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Emotional Literacy in the Digital Era: Role of AI Tools for Social-emotional training in school populations

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ADMINISTRATIVE INFORMATION

Support - Proyecto ANID/Fondecyt Exploración 13220040.**Review Stage at time of this submission** - Data extraction.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2025100064**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 18 October 2025 and was last updated on 18 October 2025.

INTRODUCTION

Review question / Objective The aim of this review is to assess the incidence or Artificial Intelligence (AI) on the development of emotional competencies in school populations. The PRISMA-ScR framework will be used for the identification, selection and summarization of relevant empirical studies, in order to help understand how AI algorithms have an influence on the acquisition and improvement of emotional skills.

The focus of this review will be: identifying which emotional competencies have been trained through the use of AI algorithms; identifying which AI techniques are most frequently used to train emotional competencies; describing for which educational purposes AI-based applications were used (teacher support or independent work); determining age ranges and school contexts in which tools were implemented; analyzing reported effects on emotional competence development and teaching practices. Additionally, we will review

how effective such applications and platforms were.

The research questions guiding this review will be: Which emotional competencies are most frequently trained? (recognition, expression, regulation, empathy); Which AI techniques are most frequently used to train emotional competencies? What was the purpose of using AI algorithms in the training of emotional competencies? In which age range are emotional competence development apps and tools most frequently used? What is the purpose of using emotional education software? Is it used for teaching support or for independent work? What effects do AI tools have on the development of competencies? Do these apps work? How do AI tools support teaching practice?

Rationale Mental health issues are on the rise among children and adolescents. This has led the World Health Organization (WHO) to note that during the first year of the global lockdown, the worldwide prevalence of anxiety and depression

rose by 25%. Moreover, the WHO estimates that one in seven people between the ages of 10 and 19 suffer from mental health disorders (WHO, 2024). Regional assessments mirror such alarming figures: in the social-emotional module of the ERCE study in 2019, only 51% of Latin-American school students reported frequent empathic behavior, while fewer than 60% of them reported being able to self-regulate constantly. At a worldwide level, social-emotional skills are distributed unevenly according to age, gender and social-economical level (OECD, 2024).

While emotional education is an essential part of a comprehensive education (Bisquerra & Pérez, 2007; UNESCO, 2020), its implementation is currently facing several relevant challenges: (A) a lack of programs adapted to real contexts and (b) a lack of instruments validated to assess their impact.

In this context, Artificial Intelligence (AI) technologies are becoming a useful tool to customize social-emotional training and to overcome restrictions of on-site programs (Gómez-León, 2022). In recent years, AI-based tools have made use of facial recognition, voice analysis, deep learning, virtual reality and bio- and neurofeedback in order to monitor and promote emotional competencies (Flynn et al., 2020; Kim et al., 2021). For instance, affective computing platforms adjust their content in real time according to facial expression patterns of the user. Likewise, serious games are adaptive and modulate their difficulty according to detected emotional self-regulation. Samawi and Al-Assaf (2023) have shown that adaptive learning systems in a school context can be helpful in improving self-regulation and empathy. However, the authors also point out that there is a need to foster equity in order to avoid cultural gaps or biases.

In spite of such progress, the literature lacks rigorous comparative studies delving into the effectiveness of interventions mediated by AI, as opposed to conventional methodologies. Additionally, the impact of such technologies depending on the age of students, as well as their effect on teaching practice, is yet to be determined. In order to fill these gaps, we propose reviewing the state of the art and identifying emerging trends in literature, in order to provide recommendations for a balanced implementation of AI solutions in emotional education.

Condition being studied Emotional competencies are a set of knowledge, skills, abilities and attitudes necessary to recognize, express and regulate one's own emotions, as well as to be able to empathically respond to others' feelings

(Bisquerra, 2021). Mastering emotional competencies helps individuals to adapt to their environment and fosters learning processes, interpersonal relationships and problem resolution. In Bisquerra and Pérez-Escoda's (2017) description, these competencies fall between five interconnected dimensions:

emotional awareness; perceiving and labeling one's own and others' affective state
emotional regulation; adequately managing one's emotions
emotional autonomy; closely related to self-efficacy, self-esteem and informed decision-making during and affective state
social competence; includes empathy and relational skills

skills for life and well-being; skills related to resilience and the generation of positive emotional experiences (Bisquerra y Perez-Escoda, 2007).

Several AI tools have started being used in educational contexts with the aim of fostering emotional competence training. Some of these techniques include Facial Expression Recognition (FER), which uses convolutional neural networks in order to detect and interpret emotional expressions in real time (Flynn et al., 2020); voice analysis, which uses automatic learning to identify prosodic variations associated with affective states (Kim et al., 2021); and interactive simulations or serious games, which adapt learning scenarios according to the emotional responses of the users, thereby strengthening self-regulation and empathy in a fun way.

Integrating such technologies in teaching practice can help foster XXI century skills and adapts learning while addressing ethical and logistical challenges, such as managing sensitive data and a potential technological dependence. Such requirements should be an integral part of any intervention.

METHODS

Search strategy A systematic search for the 2019-2024 period will be carried out in the following databases: Web of Science, Scopus and PubMed. For each one of the databases, a database-adapted syntax chain search will be carried out. The WoS chain search will be as follows:

ALL = ("artificial intelligence" OR "machine learning" OR "deep learning" OR "AI Techniques" OR "AI") AND ALL = ("emotion*" OR "affective computing" OR "simulation" OR "empathy")
AND ALL = ("serious game" OR "technology" OR "virtual reality" OR "VR" OR "biofeedback" OR "neurofeedback" OR "avatar")
AND ALL = ("child*" OR preschool OR "teenager*" OR "adolescent*" OR "kid*")

This structure will be adapted for each search engine in order to maximize the range of relevant studies to be found.

The screening process will consist of two stages: Firstly, duplicate studies will be excluded by importing them into Rayyan. Additionally, duplicates will be excluded by comparing titles and looking for DOI matches.

Subsequently, four independent raters will review the articles' titles and abstracts based on pre-determined eligibility criteria. Disagreements will be resolved by a fifth reviewer.

Secondly, eligible articles will be thoroughly reviewed to confirm their inclusion. Exclusion criteria will be reported during this stage and a PRISMA flow diagram will be generated. This diagram will provide a record of the process starting from the initial identification of an article up to its final selection.

Participant or population The target population of the studies will be normotypic pre-school, primary or secondary students aged 4 to 17, who are enrolled in formal educational institutions. Studies carried out in clinics, homes or other non-school contexts will be excluded. Furthermore, studies including participants with clinical diagnoses or special educational needs will be excluded from the review.

Intervention In particular, research describing interventions including the explicit use of AI techniques (such as automated learning, deep neural networks, facial recognition, natural language analysis or bio- and/or neurofeedback systems) for the purposes of training or assessing at least one emotional competence (recognition, expression, regulation or empathy).

Comparator The review will include empirical studies with a quantitative or mixed design (provided they present quantifiable results). Findings will be reported as a descriptive, quantitative summary and a narrative summary. If the studies are methodologically comparable and of good quality, effect measures will be calculated. This will depend on whether the study designs are homogeneous and outcome data are available.

Study designs to be included Empirical quantitative or mixed-methods studies published between 2019–2024.

Eligibility criteria The eligibility criteria for the scoping review will adhere to the PRISMA-ScR framework, thereby ensuring pertinence and rigorosity of the compiled evidence. Only empirical studies using a quantitative or mixed

design (provided they present quantifiable results) will be included. Their date of publication will be between the years 2019 and 2024. This period was chosen as it should include the most recent contributions of AI applied to education.

Information sources To preserve the methodological quality of the review, only peer-reviewed articles written in English and published in journals indexed in Web of Science, Scopus or PubMed will be included. Theory reviews, editorials, comments, protocols without results and any other digital technology study that does not include AI will be excluded from the review. Duplicates will be purged and their latest or more comprehensive version will be reviewed in order to avoid biases.

Main outcome(s) The review will map and summarize empirical evidence on AI-mediated development of emotional competencies in school populations (ages 4–17). Primary outcomes are: (a) which emotional competencies are targeted (recognition, expression, regulation, empathy); (b) which AI techniques are used (e.g., facial expression recognition/vision, voice analysis, deep learning, natural-language analysis, bio-/neurofeedback, serious games, virtual reality/avatars); (c) age ranges/educational stages and school contexts; (d) educational purpose (teacher support vs. independent use); and (e) reported effects on students' emotional competence development and contributions to teaching practice. Findings will be organized in structured tables and descriptive summaries.

Data management The selection of studies will be carried out on Rayyan (<https://rayyan.ai/>). This platform is widely used due to its efficiency for systematic and scoping reviews. The sifting will be carried out by a team of five independent raters: two Education and three Artificial Intelligence post-graduate students. Each rater will work independently from each other. The same inclusion and exclusion criteria will be rigorously applied by all, and any discrepancy will be solved through discussion or, ultimately, by an independent judge. Data collection and summarization will follow a standardized protocol. During a first stage, a general descriptive table will be created. This table will include key information of each one of the included studies (authors, year of publication, country, educational context, sample size and age of participants). During later stages, more complex tables will be created for further information: AI technique included, emotional competencies studied, design of the intervention, assessed variables and main results.

Quality assessment / Risk of bias analysis Given this is a scoping review, risk of bias will not be appraised mandatorily with a formal tool; instead, it will be managed through a transparent workflow: multi-reviewer screening with calculation of Cohen's κ and discrepancy resolution by an independent adjudicator; duplicate removal via DOI/title matching and PRISMA flow-diagram documentation; and standardized data extraction with structured evidence tables.

Eligibility criteria (empirical quantitative or mixed-methods studies with extractable quantitative outcomes; 2019–2024; English; indexed in Web of Science, Scopus, or PubMed) also function as a quality screen. If quantitative pooling is considered, it will be conditional on methodological comparability and adequate study quality, as well as the availability of outcome data; otherwise, findings will be synthesized descriptively and narratively.

Strategy of data synthesis The focus of this scoping review is to provide a descriptive summary of the quantitative empirical evidence published between 2019 and 2024 concerning AI tools used for the development of emotional competencies in an educational context. Data will be organized according to two analysis levels:

1) Descriptive, quantitative summary. This will include a calculation of frequencies and central trend measurements for variables, such as: (a) emotional competence addressed (recognition, expression, regulation, empathy); (b) used AI technique; (c) age range of the population, (d) educational purpose of the intervention program, (e) reported results on emotional development; and (f) contributions to teaching practice.

2) Narrative summary. This will provide an account structured around the above categories with the aim of interpreting trends and emerging patterns. This narrative summary will put findings into context, as well as highlight gaps in literature. In the event that studies are found to be methodologically comparable and of good quality, measures of effect will be calculated. This will help the quantitative understanding of the phenomenon.

Subgroup analysis Subgroup analyses will be detailed as follows. Data will be organized by: (a) emotional competence (expression, recognition, regulation, and empathy); (b) AI technique (facial expression recognition/vision, speech and prosody analysis, natural language processing, deep learning, virtual reality/avatars, serious games); (c) age/educational stage; (d) educational purpose (use with teacher support vs. independent use); (e) reported effects on emotional development; and (f) contributions to teaching practice.

Sensitivity analysis The review will first perform quantitative pooling (effect size calculation) only when studies are methodologically comparable and of good quality; otherwise, the evidence will be synthesized descriptively and narratively. To ensure research rigor in study selection, five independent reviewers will review records; Cohen's κ coefficient will be calculated to assess inter-rater reliability; an independent adjudicator will resolve discrepancies; duplicates will be excluded via DOI/title matching; and a PRISMA flowchart will document the decisions. Additional safeguards stem from pre-specified eligibility criteria (empirical or mixed-methods quantitative methods with extractable quantitative outcomes; 2019–2024; English; indexed in Web of Science, Scopus, or PubMed) and standardized data collection with structured evidence tables. All procedures will follow PRISMA-ScR guidance to maximise transparency, reproducibility, and interpretability of findings..

Language restriction Only studies in English.

Country(ies) involved The systemac review is being carried out in chile involving authors from this country.

Other relevant information Table of included studies

A table displaying a structured overview of the collected evidence will be created. This table will present a summary of the main characteristics of each study. The following characteristics will be described for each one of the selected articles.

- Author(s) and year of publication
- Country of origin
- Size of the studied population
- Sample size
- Main findings

Keywords Artificial Intelligence, emotional competencies, social-emotional training, school populations, teaching practice.

Dissemination plans Results from this scoping review will be disseminated through multiple channels to reach a broad audience, including researchers, educators, and school stakeholders. The primary strategy is to prepare a full manuscript for submission to a peer-reviewed journal in education or educational technology, accompanied by a PRISMA flow diagram and structured evidence tables that transparently document study selection and synthesis outputs.

In addition to journal publication.

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