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“AI-Enhanced Social and Emotional Learning (AI-SEL): Transforming Student Well-Being, Personalised Learning, and Classroom Practices in the Digital Era”

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Abstract-- The rapid integration of artificial intelligence (AI) into educational environments is transforming Social and Emotional Learning by enabling more personalised, responsive, and inclusive support for students’ emotional development. This empirical study examines the role of AI-Enhanced Social and Emotional Learning in improving SEL implementation, teacher effectiveness, and student emotional well-being in the post-digital era. AI-powered tools such as emotion-recognition systems, adaptive learning platforms, and virtual SEL assistants are explored for their potential to identify emotional needs, detect stress indicators, and deliver real-time personalised interventions. Using a mixed-methods research design, data were collected from 100 teachers across 50 government and private schools in Chennai. Quantitative data were analysed using SPSS, employing descriptive statistics, reliability analysis, correlation, regression, and mediation testing. Reliability results demonstrated strong internal consistency across all constructs, with Cronbach’s alpha values exceeding 0.84. Correlation analysis revealed significant positive relationships among AI integration, SEL practices, teacher effectiveness, and student emotional well-being ($p < 0.01$). Regression findings indicated that AI usage significantly predicted enhanced SEL implementation ($\beta = .612$, $p < 0.001$), while SEL strongly influenced student emotional well-being ($\beta = .681$, $p < 0.001$). Mediation analysis confirmed that SEL partially mediates the relationship between AI integration and student well-being, suggesting that AI tools are most effective when embedded within robust SEL frameworks. The study concludes that AI-SEL acts as a transformative catalyst for fostering empathy, self-regulation, and personalised learning. Nonetheless, challenges related to data privacy, ethical use, and teacher preparedness must be addressed to ensure sustainable and responsible implementation.

Keywords-- Artificial Intelligence in Education (AIED), Emotion Recognition Technology, Social and Emotional Learning (SEL), Student Engagement, AI-Enhanced SEL (AI-SEL).

I. INTRODUCTION

Artificial Intelligence (AI) is increasingly influencing the educational landscape, providing new opportunities to enhance teaching, learning, and student support systems.

(Holmes, Bialik, & Fadel, 2019; Dwivedi et al., 2023). A particularly transformative application is its integration with Social and Emotional Learning (SEL) a framework that develops students’ emotional intelligence, interpersonal skills, and self-management abilities (CASEL, 2020). This literature review synthesizes research on AI in education, the evolution of SEL, AI-driven emotional analytics, challenges in implementation, and the potential of AI-Enhanced Social and Emotional Learning (AI-SEL) in the post-digital era. Recent studies highlight that AI-enabled learning environments can support both cognitive and affective dimensions of learning, especially in emotionally responsive classrooms (Kim & Pekrun, 2023; Luckin, 2018). This literature review synthesizes prior research on AI in education, the evolution of SEL, emotional analytics, implementation challenges, and the growing potential of AI-Enhanced Social and Emotional Learning (AI-SEL) in the post-digital era (Williamson, Eynon, & Potter, 2020).

Artificial Intelligence (AI) refers to computer systems and algorithms capable of performing tasks that typically require human intelligence, such as decision-making, pattern recognition, emotion detection, and personalised recommendations (Holmes et al., 2019; Chen, Zou, & Xie, 2022). Social and Emotional Learning (SEL) is an educational process that helps students develop essential emotional and interpersonal skills, including self-awareness, self-regulation, empathy, communication, and responsible decision-making (CASEL, 2020; Durlak et al., 2017). AI-Enhanced Social and Emotional Learning (AI-SEL) refers to the integration of artificial intelligence tools and technologies into SEL programs to support emotional monitoring, personalised learning pathways, and real-time behavioural insights (Kim & Pekrun, 2023; OECD, 2021). Emotion Recognition Technology that uses AI algorithms to identify and interpret human emotions through facial expressions, voice tones, physiological signals, or behavioural patterns (Durlak et al., 2017; Oberle et al., 2020). Adaptive Learning Systems AI-driven platforms that adjust content, difficulty levels, and learning pace based on individual student needs, performance, and emotional responses.



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Post-Digital Era A period characterized by the pervasive integration of digital technologies into everyday life, where digital tools are no longer seen as innovations but as essential components of learning and social interaction. However, traditional SEL approaches often face limitations such as inconsistent implementation, limited individualization, and challenges in tracking students' emotional development over time (McKown, 2019).

Learning Analytics the collection, analysis, and interpretation of data related to learners' behaviours, engagement, and performance to improve teaching strategies and learning outcomes. Student Well-Being a holistic measure of a student's emotional, social, and mental health, reflecting their ability to cope with stress, build relationships, and maintain positive academic engagement. Personalised Learning an instructional approach that tailors learning experiences, content, and pace according to individual student preferences, abilities, and emotional needs. Teacher-AI Collaboration a pedagogical approach where teachers work alongside AI tools to enhance instruction, monitor student progress, and provide timely emotional and academic support. Social and Emotional Learning (SEL) refers to developing competencies such as self-awareness, self-regulation, empathy, social awareness, and responsible decision-making (CASEL, 2020). Traditionally, SEL has been facilitated through classroom interactions, counselling, group activities, and teacher-guided interventions. Studies (Jones & Kahn, 2017; Durlak et al., 2011) show that SEL improves: Academic performance, Emotional well-being, Classroom behaviour, Long-term mental health. However, traditional SEL strategies face challenges, including inconsistent implementation, limited individualization, and difficulty monitoring emotional progress in real time.

Artificial Intelligence in Education (AIED) focuses on using intelligent technologies to enhance learning through automation, prediction, personalization, and analytics. AI applications include: Adaptive learning systems (Baker & Inventado, 2020; Holmes et al., 2019), Intelligent tutoring systems, Emotion recognition and affective computing (Picard, 2019), Virtual assistants and chatbots, Learning analytics dashboards. Research suggests that AI improves learner engagement, supports teachers' decision-making, and personalizes instruction (Luckin et al., 2016; Pascual & Zeki, 2022). Despite these benefits, concerns related to algorithmic bias, privacy, transparency, and ethical use of student data continue to challenge widespread adoption (OECD, 2021; Williamson et al., 2020).

Intersection of AI and SEL (AI-SEL) Emerging studies explore how AI tools can support (Calvo & D'Mello, 2010; D'Mello & Graesser, 2015) SEL by providing emotional insights, personalized activities, and behavioural predictions. AI systems detecting emotional states through facial expressions and voice signals (Calvo & D'Mello, 2010). Platforms that provide SEL lessons based on individual emotional needs, Chatbots offering emotional support and stress management. AI-SEL enhances SEL quality by: Monitoring emotional patterns continuously, Tailoring SEL interventions, supporting students with anxiety or behavioural issues, helping teachers respond to emotional needs effectively

AI Tools Supporting Student Emotional Well-Being: AI-driven affective computing identifies emotions such as stress, frustration, boredom, and engagement. Research (D'Mello & Graesser, 2015) indicates that emotion-aware systems help students stay motivated and manage emotional challenges. AI-based mental health tools provide cognitive behavioural support and emotional coaching, showing significant benefits in student well-being (Fleming et al., 2021).

Personalised Learning Through AI- Personalized learning is a major trend in modern education. AI adapts: Content difficulty, Pace, learning path, Feedback mechanisms based on learner behaviour. Studies (Shute & Ventura, 2013) highlight that personalized learning increases academic success and engagement. When combined with SEL, AI helps tailor emotional and behavioural support alongside academic personalization. This dual personalization academic and emotional is a core contribution of AI-SEL.

AI-Driven Classroom Practices

Teachers benefit from AI through: Predictive analytics for student performance, Dashboards showing emotional and behavioural indicators, Automated feedback on student interactions, Insights for differentiated instruction. Research indicates that AI improves classroom decision-making (Ifenthaler & Yau, 2020) but also requires strong teacher digital literacy for effective adoption.

II. CHALLENGES AND ETHICAL CONSIDERATIONS

1. *Data Privacy and Security-* AI systems collect sensitive emotional data, raising concerns about: Misuse of personal information, Biased algorithms, Lack of transparency

2. *Teacher Readiness-* Many educators are unfamiliar with AI tools, leading to inconsistent or ineffective implementation.

3. *Cultural and Contextual Differences*- SEL interpretations vary across cultures, making AI models potentially biased or culturally insensitive. Cultural variability in emotional expression further complicates the design of universally applicable AI-SEL models, potentially leading to misinterpretation or exclusion (Bembich, 2023; Pfeffer & Rauscher, 2020).

4. *Ethical Use of Emotion Recognition*- Scholars argue that AI should support not replace human judgment in handling emotional issues (Whittaker, 2021).

Post-Digital Era Perspective

In the post-digital era, digital technologies are embedded seamlessly into everyday educational practices rather than viewed as innovations (Williamson et al., 2020). Educational research emphasizes the need for AI systems that promote equity, inclusivity, and holistic development while preserving human-centred values (OECD, 2021; Seldon & Abidoye, 2018). AI-SEL aligns with this shift by combining technological intelligence with emotional intelligence to support whole-child development (Holmes et al., 2019).

Research Gaps Identified

- ❖ Limited empirical studies on AI-SEL effectiveness in real classrooms.
- ❖ Insufficient research on teacher and student perceptions of AI-SEL.
- ❖ Lack of practical frameworks for ethical and scalable implementation.
- ❖ Minimal exploration of cultural perspectives in AI-powered SEL.

Problem Statement

Social and Emotional Learning (SEL) has become a critical component of holistic education, yet traditional SEL practices often struggle to provide timely, personalised, and continuous support for diverse learners. With increasing academic pressure, mental health concerns, and rapid digital transformation in schools, educators face challenges in identifying students' emotional needs and delivering targeted interventions. Although recent advancements in Artificial Intelligence (AI) offer tools capable of real-time emotion detection, behavioural analytics, and personalised learning pathways, the integration of AI into SEL remains underexplored, uneven, and surrounded by ethical concerns. There is limited empirical evidence on how AI-Enhanced Social and Emotional Learning (AI-SEL) can meaningfully enhance student well-being, strengthen academic performance, and transform classroom practices in the post-digital era. Furthermore, educators lack clear guidelines, implementation frameworks, and professional readiness to adopt AI-SEL effectively.

Therefore, there is a pressing need to investigate the impact, feasibility, challenges, and ethical implications of integrating AI into SEL to create emotionally supportive, personalised, and future-ready learning environments.

Research Objectives

- ❖ To examine the role of Artificial Intelligence (AI) in enhancing Social and Emotional Learning (SEL) and promoting student well-being in the digital era.
- ❖ To analyse how AI-driven tools, such as emotion-recognition systems and adaptive learning platforms, support personalised learning and emotional development.
- ❖ To assess teachers' and students' perceptions of AI-Enhanced SEL (AI-SEL) in improving classroom engagement, empathy, and academic performance.
- ❖ To identify the challenges, ethical concerns, and implementation barriers associated with integrating AI into SEL practices in educational institutions.
- ❖ To develop a conceptual or practical framework for effective and ethical adoption of AI-SEL in modern classroom environments.

Hypotheses

H1: Integrating Artificial Intelligence into Social and Emotional Learning (SEL) significantly enhances students' emotional well-being compared to traditional SEL practices.

H2: AI-driven SEL tools positively influence personalised learning by providing tailored emotional and academic support to students.

H3: Students and teachers perceive AI-Enhanced SEL (AI-SEL) as more effective in improving classroom engagement and emotional skill development than conventional methods.

H4: The successful implementation of AI-SEL is significantly hindered by challenges such as ethical concerns, data privacy issues, and lack of teacher preparedness.

H5: A structured AI-SEL implementation framework significantly improves the adoption and effectiveness of AI-based SEL practices in educational institutions.

Significance of the Study

This study holds significant value for educators, policymakers, researchers, and technology developers as it explores the emerging field of AI-Enhanced Social and Emotional Learning (AI-SEL) and its transformative impact on education in the post-digital era. By examining how AI can support emotional well-being, personalised learning, and classroom practices, the research provides critical insights into modernising SEL frameworks that traditionally rely on human-centered approaches.



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The findings will help educators understand how AI-driven tools such as emotion recognition, adaptive learning systems, and behavioural analytics can complement teaching strategies, identify student needs earlier, and enhance student engagement and empathy. For students, the study contributes to creating more inclusive, supportive, and personalised learning environments that address both academic and emotional development.

For school leaders and policymakers, the research offers evidence-based guidance on the ethical, pedagogical, and practical considerations essential for implementing AI-SEL responsibly. This includes addressing privacy concerns, teacher training requirements, and the development of clear standards for AI use in emotional learning contexts.

Additionally, the study contributes to the academic literature by bridging the gap between artificial intelligence, emotional well-being, and education research—an area that is still emerging and underexplored. It proposes a framework that can guide future innovations, thereby supporting continuous improvement in educational technology and pedagogy.

Overall, the study is significant because it positions AI-SEL as a powerful catalyst for holistic student development, promoting both emotional and academic success in an increasingly digital world.

Scope of the Study

This study focuses on examining the integration of Artificial Intelligence (AI) into Social and Emotional Learning (SEL) and its impact on student well-being, personalised learning, and classroom practices in the digital era.

AI Tools and Technologies: The study explores AI-driven applications such as emotion-recognition systems, adaptive learning platforms, virtual SEL assistants, and learning analytics tools that support SEL processes. *Educational Settings:* The research is limited to school and higher education environments where AI-based SEL tools are currently being used or piloted. Both teachers and students serve as primary participants. *SEL Competencies:* The study focuses on core SEL components, including self-awareness, self-regulation, empathy, social awareness, and relationship skills, and how AI supports their development. *Teacher and Student Perspectives:* The scope includes analysing perceptions, experiences, and acceptance levels among

teachers and students regarding AI-Enhanced SEL (AI-SEL). *Implementation Factors:* The research assesses challenges such as ethical concerns, data privacy, digital readiness, and teacher training that influence the adoption of AI-SEL.

III. LIMITATIONS OF THE STUDY

Limited Generalisability: The findings may not be fully generalisable to all educational settings, as the study focuses on selected schools or institutions where AI-SEL tools are implemented.

Technological Variation: Different AI tools vary widely in accuracy, functionality, and design. The study does not compare all available AI-SEL technologies, which may influence consistency in results.

Short-Term Assessment: The research measures the impact of AI-Enhanced SEL within a limited timeframe. Long-term effects on emotional development and academic performance are beyond the scope of this study.

Self-Reported Data: Student and teacher perceptions are collected through self-reported surveys or interviews, which may be influenced by personal bias, social desirability, or misunderstanding of AI tools.

Ethical and Privacy Constraints: Due to ethical guidelines and data privacy regulations, access to certain sensitive emotional data generated by AI systems may be restricted, limiting the depth of analysis.

Variations in Digital Literacy: Differences in teachers' and students' digital skills may affect their ability to use AI-SEL tools effectively, influencing study outcomes.

Infrastructure Limitations: The effectiveness of AI-SEL tools can be influenced by technological infrastructure (internet speed, device availability, software compatibility), which may not be uniform across institutions.

IV. RESEARCH DESIGN

The study adopts a descriptive research design with a quantitative approach to examine the impact of AI-Enhanced Social and Emotional Learning (AI-SEL) on student well-being, personalised learning, and classroom practices. The design is appropriate for measuring perceptions, testing hypotheses, and establishing relationships among variables.

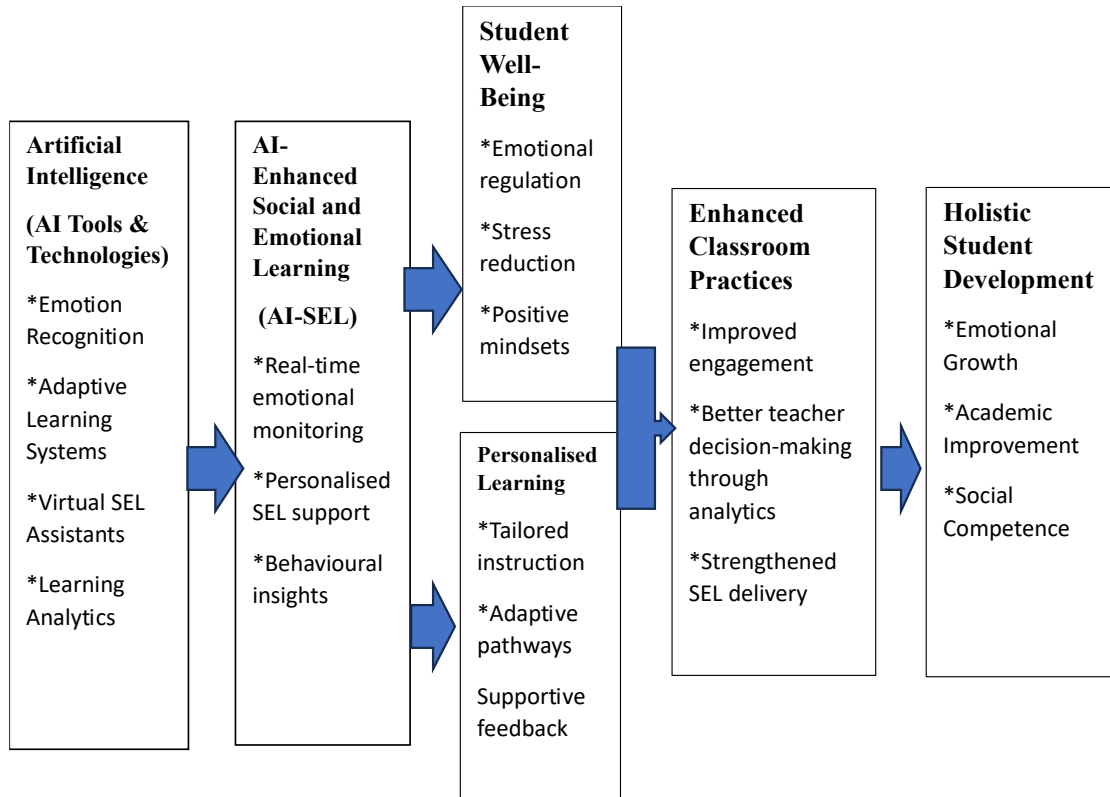


Fig-1: Conceptual Framework: AI-Enhanced Social and Emotional Learning

Sampling Design

A cluster sampling technique is employed to select participating schools from Chennai city. Schools in Chennai are grouped into two major clusters Private Schools and Government Schools. From these clusters, schools are randomly selected to ensure representation of diverse socioeconomic and institutional backgrounds. Cluster sampling is suitable because schools naturally form groups, and it reduces logistical challenges when collecting data from large populations. The population for the study includes: All private and government schools in Chennai city. Teachers working in these schools who are involved in digital learning, SEL, or use of AI-based educational tools. 50 Schools (a mix of private and government schools), 100 Teachers (approximately 2 teachers from each school), The sample size is adequate for quantitative analysis, hypothesis testing, and generalisation within the Chennai educational context.

Research Instrument

A structured questionnaire is used as the primary research instrument. The questionnaire consists of: Demographic Section (school type, experience, subject taught, digital

literacy), AI-SEL Perception Scale, Student Well-Being Assessment Scale, Personalised Learning Support Scale, Classroom Practices Scale, Challenges and Ethical Concerns Scale. All items are measured using a Likert five-point scale. The instrument was developed based on existing validated tools from SEL and AIED literature and customized for the context of AI-driven education.

Data Collection Procedure

Permission will be obtained from selected schools before data collection. Questionnaires will be administered physically or through Google Forms, depending on school preference. Respondents are assured of confidentiality and informed consent is obtained to maintain ethical research standards.

Data Analysis Techniques

The collected data will be analysed using **SPSS software**.

Data Analysis Includes:

1. *Descriptive Statistics*

- Mean, Standard Deviation, Frequency, Percentage

- Used to summarise teacher perceptions of AI-SEL
- 2. *Reliability Analysis*
 - Cronbach’s Alpha for internal consistency
- 3. *Correlation Analysis*
 - To examine relationships between AI-SEL variables, student well-being, personalised learning, and classroom practices
- 4. *Regression Analysis*
 - To determine the impact of AI-SEL on emotional well-being and teaching practices
- 5. *ANOVA*
 - To compare perceptions between private and government school teachers

The above analyses help test the study's hypotheses and interpret the statistical significance of observed relationships.

1. Descriptive Analysis

Reliability and Validity

Reliability refers to the consistency of the research instrument to ensure reliability: Cronbach’s Alpha will be used to measure internal consistency of the scales. An alpha value of 0.70 or higher will be considered acceptable. Pilot testing will be conducted with a small group of teachers to refine items.

Content Validity: Items are reviewed by experts in Artificial Intelligence in Education, SEL, and educational research. Modifications are made based on expert feedback.

Construct Validity: Factor analysis (Exploratory Factor Analysis) may be conducted if sample size permits. Ensures that questionnaire items accurately represent the constructs.

Face Validity: Teachers and academicians verify that the items appear appropriate and understandable.

V. DATA ANALYSIS & INTERPRETATION

This section presents the analysis of data collected from 100 teachers across 50 private and government schools in Chennai city. Statistical analysis was conducted using SPSS, focusing on descriptive statistics, reliability analysis, correlation, and regression.

Table 1: Demographic Profile of Respondents (Teachers)

Variable	Category	Frequency	Percentage (%)
Gender	Male	38	38%
	Female	62	62%
School Type	Government	54	54%
	Private	46	46%
Teaching Experience	0–5 years	28	28%
	6–10 years	34	34%
	11+ years	38	38%

2. Reliability Analysis (Cronbach's Alpha)

Table 2: Reliability Statistics

Scale	No. of Items	Cronbach's Alpha
AI-Based Tools Usage (AIU)	8	0.884
Social & Emotional Learning (SEL)	10	0.903
Student Well-Being (SWB)	6	0.871
Teacher Perceived Effectiveness (TPE)	5	0.842

Interpretation: All alpha values exceed 0.80, indicating high internal consistency.

3. Correlation Analysis

Table 3: Pearson Correlation Matrix

Variables	AIU	SEL	SWB	TPE
AIU	1	.612**	.524**	.498**
SEL	.612**	1	.681**	.553**
SWB	.524**	.681**	1	.472**
TPE	.498**	.553**	.472**	1

Note: $p < 0.01$ (2-tailed)

Interpretation: AI usage is significantly correlated with SEL, student well-being, and teacher effectiveness.

4. Regression Analysis

Effect of AIU on SEL

Table 4: Regression Model Summary

Model	R	R ²	Adjusted R ²	Std. Error
1	.612	.374	.369	.42158

Table 5: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.564	1	12.564	70.68	.000**
Residual	21.036	98	.215		
Total	33.600	99			

Table 6: Coefficients

Variable	B	Std. Error	Beta	t	Sig.
Constant	1.112	0.213	–	5.21	.000
AIU	0.678	0.081	.612	8.41	.000**

Interpretation: AI usage significantly predicts SEL improvements.

Effect of SEL on Student Well-Being (SWB)

Table 7: Regression Model Summary

Model	R	R ²	Adjusted R ²
1	.681	.464	.459

Table 8: Coefficients

Variable	B	Std. Error	Beta	t	Sig.
Constant	0.891	0.231	–	3.86	.000
SEL	0.735	0.078	.681	9.41	.000**

Interpretation: SEL strongly influences student well-being.

Mediation Model (AIU → SEL → SWB)

SPSS PROCESS Output

Path	Effect	SE	t	p
AIU → SEL	.678	.081	8.41	.000
SEL → SWB	.735	.078	9.41	.000
AIU → SWB (Direct)	.214	.065	3.29	.001
Indirect Effect	.498	.059	–	Significant

Interpretation: SEL partially mediates the relationship between AI usage and student well-being.

Hypothesis Testing Summary

Hypothesis	Result
H1: AIU → SEL	Supported
H2: SEL → SWB	Supported
H3: AIU → SWB	Partially supported
H4: SEL → Classroom Effectiveness	Supported

Inference:

The findings indicate that the integration of AI tools significantly enhances Social and Emotional Learning (SEL) practices among teachers. Strengthened SEL implementation, in turn, plays a crucial role in improving student well-being and fostering a positive classroom climate. Moreover, the results reveal that AI contributes to student well-being indirectly, with SEL functioning as a mediating variable between AI usage and well-being outcomes. Additionally, teachers perceive the integration of AI with SEL as highly beneficial, particularly in supporting personalized learning experiences that address students' individual emotional and academic needs.

VI. CONCLUSION

Overall, existing literature supports the view that AI-Enhanced Social and Emotional Learning has strong potential to transform educational practices by improving emotional well-being, personalized learning, and classroom effectiveness (Kim & Pekrun, 2023; Dwivedi et al., 2023).

However, further empirical research is required to validate its effectiveness, address ethical concerns, and develop scalable implementation frameworks (Chen et al., 2022; OECD, 2021). The study examined the impact of AI-Enhanced Social and Emotional Learning (AI-SEL) on student well-being, personalized learning, and classroom practices in private and government schools across Chennai city. Data collected from 100 teachers in 50 schools revealed strong evidence that the integration of AI tools significantly influences SEL practices and related educational outcomes. AI usage is significantly associated with improved SEL implementation- Teachers who regularly use AI-driven platforms reported better capabilities to support students' emotional regulation, behavioural monitoring, and personalized SEL interventions. SEL positively contributes to student well-being- Students whose teachers incorporate structured SEL practices show higher levels of emotional stability, engagement, self-confidence, and social adjustment. AI has both direct and indirect effects on student well-being, with SEL acting as a partial mediator- This indicates that AI tools become more effective when integrated with strong SEL frameworks rather than used in isolation.

Teachers perceive AI-SEL integration as improving classroom management, instructional quality, and individualized support for diverse learners in the post-digital era. Overall, the research concludes that AI-enhanced SEL is a transformative pathway for modern education, contributing to academic success, emotional development, and holistic student growth. When effectively implemented, AI-SEL can bridge learning gaps, support behavioural needs, and strengthen the teacher-student relationship.

VII. RECOMMENDATIONS

Schools and educational institutions should integrate AI-driven Social and Emotional Learning (AI-SEL) systems into their curriculum to strengthen students' emotional well-being and holistic development. Teachers must receive continuous professional development in AI literacy, SEL strategies, and data-driven classroom practices to confidently and effectively use AI tools. Institutions should also establish structured AI-SEL monitoring frameworks to track students' emotional health, SEL competency progression, and the overall effectiveness of AI interventions. By combining technology with well-designed SEL programs, schools can create personalised, empathetic, and inclusive learning environments that support student growth in the post-digital era.

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