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Emotional intelligence as predictor of learning performance in higher education: a SEM approach

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Emotional Intelligence (EI) is gaining recognition as an essential component of academic performance, especially in teacher education programs where emotional competence is critical for engaging with young learners. This research analyzes the significant impact of four emotional intelligence dimensions (Wong and Law Emotional Intelligence Scale) on Learning Performance among pre-service teachers in Bachelor of Early Childhood Education and Bachelor of Elementary Education programs in the Philippines. Partial Least Squares Structural Equation Modeling (PLS-SEM) was utilized to evaluate the measurement and structural models. The results showed that all four EI dimensions had a significant and positive effect on LP. ROE had a medium effect size, while the other three dimensions had small effect sizes. UOE was the strongest predictor of the path coefficient, which shows how important it is to leverage emotions to boost motivation and cognitive engagement. The model accounted for 57.6% of the variance in LP. These findings contribute to the literature by examining the relatively neglected environment of early childhood and elementary pre-service teachers, offering empirical evidence for the beneficial implications of several EI components in improving learning performance. The study provides theoretical implication for incorporating emotional intelligence development into teacher education programs to enhance academic performance and professional preparedness.

KEYWORDS

emotional intelligence, self-emotion appraisal, others emotion appraisal, regulation of emotion, use of emotion, learning performance

Introduction

The impact of Emotional Intelligence (EI) on a person's ability to navigate the workforce and interpersonal relationships has become an increasingly important topic of interest in education (Shamsi et al., 2024). In the last decades, EI has gained importance in the educational field, as it favors the psychological wellbeing of students and allows them to better understand the environment surrounding them, providing them with the necessary skills, to be able to face everyday situations (Puertas-Molero et al., 2020). Zhang (2025) emphasized that EI is a collection of talents encompassing an individual's self-knowledge, self-management abilities, social awareness, and appropriate behaviors in different situations.

EI also has been found to be connected with key skills and important students' competencies that can help to better control emotions and connect with other (Acebes-Sánchez et al., 2019). Petrides et al. (2016) and Phang et al. (2018) suggested that EI is individuals' perception about their emotional dispositions and the ability to recognize, manage, use and understand their own emotions as well as those of others. Chen et al. (2023) highlighted that EI helps students foster positive attitudes toward feedback and regulate negative emotions triggered by criticism, thereby promoting more effective engagement with feedback and empathy. Moreover, EI encompasses a variety of unique skills and characteristics that allow a person to perceive, understand, and regulate their emotions (Shamsi et al., 2024; Issa et al., 2022). Additionally, Zhang et al. (2024) noted that EI is the ability to perceive, access, generate, understand, and regulate emotions, promoting both emotional and intellectual growth. Thus, individual who are emotionally intelligent typically possess a clear understanding of their requirements, strengths, weaknesses, and capabilities (Zhang, 2025).

Dover and Amichai-Hamburger (2023) emphasized that that individuals with high levels of EI can identify and regulate negative emotions while generating and utilizing positive emotions to facilitate thinking and decision making. Moreover, Saud (2019) highlighted that EI has a high impact on many aspects of a learner's life and academic performance level. For instance, students possessing EI frequently exhibit more proficiency in articulating intricate emotional nuances through their artistic endeavor (Costa and Cipolla, 2025), establishes healthy and positive relationships (Sharma, 2024), influences capacity to control conduct, navigate complex social circumstances, and make personal decisions that result in positive results (Chung et al., 2023), enjoy greater productivity, success, and positive health outcomes (Kotsou et al., 2019), protector against mental illness and potentially increases mental health (Nguyen et al., 2025), high EI can positively influence adaptive coping styles (Mavroveli et al., 2007) and general academic performance (Gugliandolo et al., 2015; Petrides et al., 2004). Moreover, emotions can significantly influence students' engagement, motivation, and overall success (Lantolf and Poehner, 2023). Given this contribution of Emotional Intelligence (EI) to education, it is undeniable that EI plays a significant influence in the academic endeavors and success of students in higher education.

Emotions significantly impact the academic performance. Building upon this foundational understanding, Pishghadam (2009) and Abera (2023) have demonstrated through empirical studies that students with higher levels of EI tend to achieve better academic results. Understanding these mechanisms is crucial to foster supportive learning environments that mitigate negative emotions and promote positive ones (Zhang et al., 2024). Several researches have been undertaken to ascertain the contribution of EI in higher education, but there is still very little research that directly examines how different EI (i.e., self-emotion appraisal, others' emotion appraisal, regulation of emotion, and use of emotion) affect learning performance for students taking Bachelor in Early Childhood Education and Bachelor in Elementary Education.

Prior research predominantly concentrated on general teacher education or students from various disciplines (Trigueros et al., 2019; Keefer et al., 2018), neglecting the distinctive emotional demands associated with early childhood and elementary education, where pre-service teachers must possess advanced emotional competencies to engage effectively. Moreover, limited research has employed Structural Equation Modeling (SEM) to examine the predictive capacity of Emotional Intelligence (EI) on student performance in this particular domain, despite SEM's efficacy in assessing both measurement and inter-variable correlations (Hair et al., 2021). This study fills the gap by employing SEM to investigate the impact of emotional intelligence on learning performance among pre-service teachers, including those enrolled in early childhood and primary education programs in the Philippines. This study will examine the impact of emotional intelligence on the academic performance of pre-service teachers in early childhood and elementary education Using structural equation modeling, it will shed light which components of EI are most significant. This will enable higher educational institutions (i.e., state universities and colleges) create programs that improve these skills, which will lead to improved learning performance of the students.

Literature review

Emotional intelligence

Thorndike (1920) introduced the notion of Emotional Intelligence (EI) in the 1920s, categorizing it as abstract, mechanical, and social. Later, in the 1980s, various scholars added additional contributions to the concept of emotional intelligence. Gardner (2013) introduced the concepts of intra-emotional intelligence and inter-emotional intelligence. Steiner (1984) proposed the concept of EI. Salovey and Mayer (1990) developed the idea of "emotional intelligence" based on the contributions of these researchers. Moreover, emotional intelligence has been intensively researched in various fields, including organizational behavior, human resources, and management. George (2000) is of the view that individuals are different from each other in terms of degree of awareness about their emotions and expression of verbal and non-verbal emotions. Additionally, interest in emotional intelligence (EI) has increased greatly over the last decade. Although some researchers and practitioners have been quite optimistic about the importance of EI in organizations, critical questions remain about the concept, theory, and measurement of (Landy and Conte, 2004; Matthews et al., 2002). Day and Carroll (2004) emphasized that the relationship between various aspects of emotional intelligence and individual performance in terms of decision making. They explained that, better performance can be achieved through emotional performance.

Self-emotion appraisal

Self-emotion appraisal is the ability to detect and understand one's feelings. This skill helps students understand how emotions affect their thinking, motivation, and learning. Students with excellent self-emotion evaluation can detect and handle stress and frustration, which helps them focus and continue in school (Law et al., 2004; Extremera and Fernández-Berrocal, 2005). Awareness increases self-regulation and problem-solving in higher

education, improving learning outcomes (Pekrun et al., 2017). Self-emotion appraisal helps pre-service teachers adapt to problems, stay motivated, and communicate well with colleagues and instructors (MacCann et al., 2020). Self-emotion appraisal is crucial to academic performance since it is the first step to emotion regulation.

H1. Self-emotion appraisal has a positive influence on learning performance.

Regulation of emotion

Regulation of emotion is how students handle their feelings so they can pay attention, remember things, and keep going with their work (Broderick, 2021). Cognitive reappraisal enhances concentration, engagement, and academic success, whereas expressive suppression does not (Ahmed, 2020; Montasser, 2019). Because they participate more and have less exam anxiety and stress, emotionally balanced adolescents perform better in school (Arsenio and Loria, 2014). Recent meta-analysis suggests that emotion regulation components predict emotional intelligence success (MacCann et al., 2020). All this demonstrates that emotionally stable students perform better academically. Thus, the hypothesis was constructed:

H2. Regulation of emotion has a positive influence on learning performance.

Others emotion appraisal

The ability to recognize, understand, and assess one's own and others' emotions corresponds to others emotion appraisal. This skill improves learning by helping students manage stress, academic issues, and motivation (Pekrun et al., 2017). Effective emotion assessment helps students manage negative emotions, solve issues, and focus on academic tasks, improving performance (MacCann et al., 2020). Emotional assessment helps students meet course expectations, boosting academic resilience (Trigueros et al., 2019). Others emotion appraisal promotes learning group performance and peer interactions (Perera and DiGiacomo, 2013). Given these findings, students with higher emotional assessment should do better intellectually. Thus, the hypothesis was constructed:

H3. Emotion appraisal has a positive influence on learning performance.

Use of emotion

Emotion use is the process of using feelings like excitement and optimism to drive thought, keep working hard, and solve problems. According to the Wong–Law EI framework, this trait predicts important outcomes because students who can "use" their feelings are more likely to study and keep at it (Law et al., 2004). Positive feelings make it easier to pay attention, think, and interact with others, which helps with learning and performance (Fredrickson, 2001). Enjoyment and hope make students do better in school, while fear and boredom make them do worse (Pekrun et al., 2017).

A meta-analysis shows that emotional intelligence, which includes using emotions in a healthy way, improves academic success in ways that go beyond cognitive ability (MacCann et al., 2020). EI raises performance by increasing academic involvement and social-emotional skills, which are important for doing well in college (Perera and DiGiacomo, 2013). These results show that students learn more when they use their feelings to inspire and focus.

H4. Use of Emotion has a positive influence on learning performance.

Learning performance

Learning performance refers to the ability of students to achieve desired academic outcomes, often measured through grades, test scores, or skill acquisition (Guskey, 2013). It is influenced by a range of factors, including cognitive abilities, motivation, emotional intelligence, teaching quality, and learning environment (Kasemy et al., 2022). Empirical research by Morrison (1999) examined various student attributes associated with academic motivation. These findings suggested that either cognitive abilities or non-ability traits can have a strong positive influence on both academic performance and subsequent employment performance (Griffin et al., 2013). Moreover, studies show that psychological aspects, such as self-regulation and emotional management, play an important role alongside traditional academic skills (Putwain et al., 2013). Technology integration, active learning strategies, and supportive feedback have also been found to enhance student learning outcomes (Wang, 2020). In higher education, understanding what drives learning performance is essential for designing interventions that improve student success and prepare them for professional demands (Norris et al., 2008). The conceptual framework of the study, which illustrates the hypothesized relationships among emotional intelligence constructs and learning performance, is presented in Figure 1.

Methods

Instruments

The constructs in the proposed model were assessed using items that were developed after conducting a comprehensive literature review (Appendix 1). Emotional Intelligence (EI) was assessed using the Wong and Law (2002) with 16 items. There are four subscales, with four items each. The questionnaire includes self-emotion appraisals (SEA), Others' Emotion Appraisals (OEA), Regulation Of Emotion (ROE), and Use Of Emotion (UOE). Whereas, the items for measuring Learning Performance (LP) of students were taken from Young et al. (2003). A 7-point Likert scale was employed to evaluate each construct in the survey instrument. Items in all of the constructs transitioned from "strongly disagree" to "strongly agree." In order to enhance the questionnaire's instructions, questions, difficulty, phrasing, order, form, and structure, a pre-test was administered. The pretest was distributed to ten individuals, who were subsequently requested to complete it. Any modifications that were necessary were implemented prior to the commencement of the actual collection,

FIGURE 1
The proposed structural model for students learning performance.
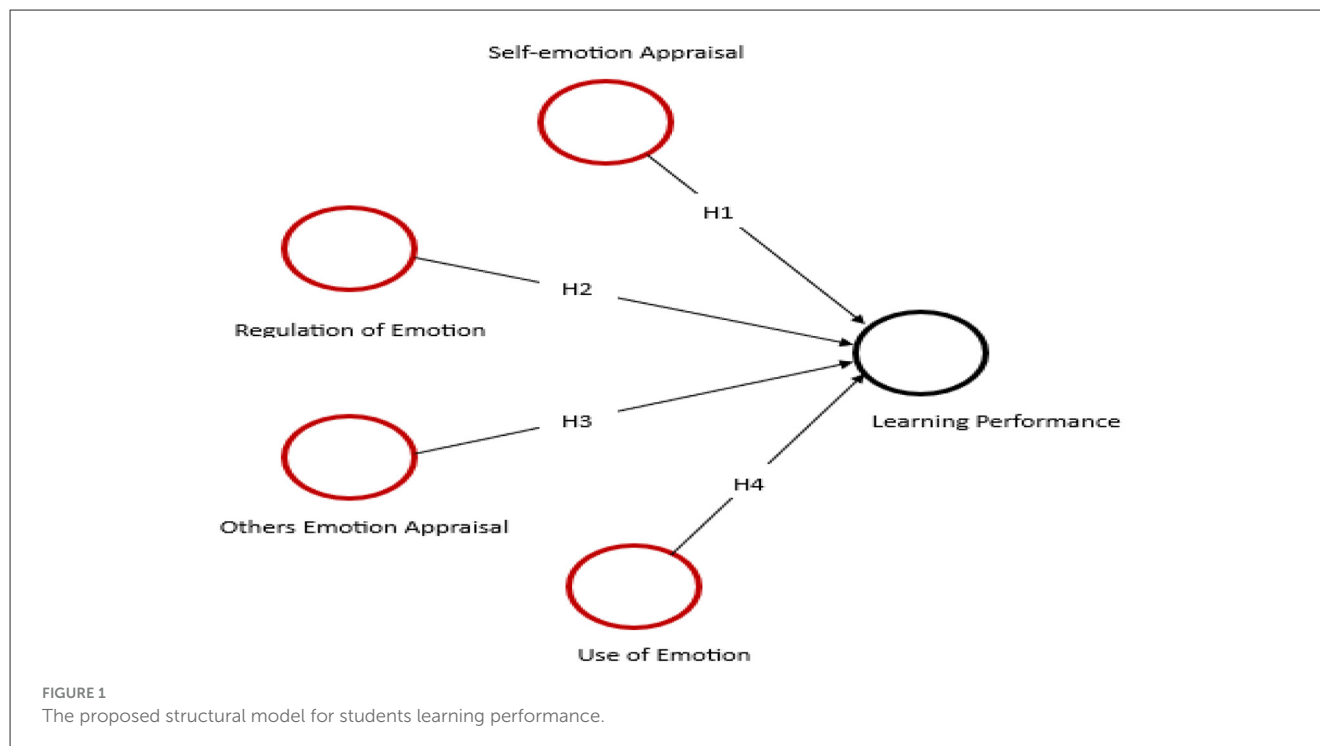
as indicated by their responses. For IE no modifications on EI were implemented since the responses were consistent, clear, and indicated that the instrument was understandable and appropriate for the study's objectives. However, for LP, the indicators were revised align with the objectives and function of the study.

Data collection

Participants in the study were undergraduate students from one of the Philippines' major state universities. The participants were senior College of Education students pursuing bachelor's degrees in elementary and early childhood education. This study involved a total of 819 students. The data was obtained via online platforms (i.e., Google Forms). The study used online surveys to collect and analyze data more efficiently. As a general rule of thumb, the minimum sample size should be ten times the maximum number of arrows that lead to the latent variable in the PLS path mode (Hair et al., 2021). As a result, the minimal sample size for this study was 40, as recommended by Hair et al. (2021). According to the rule of thumb, the sample size in this study is more than adequate because the number of respondents exceeds the minimum required.

Data analysis results

Hair et al. (2017) emphasized that in using PLS-SEM, the first criterion for evaluating the model is an assessment of the reliability and validity of the measures. The measurement model assessment result shows that all the indicators were convergent and reliable, as shown in Table 1, where the factor loading for each item is above

the threshold value of 0.70 (Henseler et al., 2009). Additionally, the AVE statistics for each construct range from 0.773 to 0.881, which is higher than the proposed threshold of 0.5 (Fornell and Larcker, 1981). This indicates that all the constructs in the model had an appropriate convergent validity. In addition, the measures were all reliable, with all the constructs being above the Cronbach's alpha (α) and Composite Reliability (CR) threshold value of 0.70 (Hair et al., 2017).

Fornell and Larcker (1981) demonstrated discriminant validity by finding that the average variance extracted (AVE) of the constructs was greater than the squared correlation of each latent variable. As indicated in Table 2, the values in bold inside the data table represent the square roots of the AVE, whilst the values in the table that are not bolded represent the intercorrelation values between the structures. Off-diagonal values less than the square roots of the AVE are thought to be compatible with the Fornell and Larker criteria.

Structural model assessment

The summary of the measurement model, including factor loadings, composite reliability, and average variance extracted, is shown in Table 3. This study examined the predictive capacity of the model's endogenous variables, a finding from the PLS-SEM results (Sarstedt et al., 2014). The structural model was assessed utilizing PLS-SEM, focusing on the significance of the path coefficients, R^2 values (predictive power), and f^2 (effect size) (Hair et al., 2017). The route coefficient outcomes of the structural model that validate the proposed hypotheses are detailed in Table 4 and displayed in Figure 2. All 4 hypotheses were supported.

TABLE 1 Measurement model of assessment results.

Convergent validity		Discriminant validity			Convergent validity		Discriminant validity		
Loadings		Ave	α	CR	Loadings		Ave	α	CR
OEA1	0.857	0.777	0.904	0.910	SEA1	0.855	0.773	0.902	0.906
OEA2	0.892				SEA2	0.922			
OEA3	0.863				SEA3	0.906			
OEA4	0.913				SEA4	0.831			
LP1	0.821	0.881	0.955	0.956	UOE1	0.891	0.775	0.903	0.905
LP2	0.768				UOE2	0.819			
LP3	0.836				UOE3	0.908			
LP4	0.879				UOE4	0.900			
ROE1	0.911	0.835	0.934	0.938					
ROE2	0.927								
ROE3	0.885								
ROE4	0.931								

α = Cronbach's alpha; CR, Construct Reliability; AVE, Average Variance; OEA, Others Emotion Appraisal; LP, Learning Performance; ROE, Regulation Of Emotion; SEA, Self-Emotion Appraisal; UOE, Use Of Emotion.

TABLE 2 Correlation and testing of discriminant validity.

	Others Emotion Appraisal	Learning Performance	Regulation of Emotion	Self-Emotion Appraisal	Use of Emotion
Others Emotion Appraisal	**0.881**				
Learning Performance	0.603	**0.939**			
Regulation of Emotion	0.532	0.604	**0.914**		
Self-emotion appraisal	0.677	0.654	0.633	**0.879**	
Use of Emotion	0.655	0.702	0.590	0.723	**0.880**

The square root of AVE is shown on the diagonal of the matrix in bold; inter-construct correlation is shown off the diagonal.

TABLE 3 Path coefficients and hypothesis results.

Hypothesis	β	p-Values	Decision
H1: Self-Emotion Appraisal → Learning Performance	0.158	0.000***	Supported
H2: Regulation of Emotion → Learning Performance	0.209	0.000***	Supported
H3: Others Emotion Appraisal → Learning Performance	0.141	0.000***	Supported
H4: Use of Emotion → Learning Performance	0.372	0.000***	Supported

***$p < 0.001$; **$p < 0.05$; NS, Not Significant.

Figure 2 displays the structural model's R^2 value, which represents its prediction accuracy. R^2 values of 0.75, 0.50, and 0.25 were considered acceptable according to the rule of thumb for prediction accuracy (Henseler et al., 2009; Hair et al., 2011). With an $R2$ of 0.576 (58%), the model's R^2 values demonstrated that LP accounted for the most variation.

Using the PLS algorithm, effect sizes (f^2) of 0.02, 0.15, 0.35 were calculated, indicating small, medium or significant effects, respectively, on the relationship between the exogenous and endogenous constructs (Hari et al. 2017). A value of less than 0.2 indicates no effect of the exogenous constructs on an endogenous construct. The (f^2) result showed that RE and

TABLE 4 Effect size.

Relationship	$f2$	Effect size
SEA → LP	0.023	Small effect
RE → LP	0.181	Medium effect
EA → LP	0.023	Small effect
UE → LP	0.021	Small effect

LP, had medium effects, while SEA and LP, EA and LP, and UE and LP had small effects. The results are summarized in Table 4.
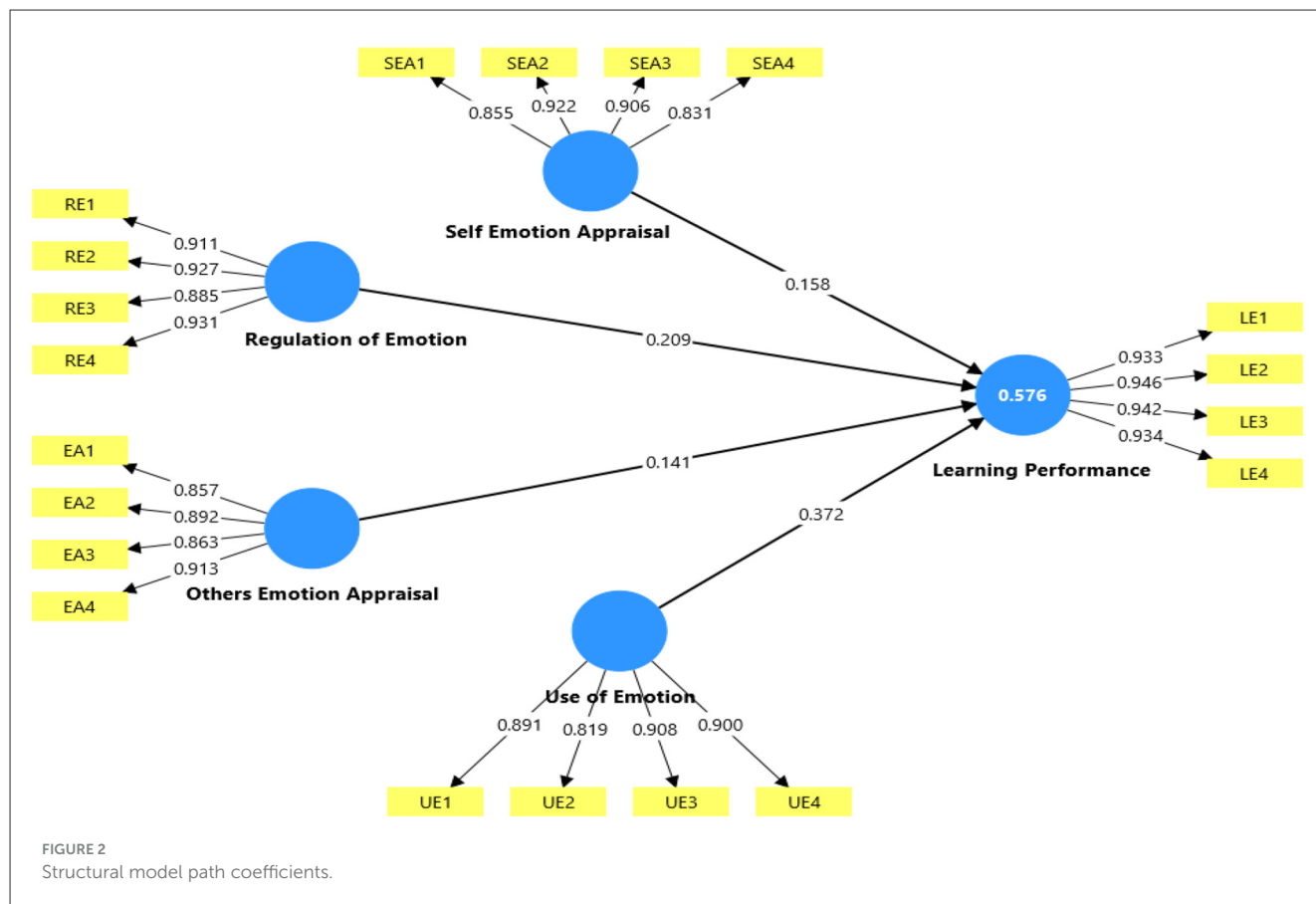
FIGURE 2
Structural model path coefficients.

Discussion

This study proposed a model examining the influence of Emotional Intelligence (EI) dimensions among pre-service teachers in early childhood and elementary education programs. Using PLS-SEM, the model demonstrated moderate predictive accuracy, with LP accounting for 57.6% of the variance ($R^2 = 0.576$). All four hypotheses were supported, confirming the robustness of the framework in explaining how EI contributes to academic achievement in this context. The results revealed that UE had the largest path coefficient ($\beta = 0.372$) but a small effect size ($f^2 = 0.021$), indicating that while the ability to channel emotions toward learning significantly predicts LP, its incremental explanatory power over other EI components is limited. This supports prior work by Law et al. (2004) and Pekrun et al. (2017), which showed that positive emotions such as enthusiasm and hope enhance engagement and persistence, thereby improving performance. SEA ($\beta = 0.158$, $f^2 = 0.023$) and EA ($\beta = 0.141$, $f^2 = 0.023$) also exhibited significant positive effects on LP, consistent with MacCann et al. (2020) and Perera and DiGiacomo (2013), who highlighted that accurate self- and other-emotion evaluation fosters adaptive coping, resilience, and academic focus. RE ($\beta = 0.209$) emerged as the second-strongest predictor, with a medium effect size ($f^2 = 0.181$), reinforcing evidence from Arsenio and Loria (2014) that students who can effectively regulate negative emotions, such as stress and anxiety, perform better academically.

Notably, while all EI components were significant, their relative contributions suggest complementary roles such as SEA and OEA establish emotional awareness, ROE ensures emotional stability, and UOE translates emotions into motivational and cognitive resources for learning. This aligns with Broderick (2021) and Fredrickson's (2001) broaden and build theory, where positive emotions expand cognitive capacity and social resources. Unlike some prior studies that found ROE to be the dominant EI predictor of performance (e.g., Ahmed, 2020), the present findings indicate a more balanced interplay among the four dimensions, suggesting that for pre-service teachers, the capacity to use emotions constructively is as critical as regulating or appraising them. Overall, the results underscore that enhancing EI in teacher education particularly fostering skills to harness emotions for motivation UOE and maintaining composure under stress RE can have meaningful impacts on academic success. These findings carry important implications for curriculum design in teacher preparation programs, supporting the integration of targeted EI training to optimize learning performance.

Conclusion

This study demonstrates that emotional intelligence dimensions (i.e., SEA, ROE, OEA, UOE), significantly enhances the learning performance of pre-service teachers in early childhood and elementary school. Applying structural equation modeling, all four factors demonstrated a positive influence, with regulation of

emotion exhibiting a medium effect and the remaining constructs displaying small but still significant effects. The findings indicate that cultivating emotional competencies can assist prospective educators in dealing with stress, maintaining motivation, and enhancing their academic engagement. These results can be used by higher education to create training programs that improve students' emotional intelligence. This will enhance students' academic performance and equip them with the affective skills necessary to become educators.

Theoretical implications

This research makes a significant contribution to the expanding body of literature on Emotional Intelligence (EI) by demonstrating how the four components of EI (self-emotion appraisal, others emotion appraisal, regulation of emotion, and use of emotion) predict learning performance among pre-service teachers in early childhood and elementary education. Previous research has frequently investigated Emotional Intelligence (EI) in broad student populations however, this study expands upon that research by concentrating on the specific emotional demands that are associated with teacher education. The findings, which were obtained through the use of Structural Equation Modeling (SEM), the findings support the theoretical premise that EI not only influences social and emotional functioning but also directly enhances academic outcomes. Emotional intelligence (EI) aspects are associated yet different determinants of performance, as confirmed by the findings, which lend support to models such as the Wong–Law Emotional Intelligence Scale (WLEIS) framework. Furthermore, the study emphasizes the significance of incorporating emotional skills into teacher preparation programs.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical approval was not required for the study involving humans in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and the institutional requirements.

Author contributions

RS: Validation, Methodology, Data curation, Supervision, Project administration, Conceptualization, Software, Investigation, Resources, Visualization, Funding acquisition, Writing – review & editing, Writing – original draft, Formal analysis. AD: Conceptualization, Writing – original draft. HG: Writing – review & editing, Data curation. ME: Data curation, Writing – review & editing. JC: Writing – review & editing. AC: Writing – review & editing. MS: Writing – original draft. HP: Writing – original draft.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix A

Constructs	Indicators	References
Self-emotion appraisal	I have a good sense of why I have certain feelings most of the time	Wong and Law (2002)
	I have good understanding of my own emotions.	
	I really understand what I feel.	
	I always know whether or not I am happy.	
Others emotion appraisal	My classmates believe that using GenAI for our research work is beneficial.	Wong and Law (2002)
	I always know my friends' emotions from their behavior.	
	I am a good observer of others' emotions.	
	I am sensitive to the feelings and emotions of others.	
Use of emotion	I have good understanding of the emotions of people around me.	Wong and Law (2002)
	I always set goals for myself and then try my best to achieve them.	
	I always tell myself I am a competent person.	
	I am a self-motivated person.	
	I would always encourage myself to try my best.	
Regulation of emotion	I am able to control my temper and handle difficulties rationally.	Wong and Law (2002)
	I am quite capable of controlling my own emotions.	
	I can always calm down quickly when I am very angry.	
	I have good control of my own emotions.	
Learning performance	I gain knowledge from my learning activities.	
	I develop skills through my learning experiences.	
	I am able to apply the knowledge and skills I have gained. Overall, I learn a lot from my studies.	Young et al. (2003)