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Social Intelligence Skills in Hybrid Learning Ecosystems: A Systematic Literature Review of University Students

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Abstract

Research on hybrid higher education frequently discusses social presence, belonging, socio-emotional competence, and collaboration, yet these constructs are often treated as interchangeable with social intelligence. This review therefore examines how social intelligence should be reconceptualised for hybrid learning ecosystems and identifies contextual conditions that enable or constrain its development. Following PRISMA 2020, 500 records published between 2022 and 2026 were identified from Google Scholar, ScienceDirect, MDPI, and ERIC; after deduplication, screening, and eligibility assessment, 28 peer-reviewed sources were retained. To reduce conceptual and evidential conflation, the revised synthesis differentiates primary empirical evidence from prior reviews and framework papers and uses thematic synthesis to map construct boundaries, multimodal social competencies, enabling and barrier conditions, and pedagogical implications. The literature consistently suggests that hybrid environments require an expanded social-competence repertoire: reading reduced or multimodal social cues, expressing empathy across mediated interaction, sustaining social presence and belonging, coordinating synchronous and asynchronous communication, and collaborating across unequal modes of participation. However, the available evidence does not by itself demonstrate temporal or causal transformation of social intelligence. Rather, it supports a reconceptualisation in which social intelligence functions as a higher-order relational capacity, whereas social presence and belonging operate as contextual-relational conditions and socio-emotional competence provides partially overlapping emotional-regulatory resources. Hybrid pedagogy should therefore design explicitly for equitable participation, relational support, cross-modal collaboration, and reflective socio-emotional practice, while future research should validate hybrid-context measures and test developmental change longitudinally.

Keywords: Social Intelligence; University Students; Hybrid Learning; Social Presence; Systematic Literature Review

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INTRODUCTION

Hybrid higher education has expanded the range of spaces, times, and media through which students learn and interact. In this review, a hybrid learning ecosystem refers to an interconnected learning environment in which physical presence, digital connectivity, synchronous participation, asynchronous activity, and academic support are deliberately coordinated rather than treated as separate delivery channels. Blended learning generally combines planned face-to-face and online components, synchronous hybrid learning enables simultaneous participation by in-room and remote students, and HyFlex adds structured student choice among participation modes (Raes, 2022; Istenič, 2024; Mahmud et al., 2026). These distinctions matter

because each configuration changes the availability of social cues, turn-taking opportunities, visibility, and access to peer and lecturer support. Social intelligence therefore requires conceptual precision. Foundational work defines it as a multidimensional capacity to process social information, understand social situations, and respond effectively in interpersonal contexts rather than as a synonym for sociability or emotional intelligence (Silvera et al., 2001; Weis & Süß, 2007). In contemporary higher education, this capacity is enacted through both physical and technology-mediated interaction. Accordingly, the central question is not whether technology simply 'transforms' a stable personal trait, but how hybrid environments alter the conditions under which students perceive social information, regulate relational responses, and coordinate action with others.

The practical problem is the unequal social experience that can emerge when students participate through different modes. Remote students may be less visible, receive fewer spontaneous interaction opportunities, or experience weaker affective engagement when course design does not deliberately support reciprocal communication and social presence (van der Stap et al., 2024; Wagner et al., 2024; Schermeier et al., 2025). Studies of online and hybrid teaching also report challenges involving engagement, feedback, technology integration, and equitable participation, even when flexibility and access improve (Gamage et al., 2022; Gudoniene et al., 2025; Yalan & Marcial, 2025). These conditions are consequential for social-intelligence development because repeated opportunities to notice social cues, interpret others' perspectives, negotiate roles, and repair misunderstandings are part of how social competence is enacted. Existing responses have included structured peer interaction, lecturer facilitation, group work, feedback routines, and intentional community-building, but the literature does not yet show that these interventions affect all students or participation modes in the same way. Synchronous versus asynchronous communication, class size, disciplinary norms, technology access, and whether participation is HyFlex or fixed-mode can alter the relational demands placed on students. Thus, the urgent issue is not technology use alone but the social ecology created by the learning design and the extent to which it provides comparable opportunities for recognition, participation, and relationship-building across modes.

Despite rapid growth in research on hybrid learning and student interaction, the conceptual gap remains substantial. Existing systematic reviews separately address blended-learning engagement (De Bruijn-Smolders & Prinsen, 2024), hybrid teaching and learning (Gudoniene et al., 2025), HyFlex engagement (Mahmud et al., 2026), online interaction and social presence (van der Stap et al., 2024), belonging in higher education (Dias-Broens et al., 2024; van Kessel et al., 2025), and social presence as a technology-mediated relational phenomenon (Kreijns et al., 2024). These literatures are highly relevant but do not establish that social presence, belonging, socio-emotional competence, soft skills, and social intelligence are equivalent constructs. The present manuscript previously used the term 'transformation' more strongly than the underlying evidence warranted. The revised novelty is therefore an integrative conceptual synthesis that specifies construct boundaries and identifies which hybrid-context competencies can defensibly be interpreted through a social-intelligence lens. Social presence is treated as a condition of perceived relational availability, belonging as a sense of acceptance and connection, socio-emotional competence as a partly overlapping set of emotional and interpersonal resources, and soft skills as a broader competency family. The contribution is not a claim of proven temporal change; it is a

framework for explaining how social intelligence may need to be enacted differently when social information and participation are distributed across physical and digital spaces.

Based on this gap, the review aims to (1) identify the social competencies most consistently required in hybrid higher-education environments; (2) clarify the relationship between social intelligence and adjacent constructs; (3) identify contextual factors that enable or constrain the enactment of these competencies; and (4) derive pedagogical implications without overstating causal evidence. Four analytical dimensions are used as sensitising concepts: social awareness, empathic response, multimodal interpersonal communication, and adaptive collaboration. Social awareness is anchored in social-information processing and social understanding; empathic response captures the interpretation of and appropriate response to others' affective states; multimodal interpersonal communication concerns the maintenance of relational clarity and responsiveness across face-to-face, synchronous online, and asynchronous channels; and adaptive collaboration concerns role negotiation and coordinated action under unequal participation conditions (Silvera et al., 2001; Weis & Süß, 2007; Collie et al., 2024; Wang et al., 2025a). These dimensions are not treated as pre-validated subscales of a new instrument. Instead, they provide a theory-informed starting framework that is refined through thematic synthesis. The review is limited to higher education and focuses on studies relevant to hybrid, blended, HyFlex, or closely related multimodal learning arrangements.

Review Questions

RQ1. Which social-intelligence-related competencies are most consistently described in hybrid, blended, and HyFlex higher-education contexts?

RQ2. How do social intelligence, social presence, belonging, socio-emotional competence, emotional intelligence, and soft skills overlap and differ conceptually?

RQ3. Which learning-design, relational, technological, and contextual conditions enable or constrain students' social competence across participation modes?

RQ4. What pedagogical implications and research priorities can be supported by the strength and type of the available evidence?

METHODS

Review Design and Evidence Architecture

This study is a systematic literature review reported in accordance with PRISMA 2020 (Page et al., 2021). The unit of analysis is the published source rather than the individual participant. Because the submitted corpus contains both primary empirical studies and secondary evidence syntheses, the revised review uses a stratified evidence architecture. Primary empirical studies are used to support empirical thematic claims. Systematic reviews, meta-analyses, and framework papers are used for conceptual comparison, triangulation, and identification of prior synthesis, but they are not counted as independent empirical confirmations when the same primary evidence may already be represented. This separation is intended to reduce double counting and to make the evidential basis of each claim explicit. The review period remains 2022-2026 to capture recent post-pandemic developments in hybrid higher education. A protocol statement, exact search dates, reviewer roles, and any

registration information must be reported consistently with the procedures actually used.

Information Sources and Search Strategy

The original search covered Google Scholar, ScienceDirect, MDPI, and ERIC and used combinations of the terms 'social intelligence skills', 'social skills', 'socio-emotional competence', 'social presence', 'sense of belonging', 'hybrid learning', 'blended learning', 'HyFlex', 'higher education', and 'university students'. A total of 500 records were reported: Google Scholar (n = 220), ScienceDirect/Elsevier (n = 140), MDPI (n = 85), and ERIC (n = 55). These numbers should be treated as exact counts, not approximations. Because ScienceDirect and MDPI are publisher platforms rather than comprehensive bibliographic databases, the revised manuscript should justify their use and state the coverage limitation explicitly. The final resubmission should report the verbatim query used in each platform, the fields searched, the date of each search, language restrictions, and any limits applied. If the original platform search histories are unavailable, the methodologically safest option is to rerun the search using a documented protocol and update the PRISMA counts and included-study set.

Eligibility Criteria

Articles were eligible when they were peer-reviewed journal publications focused on higher-education students and explicitly addressed hybrid, blended, HyFlex, or closely related multimodal learning together with at least one relevant social dimension, such as social interaction, social presence, belonging, interpersonal communication, collaboration, or socio-emotional competence. Publications were excluded when they focused on primary or secondary education, discussed technical platforms without a social-learning dimension, were editorials or opinion pieces, or lacked sufficient full text for eligibility assessment. The revised synthesis additionally distinguishes core hybrid evidence from contextual construct literature. Studies on social or socio-emotional competence that do not examine a hybrid, blended, or HyFlex context may inform theory and discussion but should not be presented as if they independently satisfy the core inclusion criteria. This distinction is essential to prevent the conceptual literature from inflating the empirical hybrid evidence base.

Screening and Study Selection

According to the submitted PRISMA counts, 118 duplicates were removed from the 500 identified records, leaving 382 records for title and abstract screening. Of these, 290 were excluded as not relevant, and 92 full-text articles were sought and assessed; no reports were reported as not retrieved. Sixty-four full-text articles were excluded because they were outside higher education (n = 18), did not address hybrid/blended/HyFlex learning (n = 16), lacked a relevant social or emotional dimension (n = 20), or were opinion/editorial/non-research articles (n = 10), leaving 28 sources in the reported corpus. For full reproducibility, the final manuscript must state how duplicates were identified, the software or manual procedure used, how many reviewers independently screened titles/abstracts and full texts, and how disagreements were resolved. Full-text exclusion reasons should be recorded at article level in the extraction log.

Data Extraction

Data were extracted to a structured review matrix containing citation details, country, participants, study design, learning modality, construct examined, measurement instrument, data-collection method, and key findings. The revised matrix should also include an evidence-type field (primary empirical study, systematic review/meta-analysis, or conceptual/framework paper), a core-hybrid-eligibility flag, and notes on whether a study contributes directly to a thematic claim or only to contextual interpretation. Coding should be conducted at the study level so that one source is counted once per relevant theme even when it contributes multiple observations. To make extraction reliable, the final manuscript should report who extracted the data, whether a subset or all records were double-checked, whether the form was piloted, and how discrepancies were resolved.

A formal quality appraisal is required before the revised synthesis can treat the included evidence as having interpretable strength. For a mixed set of qualitative, quantitative, and mixed-method primary studies, a design-appropriate tool such as the Mixed Methods Appraisal Tool (MMAT) can be used; if systematic reviews or meta-analyses remain in the evidence corpus, they should be appraised separately with a review-level tool such as AMSTAR 2. Appraisal should be conducted independently by at least two reviewers or verified by a second reviewer, with disagreements resolved through discussion. The synthesis should not convert appraisal scores into a single pseudo-precise quality number. Instead, the results should be used to qualify confidence in thematic claims, identify recurring methodological weaknesses, and distinguish stronger from weaker evidence.

Data Synthesis and Thematic Analysis

Thematic synthesis combines theory-informed and inductive coding. The four analytical dimensions introduced in the Introduction serve as sensitising concepts rather than predetermined outcomes. During first-cycle coding, the unit of coding is a study-level finding relevant to social interaction, social-cue interpretation, empathy, communication, collaboration, social presence, belonging, support, or participation equity. In second-cycle coding, related codes are grouped into descriptive themes and then into analytical themes that answer the review questions. The revised procedure also retains contradictory, null, or boundary-condition evidence rather than coding only supportive findings. Mode of participation (synchronous/asynchronous, hybrid/HyFlex/blended), discipline, class size, country, and technology access should be recorded when reported because these factors may explain variation. Secondary reviews are used for triangulation and conceptual comparison, not as duplicate votes for the same empirical pattern.

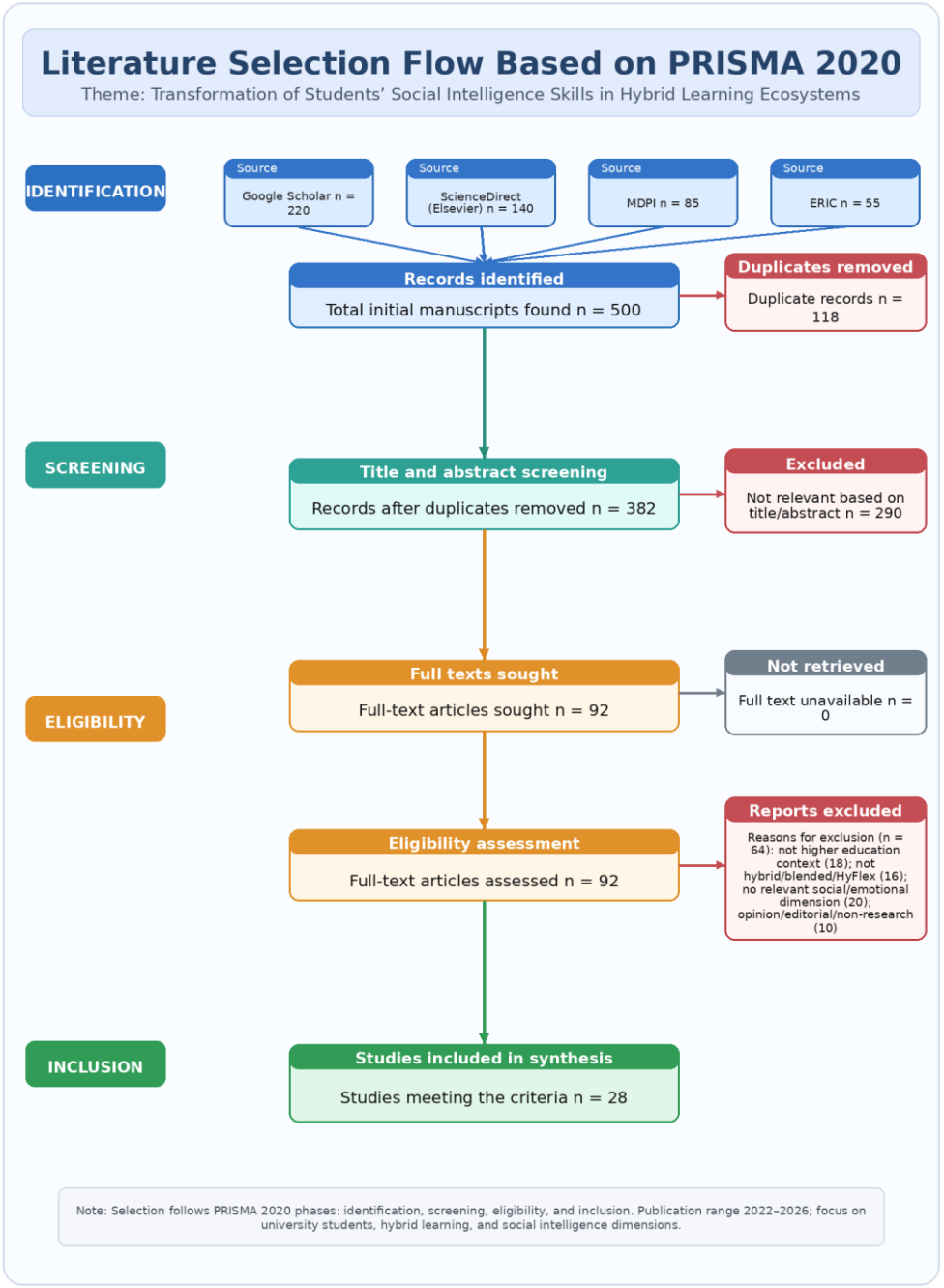

Figure 1. Study selection flow based on PRISMA 2020

RESULTS AND DISCUSSION

Evidence Base and Construct Boundaries

The revised interpretation begins by separating the focal construct from adjacent constructs before drawing thematic conclusions. Social intelligence is treated as the higher-order capacity to process social information, understand interpersonal situations, and select effective social responses. Social presence concerns whether other people are experienced as psychologically available or 'real' in mediated interaction; belonging concerns acceptance, connection, and recognition within a community; socio-emotional competence concerns a broader set of emotional, self-

regulatory, and interpersonal resources; and soft skills form an even broader family that may include communication, collaboration, adaptability, leadership, and empathy (Silvera et al., 2001; Kreijns et al., 2024; Dias-Broens et al., 2024; Collie et al., 2024; Pathan et al., 2025). These constructs overlap, but the review does not treat them as interchangeable. This boundary clarification changes the strength of the central claim: the evidence supports an expanded way of enacting social intelligence in hybrid contexts, not proof that a stable trait has been causally transformed by hybrid learning.

Table 1. Construct-boundary map for the revised social-intelligence framework

Construct	Working definition	Role in framework	Relation to social intelligence	Key references
Social intelligence	Capacity to process social information, understand social situations, and respond effectively.	Focal higher-order construct	Includes social awareness/information processing and socially effective response; enacted differently across modes.	Silvera et al. (2001); Weis & Süß (2007)
Social presence	Perception that others are psychologically available/real in mediated interaction.	Relational condition	Supports the enactment of social intelligence but is not itself social intelligence.	Kreijns et al. (2024); Ratan et al. (2022)
Belonging	Sense of acceptance, connection, and recognition in an academic community.	Relational outcome/context	Can be strengthened by effective interaction and can also support future participation.	Dias-Broens et al. (2024); van Kessel et al. (2025)
Socio-emotional competence	Emotional awareness, regulation, interpersonal and relationship-related capabilities.	Partly overlapping resource set	Provides empathy/regulation resources that support but do not exhaust social intelligence.	Collie et al. (2024); Wang et al. (2025a, 2025b)
Soft skills	Broad family of non-technical skills including communication, collaboration, adaptability, leadership, and empathy.	Umbrella competency family	Overlaps with social intelligence but is conceptually broader.	Pathan et al. (2025); Sambudi et al. (2023)

1. Reconceptualising Social Intelligence for Multimodal Interaction

The first theme indicates that hybrid environments increase the range of interactional conditions under which social competence must be enacted. Students may need to interpret reduced non-verbal cues, manage response timing in synchronous platforms, select communication channels, maintain digital interaction norms, and coordinate with peers who do not share the same physical setting. Ratan et al. (2022) show that social presence and active learning are associated with perceived course gains across synchronous and asynchronous online classes, while Merlin and Soubramanian (2024) and Vázquez et al. (2025) link interpersonal competence with intrapersonal awareness, motivation, and emotional intelligence. These findings do not demonstrate longitudinal transformation of social intelligence. Rather, they suggest that existing social-information and interpersonal capacities are

recruited under a wider set of media conditions. The mechanism proposed by the review is cue redistribution: when visual, vocal, spatial, or informal cues are reduced or shifted across media, students must rely more deliberately on verbal clarification, responsiveness, perspective taking, and channel selection.

This interpretation is consistent with social-intelligence theory that treats the construct as multidimensional and distinguishable from academic intelligence (Silvera et al., 2001; Weis & Süß, 2007), but it also reveals an important boundary. Not every communication or collaboration skill should automatically be relabelled as social intelligence. For example, soft-skills research includes creativity, time management, and problem solving alongside interpersonal competencies (Pathan et al., 2025), whereas the present framework retains only competencies that involve perceiving, interpreting, and responding to social information. The evidence is therefore best described as reconceptualisation or contextual expansion. Direct evidence of developmental change would require repeated measurement, comparison across learning configurations, or longitudinal designs that isolate change in social-intelligence indicators over time.

2. Social Presence and Belonging as Relational Conditions

The second theme concerns the relational conditions under which students can enact social competence. Across hybrid and blended contexts, students are more likely to participate meaningfully when they feel visible, acknowledged, and able to reach others. van der Stap et al. (2024) identify social presence and convergence as important for online interaction in blended learning, while Raes (2022) shows that the experience of presence can differ even when conceptual learning outcomes are not sharply separated by participation mode. Wheeler et al. (2026) likewise describe social connection in a hybrid university environment through socialising, support, and belonging. These findings support a mechanism of relational availability: students cannot effectively read or respond to social situations when interaction channels do not provide sufficient access to peers, lecturers, or feedback.

Belonging should nevertheless remain conceptually distinct from social intelligence. Reviews define belonging in terms of acceptance, connection, and recognition within higher education and associate it with academic and well-being outcomes (Dias-Broens et al., 2024; van Kessel et al., 2025). In the revised framework, belonging is therefore treated as a relational outcome and contextual resource rather than as a subdimension of social intelligence. The same student may possess strong interpersonal skills yet experience weak belonging in a course that systematically privileges in-room participation. Conversely, strong community design may help students with different baseline social competencies to participate. This distinction prevents a common inferential error: attributing relational outcomes entirely to individual student ability when they may partly reflect course design and participation structure.

3. Enabling and Inhibiting Conditions

The third theme shows that social competence in hybrid learning is shaped by learning design, lecturer support, climate, and technology quality rather than by technology exposure alone. Gamage et al. (2022) report that effective online and hybrid engagement depends on intentional adjustment of teaching and interaction practices. Gudoniene et al. (2025) identify recurring challenges involving communication, time management, assessment, and technology integration, and

Yalan and Marcial (2025) show that stakeholder evaluations of hybrid-learning quality can differ across institutional roles. Evidence from socio-emotional research further indicates that learning climate, teacher support, psychological resilience, and emotion regulation are associated with students' socio-emotional competence (Fang et al., 2025; Wang et al., 2025a, 2025b). Together, these findings suggest that the opportunity structure of the learning environment matters for how social capacities are expressed and practised.

Important boundary conditions qualify this pattern. Synchronous hybrid classrooms create immediate turn-taking and visibility challenges, whereas asynchronous environments shift demands toward response timing, written interpretation, and sustained relational continuity. HyFlex adds a further challenge because students may change participation mode, requiring group norms that remain stable across configurations. Class size, disciplinary norms, national context, bandwidth, device access, and lecturer competence can also moderate the quality of social interaction. Schermeier et al. (2025) show that hybrid small-group collaboration can produce socio-affective experiences that differ from fully face-to-face or fully remote collaboration, while Wagner et al. (2024) demonstrate the importance of learning activities and social presence in synchronous hybrid classrooms. Therefore, the review does not support a single universal 'hybrid effect'; it supports context-sensitive design principles.

4. Pedagogical Implications and Evidence-Calibrated Claims

The fourth theme is pedagogical. Meta-analytic and review evidence indicates that blended learning can support performance, engagement, and motivation when design quality is strong (Cao, 2023; De Bruijn-Smolders & Prinsen, 2024; Han, 2025), but the present review narrows this implication to social learning. Activities should create comparable opportunities for students to initiate interaction, receive responses, negotiate roles, and contribute across modes. Practical strategies include cross-modal group tasks, structured peer mentoring, rotating group roles, explicit communication norms, reflective debriefing on collaboration, and assessment criteria that recognise relational contribution rather than attendance alone. Complementary higher-education studies also show that structured project work can support communication and teamwork skills (Susetyarini et al., 2022; Sambudi et al., 2023), although these studies should be treated as contextual support rather than automatically counted as part of the hybrid evidence set unless they satisfy the review protocol.

The theoretical contribution of the revised framework is therefore a separation of construct, condition, and outcome. Social intelligence is the focal capacity; socio-emotional competence provides overlapping emotional-regulatory resources; social presence describes perceived relational availability; belonging describes connection to the academic community; and learning design structures the opportunities through which these processes can operate. This formulation is more defensible than a causal pathway in which hybrid learning directly produces a 'transformation' of social intelligence. It also generates testable future propositions: for example, whether equitable cross-modal participation predicts growth in social-awareness or adaptive-collaboration measures, whether social presence mediates such relationships, and whether effects differ by synchronous versus asynchronous participation. Such propositions require longitudinal or comparative research rather than narrative inference.

Table 2. Evidence-to-theme matrix distinguishing empirical support from contextual synthesis

Theme	Primary empirical examples	Secondary/contextual support	Interpretive boundary
Multimodal social competence	Ratan et al. (2022); Merlin & Soubramanian (2024); Vázquez et al. (2025)	Kreijns et al. (2024); Chang et al. (2026); Pathan et al. (2025)	Supports contextual expansion, not proven temporal transformation.
Social presence and belonging	Raes (2022); Wheeler et al. (2026); Wagner et al. (2024)	van der Stap et al. (2024); Dias-Broens et al. (2024); van Kessel et al. (2025)	Presence/belonging are relational conditions or outcomes, not synonyms for social intelligence.
Enabling/inhibiting conditions	Gamage et al. (2022); Fang et al. (2025); Xiong & Zhou (2025); Yalan & Marcial (2025); Wang et al. (2025a, 2025b)	Gudoniene et al. (2025)	Associations are context-dependent; causal claims require stronger designs.
Pedagogical implications	Han (2025); Peña-Acuña et al. (2025); Yan et al. (2025); Susetyarini et al. (2022); Sambudi et al. (2023)	Cao (2023); De Bruijn-Smolders & Prinsen (2024); Mahmud et al. (2026)	Use design principles as evidence-informed recommendations, not universal effects.

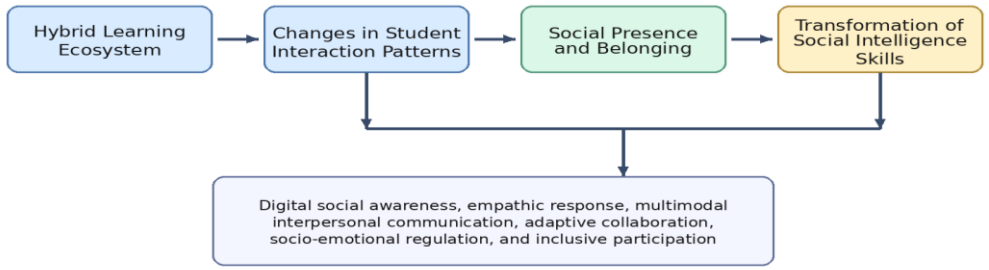

Figure 2. Conceptual model of the transformation of university students' social intelligence skills in hybrid learning ecosystems

Limitations

This review has several limitations that constrain the strength of its conclusions. First, the search relied on Google Scholar, ERIC, and publisher platforms rather than a broader set of comprehensive bibliographic databases, which may have introduced coverage bias. Second, the original corpus mixes primary empirical studies with systematic reviews, meta-analyses, and conceptual papers; although the revised framework separates their roles, an article-level overlap audit and quality appraisal are still required for a fully defensible synthesis. Third, the literature uses heterogeneous constructs and instruments, so social intelligence, social presence, belonging, and socio-emotional competence cannot be assumed to measure the same phenomenon. Fourth, the review may be affected by publication and language bias, depending on the restrictions actually used in the original search. Fifth, the available

studies span different learning configurations, disciplines, countries, class sizes, and technology conditions, limiting generalisation. Finally, much of the evidence is cross-sectional, correlational, qualitative, or review-based; therefore, the synthesis cannot establish that hybrid learning causes social-intelligence development or transformation over time.

CONCLUSION

The reviewed literature suggests that hybrid higher-education environments require an expanded and more context-sensitive enactment of social competence. Students must interpret social information across reduced or redistributed cues, maintain responsive communication across synchronous and asynchronous channels, coordinate collaboration across participation modes, and build relationships in settings where social presence and belonging are not automatically guaranteed. The evidence is more defensibly interpreted as a reconceptualisation of how social intelligence is enacted than as proof of its causal or temporal transformation. The review's theoretical contribution is an integrative framework that distinguishes social intelligence as the focal relational capacity from social presence and belonging as contextual-relational conditions, and from socio-emotional competence and soft skills as overlapping but broader competency domains. Pedagogically, the synthesis supports intentional design for equitable participation, relational support, cross-modal collaboration, and reflective socio-emotional practice. These conclusions should remain qualified by the heterogeneity and methodological limitations of the evidence base.

RECOMMENDATIONS

Future research should validate measures of social intelligence specifically for hybrid contexts and test whether social awareness, empathic response, multimodal interpersonal communication, and adaptive collaboration change across time and participation modes. Longitudinal, comparative, and intervention designs are needed to distinguish developmental change from context-specific performance. Studies should compare synchronous hybrid, asynchronous blended, and HyFlex configurations and report boundary conditions such as discipline, class size, country, technology access, and mode-switching patterns. Future systematic reviews should use comprehensive database coverage, pre-specified protocols, dual screening and extraction procedures, formal quality appraisal, explicit management of overlap between primary studies and prior reviews, and transparent evidence-to-theme mapping. Higher-education institutions should test learning designs that intentionally support social presence, belonging, peer support, cross-modal collaboration, and relational feedback while monitoring whether online and in-room students receive comparable opportunities to participate.

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