and educational leaders should prioritize infrastructure upgrades, robust professional development programs, and collaborative environments to address both external and internal barriers to technology integration. By aligning these efforts with teachers' needs, institutions can create conditions that empower educators to integrate technology confidently and effectively, ultimately enhancing educational outcomes in the digital age.

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