

A Systematic Review of Technology-supported Social-emotional Learning Interventions in School Contexts: Insights from the Usefulness Framework

Ting TIAN¹, Ronnel B. KING^{1*}, Ching Sing CHAI¹, Wing Yan LEE²

¹ Department of Curriculum and Instruction, Faculty of Education, The Chinese University of Hong Kong

² Centre for Learning Enhancement and Research, The Chinese University of Hong Kong

* rbking@cuhk.edu.hk

Abstract: Social-emotional competencies are increasingly recognized as essential, leading to growing school-based SEL interventions. As educational technologies advance, their use in SEL has expanded, creating a need to examine their roles. This review analyzed 39 studies of technology-supported SEL using the usefulness framework, focusing on research characteristics, technology use, outcomes, and moderating factors. Findings show an emerging interdisciplinary field concentrated in limited regions and mainly focused on K–12 settings. Five technology types were identified: web-based platforms, digital games and gamified systems, immersive technologies, mobile applications, and artificial intelligence. These tools support SEL by improving learning environments, delivery, assessment, and opportunities for authentic or virtual social interaction. Overall, interventions reported positive effects on social-emotional competencies, academic outcomes, and mental health, shaped by individual, intervention, and environmental factors. Future research could expand geographic diversity, integrate multiple SEL frameworks, combine digital and traditional data, and develop longitudinal, personalized, and systematic interventions that integrate school, family, and community.

Keywords: Social-emotional learning, social-emotional skills, technology, usefulness framework

1. Introduction

Social-emotional skills refer to individuals' abilities to build meaningful relationships, sustain strong motivation, and make responsible decisions (Weissberg et al., 2015). These skills have a significant impact on a wide range of life outcomes (Wang et al., 2024). Strong social-emotional skills not only contribute to improved academic achievement (You et al., 2023) but also lay a solid foundation for students' future career development and overall quality of life (Murphy et al., 2021).

Social-emotional skills can be developed through formal and informal learning experiences (OECD, 2015). As a result, fostering these skills has become an important goal of school education, leading to numerous school-based interventions (e.g., Fu et al., 2024). However, most interventions rely on traditional formats, such as teacher-led psychoeducation and paper-based activities, which often limit student engagement (Lynn et al., 2024). In addition, because socio-emotional skills are procedural, practical, and context-dependent rather than purely declarative (Elbertson et al., 2025), they may be difficult to cultivate through conventional approaches alone. The rapid advancement of educational technology offers new opportunities for social-emotional learning by creating hybrid environments, promoting reflection, and supporting skill transfer to everyday contexts (Slovák & Fitzpatrick, 2015).

As technology is increasingly integrated into social-emotional learning interventions, technology-supported SEL warrants systematic investigation. This study employs the Usefulness Framework as the navigation to examine existing interventions from the perspectives of pedagogic, technological, and social affordances. By introducing the concept of affordances, the framework emphasizes the properties of technology that shape how it can be used (Norman, 1988). This framework provides a suitable lens for analyzing technology-enabled SEL interventions, guiding the examination of technological types and functions while extending the focus on technology's support for pedagogy and social interaction.

By situating technology within educational contexts, we can reveal the underlying mechanisms of technology-supported SEL interventions and generate insights for future intervention design.

2. Literature Review

2.1. Social-emotional learning

Social-emotional learning is an integral part of education and human development. It refers to the process by which young people and adults acquire and apply knowledge, skills, and attitudes to build healthy identities, regulate emotions, pursue personal and collective goals, demonstrate empathy, establish and sustain supportive relationships, and make responsible and caring decisions (CASEL, 2020).

These skills have been shown to benefit a range of important student outcomes (Guo et al., 2023), including academic achievement, learning engagement, well-being, and job success (Wang et al., 2024). Accordingly, social-emotional skills are recognized as critical to individual success in the 21st century (Wang et al., 2025).

2.2. School-based social-emotional learning interventions

Over the past decades, various SEL interventions have been developed to help children enhance their social and emotional skills. These interventions are primarily implemented in school settings and constitute an important component of formal education. School-based social-emotional learning interventions have demonstrated positive effects. For instance, a meta-analysis by Cipriano et al. (2023) showed that students participating in school-based SEL interventions exhibited significant improvements in skills, attitudes, behaviors, peer relationships, school performance, and academic achievement. Similarly, Durlak et al. (2022) found that such interventions also promote prosocial behavior while reducing emotional distress and behavioral problems.

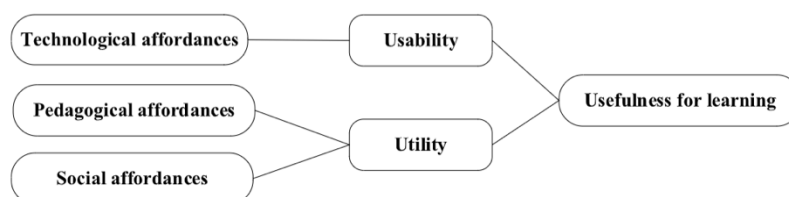
Most existing SEL interventions are delivered in a standard, teacher-led format (Lynn et al., 2024), which, although effective in improving social-emotional skills, is often passive, with low student engagement, and tends to oversimplify the real-life challenges students face (Bailey et al., 2019). Technology-based SEL interventions offer potential solutions by supporting autonomous learning, enhancing efficiency, and increasing engagement (Lynn et al., 2024; Durlak et al., 2022). However, the current landscape of technology-supported SEL interventions has not been systematically reviewed, limiting insights for future design and implementation. This review seeks to fill this gap by examining previous technology-supported SEL interventions.

2.3. Usefulness Framework

The Usefulness Framework was employed to examine the usability and utility of technological tools (see Figure 1). Usability reflects whether a technology allows users to perform tasks efficiently and satisfactorily, while utility concerns whether it provides the necessary pedagogical and social functions (Kirschner et al., 2004). In this study, pedagogical affordances refer to how the core features of an intervention interact with learner characteristics to enable SEL, technological affordances denote the types, features, and functions of the technologies used, and social affordances capture the extent to which the intervention facilitates social interactions.

Figure 1.

The usefulness theoretical framework



3. Method

This review is conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

3.1. Identifying the research question

This review is guided by the following three core research questions:

RQ1: What are the core characteristics of the studies and interventions?

RQ2: What technologies are used in social-emotional learning interventions, and how are they utilized in terms of technological, pedagogical, and social affordances?

RQ3: What are the outcomes of these interventions, and which factors moderate their effects?

3.2. Identifying relevant literature

This study conducted a comprehensive search across the Web of Science, Scopus, ERIC, and APA PsycArticles databases. Boolean operators (OR and AND) were used to combine three groups of search terms related to educational technology, social-emotional learning/competencies, and educational settings. The search covered publications from 2005 to 2025, with appropriate filters applied to refine and optimize the results.

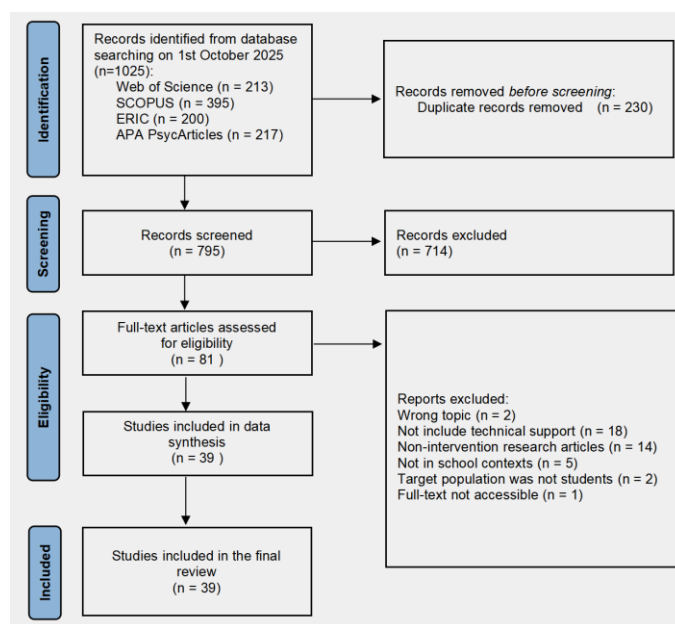
3.3. Study selection

Figure 2 illustrates the PRISMA flow diagram for literature search and screening. We screened literature based on the following inclusion criteria: (1) from peer-reviewed journals available in full-text, (2) focused on technology-supported social-emotional learning intervention, (3) included outcomes related to social-emotional skills, (4) conducted within a school context, and (5) written in English. Each record was independently assessed by two researchers for eligibility based on the inclusion and exclusion criteria, with any discrepancies resolved through team discussions.

Initially, 1025 records were identified. Before screening, 230 duplicate records were removed. Subsequently, 795 records were screened by abstract, resulting in the exclusion of 714 records that did not meet the eligibility criteria. The remaining 81 records underwent full-text screening, of which 42 records were excluded for reasons of wrong topic ($n = 2$), not include technical support ($n = 18$), non-intervention research articles ($n = 14$), not in school contexts ($n = 5$), target population was not students ($n = 2$), and full-text not accessible ($n = 1$). Ultimately, 39 studies were included in this systematic review.

Figure 2.

PRISMA flow diagram for the literature search and selection process



3.4. Summary of the Research

Overall trend

This review included 39 studies. Since the first publication in 2016, the field has shown a clear upward trend. Publications were limited and grew slowly between 2016 and 2022, but increased sharply from 2023 onward, with 20 studies published in 2024–2025, accounting for over half of the total. These patterns suggest that, although relatively recent, the field is rapidly gaining attention and has emerged as a growing research area.

Research designs

Quantitative (53.8%, $n = 21$) and mixed-methods (38.5%, $n = 15$) designs dominated the field, with only 7.7% ($n = 3$) adopting qualitative approaches. One-third of studies (33.3%) employed randomized controlled trials (RCTs), reflecting a focus on causal inference in this field.

Self-report questionnaires dominated data collection (79.5%, $N = 31$), followed by system-generated data (33.3%, $N = 13$). Interviews (28.2%), multi-informant assessments (e.g., teachers and parents; 25.6%), and classroom observations (17.9%) were also common, reflecting a diversified data landscape.

4. Results

4.1. Key characteristics of the studies and interventions

4.1.1. Characteristics of included studies

Research on technology-supported social-emotional learning interventions began in 2016 and has grown substantially in recent years. The studies were conducted across nearly 20 countries/regions, although the geographical distribution was uneven, with most research concentrated in North America, Europe, and Asia. Publications were distributed across 32 journals from multiple disciplines, such as education, psychology, educational technology, and computer science, highlighting the interdisciplinary nature of the field. Quantitative and mixed-methods approaches predominated, and one-third of the studies employed randomized controlled trials. Self-report measures were the most common data source, followed by system-logged data, interviews, external assessments, and classroom observations. Participants ranged from preschool to higher education, with a clear focus on K–12 settings, particularly middle and primary school students.

4.1.2. Intervention characteristics

The interventions primarily drew on SEL theories and pedagogical frameworks as theoretical foundations. Within SEL theories, the CASEL framework dominated ($n = 24$), while a few adopted the OECD Big Five personality framework ($n = 2$). 14 studies (35.9%) did not report a SEL theory. Among 27 studies reporting pedagogical frameworks, 21 distinct frameworks were identified, with cooperative, experiential, and gamified learning most common (each $n = 6$). 12 studies (30.8%) did not specify a pedagogical framework.

Nearly half of the studies ($n = 18$, 46.2%) integrated SEL interventions into regular curricula, covering multiple subjects, including language and humanities, STEM, and vocational courses. Early studies (2016–2020) were mostly standalone, but from 2021 onward, curriculum-embedded interventions increased rapidly, reflecting the emphasis on integrating interventions into regular instruction (see Figure 3).

4.2. Utilization of technology

4.2.1. Technological affordances

Five main categories of technology were employed in the interventions (see Table 1): web-based platforms, digital games and gamified systems, immersive and embodied technologies, mobile applications, and artificial intelligence. Web-based platforms were the most prevalent technology, used in 43.59% ($n = 17$) of interventions, typically via digital platforms such as customized web tools, learning management systems (LMS), and social media, enabling scalable support for student learning and interaction. Digital games and gamification accounted for 30.77% ($n = 12$), including gamified learning platforms, commercial video games, and serious games. Mobile applications were used in 23.08% ($n = 9$), offering high portability, interactivity, and integration into daily life. Immersive and embodied technologies (23.08%, $n = 9$) emphasized sensory engagement, encompassing VR, AR, coding robots, and wearable devices. AI technologies appeared in 5.13% ($n = 2$) of studies, incorporating large language models (LLM), natural language processing (NLP), and computer vision (CV).

Figure 3.

Year distribution of interventions embedded in courses

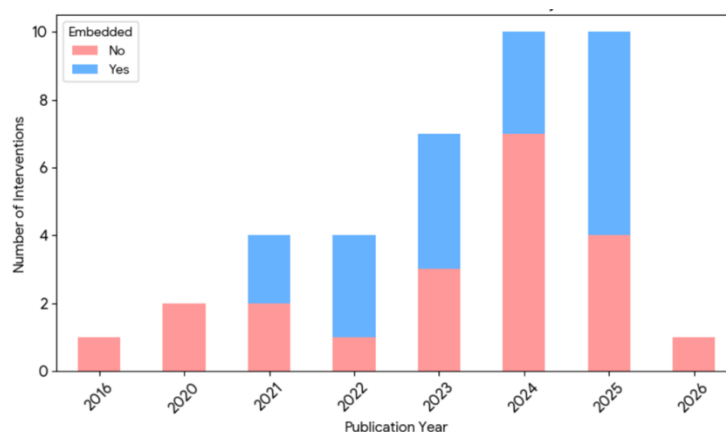


Table 1.
Overview of technology types used in interventions

Technology Categories	Specific Technology Types	Number of studies	Sample References
Web-based platforms	Customized web tools, learning management systems, and social media	17	Bowrin et al., 2025; Mujallid, 2024
Digital games and gamified systems	Serious games, commercial video games, and gamified platforms	12	Cejudo et al., 2020; Mittmann et al., 2024
Immersive and embodied technologies	Virtual reality (VR), augmented reality (AR), coding robots, and wearable devices	9	Yang (2024); Phillips et al., 2025
Mobile applications	Mobile apps and iPad applications	9	Nagpal et al., 2025; Snyder et al., 2025
Artificial intelligence	Large language models (LLMs), natural language processing (NLP), and computer vision (CV)	2	Su et al., 2024; Aure & Cuenca, 2024

Note: Some studies used hybrid technologies, resulting in multiple classifications.

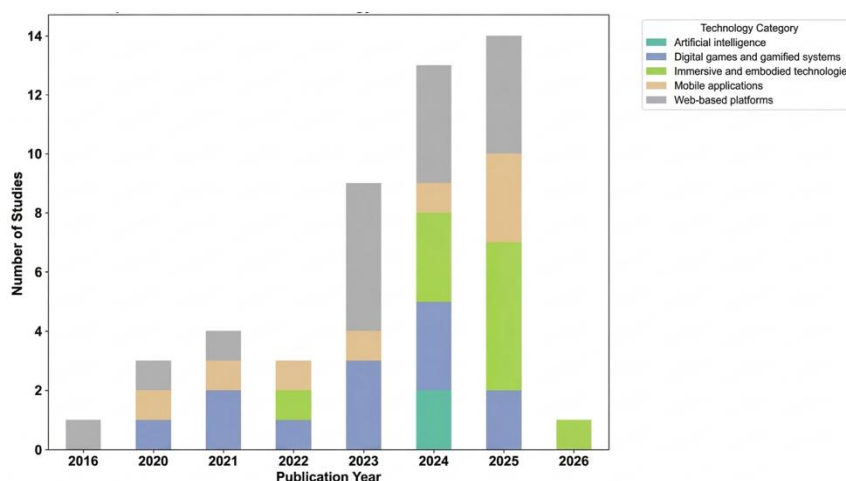
Figure 4 shows the temporal distribution of technologies in interventions. Web-based platforms, mobile applications, and digital/gamified systems have remained foundational, with stable, sustained use. Since 2024, a paradigm shift has emerged: immersive and embodied technologies (e.g., VR, AR, robots) increased sharply, peaking in 2025 ($n = 5$), while AI technologies also emerged in interventions in 2024. Overall, current SEL interventions reflect technological diversification rather than replacement, with traditional web- and game-based approaches still widely applied alongside rapidly expanding immersive, embodied, and intelligent technologies, which have become key research foci in the past two years.

4.2. Pedagogical affordances

Technology empowers SEL interventions through three key functions: environment construction, content delivery, and assessment optimization. Web platforms and mobile apps enable ubiquitous learning, while digital games and immersive technologies provide low-risk, high-fidelity practice spaces, and AI generates personalized scenarios. In content delivery, multimodal, multisensory, and adaptive experiences are supported, with web platforms integrating text, images, and audio–visual content, immersive technologies offering embodied experiences, and AI enabling real-time personalized content delivery. In assessment, technology enables continuous, immediate, and personalized feedback: system logs support stealth assessment, games and immersive environments provide real-time feedback, mobile apps allow self-tracking and visualization, and AI delivers adaptive feedback.

Figure 4.

Distribution of technology in SEL interventions



4.3. Social affordances

Technology affords social interaction in two ways: supporting real student interactions and virtual interactions. For real interactions, web platforms and mobile apps enable asynchronous and ubiquitous communication, digital games and immersive technologies embed collaboration in task-driven activities, and multimodal interactions (posting, liking, commenting) facilitate engagement. For virtual interactions, immersive and embodied technologies generate high-fidelity 3D environments and VR avatars, while AI creates personalized social scenarios, allowing students to interact with AI agents and practice skills.

4.4. Intervention outcomes and moderating factors

4.4.1. Intervention outcomes

Interventions targeted three main outcomes: social-emotional skills, cognitive and academic outcomes, and well-being and mental health. Social-emotional skills were the primary focus (37 studies), largely based on the CASEL framework, covering self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Cognitive and academic outcomes (9 studies) included improved academic performance, higher-order thinking, and digital literacy, while well-being and mental health (11 studies) showed enhanced subjective well-being and reduced anxiety and depression. Overall, all studies reported positive effects, indicating that technology-supported SEL interventions effectively enhance SEC while also benefiting academic development and mental health.

4.4.2. Potential moderating factors

Intervention effects were heterogeneous, moderated by individual, demographic, and environmental factors. For example, low-baseline SEC learners benefited most (compensatory effect), while high-baseline learners sometimes showed ceiling effects; anxiety also influenced outcomes, with low-to-moderate levels favoring gains. Demographic variables, including gender, study level, ethnicity, and socioeconomic status, affected effectiveness. Additionally, higher intervention dosage enhanced outcomes, technological novelty produced short-term gains, and classroom size, teacher–student ratio, and parental involvement further modulated effects.

5. Discussion

5.1. Intervention design and implementation

Some interventions incorporated technology without sufficient grounding in SEL theory, highlighting the need to anchor design in explicit theoretical frameworks before integrating technological tools (Zins & Elias, 2007). Curriculum integration has emerged as a feasible strategy for SEL, with recent studies increasingly integrating interventions across multiple courses, demonstrating potential for sustained implementation (Elias, 2019).

5.2. Technological categories and core functions

Five technology categories were identified, supporting SEL through environment construction, content delivery, and assessment optimization. Technology reshapes learning environments by combining psychological safety and contextual realism. In content delivery, technology supports multimodal, situational, and personalized delivery, but AI-driven personalized delivery requires adequate student AI literacy to critically evaluate the generated content. For assessment, technology enables stealth assessment, self-tracking, data visualization, and personalized feedback, aligning with technology-supported evaluation practices (McKown, 2019), while potential risks of a digital panopticon must be addressed to mitigate privacy concerns and monitoring anxiety.

5.3. Support for real and virtual social interaction

Technology facilitates both real and virtual social interactions, which are essential for social-emotional learning (Zins & Elias, 2007). Interactions with VR/AI partners allow safe, repeated practice, benefiting introverted or socially vulnerable students and enhancing SEL inclusiveness. Nevertheless, virtual interaction functions as a scaffold rather than a substitute for real interaction. It lacks real-world unpredictability and subtle cues (e.g., microexpressions, prosody),

which may constrain skill transfer. Future interventions should integrate virtual scaffolding with authentic interactions to optimize transfer to real-world contexts.

5.4. *Intervention effects and moderators*

Technology-enabled SEL interventions positively impact social-emotional skills, cognitive development, and mental health. Multilevel moderators shape effectiveness: individual differences necessitate tailored design; sustained, high-frequency interventions yield stronger effects; and environmental factors (class size, teacher-student ratio, family involvement) further influence outcomes. These findings highlight the importance of tailored, continuous, and systemic strategies beyond mere technological implementation (Zins & Elias, 2007).

5.5. *Research gaps and future research directions*

Current research faces multiple limitations: interventions rely on the CASEL framework, underutilize technology-generated data, lack longitudinal evidence, have limited AI-based personalized interventions, and systematic interventions remain scarce. Future research should incorporate other theoretical foundations, utilize system-logged data, investigate long-term outcomes, explore AI-enabled personalized interventions, and design comprehensive programs integrating school, family, and community.

6. Conclusion

This review examined 39 studies, aiming to inform the design and implementation of technology-enabled SEL interventions. Guided by the Usefulness framework, it identified the key characteristics of existing studies and, using the usefulness framework, examined the technological, pedagogical, and social affordances of the technologies employed. Overall, the reviewed studies showed positive outcomes in social-emotional competencies, academic performance, and mental health, while also highlighting the importance of technology ethics and digital literacy. Future research should further develop long-term, personalized, and systematically implemented interventions.

References

- Bailey, R., Stickle, L., Brion-Meisels, G., & Jones, S. M. (2019). Re-imagining social-emotional learning: Findings from a strategy-based approach. *Phi Delta Kappan*, 100(5), 53–58. <https://doi.org/10.1177/0031721719827549>
- CASEL. (2020). What is SEL? <https://casel.org/what-is-sel/>
- Cipriano, C., Strambler, M. J., Naples, L. H., Ha, C., Kirk, M., Wood, M., ... & Durlak, J. (2023). The state of evidence for social and emotional learning: A contemporary meta-analysis of universal school-based SEL interventions. *Child development*, 94(5), 1181–1204. <https://doi.org/10.1111/cdev.13968>
- Durlak, J. A., Mahoney, J. L., & Boyle, A. E. (2022). What we know, and what we need to find out about universal, school-based social and emotional learning programs for children and adolescents: A review of meta-analyses and directions for future research. *Psychological Bulletin*, 148(11–12), 765–782. <https://doi.org/10.1037/bul0000383>
- Elbertson, N. A., Jennings, P. A., & Brackett, M. A. (2025). The role of educators in school-based social and emotional learning. *Social and Emotional Learning: Research, Practice, and Policy*, 6, Article 100134. <https://doi.org/10.1016/j.sel.2025.100134>
- Elias, M. J. (2019). What if the doors of every schoolhouse opened to social-emotional learning tomorrow: Reflections on how to feasibly scale up high-quality SEL. *Educational Psychologist*, 54(3), 233–245.
- Fu, L., Zhang, Z., Yang, Y., & Curtis McMillen, J. (2024). Acceptability and preliminary impact of a school-based SEL program for rural children in China: A quasi-experimental study. *Children and Youth Services Review*, 160, Article 107579. <https://doi.org/10.1016/j.chilyouth.2024.107579>

- Guo, J., Tang, X., Marsh, H. W., Parker, P., Basarkod, G., Sahdra, B., Ranta, M., & Salmela-Aro, K. (2023). The roles of social-emotional skills in students' academic and life success: A multi-informant and multicohort perspective. *Journal of Personality and Social Psychology*, 124(5), 1079–1110. <https://doi.org/10.1037/pspp0000426>
- Kirschner, P., Strijbos, J. W., Kreijns, K., & Beers, P. J. (2004). Designing electronic collaborative learning environments. *Educational technology research and development*, 52(3), 47-66.
- Lynn, S., Carroll, A., Nankervis, K., & Antrobus, E. (2024). A systematic review of delivery modes in school-based adolescent social-emotional learning programs—Current perspectives and future directions. *Review of Education*, 12(3). <https://doi.org/10.1002/rev3.70019>
- McKown, C. (2019). Challenges and opportunities in the applied assessment of student social and emotional learning. *Educational Psychologist*, 54(3), 205. <https://doi.org/10.1080/00461520.2019.1614446>
- Murphy, K. M., Cook, A. L., & Fallon, L. M. (2021). Mixed reality simulations for social-emotional learning. *Phi Delta Kappan*, 102(6), 30–37. <https://doi.org/10.1177/0031721721998152>
- Norman, D. A. (1988). *The psychology of everyday things*. Basic books.
- Organisation for Economic Co-operation and Development, issuing body. (2015). *Skills for social progress : The power of social and emotional skills*. OECD. <https://doi.org/10.1787/9789264226159-en>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*, 372. <https://doi.org/10.1016/j.jclinepi.2021.03.001>
- Slovák, P., & Fitzpatrick, G. (2015). Teaching and developing social and emotional skills with technology. *ACM Transactions on Computer-Human Interaction*, 22(4), 1–34. <https://doi.org/10.1145/2744195>
- Wang, F., King, R. B., & Zeng, L. M. (2024). Cooperative school climates are positively linked with socio-emotional skills: A cross-national study. *British Journal of Educational Psychology*, 94(2), 622–641. <https://doi.org/10.1111/bjep.12670>
- Wang, F., Zeng, L. M., & King, R. B. (2025). Teacher support for basic needs is associated with socio-emotional skills: A self-determination theory perspective. *Social Psychology of Education*, 28(1), Article 76. <https://doi.org/10.1007/s11218-024-10009-1>
- Weissberg, R. P., Durlak, J. A., Domitrovich, C. E., & Gullotta, T. P. (2015). Social and emotional learning: Past, present, and future.
- You, Y., Zhang, S., Zhang, W., & Mao, Y. (2023). The impact of social and emotional learning on students' bullying behavior: Serial mediation of social and emotional competence and peer relationship. *Psychology in the Schools*, 60(10), 3694–3706. <https://doi.org/10.1002/pits.22947>
- Zins, J. E., & Elias, M. J. (2007). Social and emotional learning: Promoting the development of all students. *Journal of Educational and Psychological consultation*, 17(2-3), 233-255.