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Technology-enabled social-emotional learning for University educators: a systematic review

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Introduction: Social-emotional learning (SEL) has gained increasing attention in higher education as a critical set of competencies for both educators and students. While SEL frameworks are well established in K–12 contexts, less is known about technology-enabled SEL interventions targeting university educators across diverse and cross-cultural settings.

Methods: This systematic review followed PRISMA guidelines and synthesized empirical evidence from five academic databases (ERIC, ScienceDirect, JSTOR, EBSCOhost, and SpringerLink). Comprehensive search strategies combined terms related to SEL, higher education, technology, and cross-cultural adaptability. Out of 2,296 initial records, 896 duplicates were removed, and 1,400 records underwent title and abstract screening. After excluding 1,135 studies, 265 full-text articles were assessed for eligibility, resulting in 22 studies included in the final synthesis.

Results: Thematic analysis revealed three central domains: (1) development of SEL competencies such as emotional regulation, self-awareness, and responsible decision-making; (2) integration of digital tools including online platforms, virtual simulations, and mobile applications; and (3) adaptation to cultural diversity and educator readiness in global higher education contexts.

Discussion: Findings highlight the potential of technology to foster SEL among university educators while also underscoring persistent challenges related to scalability, long-term effectiveness, and cultural responsiveness. The review provides evidence to guide the development of a cross-culturally adaptable SEL toolkit to support faculty professional development in increasingly globalized higher education systems.

KEYWORDS

social-emotional learning (SEL), higher education, technology-enabled learning, cross-cultural education, digital tools in education, professional development, emotional regulation, SEL competencies

1 Introduction

Social-emotional learning (SEL) has emerged as a transformative educational paradigm that prioritizes the development of emotional intelligence, interpersonal skills, and reflective practices alongside cognitive and academic competencies. While initially rooted in school-based interventions, SEL has gained momentum across educational levels, including higher education, where the emotional and social demands placed on both educators and students are increasingly recognized. This shift is particularly critical in the context of global educational disruptions, growing attention to educator mental health, and the rapid digitalization of teaching and learning. Faculty are not only content deliverers, but emotional anchors in increasingly diverse, high-pressure academic environments–highlighting the urgent need to integrate SEL into their professional development (Flynn et al., 2024).

SEL emphasizes competencies such as self-awareness, emotional regulation, empathy, and responsible decision-making– skills that are foundational not only for personal development but also for building inclusive and effective learning environments (Brackett and Salovey, 2019; Jones and Bouffard, 2018; Durlak et al., 2011). Expanding on this, the Inter-Agency Network for Education in Emergencies (INEE) frames SEL as "the process through which individuals learn and apply a set of social, emotional, cognitive, and related skills, attitudes, behaviors, and values that help direct their thoughts, feelings, and actions in ways that enable them to succeed in school, work, and life" (Inter-Agency Network for Education in Emergencies, 2016), thereby broadening the scope of SEL beyond emotional and social domains to include cognitive and value-driven dimensions. Further expanding the scope, UNESCO's TVETipedia frames SEL as "a process of acquiring the competencies to recognize and manage emotions, develop care and concern for others, establish positive relationships, make responsible decisions and handle challenging situations effectively. It is a holistic process of learning grounded in ethics of care that links the cognitive with the social and emotional as well as relational aspects of learning toward supporting learners' well-being, academic attainment, and active global citizenship for positive social change" (UNESCO-Unevoc International Centre for Technical and Vocational Education and Training., 2024).These competencies have been widely adopted in frameworks guiding both K-12 and higher education contexts (Elias and Arnold, 2017; Greenberg et al., 2017; Osher et al., 2016). Building on Bandura's (1977) social learning theory and drawing from Mayer and Salovey's conceptualization of emotional intelligence, SEL emphasizes the reciprocal interaction of personal, behavioral, and environmental factors (Mayer and Salovey, 1997).

In the context of higher education, the relevance of SEL extends beyond classroom management or student well-being. Effective classroom management is not just about organizing learning activities–it depends heavily on educators' ability to regulate their own emotions, form empathetic and supportive relationships, and sustain a positive classroom climate. Research shows that educators with stronger social-emotional competencies–including self-awareness, emotional regulation, empathy, and relationship skills–demonstrate more positive teacher–student interactions and more effective classroom management; emotion regulation

in particular facilitates smoother navigation of challenging classroom dynamics in higher-ed contexts (Fitzgerald et al., 2022; Aldrup et al., 2024). Moreover, SEL frameworks emphasize that helping educators build these competencies supports stronger classroom management and relational foundations with students (CASEL, 2025). University educators face multifaceted roles that require them to navigate diverse student populations, manage emotionally charged discussions, facilitate collaboration, and maintain motivation and mental health under often high-pressure environments; especially when emotional labor heightens both exhaustion and disengagement among faculty (Zhai et al., 2025). Research suggests that educators with well-developed SEL competencies are better equipped to foster supportive learning climates, handle interpersonal conflicts, and model emotional resilience (Greenberg et al., 2017). Yet, despite its importance, SEL remains inconsistently implemented and under-theorized at the university level, particularly in regard to educator professional development.

Furthermore, higher education settings are increasingly characterized by internationalization, cross-disciplinary collaboration, and cultural diversity, which add layers of complexity to the emotional dynamics within classrooms. Transformative SEL frameworks have been proposed for experiential learning (Li-Grining et al., 2021). Instructors are expected to be not only content experts but also emotionally attuned facilitators who can manage cross-cultural interactions, create psychologically safe spaces, and engage students from diverse backgrounds. These expectations place socio-emotional demands on educators that are often unmet by existing professional development models, many of which overlook SEL entirely or address it only superficially (Jones et al., 2017; Mintz, 2022). Recent research emphasizes the role of emotional intelligence in effective teaching and teacher performance, while also highlighting the contribution of SEL to student well-being across diverse cultural settings (Kaur et al., 2019, 2022; Kitami and Yamuchi, 2022).

In framing this review, several theoretical perspectives provide an essential lens to understand how SEL operates in higher education faculty development. Bandura's Social Learning Theory (1977) underscores the role of modeling, observation, and reinforcement in acquiring SEL competencies, while Mayer and Salovey's Emotional Intelligence Theory (1997) explains the underlying cognitive-emotional processes shaping SEL skill development. Additionally, Social Constructivism highlights the importance of collaborative and reflective learning experiences in supporting educators' emotional growth (Vygotsky and Cole, 1978). The Community of Inquiry (CoI) model further contextualizes the integration of technology by emphasizing social presence, cognitive presence, and teaching presence–critical dimensions for technology-enabled SEL in online and hybrid learning environments (Garrison et al., 2000). Together, these frameworks inform both the synthesis and interpretation of the literature reviewed in this study.

Recent developments in educational technology offer promising pathways to bridge this gap. Emerging reviews by Goldoni et al. (2023), Izumi et al. (2021), and Sakr et al. (2019) highlight how computational tools and virtual reality are increasingly applied in SEL training. Digital platforms, virtual simulations, mobile applications, and AI-enabled tools are now being explored as mechanisms for SEL delivery and enhancement,

offering scalable, flexible, and personalized interventions that can be adapted to different teaching contexts and educator needs (Izumi et al., 2021; Liu et al., 2019). For example, virtual reality (VR) tools can simulate challenging classroom scenarios to support empathy training, while intelligent tutoring systems can model emotional feedback in real time. However, challenges remain in ensuring authenticity, accessibility, and cultural responsiveness in technology-enabled SEL solutions. As de Fátima Goulão and Menedez (2015) note, supporting faculty autonomy and self-regulation is also essential during technology-mediated SEL training. Finally, concerns about over-standardization, lack of personalization, and limited empirical evaluation highlight the need for evidence-based design and contextual adaptation (Mayer, 2018; Sakr et al., 2019).

Despite growing recognition of SEL's relevance for educators, most existing literature remains narrowly focused on student-centered outcomes in K–12 settings. Few studies have systematically examined SEL from the perspective of faculty development, and even fewer have explored how digital tools shape SEL competencies in higher education contexts. Additionally, the cultural and institutional diversity that shapes SEL implementation is often under-theorized, leaving a gap in how these interventions are adapted across varied teaching environments (Brandao De Souza and Jacomuzzi, 2025). Although prior research and systematic reviews have explored SEL in K–12 settings and the use of digital tools in education broadly, there is a notable gap in the literature specifically addressing the intersection of SEL, technology integration, and educator development in higher education. Emerging research links SEL growth to educator identity development. The importance of socio-emotional engagement is also emphasized in faculty development models post-COVID. University educators have unique pedagogical needs, and their socio-emotional growth is shaped by distinct professional pressures, institutional structures, and cultural expectations. Thus, understanding how technology-enabled SEL interventions operate in these environments–and how they can be tailored to support educators across cultures–is essential for advancing the field (Megawati et al., 2023; Clinton and Hall, 2022; Evans, 2022).

This systematic review offers a novel contribution by focusing specifically on university and college educators as the primary agents of SEL growth, rather than as facilitators of student development. It is the first review to comprehensively examine technology-enabled SEL interventions for faculty through a culturally responsive lens, integrating both empirical evidence and theoretical frameworks to inform contextually grounded faculty development practices. The aim is to identify key strategies, tools, and frameworks that inform the development of a comprehensive and culturally adaptable SEL toolkit for higher education faculty. Particular attention is paid to interventions that promote self-awareness, emotional regulation, and responsible decision-making, as these competencies emerged as most relevant based on an initial scoping analysis. These skills are widely recognized as essential for effective teaching (Elias and Arnold, 2017). Empirical evidence suggests SEL competencies correlate strongly with teaching effectiveness (Kaur et al., 2019).

The review is guided by the following overarching questions: What are the essential components of technology-based SEL interventions for university educators? What strategies support the adaptability and contextual relevance of these interventions across diverse academic and cultural settings? What impact do these interventions have on teaching practices, educator well-being, and inclusive learning environments?

By addressing these questions, this review seeks to provide a robust foundation for the design and implementation of a technology-enabled SEL toolkit tailored for university educators working in cross-cultural and interdisciplinary contexts. The findings will inform both theoretical understanding and practical approaches to integrating SEL into higher education in ways that are evidence-based, contextually relevant, and technologically responsive. Accordingly, this review systematically synthesizes the available empirical and theoretical evidence on technology-enabled SEL interventions for university educators, following PRISMA guidelines (Moher et al., 2009; Page et al., 2021).

2 Methods

2.1 Review design and conceptual framework

This study employed a systematic review methodology to synthesize empirical and theoretical evidence on the use of technology-enabled approaches to support social-emotional learning (SEL) among university educators. The design followed the PRISMA 2020 guidelines (Page et al., 2021) and recommendations for systematic reviews (Booth et al., 2016; Gough et al., 2017; Higgins et al., 2019), ensuring a structured and transparent process for identification, selection, and synthesis of eligible studies. The review was conceptually framed using the PICOS model (Higgins et al., 2019), which defined the scope and guided the selection criteria: Population (P)–mainly university educators (including faculty, instructors, teacher educators, faculty developers, pre-service and in-service teachers enrolled in university-based programs, and university students participating in SEL interventions or co-creation activities); Intervention (I)–technology-enabled approaches targeting SEL development; Comparator (C)–no comparator required, although internal contrasts (e.g., pre/post or between settings) were noted; Outcomes (O)–development or enhancement of SEL competencies and associated shifts in teaching practice, professional development, or inclusive learning environments; and Study design (S)–peer-reviewed empirical and theoretical studies, including qualitative, quantitative, mixed-methods, systematic mapping, scoping syntheses, and conceptual framework analyses.

Given the intersection of multiple research domains–social-emotional learning, educational technology, and faculty development–this review prioritized conceptual richness over experimental uniformity, aiming to explore how SEL is operationalized through digital means in higher education rather than assess effectiveness across standardized interventions. The review protocol was developed prior to full-text screening but was not preregistered, as the study was not clinical in nature and falls outside the scope of registries such as PROSPERO.

2.2 Eligibility criteria

The inclusion and exclusion criteria were derived directly from the PICOS framework and refined through an iterative reading of titles and abstracts during the screening process. Eligible studies met the following criteria:

- **Type of study:** Peer-reviewed empirical and theoretical research, including qualitative, quantitative, mixed-methods, systematic mapping, scoping reviews, and conceptual analyses.
- **Language:** English or Arabic (with full English translations available for Arabic sources).
- **Publication window:** January 2014 to December 2024.
- **Participants:** Postsecondary educators (university and community college faculty, instructors, and teacher educators), pre-service and in-service teachers enrolled in university-based training, faculty developers, and postsecondary students (including adult and non-traditional learners) participating in SEL interventions, co-design, or experiential learning (see transfer-relevance clause). Studies focusing solely on K–12 student populations or K–12 classrooms without university-level involvement were excluded.
- **Transfer-relevance clause:** Studies conducted in postsecondary settings that focus on students were included when their findings or technology modalities directly inform educator professional development (e.g., tools, design features, or implementation strategies that can be adapted for faculty training in SEL).
- **Intervention focus:** Integration of technology—such as online platforms, virtual learning environments, mobile applications, simulations, or other digital tools—to support or deliver SEL-related content.
- **Outcomes:** Studies needed to address SEL competencies (e.g., emotional regulation, self-awareness, decision-making), either explicitly measured or clearly articulated through reported practices or instructional strategies. Broader outcomes related to professional growth, inclusive teaching, and cross-cultural responsiveness were also considered when tied to SEL constructs.

Studies were excluded if they were not peer-reviewed (e.g., opinion pieces, non-peer-reviewed book chapters, editorials, or gray literature). Gray literature, conference proceedings, and non-peer-reviewed articles were also excluded to maintain methodological quality.

2.3 Information sources and search strategy

A systematic literature search was conducted across five academic databases known for their coverage of educational, psychological, and interdisciplinary research: ERIC, ScienceDirect, JSTOR, EBSCOhost, and SpringerLink. These databases were selected to ensure comprehensive coverage of the intersection between SEL, higher education, and educational technology.

Search strategies were adapted for each platform's syntax and used Boolean logic and keyword mapping. The search strings combined terms from five conceptual pillars: SEL, higher education, educators, technology, and context/culture. For example, strings included combinations such as:

("Social-emotional learning" OR "SEL") AND ("higher education" OR "university") AND ("educators" OR "faculty") AND ("technology" OR "digital tools" OR "online platforms") AND ("cross-cultural" OR "inclusive" OR "intercultural").

Database-specific filters were applied to restrict results to peer-reviewed journal articles. The search was conducted in March 2024 and included articles published between January 2014 and December 2024. Only studies with available full text were considered.

2.4 Study selection and screening

The initial search identified 2,296 records across the five databases. After duplicate removal ($n = 896$) using Zotero, 1,400 unique studies were retained for screening. Title and abstract screening was performed independently by two reviewers using Rayyan, applying the predefined inclusion/exclusion criteria. Disagreements were resolved through team discussion.

The study selection process is illustrated in the PRISMA 2020 flow diagram (Figure 1), which follows the four standard stages–identification, screening, eligibility, and inclusion–recommended for systematic reviews (Page et al., 2021). This diagram provides a transparent overview of how records were identified, screened, excluded, and ultimately included in the final synthesis.

This stage excluded 1,135 studies, resulting in 265 full-text articles assessed for eligibility.

During full-text screening, 243 studies were excluded for the following reasons: not focused on SEL in higher education ($n = 27$), no integration of technology in SEL ($n = 12$), populations outside higher education ($n = 161$), poor methodological quality ($n = 41$), and accessibility issues ($n = 2$). Studies were considered of "poor methodological quality" when they exhibited one or more of the following: absence of a clear research design or methodology; lack of valid or reliable measures for SEL outcomes; insufficient description of intervention procedures; or missing data that hindered interpretation of results. This assessment was based on adapted quality appraisal criteria from PRISMA 2020 guidelines, ensuring that only methodologically sound studies were included in the synthesis.

Ultimately, 22 studies were included in the final synthesis. The full screening and selection process is illustrated in the PRISMA 2020 flow diagram (Figure 1).

2.5 Data extraction and coding

A structured data extraction template was created using Microsoft Excel, informed by the review questions and PICOS dimensions. The following data were extracted from each study:

- Study citation (authors, year, journal)
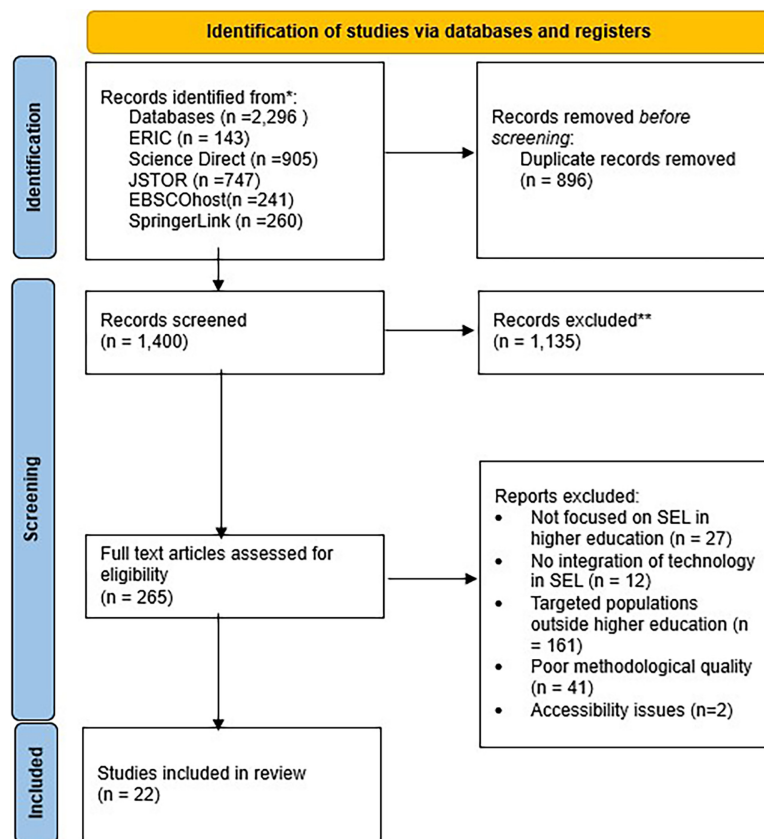- Country and institutional context

FIGURE 1
PRISMA 2020 flow diagram detailing the identification, screening, eligibility, and inclusion of studies.

- Target population and sample characteristics
- SEL competencies addressed
- Nature and function of the technology used
- Research design and methodology
- Measured or reported outcomes
- Cultural considerations and adaptability
- Implications for teaching practice and professional growth

Studies were also organized in Zotero under thematic folders reflecting four dimensions: SEL relevance, higher education focus, technology integration, and cross-cultural adaptability. Notes on theoretical framework, practical relevance, and quality of reporting were also recorded.

2.6 Quality appraisal and relevance ranking

While no formal risk-of-bias tool (e.g., ROBIS, CASP) was applied due to the diversity of included studies, each study was evaluated using a narrative quality framework. Criteria included clarity of aims, appropriateness of methods, richness of findings, and consistency with inclusion criteria (Gough et al., 2017). A relevance score (High, Medium, Low) was assigned based on alignment with the research objectives, particularly the study's contribution to the design of a SEL toolkit for university educators.

Studies with lower methodological clarity were retained if they offered novel conceptual insights or addressed underrepresented contexts (e.g., Global South, refugee education, virtual learning in conflict zones), thus enhancing the review's contextual diversity.

2.7 Data synthesis and thematic analysis

Given the methodological heterogeneity, a qualitative thematic synthesis approach was employed (Thomas and Harden, 2008; Braun and Clarke, 2006). After extraction, data were open-coded using inductive methods. Codes were grouped into themes that addressed the review's central questions:

1. Key SEL competencies supported through technology (e.g., self-awareness, emotional regulation)
2. Pedagogical strategies and technological modalities used
3. Adaptation across cross-cultural and diverse higher education settings
4. Outcomes related to educator engagement, inclusive teaching, and professional development

Synthesis was iterative and reflexive, involving constant comparison across studies. Emerging patterns were mapped onto a matrix structured around the PICOS components to support integrative interpretation and highlight areas of strength, variation,

and research gaps. In addition to educator-participant studies, we retained student-focused higher-education studies whose technology features (e.g., emotion-recognition feedback, game-based practice, social robots) provide transferable design elements for faculty professional development in SEL. These studies inform design/specification choices rather than outcome frequencies and were therefore excluded from educator-outcome tallies. A brief sensitivity check indicated that thematic conclusions remained stable when excluding these transfer-focused studies.

3 Results

Following the systematic search and screening process described in the Methods, a total of 22 studies fully met the eligibility criteria and were included in the final synthesis.

3.1 Characteristics of included studies

The 22 studies synthesized in this review reflect the emerging yet increasingly diversified body of research which corresponds with prior mapping of technology-supported SEL interventions (D'Angelo, 2018; Mayer, 2018; Mayer and Schwemmle, 2023) exploring the integration of technology-enabled SEL interventions

in higher education faculty development. The studies covered a range of international contexts, including North America, Europe, the Middle East, and Asia, representing both Western and non-Western educational systems. This geographical spread allowed for the examination of both globally shared challenges and culturally specific adaptations in implementing SEL interventions.

A broad spectrum of research designs was observed. These included mixed-methods studies, qualitative designs (e.g., interviews, case studies, participatory inquiry), scoping and systematic reviews, conceptual frameworks, and quantitative designs (e.g., surveys, structural equation modeling, experimental and quasi-experimental approaches). Quantitative studies employed experimental and quasi-experimental designs, pre- and post-intervention assessments, and validated SEL measurement instruments to assess competency growth. Several studies utilized mixed methods designs that combined self-report surveys, observational data, focus groups, and reflective journals to triangulate findings. This methodological variety provided both depth and breadth to the synthesis, allowing for a richer understanding of both intervention processes and outcomes.

Participants in the included studies represented a diverse spectrum of university-based populations. These included faculty members, instructors, teacher educators, faculty developers, pre-service and in-service teachers enrolled in university-affiliated training, and university students engaged in SEL interventions or

TABLE 1 Overview of included studies.

Code	References	Study design	Participants
S1	Brzezinska and Cromarty, 2022	Mixed methods (qualitative interviews and surveys)	University educators
S2	Caprara and Caprara, 2022	Scoping review	General higher education contexts
S3	Li-Grining et al., 2021	Conceptual framework, case-based reflections	University students and educators
S4	Clinton and Hall, 2022	Case studies and mixed-methods reflections	Pre-service and in-service teachers
S5	ElSayary et al., 2022	Mixed-method explanatory sequential	Pre-service teachers
S6	Evans, 2022	Conceptual with practical strategies	Non-traditional learners (community college)
S7	Flushman et al., 2021	Mixed methods (surveys and interviews)	Pre-service and in-service teachers
S8	Goldoni et al., 2023	Systematic mapping	Students with autism spectrum disorders[1]
S09	van der Zijden and Wubbels, 2023	Mixed-method (interviews and surveys)	First-year university students
S10	Johnson et al., 2022	Case study (4 years)	University educators and students
S11	Kasperski, 2023	Quantitative (survey with EduSEL questionnaire)	Pre-service and in-service teachers
S12	Kaur et al., 2019	Quantitative (Structural Equation Modeling - SEM)	University educators (higher education faculty)
S13	Kitami and Yamuchi, 2022	Inquiry-based learning	University students
S14	Lapidot-Lefler, 2022	Qualitative (thematic reflections)	Pre-service teachers
S15	de Fátima Goulão and Menedez, 2015	Mixed methods	Adult learners
S16	Markowitz et al., 2018	Mixed methods	Pre-service and in-service teachers
S17	Mayer et al., 2023	Qualitative	University students and educators
S18	Megawati et al., 2023	Qualitative	Pre-service English teachers (university intervention)
S19	Osher et al., 2016	Theoretical Synthesis	Cross-sector educational research
S20	Sachyani and Gal, 2022	Qualitative phenomenological study	Pre-service teachers(university intervention)
S21	Wilson et al., 2024	Qualitative participatory design	University students
S22	Zhu and Basdogan, 2021	Case study	University students

[1]S8 – Reason for inclusion: Technology modalities for SEL (emotion recognition, games, robots) inform educator-facing design for inclusive, tech-enabled SEL training in higher education.

co-creation activities. The participant samples reflected a range of teaching experience, disciplinary fields, and cross-cultural higher education contexts. The main characteristics of the included studies, including study design, country, sample population, and intervention type, are summarized in Table 1.

3.2 Thematic synthesis of findings

The findings of the 22 included studies were synthesized according to three core themes that emerged consistently across the literature: (1) SEL Competencies Targeted, (2) Technology-Enabled Strategies, and (3) Contextual Adaptation and Impact. These themes align directly with the research questions guiding the review and the PICOS framework used to structure the inclusion criteria.

3.2.1 SEL competencies targeted

All of the reviewed interventions aimed to strengthen educators' capacity to navigate the emotional demands of teaching, though the emphasis on specific SEL competencies varied. Emotional regulation was the most frequently addressed competency, explicitly featured in nine studies (S2, S8, S12, S13, S19, S20, S3, S15, S18) and partially embedded in others (S5, S6, S14). These interventions focused on equipping educators to manage stress, frustration, and anxiety in challenging contexts such as conflictual student interactions, emotionally charged discussions, or workload pressures. For example, S12 integrated emotional regulation with self-awareness and empathy in higher education teacher effectiveness programs, while S20 linked it to collaboration and decision-making in distance teacher education. Technology-supported strategies included online reflective journals, gamified simulations, and structured discussion forums to model and practice regulation techniques.

Self-awareness appeared in eight studies (S2, S3, S12, S14, S15, S17, S18, S21), often alongside emotional regulation. Interventions helped educators identify their emotional triggers, teaching biases, and interpersonal tendencies that influence classroom management and relationships with students. In S3, self-awareness was connected to decision-making and relationship skills in service-learning contexts, whereas S18 linked it to responsible decision-making in pre-service English teacher training. Technology use here often involved self-assessment platforms and digital portfolios to track and reflect on personal growth.

Empathy featured in five studies (S1, S4, S12, S13, S19), frequently paired with relationship skills. In S4, empathy was embedded in culturally responsive, anti-racist pedagogy through gamified learning, while S13 drew on Japanese higher education contexts to link empathy with emotional regulation and critical thinking. These interventions sought to enhance educators' capacity to recognize and respond sensitively to students' emotional needs, especially in diverse or multicultural classrooms.

Relationship skills were commonly addressed in combination with empathy, focusing on building trust, fostering effective communication, and promoting inclusive student engagement practices. Digital collaboration tools and peer feedback platforms were used to facilitate these skills in authentic teaching scenarios.

Responsible decision-making appeared in five studies (S3, S15, S18, S20, plus aspects in S16). S15 incorporated it with self-regulation in adult higher education via digital self-assessment

tools, while S16 fostered it through ethical case discussions in university–district teacher preparation partnerships. Across contexts, this competency was strengthened through structured ethical reflection exercises, case-based problem-solving, and scenarios addressing dilemmas in grading, bias, and culturally responsive pedagogy in globalized teaching settings.

A recurring mechanism for developing these competencies was guided reflective practice, facilitated through digital reflection journals, scaffolded online discussion boards, and structured self-assessment activities. This process supported educators' metacognitive awareness of their emotional responses and pedagogical decisions, forming a foundation for continuous self-monitoring and adaptive responses in emotionally complex teaching environments.

3.2.2 Technology-enabled strategies

The interventions examined demonstrated significant variability in how technology was used to support SEL development, with digital platforms being the most prevalent, appearing in 11 studies (S1, S3, S5, S9, S16, S17, S18, S20, S21, S22, plus limited forms in S12 and S19). Learning management systems (LMS) such as Moodle, Microsoft Teams, and Book Creator were often used to embed reflective exercises, SEL modules, and guided discussion activities into professional development courses (S14, S20). In several cases, these were supplemented with interactive tools, such as video-based role-play simulations, enabling educators to rehearse emotionally challenging classroom scenarios and receive feedback (S11, S20).

Mobile learning applications appeared in multiple studies (S6, S8, S15) to deliver personalized SEL support through real-time emotional self-monitoring, mindfulness exercises, stress reduction techniques, and daily check-ins. For instance, S15 integrated self-assessment calibration tools to strengthen emotional regulation and self-awareness in adult learners, while S8 used robotics and emotion-recognition games to develop empathy and socio-emotional adaptability in higher education contexts.

Gamification strategies (S4, S5, S8) and AI-driven tools (S8, S10) supported collaboration, decision-making, and motivation, particularly in online and hybrid courses. VR and AR simulations, as seen in S8, offered immersive environments for practicing empathy, emotional regulation, and conflict resolution in realistic classroom scenarios.

Several studies also highlighted lower-tech or limited-tech approaches (S12, S13, S19) where reflective discussion, journaling, and peer mentoring played a central role. This demonstrates that SEL integration is not restricted to high-tech environments; instead, technology often functioned as a facilitator for iterative reflection, structured emotional practice, and peer-supported dialogue.

A matrix summary of the SEL competencies addressed, technology types utilized, and the educational contexts across studies is presented in Table 2.

3.2.3 Contextual adaptation and impact

The reviewed studies emphasized the critical importance of tailoring SEL interventions to fit the cultural, institutional, and pedagogical contexts in which educators operate.

Cultural responsiveness was explicitly addressed in at least six studies (S1, S2, S4, S6, S16, S18). Adaptations

TABLE 2 Summary of SEL focus, technology use, and educational context.

Study code	SEL compentencey					Technology used					Context			
	Self aware-ness	Self-manage-ment & emotional regulation	Social aware-ness & empathy	Respon-sible decision−making	Other skills	Digital platforms & online tools	Interactive/ experiential tolls	Communi-cation & discussion tools	Specialized learning tools	Other limited/ emergency use of technology	University and college educators/ students	University-based teacher education & preparation	Culturally responsive/ diverse post secondary context	Special/ transfer-relevant post secondary context[1]
S1			✓		✓	✓					✓			
S2	✓	✓			✓	✓					✓		✓	
S3	✓			✓	✓	✓		✓			✓			✓
S4			✓		✓		✓					✓	✓	
S5			✓				✓				✓			
S6		✓			✓			✓			✓			
S7			✓	✓		✓		✓			✓			✓
S8		✓			✓		✓				✓			
S9			✓		✓	✓					✓			✓
S10					✓	✓					✓			
S11		✓	✓		✓		✓				✓			
S12	✓	✓	✓						✓		✓			
S13		✓	✓	✓					✓		✓			
S14	✓	✓	✓			✓			✓		✓			
S15	✓	✓		✓		✓			✓		✓			
S16	✓				✓	✓			✓		✓			
S17	✓				✓		✓				✓			
S18	✓		✓	✓								✓		
S19		✓	✓									✓		✓
S20		✓		✓	✓	✓						✓		
S21	✓	✓				✓	✓				✓			✓
S22					✓		✓				✓			

[1] Context-to-PD transfer: Student-focused evidence retained solely for its transferable technology features that inform faculty PD design; excluded from educator-outcome counts.

included modifying case studies to reflect local narratives (S4), embedding linguistic diversity in synchronous online sessions (S2), and tailoring SEL activities to specific socio-political contexts, such as emergency remote teaching for refugee populations (S1, S18). In S4, gamified SEL activities were integrated into anti-racist, culturally responsive pedagogy for urban teacher training, while S6 adapted SEL tools for community college settings post-COVID to address resilience and collaboration.

Cross-cultural challenges emerged in studies like S8 and S13, where technological tools had to align with local educational norms–such as respecting hierarchical teacher–student relationships in Japanese higher education (S13) or integrating emotion-recognition robotics in culturally sensitive ways (S8).

Across the corpus, positive impacts included enhanced emotional awareness, increased confidence in managing emotionally complex situations, and improved relational skills (S7, S12, S19). Faculty reported gains in inclusive teaching practices (S14, S21) and professional resilience (S6, S16). However, barriers such as time constraints, digital literacy gaps, and limited institutional recognition of SEL persisted across contexts (S5, S10, S14).

Comparative analysis indicates that high-tech immersive tools (e.g., VR, robotics) often paired emotional regulation with empathy, while culturally adapted low-tech approaches tended to emphasize self-awareness and decision-making. These patterns suggest that technology type, SEL competency focus, and cultural adaptation are interdependent factors influencing the success of SEL interventions in higher education.

4 Discussion

This systematic review synthesized 22 empirical studies examining the integration of technology-enabled interventions to support social-emotional learning (SEL) among university educators across diverse higher education contexts. The findings are framed in response to the growing recognition–highlighted by Jennings and Greenberg (2009) and Schonert-Reichl (2017)–that faculty well-being, relational capacity, and adaptive teaching are central to effective, inclusive education. They are situated within well-established frameworks, including the CASEL competency model (CASEL, 2025), culturally responsive and sustaining pedagogy (Paris and Alim, 2017), and the Community of Inquiry (CoI) framework (Garrison et al., 2000), which together illuminate how socio-emotional competencies, technological modalities, and cultural contexts intersect in higher education.

Historically, SEL research has focused predominantly on K–12 student populations, leaving the role of SEL in faculty development underexplored. This synthesis positions faculty as both agents and beneficiaries of SEL, underscoring the need for professional development approaches that cultivate emotional competencies as a foundation for inclusive pedagogy and student engagement.

This review addressed three interrelated research questions:

1. What SEL competencies do technology-enabled interventions in higher education target for university educators?

2. What technology-enabled strategies are most effective in enhancing these competencies?

3. How do contextual factors influence the adaptability and impact of these interventions across diverse higher education settings?

4.1 Targeted SEL competencies (RQ1)

Across the 22 studies, self-awareness was the most frequently addressed competency (9/22; S2, S3, S6, S12, S14, S15, S17, S18, S21), followed by emotional regulation (7/22; S2, S8, S12, S13, S15, S19, S20), responsible decision-making (4/22; S3, S15, S18, S20), and empathy (5/22; S1, S4, S12, S13, S19).

These competencies were commonly developed through reflective practices such as digital journaling (S12, S15, S17), self-assessment tools (S15), and structured peer feedback (S6, S18). In alignment with the CASEL framework, self-awareness and self-management (including regulation) were identified as core SEL elements. Recent comprehensive reviews (Osher et al., 2016) further underscore SEL's relevance across educational levels. Emotional regulation emerged as a critical resilience skill for educators navigating emotionally charged student interactions, academic workload pressures, and shifting classroom dynamics (Brackett et al., 2019).

Cultural framing shaped these competencies: in collectivist contexts (S4, S15), regulation emphasized maintaining group harmony; in more individualistic contexts (S6, S10), it focused on personal resilience and self-care. A similar contextual divergence appeared for self-awareness: in collectivist higher education environments (S4, S15), Similarly, self-awareness exhibited distinct emphases across cultural contexts. In collectivist settings such as S15 and S18, self-awareness was often framed as an awareness of one's role in maintaining group harmony, recognizing shared responsibility, and aligning personal values with collective norms. In more individualistic contexts, such as S6 and S17, self-awareness tended to focus on personal resilience, independent growth, and reflective self-improvement in teaching practice. Empathy also reflected contextual variation: in multicultural or diverse classrooms (e.g., S4, S13), empathy was operationalized through cultural humility and active listening to foster inclusivity, whereas in more homogeneous academic environments (e.g., S1, S12) it centered on perspective-taking within subject-specific or institutional communities.

Empathy and relationship skills were particularly important in multicultural teaching contexts (S4, S13), reinforcing Gay's (2018) assertion that relational competence is central to inclusive pedagogy. Taken together, these findings suggest that emotional regulation and self-awareness may yield shorter-term gains, while empathy and relationship skills often require sustained, immersive engagement. This echoes findings from higher education research indicating that empathy–and particularly its impact on teaching presence and student support–develops most effectively through prolonged interventions. Empathy is linked to long-term relationship quality and mental health outcomes, suggesting that short bursts of training are less impactful than ongoing SEL engagement (Aldrup et al., 2022).

4.2 Technology-enabled strategies (RQ2)

The reviewed studies showed that technology functioned not merely as a delivery platform, but as an active facilitator of SEL skill development, consistent with Mayer's (2018) multimedia learning principles. Tools were deployed in ways that often mapped directly to targeted competencies:

- Learning Management Systems (LMS) such as Moodle, Microsoft Teams, and Book Creator were used in 3/22 studies (S14, S15, S20) to structure SEL content and facilitate collaboration.
- Mobile applications with emotion tracking, mindfulness exercises, and stress-reduction prompts appeared in 2/22 studies (S8, S15), often linked to emotional regulation.
- Reflective journaling/self-reflection tools were used in 3/22 studies (S12, S15, S17), supporting self-awareness and critical reflection.
- Gamification (S4, S8) and simulation-based learning (S11) provided authentic, low-risk practice environments for relational and decision-making skills.
- Emergency Remote Teaching (ERT) contexts (S1, S18) highlighted the role of SEL in faculty resilience during crisis teaching (Brzezinska and Cromarty, 2022).

Taken together, these patterns suggest that the choice of technology is not merely a technical matter but a pedagogical one, where alignment with institutional and cultural needs becomes central to sustained engagement.

A fit-for-purpose alignment emerged: emotion-monitoring apps (S8, S15) best supported regulation; journaling platforms (S12, S15, S17) enhanced self-awareness; scenario-based simulations embedded in LMS (S15, S20) effectively developed responsible decision-making. This aligns with broader digital equity research showing that accessibility and technological appropriateness significantly influence engagement with SEL interventions–particularly in under-resourced higher education contexts. For example, recent work emphasizes how barriers like limited broadband and device access compromise SEL uptake unless low-bandwidth, inclusive designs are prioritized (Drljić et al., 2025).

These findings resonate with the CoI framework (Garrison et al., 2000; Johnson et al., 2022), showing how technology-mediated environments can foster cognitive, social, and teaching presence. Many interventions balanced asynchronous self-paced work with synchronous, peer-supported dialogue (S2, S6, S21), reflecting evidence that blended approaches combine the benefits of individual reflection with collaborative meaning-making (Liu et al., 2019; Mayer, 2018).

4.3 Contextual adaptation and impact (RQ3)

Explicit cross-cultural adaptation was evident in **5/22** studies (S2, S4, S15, S18, S21), yet contextual sensitivity was a recurring implicit factor across the corpus. Adapting Western-centric SEL models proved essential where cultural norms around emotional expression, educator–student hierarchies, and interpersonal dynamics differed substantially.

Examples include integrating linguistic diversity into activities (S2, S21), modifying case studies to reflect local socio-political realities (S4), and embedding SEL within professional ethics frameworks (S4, S15). In East Asian contexts (S15), SEL emphasized indirect emotional disclosure; in Middle Eastern settings (S4), it was tied to community-oriented values. In under-resourced environments (S8, S14), low-bandwidth tools outperformed resource-heavy simulations, illustrating how technological feasibility and cultural adaptability are interdependent. This observation echoes findings that inclusive, low-tech modalities can reduce cognitive load and enhance reach, especially for faculty in infrastructure-challenged regions. Studies suggest that scalable, accessible platforms–not high-spec solutions–are critical for equitable SEL implementation (Drljić et al., 2025; Burrus et al., 2022).

These findings affirm the need for culturally responsive pedagogy (Gay, 2018; Ladson-Billings, 1995) and culturally sustaining approaches (Paris and Alim, 2017) to ensure relevance, authenticity, and emotional safety.

4.4 Interactions between competencies, technology, and culture

Comparative synthesis revealed specific synergies:

- Emotional regulation + mindfulness apps gained stronger engagement in contexts with contemplative traditions (S15, S19).
- Self-awareness + journaling tools thrived in settings valuing individual professional reflection (S12, S15, S17).
- Responsible decision-making + simulations proved effective in ethically complex professional environments (S15, S20).
- Empathy + video-based case simulations proved particularly effective in multicultural classrooms (S4, S13), allowing educators to practice nuanced intercultural responses. Self-awareness + peer feedback platforms (S6, S18) also showed stronger outcomes when paired with reflective prompts tailored to educators' prior teaching experiences. These patterns illustrate that the relationships between competencies, technological modalities, and cultural contexts are not incidental but actively shape intervention success.

Several reviewed interventions explicitly grounded their design in established theoretical or pedagogical frameworks. For example, S4 drew on the SCARF model to address status, certainty, autonomy, relatedness, and fairness in emotional engagement; S13 incorporated the Philosophy for Children (P4C) approach to facilitate critical and empathetic dialogue; S3 embedded Transformative SEL principles to link social-emotional growth with civic engagement; and S19 employed mindfulness-based SEL strategies to promote sustained emotional regulation. These frameworks informed the structure and sequencing of activities in the respective interventions, influencing both the competency emphasis and the mode of technology integration.

These patterns underscore that success depends on alignment between competency focus, technological affordances, and cultural context – not the independent selection of any single element.

4.5 Implications for practice and research

The findings support a toolkit design that:

1. **Centers core competencies** – Prioritize self-awareness (9/22) and emotional regulation (7/22), with optional modules for decision-making (4/22) and empathy (5/22).
2. **Matches tools to competencies** – Use emotion tracking for regulation, journaling for self-awareness, simulations for decision-making.
3. **Supports cultural adaptation** – Provide customizable templates, multilingual support, and context-specific scenarios.
4. **Integrates institutionally** – Embed within faculty development programs, link participation to recognition, and ensure technical and relational supports (S7, S16, S22).

In under-resourced universities, integration might prioritize low-bandwidth, mobile-compatible SEL tools embedded within existing teaching duties, paired with peer-support communities to reduce training costs. In contrast, research-intensive institutions may leverage high-capacity infrastructure for more immersive tools (e.g., VR simulations), with integration through structured professional learning communities and research-led evaluation. Cultural context also shapes implementation–collectivist settings may embed SEL development in collaborative faculty activities and community-oriented goals, while individualist contexts might emphasize self-paced modules and personalized skill tracking.

Such a toolkit, embedded within holistic faculty development models that include interpersonal mentoring, institutional support, and culturally responsive curriculum design, can strengthen emotional competence, inclusive pedagogy, and professional resilience.

4.6 Limitations and future research

This review excluded non-English and non–peer-reviewed studies, potentially limiting cultural diversity in the synthesis. The heterogeneity of designs, intervention models, and outcome measures precluded meta-analysis, necessitating thematic synthesis and introducing subjectivity in theme identification.

Future priorities include:

- Longitudinal studies to assess sustained impacts on educator competencies, teaching practices, and student outcomes (S6, S15).
- Cross-cultural comparative studies to refine SEL adaptation strategies (S3, S8).
- Scalable, AI-supported models integrating coaching and gamification (S4, S8). Consistent with previous literature, barriers such as time constraints, institutional prioritization gaps, and digital literacy limitations may hinder the scalability

of SEL interventions (Darling-Hammond, 2020; Jones et al., 2017; Luo et al., 2025).
- Expanded investigation of SEL in faculty professional learning communities, mentorship structures, and co-creation pedagogies (Wilson et al., 2024; van der Zijden and Wubbels, 2023; Lapidot-Lefler, 2022).

This heterogeneity limits the comparability of effect sizes across studies and necessitates cautious generalization of results. Without meta-analytic aggregation, observed patterns should be interpreted as indicative rather than definitive, and future research employing standardized measures could enhance cross-study comparability.

Data availability statement

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

Author contributions

RM: Writing – original draft, Writing – review & editing, Conceptualization, Formal analysis, Methodology, Validation. SA: Supervision, Validation, Writing – original draft, Writing – review & editing. DB: Supervision, Validation, Writing – original draft, Writing – review & editing.

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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

Database	Full search string
ERIC	("social emotional learning" OR SEL OR "socio-emotional learning") AND ("higher education" OR university OR college OR "post-secondary education" OR "tertiary education") AND (educator* OR teacher* OR faculty OR instructor* OR lecturer*) AND ("technology-enabled" OR "technology integration" OR "digital tools" OR "online learning" OR "e-learning")
ScienceDirect	("social emotional learning" OR SEL OR "socio-emotional learning") AND ("higher education" OR university OR college OR "post-secondary education" OR "tertiary education") AND (educator* OR teacher* OR faculty OR instructor* OR lecturer*) AND ("technology" OR "digital" OR "online" OR "e-learning" OR "virtual learning")
JSTOR	("social emotional learning" OR SEL OR "socio-emotional learning") AND ("higher education" OR university OR college OR "post-secondary education" OR "tertiary education") AND (educator* OR teacher* OR faculty OR instructor* OR lecturer*) AND ("technology integration" OR "digital learning" OR "online learning" OR "e-learning")
EBSCOhost	("social emotional learning" OR SEL OR "socio-emotional learning") AND ("higher education" OR university OR college OR "post-secondary education" OR "tertiary education") AND (educator* OR teacher* OR faculty OR instructor* OR lecturer*) AND ("technology-enabled" OR "digital tools" OR "online platforms" OR "e-learning")
SpringerLink	("social emotional learning" OR SEL OR "socio-emotional learning") AND ("higher education" OR university OR college OR "post-secondary education" OR "tertiary education") AND (educator* OR teacher* OR faculty OR instructor* OR lecturer*) AND ("technology integration" OR "digital" OR "online" OR "e-learning" OR "virtual learning")