

Emotion regulation of preservice teachers: Integrating emotional dimensions into online education

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ABSTRACT

In this study, preservice teachers' activating and deactivating emotions and emotion regulation strategies in online education were investigated. With this purpose in mind, two related studies were conducted. In Phase 1, the preservice teachers' activating and deactivating emotions in an online setting were investigated. In Phase 2, emotion regulation strategies of preservice teachers in online education were examined. While the first phase used quantitative methods, the second one employed qualitative methods. According to results, the most frequently mentioned emotions among preservice teachers in online education are positive emotions such as enjoyment, peacefulness, hopefulness, and happiness. It has been observed that attention shifting and avoidance were used to regulate their emotions. Preservice teachers' emotions were positive, though they had problems utilizing diverse emotion regulation strategies.

KEYWORDS: Preservice teachers; Emotion regulation; Online education

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1. Introduction

The transition to online teacher education during the pandemic has created a new landscape for preservice teachers (PTs), eliciting complex emotions amid the unique challenges of online education (Zembylas, 2005). As students, PTs faced critical challenges in online learning environments, including unreliable internet access, limited peer interaction, poor connectivity, and high data costs (Bunyamin et al., 2021). Moreover, low motivation, demands on self-regulation, cognitive overload, delayed feedback, limited social learning, and unstable study spaces pose additional challenges for students (Draxler-Weber et al., 2022; Fabito et al., 2020; Khalaf & Al Athali, 2020; Makarova, 2021). Thus, emotion regulation—monitoring, evaluation, and modification of emotional responses—has become an essential skill for PTs as they strive to navigate digital classrooms and sustain their professional development (Gross, 1998; Schutz & Zembylas, 2009).

The challenges PTs face in online education have been extensively studied; however, the psychological mechanisms they use to overcome these challenges remain underexplored. Emotion regulation, the attempt to alter emotions in ourselves/others, has emerged as an important competency that sustains professional development in the digital learning environment. To understand those mechanisms, this study is grounded in Gross's Process Model of Emotion Regulation (Gross, 1998). The model emphasizes that emotion regulation does not occur in a one-

time manner but rather as a process unfolding over the timeline of emotion generation. The model differentiates between “antecedent-focused strategies”, such as situation selection, attentional deployment, and cognitive change that occur before the creation of an emotional response, and “response-focused strategies” in the form of response modulation or suppression that occur after the emotion is felt (Aldao et al., 2010). Research generally suggests that antecedent strategies are adaptive and linked to well-being, with cognitive reappraisal being a particularly important one (Gross & John, 2003), whereas response-focused suppression is usually maladaptive and associated with burnout (John & Gross, 2004). The specific ways in which an online learning environment constrains preservice teachers' selection of these strategies, however, remain unclear.

The need to investigate those strategies stems from the close relationship between emotions and the formation of a teacher identity. While learning to teach in face-to-face education, PTs navigate a complex emotional landscape, encountering intense and diverse feelings during their initial teaching experiences (Cohen & Roman, 2020). Emotions can hinder identity formation, whereas positive experiences may promote its reconstruction (Teng, 2017), indicating a connection between the emotional journey and PTs' professional identity formation. Becoming a teacher involves what Bloomfield (2010) describes as a “struggle for voice,” encompassing background, emotion, and institutional structures, which highlights the multifaceted and comprehensive nature of teacher identity development. To describe their emotional experiences, PTs' metaphors illustrate how they conceptualize emotions as burdens, tools, and sources of self-knowledge (Muñoz-Salinas, 2025). However, many PTs report inadequate emotional support or opportunities to process their complex emotional journeys (Cohen & Roman, 2020). The crucial role in shaping professional identity places significant responsibility on teacher education programs, which must acknowledge and address the emotional dimensions of becoming a teacher (Muñoz-Salinas, 2025; Teng, 2017).

In light of the complex emotions associated with online education, research indicates that PTs experience both positive and negative emotions during online teaching and learning, which in turn influence their professional identity formation (Astutik & Hapsari, 2022; Syakira et al., 2023). These emotions evolve as they adapt to the digital environment, shifting from anxiety and frustration to delight and determination (Syakira et al., 2023). In this context, emotional resilience is just as essential as strong communication skills for successfully navigating the new educational landscape (Astutik & Hapsari, 2022). PTs' emotional reactions to online learning activities were revealed via tools such as emotion diaries and blogs, uncovering a wide range of emotional states that may influence their educational experiences (Mills & Ritchie, 2014). While higher education can support students' emotion regulation skills and enhance their motivation to learn, it could lead to deeper engagement and academic achievement (Xu et al., 2024). On the other hand, students also commonly experience negative emotions such as self-doubt and alienation, which often align with their self-perceptions (Bharuthram, 2018). Therefore, it is critical to address emotional factors in preservice teacher education to foster effective learning environments and cultivate emotionally resilient future teachers.

Teachers' emotions are commonly categorized into two broad types: activating and deactivating emotions (Frenzel, 2014). Positively activating emotions, such as enjoyment, enthusiasm, and pride, are associated with increased engagement and motivation and with effective classroom management. However, negatively activating emotions, such as anger, may contribute to adverse teacher responses (Taxer & Frenzel, 2015). Deactivating emotions, such as sadness, anxiety, and helplessness, are linked to reduced energy, lower classroom engagement, and poorer instructional decision-making (Chang, 2009). These emotions are frequently associated with professional burnout

and diminished motivation (Sutton & Wheatley, 2003). Given the importance of teacher emotions, research highlights the necessity of emotion regulation and the ability to meaningfully interpret emotional experiences as key components of professional growth (Fried et al., 2015).

Understanding the emotional experiences and regulation strategies used by PTs during online education is essential, as emotions significantly influence learning, engagement, and identity formation (Astutik & Hapsari, 2022; Teng, 2017). The transition to online teaching presents unique emotional challenges and opportunities that can affect students' motivation, involvement, and well-being (Chang, 2009; Xu et al., 2024). Isenbarger and Zembylas (2006) define teachers as emotional workers, and changing circumstances forced them to shift educational activities online, creating a new dimension of teachers' emotional regulation. Although the significance of teacher emotions for educational quality is recognized, a substantial gap remains in the literature on the regulative potential of these emotions in online learning environments. The literature has provided comprehensive, descriptive explanations by identifying teachers' emotional conditions (e.g., anxiety or joy), but has not examined the regulation of emotional experience. Furthermore, a lack of specificity has been identified in applying the Gross model to explain the antecedents of online teacher education for PTs. To address this gap, this study employed a mixed-methods approach to provide a comprehensive analysis and understanding of PT's emotional regulation within an online education system. Thus, the current study aims to investigate the emotions and emotion regulation strategies (ERS) experienced by PTs during their online education. For this aim, the following research questions were formulated: (1) How intensely do the preservice teachers during their online education feel emotions (positive activating, positive deactivating, negative activating, and negative deactivating ones)? (2) How do preservice teachers regulate their emotions in online education?

2. Emotion Regulation of Preservice Teachers

Emotion regulation was defined by Gross (1998) as “the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions” (p. 275). It is considered a central component of psychological functioning and mental health (Aldao et al., 2010). The extended process model of emotion regulation conceptualizes regulation strategies along the timeline of emotional generation. The model outlines five strategies: situation selection, situation modification, attentional deployment, cognitive change, and response modulation (Gross, 1998). Situation selection involves approaching or avoiding certain situations based on their anticipated emotional consequences. Situation modification involves altering the environment to alter its emotional impact. Attentional deployment includes shifting attention toward or away from emotional aspects of a situation. Cognitive change entails reinterpreting the meaning of a situation to alter its emotional significance. Response modulation occurs after the emotional response has been triggered and focuses on managing the experiential, behavioral, or physiological aspects of emotion. Among these, cognitive reappraisal is generally regarded as an adaptive strategy associated with long-term emotional well-being. At the same time, expressive suppression is often considered maladaptive due to its link with psychological distress (Aldao et al., 2010). Cognitive reappraisal is linked to greater positive affect and effective psychological adjustment (Gross & John, 2003), whereas expressive suppression is associated with higher stress and decreased well-being (John & Gross, 2004).

The PTs experience a wide range of emotions and commonly use ERS, such as instant messaging, social media, and face-to-face communication, to manage them (Wetcho & Na-Songkhla, 2022). To support emotion regulation among PTs, the literature suggests implementing evidence-based strategies that promote positive emotions and foster coping mechanisms (Iovino et al., 2021). It is

also crucial to consider the multidimensional nature of well-being when designing educational environments. For instance, Blake and Dewaele (2023) recommend incorporating agency, empathy, and reflection to mitigate the negative impacts of stress on teacher well-being. ERS serve as mechanisms for individuals to monitor, evaluate, and modify emotional reactions to achieve personal or contextual goals (Gross, 1998). These strategies are generally divided into antecedent-focused and response-focused categories. Antecedent-focused strategies modify the interpretation of an emotion-eliciting situation before the emotional response entirely unfolds, leading to more adaptive outcomes (Gross & John, 2003). In contrast, response-focused strategies involve inhibiting the outward expression of emotions after they have been activated and are associated with negative psychological consequences, including heightened stress and impaired interpersonal functioning (John & Gross, 2004). In online education, emotion regulation is critical for managing stress, maintaining instructional quality, and creating positive learning environments (Chang, 2009). Teachers' capacity for emotional regulation not only contributes to their professional identity development but also shapes how they engage with students and instructional practices (Zembylas, 2005).

3. Study Context

In Türkiye, preservice teacher education (PTE) underwent significant changes after the pandemic lockdown. At the policy level, higher education institutions decided to offer at least 30% of their courses online to prepare students for the requirements of the century (HEI, 2022). After this decision, the courses in PTE have been offered in face-to-face, hybrid, and fully online formats. In the literature, teachers' emotions have a critical role in the effectiveness of the teaching and learning process (Chen, 2021). In light of this dramatic change in PTE, online education has gained attention in recent years.

4. Method

This research was designed as an explanatory mixed-methods study (Creswell & Clark, 2017), comprising two sequential phases that examined preservice teachers' emotions and emotion regulation strategies in online education. The first phase was conducted to reveal the current state of their emotions, while the second phase explored how they regulate those emotions in online education. Educational opportunities and online teaching experiences shape preservice teachers' attitudes toward online education (Getenet et al., 2024; Zhang & Zhu, 2025). Considering this, the first aim was to identify which emotions preservice teachers experienced during online education using a larger sample. Then, in light of the findings, their emotion regulation strategies were examined in depth through interviews with a small sample of preservice teachers. The research process is shown in Figure 1.

Figure 1 *Research Design Process*



4.1. Phase 1

This phase employed a descriptive research design to explore the emotions experienced during online education while participants developed themselves as future online teachers. Quantitative research was employed to capture PTs' emotions, facilitating an in-depth exploration of participants' current situations.

4.1.1. Participants

The participants of this phase were enrolled in various teacher education programs within a faculty of education in Türkiye. 127 PTs (91 women and 36 men) from different teacher education programs were included in the study and enrolled in various departments. The participants' ages ranged from 19 to 41 ($M = 20.66$, $SD = 3.10$), providing a broad perspective on the development of online teacher identity across various stages of teacher education. All participants were enrolled in at least one online course as students ($M = 49.95$, $SD = 23.10$).

4.1.2. Material

An online emotion-recording and reflection form, developed by researchers, was used to collect data. According to the two experts' views, the initial version of the form was revised for face and content validity. It was then piloted with 12 PTs, and based on their reflections, the form was finalized. The reason for choosing an online form was to make participants feel free to explore their emotions. PTs answered closed-ended questions in which they examined negative activating emotions (stress, anxiety, shyness, and fear); negative deactivating emotions (sadness, confusion, restlessness, hopelessness, and feeling unqualified); positive activating emotions (happiness, success, sociability, willingness, delight, energy, feeling qualified, and hopefulness); and positive deactivating emotions (surprise, peace, calmness, and security). The closed-ended questions required rating the intensity of these emotions experienced in online education on a five-point scale ranging from 1 (lowest) to 5 (highest). Those emotions were selected considering the relevant literature on human emotions (Ekman, 1992; Izard, 1977). Open-ended questions were about explaining their emotional experiences in online education. See Table 2 for sample questions.

Table 2 Sample Questions

Emotion	1 (Lowest)	2	3	4	5 (Highest)	Open-ended question
Stress						The reason why you feel stressed

Data were collected during the spring semester of 2025, after obtaining ethical committee approval. PTs participated in the study voluntarily and completed the informed consent form after being informed about the study objectives, anonymity and confidentiality, data collection tools and procedures, and before the data collection phase. The form link was distributed via their institutional email; participants were asked to complete the form within a week to reflect on the questions and answer them in detail.

4.2. Phase 2

This phase employed a basic qualitative research design to explore ERS among PTs in online education. Qualitative research was used to provide an in-depth understanding of the phenomenon, enabling extensive exploration of participants' perspectives on emotion regulation. Qualitative research provides a portrayal of human experience and the meanings humans construct within their contexts. The method also enhances the reality of participants' voices, providing a rich, detailed analysis of their experiences in online educational environments.

4.2.1. Participants

The sample comprised 41 undergraduate students, including 10 males and 31 females, who were randomly selected from Phase 1 participants. The participants' ages ranged from 20 to 25 years ($M = 21.12$, $SD = 1.18$). All participants voluntarily took part in the study and provided informed consent before data collection.

4.2.2. Data Collection and Procedure

The interview schedule was developed by considering Gross's model and its dimensions with demographic questions. The questions concerned explanations of how the emotions participants reported in Phase 1 were regulated during online education. Sample interview questions include: "During the online education process, did you make any choices to avoid environments in which you felt emotionally distressed, or to prefer situations where you felt more comfortable? Could you describe an example of such a choice?" and "Have you ever attempted to modify or leave an online learning environment that had a negative impact on you? Could you describe an example?" The interviews, which lasted approximately 20 minutes, were conducted to ensure anonymity and confidentiality during the spring semester of 2025. The researchers, experienced in conducting interviews, led the data collection process. To achieve data saturation, researchers continued interviewing until participants' responses became repetitive.

4.2.3. Data Analysis

Both qualitative and quantitative data analysis methods were employed to examine PTs' emotional experiences and their ERS. PTs' ratings for each emotion were analysed to assess the distribution and intensity of emotions among them by using descriptive statistics (e.g., means and standard deviations). The emotions were analysed by grouping them according to control-value theory (Pekrun, 2006) categories: positive and negative activating and deactivating emotions. PTs' emotion regulation strategies during online education were reviewed and coded to identify potential themes rooted in Gross's Extended Process Model of Emotion Regulation (Gross, 2015). For this purpose, a content analysis framework was employed to analyze data via deductive category development "to elucidate explicit definitions, reference examples, and coding rules for each deductive category, thus helping to determine the exact criteria by which parts of the data (e.g., text passages) will be coded" (Gläser-Zikuda et al., 2020, p. 4).

Data have been read and reread to ensure familiarity, and codes have been allocated to classify the reasons behind emotional experiences and ERS in online education. Initial codes were revealed by researchers in the first turn of the coding process. In the second turn, researchers recoded the entire dataset, considering both concurrent and emerging codes. Once the code list was determined, the codes were categorized according to Gross's Model. To ensure validity, several methods were used, including triangulation, member checking, thick description, and expert review. Data from both qualitative and quantitative sources were used for triangulation. As part of the audit trail, participants were asked to review and confirm their responses and analysis results to ensure the accuracy of the interpretations (Creswell & Poth, 2016). Also, as suggested by Lincoln and Guba (1985), direct quotations from participants were represented. Moreover, the interview form was developed by the researchers and reviewed by experts in teacher education, psychological counselling, and guidance to ensure content validity. To ensure research reliability, inter-coder agreement, consistency in data collection, and pilot testing were used. Two independent researchers coded the data, and discrepancies between their codes were discussed until consensus was reached (Miles, 1994). Cohen's kappa coefficient was calculated as .85, reflecting high reliability.

5. Findings

5.1. Results of Quantitative Data Analysis on Emotion in Online Education

PTs' emotions were analyzed by grouping activating and deactivating positive and negative emotions following the control-value theory (Pekrun, 2006). Table 3 shows the positive emotions; among them, happiness ($M = 4.66$, $SD = 0.62$) and delightfulness ($M = 4.62$, $SD = 0.71$) are common. PTs' positive deactivating emotions have diverse mean scores. The most frequently felt positive deactivating emotion is peacefulness ($M = 4.65$, $SD = 0.75$), while the least frequently felt is calm ($M = 3.90$, $SD = 1.86$).

Table 3 Positive Emotions (Activating & Deactivating) of Preservice Teachers in Online Education

Emotion	Type	M	SD
Happiness	Activating Positive	4.661	0.62
Delightfulness	Activating Positive	4.630	0.71
Hopeful	Activating Positive	4.587	0.82
Successful	Activating Positive	4.575	0.72
Volunteer	Activating Positive	4.570	0.82
Sociable	Activating Positive	4.551	0.76
Energetic	Activating Positive	4.433	0.87
Qualified	Activating Positive	4.394	0.80
Surprised	Activating Positive	2.200	1.13
Peaceful	Deactivating Positive	4.653	0.76
Secure	Deactivating Positive	4.630	0.72
Calm	Deactivating Positive	3.898	1.86

Table 4 shows PTs' negative emotions in online education. This indicates that PTs feel negative deactivating emotions less than positive ones. Among the negative deactivating ones, confusion ($M = 1.90$, $SD = 1.03$) is reported more frequently, and hopelessness ($M = 1.19$, $SD = 0.66$) is reported less frequently. Among those, stress ($M = 1.70$, $SD = 0.94$) and anxiety ($M = 1.70$, $SD = 0.91$) are the most common emotions. On the other hand, unqualified ($M = 1.21$, $SD = 0.70$) and sorry ($M = 1.31$, $SD = 0.64$) are felt less than other deactivating negative emotions.

Table 4 Negative Emotions (Activating & Deactivating) of Preservice Teachers in Online Education

Emotion	Type	M	SD
Stressed	Activating Negative	1.698	0.95
Anxious	Activating Negative	1.698	0.91

Emotion	Type	M	SD
Confused	Activating Negative	1.896	1.03
Fear	Activating Negative	1.246	0.65
Shy	Activating Negative	1.294	0.72
Sorry	Deactivating Negative	1.302	0.64
Hopeless	Deactivating Negative	1.192	0.67
Unqualified	Deactivating Negative	1.309	0.70
Peaceless	Deactivating Negative	1.294	0.73

The findings revealed that PTs predominantly experienced high levels of both activating and deactivating positive emotions. The mean scores for these emotions ranged from 4.39 to 4.66, with relatively low standard deviations, indicating a consistent pattern across participants. In contrast, negative emotions were reported at considerably lower levels. Activating negative emotions yielded moderate mean scores (ranging from 1.24 to 1.90). Negative emotions were reported to be deactivated, with the lowest mean values, suggesting they were not commonly experienced among participants.

5.2. Results of Qualitative Data Analysis on Emotion Regulation Strategies

PTs' emotion regulation strategies were analyzed using Gross's (1998) model. Participants' physical regulation strategies were categorized as avoidance, self-regulation, and environmental regulation (see Table 5). The most frequent one is avoidance, such as engaging in unrelated activities, sleeping, resting, and postponing tasks. As self-regulation strategies, participants preferred removing distractors, changing physical location, and wearing comfortable clothing to enhance concentration and comfort. Environmental regulation strategies focused on the study environment, such as establishing a dedicated workspace or modifying a classroom's physical layout.

Table 5 Codes for Physical Regulation Strategies with Supporting Quotations

Sub-theme	Code	f	Example Quotation
Self-regulation	Removing distractions	1	"I turned off my phone to focus better."
	Changing the room	4	"When I couldn't concentrate, I moved to another room."
	Wearing comfortable clothes	2	"I put on my comfy hoodie to feel more relaxed."
Environmental regulation	Organizing the desk	1	"I cleaned my desk before starting to study."
	Arranging classroom layout	1	"I rearrange the classroom in a way that makes me easily focus."
	Creating a study setup	1	"I made a small study corner in my room."
Avoidance	Taking breaks	2	"I just stepped away for a few minutes."

Sub-theme	Code	f	Example Quotation
	Engaging in unrelated activities	18	"I started watching random videos instead of studying."
	Sleeping	11	"I went to sleep hoping I'd feel better after."
	Resting while lying down	7	"I lay down and tried to relax."
	Avoiding the task	9	"I kept postponing the assignment."
	Ignoring the challenges	1	"I acted like it wasn't a big deal."

PTs apply situation modification strategies to alter external circumstances to meet their academic needs in online education. Technical alterations, alternative solutions to connection problems, and changing devices are frequently used. Additionally, situational adjustments were made by changing rooms or waiting for a quieter time to study. This finding suggests that technological competence and adaptability play a key role in students' ability to maintain continuity in their academic tasks, especially in online or hybrid learning contexts. Some participants reported unsuccessful attempts as failed regulatory behaviors (see Table 6). These strategies reflect a proactive attempt to manage distractors and optimize concentration (Boekaerts & Corno, 2005; Zimmerman, 2002).

Table 6 Codes for Situation Modification Strategies with Supporting Quotations

Sub-theme	Code	f	Example Quotation
Technical Alterations	Seeking alternative solutions for connection problems	17	"I switched to mobile data when the Wi-Fi didn't work."
	Changing the device	8	"I used my tablet instead when my laptop froze."
	Getting homework help online	1	"I searched for examples on YouTube to understand better."
Situational Alterations	Changing the environment	14	"I changed the room to get away from the noisy environment."
	Preferring a quieter place	6	"I waited until everyone went to sleep to study in silence."
	Organizing the study space	4	"I rearranged my desk to feel more motivated."
Unsuccessful Attempts	Ineffective or failed regulation attempts	4	"I tried changing places, but it didn't really help."

Participants reported digital distractions, alternative engagements, physical activities, and self-soothing and regulation as ways to divert their attention from stress-inducing academic tasks. The most frequently preferred strategy for attention deployment is digital distractions: spending time on the phone, browsing social media, and watching videos. Furthermore, students frequently used other activities to avoid them, such as engaging in other activities, rearranging their study area, or looking outside. Physical activities such as wandering around and walking outdoors were also mentioned; however, they were less frequent. Several participants notably discussed self-soothing and regulation techniques, such as sipping herbal tea, talking to oneself, breathing techniques, and becoming more aware of their bodies.

Table 7 Codes for Attentional Deployment Strategies with Supporting Quotations

Sub-theme	Code	f	Example Quotation
Digital Distractions	Spending time on the phone	11	"I just kept checking my phone instead of studying."
	Browsing social media	6	"I scrolled through Instagram to clear my mind."
	Watching videos	2	"I watched short videos to distract myself."
Alternative Engagements	Engaging in other tasks	17	"I started doing chores to avoid studying."
	Reading a book	1	"I read a chapter of a novel to take my mind off things."
	Playing games	1	"I played a mobile game to relax."
	Taking a break	1	"I gave myself a short break to breathe."
	Looking outside	2	"I look through the window for a while."
	Rearranging study space	4	"I reorganized my desk to feel more focused."
	Sleeping	1	"I took a nap to reset my mind."
Physical Activities	Walking outdoors	1	"I went for a quick walk outside."
	Wandering around	1	"I just walked aimlessly to clear my head."
Self-soothing & Regulation	Drinking herbal tea	1	"I made myself some herbal tea to calm down."
	Self-talk	1	"I told myself I could handle it."
	Breathing exercises	1	"I focused on my breathing to relax."
	Body awareness	1	"I paid attention to how tense my body felt and tried to release it."

Table 8 presents the cognitive reappraisal strategies participants used to cope with challenges, with a focus on individual-centered approaches and the advantages of online learning. As individual-centered strategies, goal orientation, self-empowering thoughts, cognitive reframing (especially in response to external stressors such as the earthquake), and expressing personal opinions were commonly employed behaviors. One notable strategy was to develop empathy toward instructors, demonstrating the emotional and mental effort to understand the challenges educators might be facing. The advantages of online education for participants included reflection on cognitive reappraisal of the online learning environment. Commonly cited advantages included the flexibility of time and location independence, suggesting that students valued the freedom and autonomy of online education. Moreover, easy access to content, comfort, easier exams, cost-effectiveness, and the development of digital skills were framed as benefits that reduced academic stress and enhanced learning.

Table 8 Codes for Cognitive Reappraisal Strategies with Supporting Quotations

Sub-theme	Code	f	Example Quotation
Individual-Centered	Goal orientation / self-empowering thoughts	1	"I reminded myself why I started and focused on my long-term goals."
	Cognitive reframing	3	"I consciously shifted to a calmer mindset to facilitate my ability to focus."
	Expressing individual opinions	1	"I felt more comfortable expressing my views during online classes."
	Developing empathy toward the instructor	1	"I thought the teacher might also be struggling, so I tried to understand."
Getting the Advantages of Online Education	Repeated access to content	3	"I could rewatch the lessons whenever I needed to understand better."
	Time flexibility	12	"It was easier to manage my schedule and avoid stress."
	Independence from location	12	"I didn't have to worry about commuting or being in a specific place."
	Easier exams	2	"The exams felt less stressful compared to face-to-face ones."
	Cost-effectiveness	3	"I saved money because I did not travel and eat out."
	Comfort	2	"Being at home made learning more comfortable and stress-free."
	Gaining digital skills	1	"I learned how to use new platforms and tools."
	No absenteeism issues	1	"Even when I was unwell, I could still attend classes from home."

Participants expressed varying perceptions of how different learning modalities influenced their ability to regulate emotions during online education. The majority reported feeling more comfortable and emotionally expressive in face-to-face settings. Some found emotion regulation to be easier in online environments, citing greater personal control over their emotional state. A few participants indicated that face-to-face contexts revealed feelings of anxiety and tension. Only two participants reported no significant difference between the two modalities regarding emotional regulation.

Table 9 Perceptions of Emotion Regulation in Face-to-Face vs. Online Learning Contexts

Code	f	Example Quotation
Feeling more comfortable face-to-face	20	"I feel more natural and expressive in face-to-face settings."
No difference between modalities	2	"It doesn't matter whether it's online or in person for me."
Emotion regulation is easier online	15	"Online classes give me more control over my emotional state."
Feeling challenged in face-to-face settings	4	"In face-to-face settings, I feel more anxious and tense."

The integration of results from the quantitative and qualitative phases reveals a complex interplay between preservice teachers' emotional experiences and their regulatory behaviors. Although the results of Phase 1 showed a prevalence of positive activating emotions, suggesting high levels of motivation and flexibility, the results of Phase 2 showed a strong reliance on avoidance-based regulation strategies, such as digital distraction and sleep, to cope with stress. This finding indicates that although the flexibility of online education contributes to positive affect, it can inadvertently promote maladaptive regulation strategies by enabling students to disengage easily from academic tasks rather than proactively regulating themselves or cognitively reappraising the situation. Consequently, the high rates of positive emotions observed during the quantitative phase may also, to some extent, reflect temporary comfort afforded by avoidance behaviors during the qualitative phase, rather than actual regulatory competence. This is also in line with the finding that while students appreciate the autonomy of online learning, they lack the metacognitive skills to use this autonomy to structure the learning environment or to set effective goals. Thus, the findings collectively point to the importance of the gap between positive emotions in digital learning and actual emotion regulation, which teacher education programs need to address in order to transform passive avoidance into antecedent-focused resilience.

6. Discussion

PTs report notably different emotional experiences in traditional face-to-face and online learning contexts due to limited emotional and social interaction between students and teachers (Sepúlveda-Escobar & Morrison, 2020). In Phase 1, PTs' positive emotions may reflect emotional readiness and psychological preparedness for the teaching profession in online education. On the other hand, the notable variability in certain negative emotions—such as confusion—may reflect the need for individualized support and differentiated guidance throughout the teacher training process. Regan et al. (2012) highlight the emotions of instructors in online learning environments, including feelings of restriction, stress, devaluation, validation, and rejuvenation. Emotional labor of PTs in an online setting may yield both positive (e.g., increased confidence) and negative outcomes (e.g., burnout). In this study, PTs exhibited more positive activating and deactivating emotions than negative ones in online education.

Various reasons can explain this. Firstly, PTs' high motivation towards professional development may be related to these positive emotions (Timošćuk & Ugaste, 2010). Another reason may be that, as preservice teachers, the freedom and greater comfort afforded by the student role in online education may appeal to them. Similarly, they may perceive the opportunities for environmental and social support in online education as attractive (Kebritchi et al., 2017). Along with all these, studies show that the adaptation and compatibility with technology of the Z and alpha generations, which constitute the sample of this study, are higher (Ziatdinov & Cilliers, 2021).

In Phase 2, the findings indicate that PTs employed a range of physical regulation strategies to manage academic stress during online education—often to regain control over their emotional states and learning environments. The results of the study align with prior research indicating that avoidance strategies in online education, such as ignoring tasks, are associated with stress and lower engagement (Mozid, 2022). Notably, avoidance strategies were used more frequently than self-regulation or environmental regulation techniques. While some participants adopted proactive behaviors (e.g., changing rooms, organizing study spaces) to enhance concentration, many resorted to passive or avoidance behaviors, such as watching unrelated videos, sleeping, or engaging in irrelevant tasks. This pattern suggests a limited repertoire of adaptive coping strategies among some PTs, particularly under conditions of academic pressure. In line with the findings of the current study,

Kohnke et al. (2021) indicated that the opportunity to create a suitable location and the sharing of problems with classmates are self-regulatory learning strategies. The frequent use of avoidance-based strategies is consistent with previous studies indicating that such behaviors offer short-term relief but may compromise long-term academic performance and emotional well-being (Boekaerts, 2011). Moreover, the relatively low usage of environmental regulation strategies may indicate a lack of awareness or limited access to structural modifications that could support effective self-regulation.

The findings on attentional deployment further reveal a strong reliance on avoidance-based behaviors, particularly digital distractions and alternative tasks. This tendency may reflect the difficulty many students face in sustaining attention and managing emotions, especially in online or self-directed learning environments. The frequent use of mobile devices, time spent on social media, and non-academic tasks (e.g., household chores) suggest a preference for immediate emotional relief over intentional self-regulation. Although some participants reported using self-soothing techniques (e.g., breathing exercises, self-talk), these appeared infrequent and possibly underdeveloped. This supports earlier findings that, in the absence of explicit instruction, students are more likely to adopt passive or externally driven strategies than active, internal ones. These patterns highlight the need for interventions that enhance metacognitive awareness and emotional regulation (Veenman, 2016) to help PTs not only manage their own stress but also model adaptive regulation in their future classrooms.

Environmental adjustments to regulate emotions during online education, such as changing rooms, adjusting lighting, reducing noise, and organizing the work area, can help manage stress and enhance emotional control (Kohnke et al., 2021). People who change their work environment to reduce distractions experience lower levels of emotional exhaustion. In addition, digital environmental regulations, such as turning off notifications or website blockers, can also be effective (Zimmerman, 2002). The study reveals how participants engaged in both individual cognitive efforts and contextual evaluations to regulate their emotions and sustain motivation during an unprecedented learning period. This aligns with the capacity to select and implement the most contextually appropriate strategy (Bonanno & Burton, 2013). This study highlights the role of time flexibility and location independence in online education for emotional regulation. It is stated that the opportunity to manage the learning environment in accordance with personal rhythms and emotional states can reduce stress and enhance self-regulatory capacities (Martin & Bolliger, 2018). According to Jääskelä et al. (2017), learners who can control the timing and pace of their learning report greater emotional independence and engagement. In addition, the asynchronous structure of many online learning environments, as noted in this study's results, makes it easier for individuals to re-evaluate challenging content emotionally (Gross, 2015). It has been stated that flexibility in the online learning environment supports a balance between students' academic demands and other life responsibilities and can act as a buffer against emotional burnout (Hart, 2012).

PTs in this study had difficulty managing emotional challenges, particularly in online learning contexts, stemming from technological difficulties, delayed feedback, feelings of isolation, and performance-related anxiety. The ability to regulate such emotions effectively is not only vital for their personal well-being but also essential for fostering teaching efficacy and creating emotionally supportive learning environments (Sutton & Wheatley, 2003). In online education, where emotional and social support are limited, PTs used self-calming strategies infrequently—despite their importance in reducing isolation and stress (Kebritchi et al., 2017). Practices such as mindfulness, breaks, and music help reduce anxiety and improve focus (Maddock & Blair, 2023). Emotion

regulation is vital for teachers' well-being and effectiveness, especially given the limited interpersonal interaction online (Gross, 1998). Suppression leads to burnout and disengagement (Gross & John, 2003), while reappraisal supports commitment and mental health (Aldao et al., 2010). The emotional demands of online teaching can strain authenticity (Zembylas, 2005), making regulation skills essential for managing burnout and self-efficacy (Yang & Du, 2024). Mindfulness offers a promising alternative to traditional ERS in digital settings (Shang, 2024), helping PTs stay motivated, resilient, and emotionally engaged.

Research indicates that people with lower self-regulatory capacities use avoidance-based emotion regulation in online learning (Wang et al., 2024). On the other hand, those with high self-regulation appear to use learning outcomes more consciously by alleviating negative emotional states (Zhu et al., 2024). In light of these findings, it is essential to provide teachers with interventions that enhance both emotional awareness and functional regulation capacities. Mindfulness-based programs, emotion-tracking applications, and social-emotional learning modules tailored for educators may serve as promising tools in this regard (Chen, 2021). Breathing and mindfulness-based programs for PTs to develop self-calming strategies will help increase emotional well-being and maintain academic motivation in online education.

This research highlights PTs' emotions and their strategies for emotional regulation in online education. During online education, PTs frequently reported positive emotions, driven by motivation and flexible learning environments. On the other hand, they mainly apply avoidance-based ERS to cope with negative emotions such as stress. Limited use of self-calming and well-being practices requires comprehensive teacher education focused on emotional regulation strategies. Therefore, self-regulation modules can be considered essential components of teacher education programs for preparing PTs for online teaching by providing opportunities to support their well-being, academic performance, and ability to model healthy ERS in their profession. Considering the results of this study, emotion regulation skills in digital contexts should be supported by the curricula for future teachers. Online teaching competencies and emotionally responsive skills of PTs should be strengthened in their education process.

This study has some limitations. The study concentrates on emotion regulation in online education. However, online education was widespread during the pandemic and after the earthquake in Türkiye. Those unexpected situations evoked different emotions and led to insufficient preparation, which may constitute a limitation. Moreover, future research can examine emotion regulation strategies, access to technology, institutional support, course design, and evolving educational contexts. The data for this study were collected over a single time period, which limits its ability to reveal change over time. Longitudinal studies could give insights into how preservice teachers' emotion regulation strategies evolve over time.

7. Declarations

7.1. Author Contributions (CRediT)

Author 1 (Dr. Gökçe Sancak-Aydın): Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Writing—original draft; Writing—review & editing; Visualization.

Author 2 (Dr. Hatice Cılsalar-Sagnak): Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Writing—original draft; Writing—review & editing; Visualization.

7.2. Conflict of Interest

The authors declare that they have no known competing financial interests, institutional affiliations, or personal relationships that could have appeared to influence the work reported in this paper.

7.3. Funding Statement

This research received no external funding.

7.4. Data Availability Statement

Data are available from the corresponding author upon reasonable request, subject to participant confidentiality agreements.

7.5. Ethics Approval

Ethical approval for this study was granted by the Yozgat Bozok University Social and Humanities Sciences Ethical Committee (Approval No: 08/27; Approval Date: 23.11.2023). All participants signed a consent form prior to data collection.

7.6. Use of Artificial Intelligence (AI) Tools

The authors disclose the use of AI-assisted tools in the preparation of this manuscript as follows: language editing. AI tools were not used to generate or alter empirical data, produce analytical results, or shape the core findings and conclusions of the study. All AI outputs were reviewed and verified by the authors, who take full responsibility for the integrity, originality, and accuracy of the content.

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