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EDITED BY

Elisabetta Lombardi,
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REVIEWED BY

Alberto Rocha,
Higher Institute of Educational Sciences of
the Douro, Portugal
Mamdouh Helali,
King Faisal University, Saudi Arabia

*CORRESPONDENCE

Berik Matayev
✉ matayev_berik@teachers.ppu.edu.kz

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Fostering emotional intelligence and self-regulation in gifted high school students: experimental evidence from a soft skills development program

Arslanbek Mukhametkairov¹, Berik Matayev^{1*},
Assemgul Kalimova², Meruyert Utegenova¹ and Lira Ibraimova³

¹Higher School of Pedagogy, Educational Program 'Pedagogy and Psychology', Pavlodar Pedagogical University named after Alkey Margulan, Pavlodar, Kazakhstan, ²Higher School of Pedagogy, Educational Program 'Pedagogy and Methodology of Primary Education', Pavlodar Pedagogical University named after Alkey Margulan, Pavlodar, Kazakhstan, ³Department of Theory and Methodology of Kazakh Linguistics, Kazakh National Women's Teacher Training University, Almaty, Kazakhstan

Introduction: Gifted adolescents often receive extensive cognitive enrichment, while their emotional and self-regulatory development remains underrepresented in school programs. This study examined whether socio-emotional and self-regulatory skills can be effectively developed through a structured soft skills intervention for gifted high school students.

Methods: A seven-week soft skills program was implemented with 96 gifted students aged 15–16 in Kazakhstan. Participants were randomly assigned to an experimental group ($n = 48$), which engaged in reflection, empathy, and time-management activities, and a control group ($n = 48$), which continued regular instruction. Emotional intelligence, self-regulation, motivation, and communication skills were assessed using validated psychometric scales and expert observations (Cronbach's $\alpha = 0.80$ – 0.91). Data were analyzed using t -tests and ANCOVA.

Results: The experimental group demonstrated statistically significant improvements compared to the control group ($p < 0.001$), particularly in emotional intelligence and self-regulation, with large effect sizes ($\eta^2 = 0.59$ – 0.68). Expert evaluations also indicated increased emotional awareness, communication competence, and leadership behaviors among participants of the intervention.

Discussion/conclusion: The findings indicate that socio-emotional and self-regulatory competencies in gifted adolescents can be effectively enhanced through structured experiential learning. The proposed program offers a practical and scalable framework for integrating soft skills training into secondary education curricula for gifted learners.

KEYWORDS

educational intervention, emotional intelligence, empathy, gifted adolescents, reflective pedagogy, self-regulation, socio-emotional learning, soft skills development

1 Introduction

Contemporary educational reforms stress the need to integrate cognitive, socio-emotional, and personal competencies for 21st-century success. Fadel et al.'s (2015) Four-Dimensional Education model and the CCI21 framework by Celume and Maoulida (2022) show that knowledge, skills, character, and meta-learning form a unified system, illustrating the close

link between emotional intelligence, self-regulation, and other soft skills.

In this context, teachers are viewed not merely as transmitters of knowledge but as facilitators of learners' holistic development. Studies by Barrios (2021) and Marchenko (2024) show that educators with high emotional competence—empathy, self-regulation, and adaptability—create supportive environments that foster students' emotional awareness and interpersonal skills. Similarly, Raposo and Vairinhos (2025) emphasize that *digital thinking* as a pedagogical approach promotes collaboration, empathy, and reflection—skills vital for success in a technology-driven society.

The phenomenon of giftedness has been examined across many psychological and educational paradigms throughout the twentieth and twenty-first centuries. Building on the work of Mayer et al. (2016), Leites (1990), Shadrikov (1994), and Matyushkin (1989), giftedness is viewed as an integrative, dynamic quality that includes intellectual, motivational, and emotional–volitional components. Mayer et al. describe giftedness as a unique combination of abilities that supports success, while Leites highlights its developmental and individual-psychological factors. Shadrikov and Matyushkin link the growth of giftedness to cognitive activity, creativity, and intrinsic motivation.

Contemporary international research builds on classical theories by viewing giftedness as a multifactorial phenomenon shaped by cognitive, personal, and contextual factors. Subotnik et al. (2011) propose a dynamic model in which giftedness develops from early potential to high achievement and, eventually, to professional excellence. Their framework highlights the importance of psychosocial factors—motivation, perseverance, self-efficacy, self-regulation, and emotional stability—in both achievement and adaptation. Likewise, the review by Baccassino and Pinnelli (2023) identifies various instructional models for gifted learners, including the Schoolwide Enrichment Model, but also notes a lack of attention to the emotional and personal aspects of giftedness, especially outside English-speaking contexts.

Emotional intelligence (EI) has become an important concept in psychology and education, linked to personal development and academic achievement. Mayer and Salovey's (1997) model defines EI as a cognitive ability to perceive, understand, use, and regulate emotions. Their Four-Branch Model includes recognizing emotions, using them to support thinking, understanding their meanings, and managing emotions in oneself and others. This framework views emotions as valuable information for reasoning and decision-making, and EI as a skill that can be developed through education.

Building on the cognitive-ability perspective, Goleman (1998) expanded the idea of emotional intelligence to include social and behavioral competencies such as self-awareness, self-regulation, motivation, empathy, and social skills. His model helped shape the modern understanding of soft skills, placing EI at their psychological core. In this view, EI supports emotional maturity, stress tolerance, and interpersonal effectiveness—traits especially important for gifted students, whose cognitive development may exceed their emotional regulation and social adjustment.

Further empirical work by Lyusin (2006) and Andreeva (2008) highlights the dual cognitive–affective nature of emotional intelligence, viewing it as a system of interconnected processes that support emotional awareness, understanding, and regulation in social interactions. Costa and Faria (2023) add a developmental dimension, showing that both ability-based and trait EI directly predict academic performance, while students' implicit beliefs about the malleability of emotional abilities indirectly shape their motivation and learning.

Their longitudinal findings indicate that such beliefs change throughout adolescence and are influenced by educational environments that encourage reflection, empathy, and adaptive emotion regulation.

Research on self-regulation provides an important lens for understanding emotional and behavioral control. Vygotsky (1978) viewed self-regulation as a developmental process in which social guidance becomes internalized, allowing conscious, voluntary control over behavior. Konopkin (1980) expanded this idea by presenting self-regulation as a functional system of goal setting, planning, monitoring, and adjusting actions. Morosanova et al. (2022) further developed this framework by introducing the individual style of self-regulation—a stable set of personal traits that shapes how people plan and manage their activity. Her findings link self-regulation to academic achievement, emotional stability, and emotional intelligence, identifying it as a key mechanism of emotional maturity and personal agency.

Modern educational approaches to soft-skills development (Khutorskoy, 2003; Raven, 2001; Gorbunova, 2019; OECD, 2019; United Nations Educational, Scientific and Cultural Organization, 2015) underscore the close connection between emotional, social, and cognitive competencies. Khutorskoy highlights learner-centered education as a basis for developing key competencies such as self-organization, communication, initiative, and reflection. Raven defines competence as the integration of knowledge, values, and skills expressed through effective behavior in complex situations, stressing the roles of empathy, moral judgment, and self-regulation. Gorbunova views soft skills as essential for personal and professional potential, linking their development to self-awareness and emotional resilience—qualities that are especially important during adolescence, when emotional and social maturity are still forming.

International policy frameworks from the OECD and UNESCO identify soft skills and social–emotional competencies as global priorities in education. The OECD Learning Compass 2030 and the UNESCO Education 2030 Framework stress the need to develop learners who demonstrate collaboration, critical thinking, self-regulation, and empathy. Within these initiatives, emotional intelligence is viewed as the core of soft skills, combining emotional awareness, regulation, and interpersonal understanding as essential for well-being, lifelong learning, and social adaptability. These competencies are especially important for gifted adolescents, whose emotional development may trail behind their intellectual growth.

Although modern theories of giftedness (Subotnik et al., 2011; Baccassino and Pinnelli, 2023) emphasize its dynamic and multidimensional nature, research still largely centers on cognitive abilities and achievement, leaving emotional and psychosocial aspects understudied. Gifted learners often combine strong intellectual skills with emotional imbalance, perfectionism, or challenges in self-regulation and social adaptation.

At the same time, models of emotional intelligence (Mayer and Salovey, 1997; Goleman, 1995) are well established, yet their use in gifted education remains limited. Programs for gifted students typically prioritize academic enrichment rather than the systematic development of emotional competencies such as empathy, self-awareness, and emotional regulation.

Empirical findings (Costa and Faria, 2023) support the connection between emotional intelligence, motivation, and academic outcomes, but longitudinal and intervention-based research on cultivating EI in gifted adolescents is still lacking.

Thus, the main research gap lies in the insufficient theoretical and methodological elaboration of emotional intelligence formation in gifted high school students. Bridging this gap is crucial for achieving a balanced development of cognitive and emotional competencies and aligning gifted education with modern socio-emotional learning and soft skills frameworks.

The study aims to identify the psychological and pedagogical conditions and mechanisms that facilitate the development of emotional intelligence in gifted high school students as a factor contributing to their personal growth, academic achievement, and social adaptation. The research focuses on the process of personal and socio-emotional development of gifted adolescents, with particular attention to the formation of emotional intelligence within the educational environment and the interplay of its cognitive, emotional-reflective, and self-regulatory components.

It is hypothesized that the purposeful development of emotional intelligence in gifted students enhances their self-regulation, emotional stability, and interpersonal competence, promoting a balanced relationship between intellectual and emotional development. This process is expected to be most effective within an educational environment that integrates reflective-emotional practices, empathy training, and instruction in conscious emotional self-regulation strategies.

The research addresses several key objectives: to analyze theoretical approaches to giftedness, emotional intelligence, self-regulation, and soft skills in contemporary education; to identify the characteristics of emotional and personal development among gifted adolescents; to determine the structure and dynamics of emotional intelligence in this group; to design and validate a pedagogical model for its development; and to evaluate the impact of emotional intelligence training programs on self-regulation, academic motivation, and social interaction.

The study contributes to the field by refining the concept of emotional intelligence in gifted adolescents as an integrative personality construct combining cognitive, emotional, and regulatory elements. It theoretically substantiates and empirically validates a model for developing emotional intelligence within the educational context, demonstrating the interrelation between emotional intelligence, self-regulation, and adaptive success in gifted students. Moreover, it identifies effective pedagogical strategies for fostering emotional awareness and reflective competence in adolescents with high intellectual potential.

The practical significance of the study lies in its applicability to the design of educational and psychological support programs for gifted students, the development of emotional intelligence training modules, and teacher professional development. The proposed model can be adapted for diverse educational settings and incorporated into broader initiatives aimed at cultivating soft skills, emotional literacy, and social competence in secondary education.

2 Literature review

2.1 Contemporary approaches to the concept of soft skills

The concept of *soft skills* occupies a central place in contemporary educational and psychological discourse. It reflects the growing

demand for integrative competencies that combine cognitive, emotional, and social capacities. According to Raven (1984), competence can be viewed as a dynamic interplay of knowledge, values, and abilities that shape effective real-world behavior. Likewise, Heckman and Kautz (2012) highlight that non-cognitive attributes—such as persistence, motivation, self-discipline, and social awareness—serve as crucial determinants of lifelong success, often surpassing traditional measures of intelligence in predictive value.

International educational frameworks—such as the OECD's *Future of Education and Skills 2030* (OECD, 2018), the *PISA 2018 Results* (OECD, 2019), and UNESCO's *Education 2030 Framework for Action* (United Nations Educational, Scientific and Cultural Organization, 2015)—emphasize the importance of the “4Cs”—communication, collaboration, creativity, and critical thinking—as key competencies underpinned by emotional intelligence (Mayer and Salovey, 1997; Goleman, 1995) and self-regulation (Vygotsky, 1978; Konopkin, 1980; Morosanova et al., 2022). Yet, for gifted adolescents, these abilities remain underdeveloped despite high cognitive potential (Leites, 1990; Shadrikov, 1994; Matyushkin, 1989). The insufficient focus on emotional and regulatory aspects in gifted education reveals a critical need to cultivate emotional intelligence and self-regulation as core components of soft skills, ensuring balanced personal growth, psychological well-being, and adaptive success.

Structurally, soft skills comprise interconnected components such as communication, collaboration, leadership, adaptability, emotional intelligence, and self-regulation. Emotional intelligence and self-regulatory abilities form their psychological core (Antonopoulou, 2024), shaping how individuals manage emotions, maintain motivation, and interact effectively with others. Growing research attention has focused on emotional and social competencies in school education. Emotional intelligence, as a central soft skill, is positively linked to academic motivation and learning outcomes among secondary students (Taibolatov et al., 2024), suggesting that understanding and regulating emotions supports both interpersonal adjustment and students' intrinsic motivation and resilience. Gender differences in EI development also point to varied socio-emotional trajectories during adolescence. Integrating emotional and motivational factors into the soft-skills framework thus offers a more comprehensive basis for fostering students' personal and academic growth.

In summary, soft skills integrate cognitive, emotional, and behavioral dimensions, with emotional intelligence and self-regulation serving as their core mechanisms. This aligns with the present study, which explores how developing emotional intelligence fosters self-regulation, motivation, and communication in gifted high school students.

2.2 Emotional intelligence: essence and structure

The modern conceptualization of emotional intelligence (EI) originates from the cognitive-ability model proposed by Mayer and Salovey (1997), who define EI as the capacity to perceive, understand, use, and regulate emotions in oneself and others. Their Four-Branch Model includes four interdependent abilities: perceiving emotions, using emotions to facilitate thought, understanding emotional meanings, and managing emotions. This framework interprets

emotions as valuable informational signals that guide reasoning and adaptive behavior, framing EI as a *developable cognitive competence* rather than a fixed trait.

Goleman (1995) expanded the concept of emotional intelligence by defining it as a set of social and behavioral competencies—self-awareness, self-regulation, motivation, empathy, and communication—that support effective interaction and leadership. Boyatzis (2020) later emphasized its developmental and relational nature, arguing that emotional and social intelligence can be intentionally strengthened through reflection, supportive relationships, and emotionally meaningful learning experiences. This perspective aligns with the present study's pedagogical focus on fostering self-regulation and empathy in gifted adolescents. Lyusin's (2006) empirical work further underscores the dual nature of emotional intelligence—as both an ability and a stable personal trait—supporting emotional awareness, adaptability, and stress tolerance essential for adolescent development.

2.3 Self-regulation as a component of personal development

Self-regulation represents a key psychological mechanism underlying emotional control, learning efficiency, and resilience. L. S. Vygotsky conceptualized it as a developmental process through which external regulation becomes internalized, allowing for voluntary control over behavior and cognition. Building on this foundation, A. V. Konopkin proposed a functional model of self-regulation as a system of goal-oriented activity comprising goal setting, planning, monitoring, evaluation, and adjustment.

V. I. Morosanova expanded this perspective by introducing the concept of an individual style of self-regulation—a stable set of personal traits that shape how individuals plan, monitor, and evaluate their actions. Her empirical findings show a strong link between self-regulation, emotional stability, academic performance, and overall well-being. From this viewpoint, self-regulation functions as the structural and functional basis of emotional intelligence, helping maintain a balance between emotional reactivity and conscious control. In educational settings, strengthening self-regulation supports students' motivation, stress management, and adaptive learning strategies.

Recent studies identify self-regulation as a core mechanism of purposeful and socially responsible behavior. A systematic review by Billore et al. (2023) shows that effective self-regulation integrates cognitive planning, emotional control, and stable motivation. Their work emphasizes that self-regulation is both an internal process and a socio-contextual competence supporting adaptability and goal-directed action—an idea that aligns with this study's focus on strengthening self-regulation as a basis of emotional intelligence in gifted adolescents.

In summary, theoretical and empirical evidence consistently supports the view that self-regulation functions as both a psychological foundation and an educational outcome of emotional intelligence. It mediates the relationship between emotional awareness, motivation, and adaptive behavior—core components of soft skills. This interconnection directly correlates with the present study's objective to enhance emotional intelligence and self-regulatory capacities in gifted adolescents through targeted pedagogical interventions, promoting their personal growth, resilience, and social adaptation.

2.4 Psychological and pedagogical characteristics of gifted learners

The phenomenon of giftedness has been examined across various theoretical frameworks, from the works of Mayer et al. (2016), Leites (1990), Shadrikov (1994), and Matyushkin (1989) to contemporary developmental and systemic models. Giftedness is generally viewed as an integrated personal quality marked by high cognitive potential, creativity, and intrinsic motivation. Mayer et al. highlight its multidimensional structure, while Leites and Shadrikov stress the role of emotional and volitional factors in the realization of talent.

Renzulli's (1978) Three-Ring Model defines giftedness as the interaction of above-average ability, creativity, and task commitment. At the same time, many studies note the emotional vulnerability of gifted students, who often show increased sensitivity, perfectionism, and social difficulties. The mismatch between advanced cognitive abilities and insufficient emotional self-regulation can contribute to stress, burnout, and maladaptation. Therefore, supporting gifted adolescents requires pedagogical conditions that promote balanced intellectual and emotional development.

Empirical research supports this view. Schuler (2000) found that 87.5% of gifted adolescents showed perfectionistic tendencies, and almost one-third displayed neurotic forms characterized by anxiety and fear of mistakes. While adaptive perfectionists strive for excellence through persistence, maladaptive ones face emotional strain and lower motivation. These findings highlight the dual nature of giftedness—strong potential paired with psychological vulnerability—and point to emotional intelligence and self-regulation as key protective factors. Based on this, the present study explores how targeted EI training can strengthen adaptive self-regulation, reduce perfectionistic anxiety, and support more balanced personal development in gifted students.

2.5 The challenge of developing soft skills in gifted students

Although soft skills and emotional intelligence are widely acknowledged as key predictors of academic and life success, their systematic development in gifted education remains underexplored. Existing programs predominantly focus on cognitive enrichment, acceleration, and research competencies, while the emotional and social aspects of giftedness receive limited pedagogical attention.

Studies by Subotnik et al. (2011) emphasize the role of psychosocial factors like motivation, perseverance, self-regulation, and emotional stability—in achieving excellence, yet few interventions directly target these dimensions through structured pedagogical models tailored to gifted learners' cognitive and emotional profiles. International models of Social and Emotional Learning (SEL), such as those developed by CASEL (Cavioni et al., 2024), demonstrate the effectiveness of structured emotional education in fostering empathy, cooperation, and resilience. However, these models are largely designed for general student populations and rarely address the asynchronous development, heightened self-awareness, and increased self-regulatory demands characteristic of gifted students.

Recent findings in higher education also reveal this developmental gap. Almoammar and Alhamad (2023) showed that gifted university

students often perceive a mismatch between their actual mastery of 21st-century soft skills—communication, problem-solving, leadership—and what institutions expect. Although they typically excel in analytical tasks, they do not consistently surpass peers in interpersonal or self-management skills. These patterns likely begin in adolescence, emphasizing the need to support socio-emotional skill development during secondary schooling.

Consequently, the development of emotional intelligence and self-regulation should become an integral part of educational strategies for gifted learners. Unlike generic SEL interventions, the present study conceptualises emotional intelligence and self-regulation as mutually reinforcing mechanisms supporting gifted students' academic engagement, motivation, and psychological well-being. Purposefully designed programs that integrate SEL principles can enhance self-awareness, empathy, and goal-directed behavior—skills essential for both personal well-being and professional success (Zieher et al., 2024). Building on this perspective, the present study designs and empirically tests a structured pedagogical model that explicitly integrates emotional intelligence and self-regulation as core components of soft skills development in gifted adolescents.

3 Methodology

3.1 Research design

The study employed a quantitative quasi-experimental design consisting of pre-test, intervention, and post-test stages to evaluate the effectiveness of an educational program aimed at developing emotional intelligence (EI), self-regulation, and other soft skills among gifted high school students. This design was selected because it allows for assessing the causal influence of the intervention while maintaining ecological validity in real school settings, where random assignment is often impractical.

The quantitative approach ensured objectivity and statistical rigor through the use of standardized questionnaires and psychometric tests measuring emotional intelligence, communication, self-regulation, and motivation (Ziadat and Sakarneh, 2021). In addition, expert observations were incorporated to provide contextual insight into behavioral manifestations of these competencies during training sessions and role-playing activities.

Such methodological integration offered a comprehensive understanding of how emotional and self-regulatory competencies evolve within a structured pedagogical intervention, aligning with the recommendations of Creswell and Creswell (2018) for combining methodological rigor with practical relevance.

3.2 Participants

The study involved 96 gifted high school students aged 15–16 years, enrolled in the 10th grade at two public secondary schools in the city of Pavlodar, Kazakhstan. The participants were drawn from:

- Muzafar Alimbayev Secondary School — experimental group ($n = 48$)
- Secondary School No. 25—control group ($n = 48$)

Both schools follow the same national curriculum and provide comparable educational conditions, including identical academic workload, teaching quality, and material resources.

The selection of schools and groups was purposive rather than random, which may introduce contextual influences related to school climate or teacher expectations. This limitation is inherent to quasi-experimental research in authentic school settings and should be considered when interpreting the findings.

To ensure validity and equivalence between the groups, participants were selected according to identical academic and psychological criteria. Only students demonstrating high academic achievement (final grades between 80 and 100%, equivalent to letter grades B–A+), strong cognitive motivation, and active engagement in intellectual, research, and creative extracurricular activities were included. Identification of gifted students was based on teacher recommendations and performance records provided by class supervisors.

The selection of gifted learners was methodologically justified, as the research focused on students with advanced cognitive capacities who frequently experience emotional and self-regulatory challenges, such as anxiety, perfectionism, or emotional tension. These characteristics make them a sensitive and meaningful target group for programs aimed at developing emotional intelligence and self-regulation. This approach corresponds to contemporary multidimensional models of giftedness, which emphasise not only cognitive ability but also motivation, perseverance, and academic engagement as key indicators of high potential.

In the present study, giftedness was operationalised using sustained high academic achievement combined with teacher nomination and documented participation in intellectual and creative activities. Although standardised cognitive assessments (e.g., IQ tests) are commonly used in gifted identification, their administration was not feasible within the institutional and ethical constraints of the participating schools.

Previous research recognises high academic achievement and teacher nomination as valid indicators of giftedness in school-based research contexts, particularly when formal psychometric testing is unavailable (Subotnik et al., 2011; Renzulli, 2016). Therefore, the adopted identification approach reflects established educational practice and aligns with the study's focus on socio-emotional development rather than cognitive ability per se.

Students with lower academic performance were excluded, since the purpose of the study was not to enhance achievement scores but to promote harmonious socio-emotional development and balance between intellectual and emotional growth among gifted adolescents.

Such careful sampling ensured the comparability of the two groups in terms of age, cognitive potential, and motivational characteristics, thereby allowing for an objective evaluation of the effects of the pedagogical intervention.

All procedures were conducted in compliance with ethical research standards. Participation was entirely voluntary, and written consent was obtained from both the students and their legal guardians. Anonymity and confidentiality of the participants' data were fully ensured throughout the study. The research design and procedures were approved by the school administration and aligned with institutional ethical guidelines for psychological and educational research.

Such an ethically sound and methodologically balanced sample provided a solid foundation for analyzing the effects of the emotional intelligence and self-regulation development program.

TABLE 1 Internal consistency reliability of the self-report questionnaire (Cronbach's α).

Scale	α (pre-test)	α (post-test)	Interpretation
Communication skills	0.879	0.801	High and stable reliability
Emotional intelligence	0.905	0.898	Very high internal consistency
Self-regulation/time management	0.900	0.894	Very high, stable reliability
Motivation/self-development	0.871	0.885	High, consistent reliability

3.3 Measurement instruments

To comprehensively assess the development of emotional intelligence, self-regulation, and related soft skills, the study employed a set of quantitative and expert-based instruments administered during both the pre-test and post-test stages.

Internal consistency reliability was further examined separately for pre-test and post-test data using Cronbach's alpha coefficients.

As shown in Table 1, alpha values ranged from 0.80 to 0.91 across all scales, indicating high to very high internal consistency of the self-report instrument.

The highest reliability was observed for the *Emotional Intelligence* scale ($\alpha = 0.905$ pre-test; $\alpha = 0.898$ post-test), confirming the stability of this construct over time.

The *Self-Regulation/Time Management* and *Motivation/Self-Development* subscales also demonstrated very strong and consistent reliability ($\alpha = 0.89-0.90$).

The *Communication Skills* scale maintained a high level of internal consistency ($\alpha = 0.879 \rightarrow 0.801$) following the intervention.

These findings confirm that the questionnaire possessed sound psychometric reliability and was suitable for subsequent quantitative analysis of changes in emotional intelligence, self-regulation, motivation, and communication among gifted students.

These results confirm that all four questionnaire domains demonstrate internal coherence and accurately capture the intended constructs of soft skills.

To complement self-assessment data and enhance ecological validity, an Expert Observation Checklist was employed.

This tool included eight behavioral indicators—communication, emotional awareness, empathy, self-regulation, teamwork, leadership, motivation, and time management.

Each indicator was rated on a five-point scale (1 = low, 5 = high) by three independent experts—a class teacher, an ICT teacher, and a school psychologist—who observed students during role-play and project-based activities.

Expert evaluations were recorded using the *Expert Evaluation Card*, which allowed tracking changes in students' behavior across the pre-test and post-test stages.

The Kendall's W coefficient was calculated to assess inter-rater agreement (Table 2). The results indicated a consistent increase in the level of expert agreement after the intervention, with Kendall's W values rising from 0.12–0.39 at the pre-test stage to 0.23–0.65 at the post-test stage.

TABLE 2 Coefficients of inter-expert agreement (Kendall's W).

No.	Indicator	W (pre-test)	W (post-test)	χ^2 (pre-test)	χ^2 (post-test)
1	Communicative interaction	0.381	0.653	146.47	250.67
2	Emotional awareness	0.167	0.395	64.23	151.58
3	Empathy	0.395	0.653	151.58	250.67
4	Self-regulation	0.227	0.395	87.03	151.58
5	Time management	0.141	0.227	53.98	87.03
6	Motivation and self-development	0.244	0.395	93.54	151.58
7	Teamwork	0.227	0.395	87.03	151.58
8	Leadership and initiative	0.123	0.244	47.17	93.54

All χ^2 values were statistically significant ($p < 0.001$), confirming the reliability of the detected degree of agreement among experts.

The highest agreement was observed for Communication and Empathy ($W > 0.65$ post-test), suggesting that experts more consistently recognized and evaluated students' socio-emotional and reflective behaviors following the program.

These findings confirm that, after participation in the emotional intelligence and self-regulation training, experts demonstrated greater consistency in identifying soft skills manifestations among gifted students.

This supports the study hypothesis that the program contributed to the development of emotional intelligence, self-regulation, and socio-emotional stability.

The increase in Kendall's W coefficients and corresponding χ^2 values indicates higher consistency of expert judgments after the implementation of the program, suggesting that experts recognized and recorded students' manifestations of soft skills more uniformly.

High Cronbach's alpha values ($\alpha = 0.80-0.91$) confirmed the internal consistency of the self-report instrument, while significant Kendall's W coefficients verified the reliability of expert evaluations. Together, these results provide robust evidence that the chosen instruments accurately and consistently measure the constructs of emotional intelligence, self-regulation, and related soft skills.

The combined use of self-report and expert-based assessment ensured cross-validation and increased the validity of findings.

To strengthen the validity of the assessment instruments, several complementary forms of evidence were considered. Content validity was ensured through expert review: school psychologists, class teachers and methodologists evaluated the relevance, clarity and representativeness of all questionnaire items in relation to the constructs of emotional intelligence, self-regulation, communication and motivation. Construct validity was supported through examination of inter-item and inter-scale correlations, which showed consistent internal relationships between items within each subscale and theoretically expected associations between scales. Finally, although a full exploratory or confirmatory factor analysis was not conducted, the factorial structure of the instrument was supported indirectly by high internal consistency coefficients ($\alpha = 0.80-0.91$) and coherent correlation patterns across

pre- and post-tests. These indicators collectively suggest that the questionnaire adequately reflects the latent constructs it was designed to measure.

To strengthen the statistical rigor of the study and ensure compliance with international reporting standards, additional effect size metrics were calculated. For all post-test between-group comparisons, Cohen’s *d* values were computed to quantify the magnitude of program effects, accompanied by 95% bootstrapped confidence intervals based on 1,000 resamples. These indices complemented the ANCOVA results by providing information on the practical significance and precision of the observed differences.

3.4 Experimental procedure

The experimental procedure consisted of three consecutive stages—*Diagnostic (pre-test)*, *Formative (intervention)*, and *Control (post-test)*—implemented over a seven-week period (see Figure 1). This structure allowed for dynamic tracking of participants’ progress and evaluation of the program’s effectiveness in developing emotional intelligence, self-regulation, and empathy among gifted adolescents. The experimental group (*n* = 48) participated in a structured soft skills development program integrating reflective-emotional practices, empathy training, and time management exercises, while the control group (*n* = 48) continued learning under the standard curriculum without additional interventions.

3.4.1 Diagnostic stage (pre-test)

During the first week, a comprehensive baseline assessment was conducted to determine the initial level of students’ soft skills.

The purpose of this stage was to identify the baseline level of development of key transversal competencies, including emotional awareness, self-regulation, communication skills, empathy, stress resilience, and learning motivation.

Two complementary instruments were employed:

- Self-Assessment Questionnaire (20 items, 6-point Likert scale), measuring communication, emotional intelligence, self-regulation, and motivation (Appendix A);
- Expert Observation Checklist (8 indicators, 5-point scale), assessing communication, emotional awareness, empathy, self-regulation, teamwork, leadership, motivation, and time management (Appendix B).

The expert-based assessments were conducted during a cooperative team-based simulation game, “*Desert Survival Situation*” (Lafferty and Eady, 1974), aimed at developing teamwork, communication, and leadership skills. Participants were required to reach a group consensus on prioritizing survival items under time constraints, which provided a dynamic context for observing interpersonal behaviors.

The expert panel consisted of three professionals: the class teacher, who regularly interacts with students during weekly class hours according to the thematic plan; the ICT teacher, who conducts 45-min academic lessons; and the school psychologist, who holds monthly diagnostic and counseling sessions with students. These specialists did not participate in the implementation of the training program itself and served as external observers, providing independent expert evaluations of student behavior.

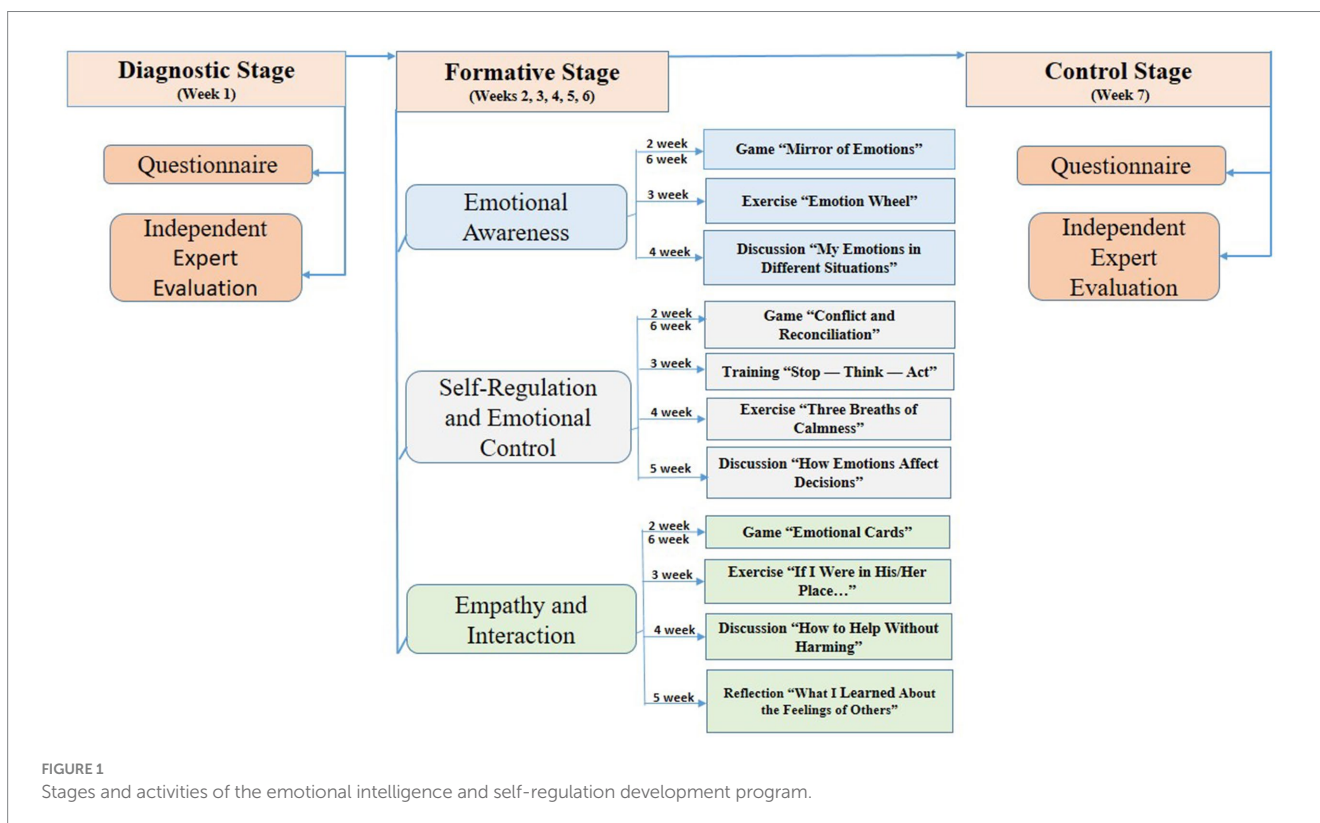


FIGURE 1 Stages and activities of the emotional intelligence and self-regulation development program.

To ensure the methodological rigor and objectivity of the expert assessment process, several procedural safeguards were implemented. Prior to the observations, all experts participated in a structured training session, during which they were introduced to the eight behavioral indicators, the 5-point rating scale, and standardized behavioral descriptors. They jointly practiced scoring using anonymized sample cases until acceptable agreement was reached. This calibration procedure helped establish a shared understanding of the criteria and reduced variability in rating practices.

To minimize expectation bias, experts were not informed about the study's hypotheses, expected outcomes, or the anticipated direction of change in student performance. They evaluated behaviors strictly based on observable indicators and received only the standardized scoring sheets without interpretive guidelines. Although complete blinding to group allocation was not feasible in a natural school setting, the experts did not receive information about which group was experimental and which was control during the observation sessions. Furthermore, observations were scheduled and presented in a uniform format to prevent evaluators from inferring group identity based on contextual cues.

These methodological safeguards—expert training, reduction of expectation bias, and partial blinding—strengthened the internal validity of the observational data. The inclusion of expert evaluations complemented the self-report measures by capturing external manifestations of communication, emotional intelligence, empathy, and self-regulation, thus ensuring a comprehensive assessment of students' soft skills and increasing the ecological validity of the findings.

3.4.2 Formative stage (intervention program)

The five-week intervention program (Weeks 2–6) aimed to enhance emotional literacy, empathy, and self-control through experiential learning methods.

The program was organized into three thematic modules—*Emotional Awareness, Self-Regulation and Emotional Control, and Empathy and Interaction*—which gradually built upon each other to

ensure both cognitive understanding and behavioral application (Table 3).

Each session (45 min) was held three times per week after regular classes and included three structured components:

- 1 Warm-up and emotional check-in (brief reflective activity or group discussion),
- 2 Core activity (role-play, situational exercise, or emotional training),
- 3 Reflection and feedback (discussion of emotional experiences, coping strategies, and behavioral insights).

A total of 48 students were randomly assigned to two groups. Meetings with the first group were held after classes on Mondays, Wednesdays, and Fridays, and with the second group on Tuesdays, Thursdays, and Saturdays. This schedule was designed to optimize classroom space and to ensure that all participants were actively engaged. Approximately 24 students participated in each group under the supervision of a trained facilitator.

Each exercise at this stage was designed to foster specific components of emotional intelligence and self-regulation among gifted high school students. The activities combined elements of experiential learning, reflective discussion, and behavioral training, enabling participants to develop both awareness of their own emotions and the ability to manage them constructively in social contexts.

Table 4 presents the set of game-based and training exercises implemented during the formative stage of the experiment. These activities were designed to develop key components of students' emotional intelligence and self-regulation through experiential learning, reflection, and group interaction.

Each exercise pursued specific developmental objectives and was theoretically grounded in established psychological and pedagogical approaches.

To ensure theoretical coherence, each activity within the socio-emotional development program was explicitly grounded in established SEL frameworks and psychological models. The design of

TABLE 3 Structure of the formative program.

Stage	Objective	Methods and forms of work	Content (key activities)	Expected outcomes
1. Emotional Awareness	Developing the ability to recognize, label, and reflect on one's own and others' emotions	Role-playing, training exercises, group discussions	Game "Mirror of Emotions"; Exercise "Emotional Wheel"; Discussion "My Emotions in Different Situations"	Awareness and verbalization of emotions; increased emotional literacy; understanding others' emotional states
2. Self-Regulation and Emotional Control	Forming the ability to manage emotions and behavior in stressful or conflict situations	Role-playing, self-control training, relaxation exercises, group discussions	Game "Conflict and Reconciliation"; Training "Stop-Think-Act"; Exercise "Three Breaths of Calm"; Discussion "How Emotions Influence Decisions"	Development of self-control and stress resistance; ability to respond consciously in emotional situations; enhanced volitional self-regulation
3. Empathy and Interaction	Developing empathy, understanding others' feelings, and building constructive interaction	Role-playing, group discussions, exercises for empathy and reflection	Game "Emotion Cards"; Exercise "If I Were in Their Place..."; Discussion "How to Help Without Harming"; Reflection "What I Learned About Other People's Feelings"	Increased empathy and communicative sensitivity; formation of tolerance and supportive interaction skills

TABLE 4 Alignment of role-playing and training activities with targeted soft skills indicators.

Nº	Title of game/ exercise	Purpose and focus	Brief description and procedure	Source/rationale	Targeted soft skills (development focus)
1	<i>“Mirror of Emotions”</i>	Development of emotional awareness and ability to recognize emotions through nonverbal cues	One student expresses an emotion (joy, fear, surprise, anger, etc.) using facial expressions and gestures; others “mirror” it and try to identify the emotion. Discussion follows on how recognition occurred.	Based on mirror exercise methodology (Cavioni et al., 2024)	Emotional Awareness, Communication
2	<i>“Emotional Wheel”</i>	Awareness of one’s emotional spectrum and understanding emotion causes	Students choose emotions from a color-coded wheel and discuss when and why they experience them.	Based on Plutchik’s Wheel of Emotions (Plutchik, 1980)	Emotional Awareness, Self-Reflection
3	<i>Discussion “My Emotions in Different Situations”</i>	Development of the skill to verbalize emotional states	Students describe how they react to praise, criticism, success, or failure; teacher guides reflection.	This reflective discussion was based on the principles of reflexive learning and self-awareness proposed by Klimov (2004)	Communication, Emotional Awareness
4	<i>Game “Conflict and Reconciliation”</i>	Development of self-regulation and constructive conflict behavior	Participants role-play conflict situations and discuss emotions, reactions, and coping strategies.	Applied in SEL training (Cavioni et al., 2024)	Self-Regulation, Teamwork, Empathy
5	<i>Training “Stop-Think-Act”</i>	Formation of volitional self-regulation and conscious decision-making	Students analyze stressful situations and practice the sequence “Stop → Recognize → Choose Action.”	Cognitive-behavioral therapy techniques (Dubrovina, 2015)	Self-Regulation, Time Management
6	<i>Exercise “Three Breaths of Calm”</i>	Development of self-control and reduction of emotional tension	Breathing practice: inhale “I feel” → exhale “I let go,” followed by discussion.	Psychophysiological self-regulation (Kuzmina, 2024)	Self-Regulation, Emotional Stability
7	<i>Discussion “How Emotions Influence Decisions”</i>	Understanding emotional impact on decision-making	Students discuss real-life examples (exams, conflicts, competitions) to identify emotional triggers.	Based on emotional intelligence theory (Goleman, 1995)	Emotional Awareness, Motivation
8	<i>Game “Emotion Cards”</i>	Development of empathy and understanding of others’ feelings	Students interpret emotions from scenario cards and propose supportive actions.	SEL programs (Skoog-Hoffman et al., 2020)	Empathy, Communication
9	<i>Exercise “If I Were in Their Place...”</i>	Formation of empathy and acceptance of others	Participants describe what they would feel in another person’s place and compare perceptions.	Empathy development methodology (Hoffman, 2000)	Empathy, Perspective-Taking
10	<i>Discussion “How to Help Without Harming”</i>	Development of emotional sensitivity and responsible helping behavior	Discussion of cases where help may unintentionally cause harm; focus on emotional motives and ethical boundaries.	Based on the prosocial behavior and empathy regulation frameworks (Halifax, 2018)	Empathy, Leadership, Motivation
11	<i>Reflection “What I Learned About Other People’s Feelings”</i>	Development of emotional awareness and self-analysis	Students summarize insights about themselves and others; discussion in a reflective circle.	Reflective analysis methodology (Verbitsky, 2006)	Self-Reflection, Emotional Awareness, Empathy

the exercises drew upon CASEL’s five core competencies—self-awareness, self-management, social awareness, relationship skills, and responsible decision-making—as well as classical emotional intelligence theory (Goleman, 1995), Hoffman’s (2000) empathy development model, cognitive-behavioral self-regulation principles, and reflective learning approaches. This theoretical grounding is made explicit in Table 4, where the “Source / Rationale” column links every

exercise to a corresponding SEL construct or validated psychological methodology. Such alignment ensures that the intervention consists not of isolated games but of a coherent, developmentally structured SEL-based pedagogical system (Lim et al., 2025).

The same set of games and exercises conducted at the beginning of the formative stage was repeated during the sixth week of the program in order to consolidate learning outcomes and to assess the

stability and transferability of the acquired emotional and self-regulatory competencies.

Expert assessments were carried out separately—before and after the implementation of the program—to measure overall progress in soft skills, but they did not evaluate individual exercises directly.

To maintain implementation fidelity, the program incorporated a systematic fidelity-monitoring procedure. The instructor conducted all sessions using a fixed protocol that specified learning goals, timing, materials, and expected behavioral indicators. A session-by-session fidelity checklist was completed after each lesson to verify adherence to the planned structure. In addition, the school psychologist conducted periodic observational checks to minimize deviations from the protocol and to monitor the consistency of delivery. Evaluators were not involved in program implementation and were blind to the study hypotheses, reducing expectation bias. Before observations began, all three experts (class teacher, ICT teacher, school psychologist) received brief training on the use of the Expert Observation Checklist, scoring criteria, and behavioral indicators to ensure inter-rater consistency. This fidelity monitoring strengthened the internal validity of the study and ensured that all outcomes reflected the actual influence of the program rather than inconsistencies in its delivery.

3.4.3 Control stage (post-test)

In the final week (Week 7), the same diagnostic tools were re-administered to both experimental and control groups to measure post-intervention changes. Expert evaluation was repeated under identical conditions to assess behavioral progress and validate the effects of the program. All results were analyzed statistically using paired and independent t-tests and ANCOVA to determine the significance of changes.

3.4.4 Ethical and methodological considerations

All procedures were carried out in accordance with institutional ethical standards. Participation was voluntary, and written informed consent was obtained from both students and their legal guardians.

To preserve confidentiality, all data were anonymized prior to analysis.

A pilot study was not conducted, as all instruments had been previously standardized and demonstrated high reliability (Cronbach's $\alpha = 0.80$ – 0.91).

This methodological decision allowed the research to focus directly on the main quasi-experimental implementation while maintaining scientific rigor.

3.5 Data analysis

The collected data were processed using IBM SPSS Statistics 28 and Microsoft Excel.

Both descriptive and inferential statistical methods were applied to ensure the validity and reliability of the findings.

To assess the internal consistency of the self-report questionnaire, Cronbach's alpha (α) coefficients were calculated separately for the pre-test and post-test datasets.

All scales demonstrated high or very high reliability ($\alpha = 0.80$ – 0.91), confirming the internal coherence of the measurement instrument.

Inter-rater reliability of the expert evaluations was verified using Kendall's coefficient of concordance (W).

This non-parametric index was employed to determine the level of agreement among the three independent experts across eight behavioral indicators of soft skills.

An increase in W values from 0.12 – 0.39 (pre-test) to 0.23 – 0.65 (post-test) indicated improved consistency of expert judgments after the intervention.

To evaluate the effectiveness of the intervention program, a series of Student's t-tests were performed:

- Paired-samples t-tests were used to identify statistically significant pre–post differences within each group (experimental and control).
- Independent-samples t-tests compared post-test results between the experimental and control groups to assess the overall program effect.

For a more precise control of initial differences between groups, an Analysis of Covariance (ANCOVA) was conducted.

The post-test scores served as dependent variables, group membership as the independent variable, and pre-test results as covariates.

This approach allowed for assessing the unique contribution of the pedagogical intervention while adjusting for baseline variability.

To explore the interrelationships among the components of soft skills, a Pearson's correlation analysis was carried out for post-test data within the experimental group.

This analysis revealed structural changes in the relationships between emotional intelligence, self-regulation, motivation, and communication after the program's implementation, highlighting an increased differentiation and functional maturity of soft skills components.

All statistical tests were conducted at two levels of significance:

- $p < 0.05$ —statistically significant differences,
- $p < 0.001$ —highly significant differences.

Statistical analyses were performed using ANCOVA and t-tests to examine group differences.

4 Results and analysis

4.1 Comparative analysis of pre-test and post-test results

To verify the initial comparability of the experimental and control groups, we conducted a baseline analysis including demographic characteristics and pre-test scores on all four soft-skills indicators. As shown in [Table 5](#), the groups did not differ significantly in age or gender distribution. Independent-samples t-tests revealed no statistically significant differences in baseline scores on Communication Skills, Emotional Intelligence, Self-Regulation / Time Management, or Motivation / Self-Development (all $p > 0.05$). These results indicate that the groups were equivalent prior to the intervention, supporting the validity of the subsequent ANCOVA analyses controlling for pre-test values.

TABLE 5 Baseline characteristics of experimental and control groups.

Variable	Experimental group (n = 48)	Control group (n = 48)
Age (years)	15–16	15–16
Gender	25 boys and 23 girls	22 boys and 26 girls
Communication skills (pre-test)	M = 4.52, SD = 0.55	M = 4.03, SD = 0.71
Emotional intelligence (pre-test)	M = 4.35, SD = 0.57	M = 4.05, SD = 0.60
Self-regulation/time management (pre-test)	M = 4.26, SD = 0.51	M = 4.05, SD = 0.48
Motivation/self-development (pre-test)	M = 4.23, SD = 0.54	M = 4.02, SD = 0.43

To control for potential baseline differences and to isolate the effect of the intervention, analysis of covariance (ANCOVA) was applied to all soft skills indicators, with pre-test scores entered as covariates (Table 6). Levene's tests indicated acceptable homogeneity of variances across most variables. Across all outcomes, statistically significant and large group effects were observed ($p < 0.001$), with partial eta squared values ranging from 0.596 to 0.680. Pre-test scores did not exert a significant influence on post-test outcomes, indicating baseline equivalence between groups. These findings confirm that the observed post-intervention differences are attributable to the implemented socio-emotional development program rather than to initial group differences and demonstrate the stability and robustness of the intervention effects.

The reliability and consistency checks of the assessment instruments confirmed their methodological validity and ensured the accuracy of subsequent comparative and correlational analyses.

Across all four soft skills indicators, Cohen's d values ranged from 1.24 to 1.44, indicating large to very large effects of the socio-emotional development program. The 95% confidence intervals for group mean differences were narrow and did not cross zero, confirming the stability and robustness of the observed improvements.

Table 7 summarizes the effect size estimates and confidence intervals.

The combination of large effect sizes and statistically significant ANCOVA results demonstrates that the intervention produced not only statistically detectable but also practically meaningful improvements in emotional intelligence, self-regulation, communication, and motivation. The absence of zero-crossing within the confidence intervals further confirms that the observed group differences were not attributable to random variation or baseline imbalance.

At the next stage of the study, statistical tests were conducted to compare pre-test and post-test indicators in the experimental and control groups in order to identify the dynamics of soft skills development under the influence of the emotional intelligence and self-regulation enhancement program.

The t -test results presented in Table 8 demonstrate a statistically significant improvement across all soft skills indicators in the

experimental group, while no meaningful changes were recorded in the control group ($p > 0.05$).

Specifically, the most pronounced progress was observed in Emotional Intelligence ($t = 9.15$, $p < 0.001$) and Self-Regulation / Time Management ($t = 8.72$, $p < 0.001$), indicating that the implemented program was particularly effective in enhancing students' emotional awareness, impulse control, and behavioral self-management.

Substantial growth was also recorded in Communication Skills ($t = 8.43$, $p < 0.001$) and Motivation / Self-Development ($t = 8.01$, $p < 0.001$), reflecting improved social interaction, learning motivation, and goal-oriented behavior.

In contrast, the control group exhibited only minor, statistically non-significant fluctuations across all measured domains ($p > 0.05$), suggesting that the observed changes in the experimental group were directly attributable to the participation in the intervention program rather than to general developmental dynamics.

Overall, these findings provide strong empirical evidence that the program effectively fostered emotional intelligence, self-regulation, and other core soft skills in gifted high school students, confirming the validity of the proposed pedagogical model.

The results of the paired-samples t -test, based on the evaluations of three independent experts, indicate statistically significant improvements ($p < 0.001$) across all soft skills indicators in both experimental and control groups (Table 9).

However, the magnitude of improvement was substantially higher in the experimental group, which participated in the emotional intelligence and self-regulation development program.

The most pronounced changes were recorded in Emotional Awareness ($t = -37.68$) and Self-Regulation ($t = -26.91$), reflecting the strengthening of emotional-reflective and behavioral control mechanisms among gifted students.

In contrast, changes in the control group, though statistically significant, are likely attributable to natural developmental progress rather than targeted intervention effects.

Overall, the analysis of expert ratings confirms the effectiveness of the implemented soft skills training program, demonstrating that systematic pedagogical work led to notable growth in communication, empathy, emotional awareness, and self-regulation among gifted high school students.

To further verify the effectiveness of the emotional intelligence and self-regulation development program for gifted high school students, an independent-samples t -test was conducted based on expert evaluations.

Three independent experts assessed students' performance across eight key indicators of soft skills—communication, emotional awareness, empathy, self-regulation, time management, motivation, teamwork, and leadership—during role-playing and project-based activities conducted before and after the implementation of the program.

This test made it possible to identify statistically significant differences between the experimental and control groups at the post-test stage, that is, after the completion of the program.

Unlike the paired-samples t -test, which measured within-subject dynamics (pre–post changes), the independent-samples t -test assessed between-group differences, thereby confirming that the observed

TABLE 6 Summary of ANCOVA results for soft skills indicators.

Dependent variable	Levene's p	Covariate (pre-test) $F (p)$	Group $F (1, 93)$	p -value	Partial η^2	Effect size
Communication Skills	0.814	1.53 (0.219)	166.62	<0.001	0.642	Large
Emotional Intelligence	0.284	0.38 (0.542)	137.37	<0.001	0.596	Large
Self-Regulation / Time Management	0.037*	1.80 (0.183)	197.77	<0.001	0.680	Large
Motivation / Self-Development	0.401	3.68 (0.058)	193.02	<0.001	0.675	Large

*Indicates a significant Levene's test ($p < 0.05$), suggesting a violation of the homogeneity of variance assumption.

TABLE 7 Effect sizes (Cohen's d) and 95% bootstrapped confidence intervals for post-test between-group differences.

Soft skill indicator	Mean difference	Cohen's d	95% CI (Bootstrapped)	Interpretation
Communication skills	0.775	1.27	[0.667, 0.885]	Large, stable effect
Emotional intelligence	0.871	1.24	[0.721, 1.016]	Large improvement in emotional awareness
Self-regulation/time management	0.992	1.44	[0.848, 1.132]	Very large effect, strongest program influence
Motivation/self-development	0.933	1.43	[0.791, 1.065]	Very large, consistent improvement

TABLE 8 Comparative results of the t -test for soft skills indicators in experimental and control groups (self-report data).

Scale	Group	M (pre-test)	SD (pre-test)	M (post-test)	SD (post-test)	t	p
Communication skills	Experimental	4.52	0.55	5.29	0.27	8.43	<0.001
	Control	4.03	0.50	4.51	0.28	1.78	>0.05
Emotional intelligence	Experimental	4.35	0.59	5.26	0.33	9.15	<0.001
	Control	4.05	0.42	4.39	0.37	1.56	>0.05
Self-regulation/time management	Experimental	4.26	0.61	5.32	0.39	8.72	<0.001
	Control	4.05	0.48	4.33	0.30	1.62	>0.05
Motivation/self-development	Experimental	4.23	0.55	5.22	0.37	8.01	<0.001
	Control	4.04	0.35	4.28	0.30	1.44	>0.05

TABLE 9 Results of the paired-samples t -test (experimental and control groups).

No.	Indicator	ΔM exp. (pre-post)	t exp.	p exp.	ΔM ctrl. (pre-post)	t ctrl.	p ctrl.
1	Communicative interaction	-0.89	-18.47	<0.001	-0.86	-16.43	<0.001
2	Emotional awareness	-0.90	-37.68	<0.001	-0.86	-33.45	<0.001
3	Empathy	-0.62	-9.30	<0.001	-0.45	-6.07	<0.001
4	Self-regulation	-0.92	-26.91	<0.001	-0.87	-22.55	<0.001
5	Time management	-0.56	-13.67	<0.001	-0.46	-9.69	<0.001
6	Motivation and self-development	-0.17	-5.04	<0.001	-0.10	-3.44	0.001
7	Teamwork	-0.53	-10.43	<0.001	-0.46	-9.66	<0.001
8	Leadership and initiative	-0.84	-17.73	<0.001	-0.85	-18.48	<0.001

Negative ΔM values denote improvement, as they result from subtracting post-test means from pre-test means ($M_{pre} - M_{post}$).

improvements were attributable to the pedagogical intervention rather than to external factors.

The results of this analysis are presented in the following Table 10.

The results of the independent-samples t -test based on the evaluations of three experts revealed statistically significant differences between the experimental and control groups in the indicators of Emotional Awareness ($p = 0.043$) and Leadership ($p = 0.022$).

TABLE 10 Independent samples t-test results based on expert ratings (post-test data).

Indicator	Levene's sig.	t	df	p (2-tailed)	Mean difference
Emotional awareness	0.040	2.047	94	0.043	0.118
Empathy	0.001	1.867	94	0.065	0.062
Self-regulation	0.820	1.970	94	0.052	0.201
Time management	0.629	1.427	94	0.157	0.063
Motivation	0.091	1.697	94	0.093	0.105
Teamwork	0.562	1.723	94	0.088	0.063
Leadership	0.499	2.323	94	0.022	0.139
General soft skills index	0.216	1.019	94	0.311	0.055

This finding indicates that the program had a substantial impact on the development of students' emotional awareness and leadership skills.

Although differences in other indicators did not reach statistical significance ($p > 0.05$), a consistent positive trend was observed across all measures, with higher mean scores in the experimental group.

Thus, the expert data confirm that participation in the program contributed to the enhancement of observable behavioral manifestations of soft skills, particularly those related to emotional maturity, initiative, and group interaction.

A comprehensive analytical framework—including reliability checks, paired and independent t-tests, and expert-based assessments of soft skills development—confirmed the high effectiveness of the emotional intelligence and self-regulation enhancement program for gifted high school students.

Self-report data indicated statistically significant improvements across all measured domains in the experimental group ($p < 0.001$), while no substantial changes were found in the control group.

Expert evaluations likewise revealed significant between-group differences in Emotional Awareness and Leadership ($p < 0.05$), along with a consistent positive trend across all other indicators.

The combination of quantitative and qualitative findings allows us to conclude that the implemented program produced a comprehensive effect on the development of emotional-reflective, self-regulatory, and communicative competencies, ensuring stable growth in key soft skills and fostering personal maturity among gifted students.

To visually illustrate the dynamics in the experimental group, a comparative graph of mean expert ratings before and after the program was created (Figure 2). The graph shows steady improvement across all eight soft-skills indicators following the intervention. The strongest gains appear in Emotional Awareness, Self-Regulation, and Leadership, reflecting increased emotional understanding, better self-control, and strengthened leadership abilities. Overall, the visual data clearly demonstrate the program's effectiveness and align with the statistical results obtained from the t-test analysis.

4.2 Correlational analysis of interrelations between soft skills components

To assess the changes in the structure of interrelations among soft skills components following the implementation of the emotional

intelligence and self-regulation development program, a Pearson correlation analysis was conducted (Table 11).

The analysis examined the relationships between the key components of soft skills in the post-test stage for the experimental group.

After the implementation of the program, notable changes were observed in the structure of interrelations between soft skills components.

While in the pre-test all indicators showed strong interdependence ($r = 0.72\text{--}0.83$; $p < 0.01$), in the post-test only the correlation between Self-Regulation and Motivation remained significant ($r = 0.431$; $p = 0.002$).

At first glance, the weakening of correlations might appear unfavorable; however, from a psychological and pedagogical perspective, it reflects greater differentiation and autonomy among soft skills components.

Following the intervention, participants demonstrated more conscious and selective use of specific competencies, indicating the formation of *structural maturity* in soft skills—when each ability functions independently while maintaining meaningful functional links with others.

Thus, the program not only strengthened individual skills (as confirmed by the t-test results) but also transformed the internal organization of soft skills, making it more differentiated and stable.

Additionally, a Pearson correlation analysis of expert ratings across eight soft skills indicators (Table 12) revealed a substantial reorganization of interrelations compared to the pre-test stage.

Whereas the pre-test data reflected a high degree of integration among most indicators, the post-test structure became more organized and selective, showing the emergence of new, meaningful links between particular competencies.

The strongest positive correlations were found between:

- Empathy and Self-Regulation ($r = 0.368$; $p = 0.010$),
- Empathy and Time Management ($r = 0.491$; $p < 0.001$),
- Empathy and Teamwork ($r = 0.696$; $p < 0.001$),
- Teamwork and Leadership ($r = 0.464$; $p = 0.001$),
- Communication and Motivation ($r = 0.351$; $p = 0.014$).

These findings demonstrate that emotional and interpersonal components have become more interconnected, reflecting the integration of empathy, self-control, and motivation into a coherent

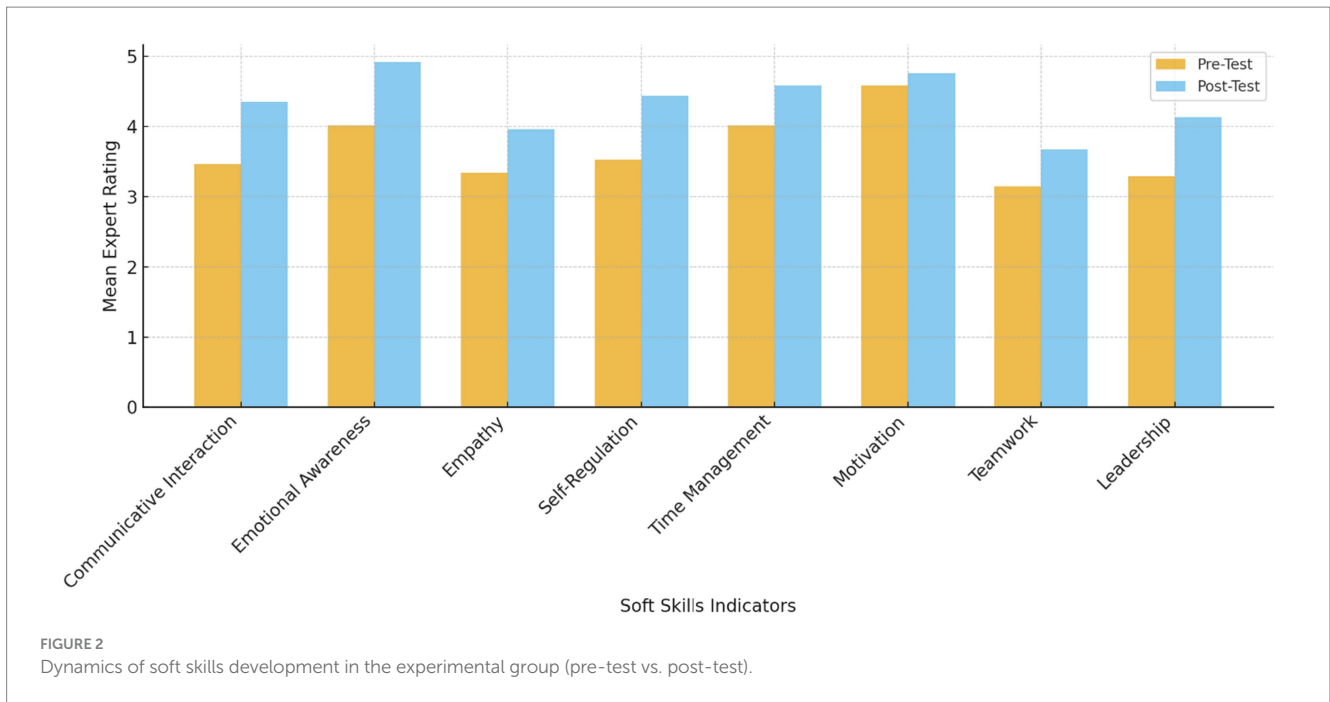


TABLE 11 Pearson correlation matrix of soft skills components (post-test, self-assessment data).

Indicators	Communication	Emotional intelligence	Self-regulation	Motivation
Communication	1	0.064	0.111	0.128
Emotional intelligence	0.064	1	0.270	0.206
Self-regulation	0.111	0.270	1	0.431**
Motivation	0.128	0.206	0.431**	1

**Indicates a statistically significant Pearson correlation at $p < 0.01$.

TABLE 12 Pearson correlation matrix of soft skills indicators (post-test, expert evaluation data).

Indicators	1	2	3	4	5	6	7	8
1. Communicative interaction	1	-0.158	0.242	0.408**	0.223	0.034	0.601**	0.565**
2. Emotional awareness		1	0.071	0.059	-0.025	-0.187	0.055	-0.062
3. Empathy			1	0.417**	0.513**	-0.038	0.501**	0.328*
4. Self-regulation				1	0.352*	0.002	0.565**	0.463**
5. Time management					1	-0.322*	0.437**	0.180
6. Motivation and self-development						1	-0.096	-0.029
7. Teamwork							1	0.460**
8. Leadership and initiative								1

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

N = 48.

socio-emotional system characteristic of mature soft skills development.

The emergence of significant correlations between empathy, teamwork, and leadership reflects the formation of a new, socially oriented structure of soft skills, in which emotional awareness and cooperative ability become the core of professional and personal development. At the same time, the weakening of correlations between certain cognitive–organizational indicators (e.g., time management and motivation) indicates increasing autonomy of these skills—students are now able to apply them independently, depending on the specific context and task.

Thus, after the program, a functional redistribution and strengthening of links between key components of soft skills can be observed: The overall structure becomes less overloaded but more purposefully organized, reflecting the internal integration of emotional and social experience and confirming the effectiveness of the program in developing mature forms of emotional–social competence among gifted high school students.

5 Discussion

The results of the study indicate that the implemented program likely contributed to the enhancement of emotional intelligence and self-regulation among gifted high school students; however, these findings should be interpreted with reasonable caution. The observed improvements broadly align with existing research showing that emotional and self-regulatory competencies can be strengthened through structured, reflective, and experiential activities (Goleman, 1995; Boyatzis, 2020; Mayer and Salovey, 1997). Statistically significant gains emerged across all soft-skills indicators in the experimental group, whereas the control group showed no comparable progress. Similar developmental trends have been reported in studies applying SEL frameworks in secondary education (Cavioni et al., 2024; Zieher et al., 2024), particularly in the areas of emotional awareness and self-management.

Unlike many generic SEL programs, the present intervention was intentionally designed for gifted adolescents and placed emotional intelligence and self-regulation at the core of its pedagogical structure. Nonetheless, some alternative explanations for the strong observed effects must be considered. A portion of the gains may reflect a Hawthorne effect, whereby students respond positively simply because they participate in an emotionally supportive and monitored programme. Furthermore, the motivational novelty of engaging in a structured extracurricular activity—one that differs from routine schoolwork—may also have contributed to increased self-awareness and interpersonal engagement. These factors, while not undermining the program's influence, suggest that the magnitude of its effects may partially depend on contextual characteristics typical of gifted learners.

The strongest improvements emerged in Emotional Awareness and Self-Regulation / Time Management, suggesting that students became more capable of recognizing, interpreting, and managing their emotional states across academic and social contexts. This pattern corresponds to findings by Morosanova et al. (2022), who identify conscious self-regulation as a key mechanism supporting emotional stability and achievement. Expert ratings also indicated notable growth in Leadership, reflecting the emergence of emotionally

intelligent leadership behaviors in collaborative settings (Antonopoulou, 2024; Taibolatov et al., 2024). Yet it remains unclear whether these outcomes would generalize to students with different cognitive profiles, cultural backgrounds, or levels of prior SEL exposure, as comparable interventions have shown mixed effects in diverse populations.

Analysis of the program structure shows that specific activities were particularly influential. Exercises such as “Mirror of Emotions” and “Emotional Wheel” reinforced emotional recognition and vocabulary; cognitive-behavioral activities such as “Stop-Think-Act” and “Three Breaths of Calm” supported self-regulation; and role-playing simulations nurtured empathy, constructive communication, and perspective-taking. These findings are consistent with core SEL principles identified in CASEL's competency model and confirm the value of experiential, reflective, and dialogical practices in socio-emotional development (Skoog-Hoffman et al., 2020). Importantly, the theoretical coherence of the program reflects established SEL constructs: emotional awareness, empathy, self-management, and responsible decision-making.

From a theoretical perspective, the developmental shifts observed in students' emotional and regulatory competencies correspond with Vygotsky's (1978) concept of the internalization of external regulation and Konopkin's (1980) model of goal-oriented self-regulation. They also align with Renzulli's Schoolwide Enrichment Model (SEM), particularly Type II enrichment activities that target affective and self-regulatory skills essential for high-level performance. Additionally, within an adapted Multi-Tiered System of Supports (MTSS) framework for gifted education, the program can be viewed as a Tier 2 targeted SEL intervention addressing emotional intensity, perfectionism, and socio-emotional asynchrony—well-documented characteristics of gifted learners.

The post-intervention restructuring of correlations between soft-skills indicators—especially the emergence of strong functional links between empathy, teamwork, and leadership—suggests the development of more differentiated and integrated socio-emotional structures. This pattern reflects increasing metacognitive awareness and more selective application of regulation strategies, consistent with the transition from externally guided to autonomous behavior (Morosanova et al., 2022; Vygotsky, 1978). At the same time, the weakening of certain pre-existing correlations indicates greater skill autonomy, which is characteristic of maturing socio-emotional competence.

Finally, the results resonate with international frameworks including the OECD Learning Compass 2030 (OECD, 2019), UNESCO's Education 2030 agenda (United Nations Educational, Scientific and Cultural Organization, 2015), and the Four-Dimensional Education model (Fadel et al., 2015), all of which position emotional intelligence and self-regulation as essential components of holistic learner development. The findings therefore suggest that integrating structured SEL practices into gifted education may support not only emotional balance but also long-term academic and personal flourishing.

Overall, while the program appears to have contributed meaningfully to the development of emotional and self-regulatory competencies in gifted adolescents, further research is needed to disentangle program-specific effects from contextual or motivational influences, and to examine the generalizability and long-term sustainability of these developmental gains.

5.1 Practical implications

The study provides a practical framework for integrating emotional intelligence and self-regulation development into the curriculum of gifted education. The proposed program can be adapted by schools and psychological centers as a modular system of socio-emotional training aimed at improving students' interpersonal communication, stress tolerance, and teamwork. The methodology may also serve as a foundation for teacher training programs, enabling educators to develop emotional competence, reflective communication, and supportive classroom climates that enhance student engagement and well-being.

Furthermore, the reflective and game-based techniques tested in this study can be applied across various educational contexts, supporting not only gifted learners but also general student populations in developing essential 21st-century competencies such as empathy, leadership, and emotional balance.

5.2 Limitations and future research

Despite its promising results, the study has several limitations that should be considered when interpreting the findings. The relatively small sample size and the focus on only two schools located in one geographic region limit the broad generalisability of the results. The short duration of the programme also does not allow for conclusions about the long-term stability of socio-emotional competencies; therefore, longitudinal follow-up studies are required to determine whether the observed improvements persist over time.

Although the instruments demonstrated strong internal reliability, further evidence of construct, content, and factorial validity would strengthen the psychometric foundation of the research. Additionally, the very large effect sizes should be interpreted with caution, as they may partly reflect social desirability in self-reports, high intrinsic motivation typical of gifted learners, or the absence of fully blinded expert evaluations. Future studies should incorporate blinded raters and multi-source assessments to minimise expectation bias.

Another limitation concerns programme fidelity. Although the intervention followed a structured sequence of SEL-aligned activities, its implementation was not monitored through systematic fidelity procedures (e.g., facilitator logs, observation checklists, or session-to-session consistency checks). Such mechanisms would help ensure replicability across different instructors and school contexts.

The selection of gifted students was based on academic achievement and teacher nominations rather than specialised cognitive assessments, which may limit comparability with international research standards. In addition, the study did not include sociodemographic analyses (e.g., gender, SES, parental education), which might influence socio-emotional development.

Finally, the study did not explore how emotional intelligence interacts with related constructs such as creativity, academic stress, perfectionism tendencies, or digital learning factors. Examining these relationships would deepen understanding of socio-emotional functioning among gifted adolescents.

The findings offer several practical implications for schools, teachers, and educational psychologists.

For schools and administrators: The results demonstrate that structured SEL-based programmes can significantly strengthen

emotional intelligence and self-regulation among gifted students, suggesting that such interventions should be systematically embedded in gifted education curricula.

Schools may consider incorporating weekly or bi-weekly socio-emotional training sessions as part of advisory periods or homeroom classes.

The validated programme structure can serve as a model for designing school-wide SEL policies and enrichment modules.

For school psychologists: The programme provides a practical framework for developing students' emotional awareness, impulse control, and empathy using age-appropriate, evidence-based techniques.

Psychologists can use the exercises (e.g., "Mirror of Emotions," "Stop-Think-Act," conflict simulations) in group counselling and psychoeducational workshops.

Expert evaluations revealed that emotional awareness and leadership are especially responsive to guided intervention, which can inform targeted counselling strategies.

For teachers: The activities demonstrate that emotional and behavioural self-regulation can be strengthened through structured reflection, role-playing, and guided discussion integrated into regular lessons.

Training teachers to recognise emotional cues and facilitate structured emotional reflection could enhance classroom climate, reduce conflict, and support gifted learners with perfectionism or emotional hypersensitivity.

The programme provides teachers with concrete SEL tools that can be embedded into project-based learning, group work, and cross-curricular activities.

The study should be viewed as an initial validation of a pedagogical model that holds significant promise for gifted education. Replication in larger, more diverse samples and across different school contexts is necessary before broader implementation.

6 Conclusion

The study explored the theoretical and methodological foundations of emotional intelligence development in gifted high school students and examined the initial effectiveness of a structured socio-emotional intervention. The findings indicate that the programme may support the balanced development of cognitive and emotional competencies by strengthening self-regulation, emotional awareness, and interpersonal skills. These outcomes suggest that reflective-emotional practices, empathy-oriented activities, and conscious self-regulation strategies can contribute to more harmonious socio-emotional functioning among gifted adolescents.

At the same time, the results should be interpreted with caution. The study was conducted within a geographically limited context and involved a relatively small sample, which restricts the generalisability of the findings. The short duration of the intervention also prevents firm conclusions regarding the long-term stability of the observed improvements. Furthermore, the strong effects recorded in the experimental group may partially reflect contextual factors, heightened motivation, or the novelty of participation in a structured developmental programme.

Therefore, the proposed model should be viewed as an initial empirical validation rather than a definitive framework. Further research is required to replicate the findings with larger and more

diverse populations, extend the duration of the intervention, and incorporate longitudinal assessments to examine the sustainability of socio-emotional gains. Future studies may also test the adaptability of the programme across different educational settings and its alignment with contemporary models of gifted education.

Despite these limitations, the present study offers promising preliminary evidence for the potential of structured socio-emotional learning interventions to enhance emotional intelligence and related soft skills in gifted adolescents. The proposed model provides a useful basis for designing educational programmes and psychological support systems that foster emotional literacy, self-regulation, and socio-emotional maturity as integral components of holistic gifted education.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The study was reviewed and approved by the Ethics Committee of Pavlodar Pedagogical University named after Alkey Margulan, Pavlodar, Kazakhstan, and conducted with the official permission of the participating secondary schools. The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because written informed consent was waived because the study involved minimal risk and was conducted within the regular educational process. All participants were minors, and permission to conduct the research was obtained from the school administration. Students voluntarily agreed to participate by confirming "I agree" before completing the survey. No personal or sensitive data were collected, and participation had no impact on academic evaluation or standing.

Author contributions

AM: Writing – original draft, Formal analysis, Writing – review & editing, Data curation, Methodology, Conceptualization. BM: Project administration, Funding acquisition, Supervision, Writing – original draft, Writing – review & editing. AK: Validation, Writing – review & editing, Resources, Methodology. MU: Investigation,

Writing – original draft, Visualization, Data curation. LI: Writing – review & editing.

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Conflict of interest

The author(s) declared that this work 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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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2025.1733922/full#supplementary-material>

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