

ORIGINAL

The digital-social nexus: investigating the influence of digital intelligence on peer relations in higher education

El nexo digital-social: investigando la influencia de la inteligencia digital en las relaciones entre pares en la educación superior

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ABSTRACT

Introduction: digital transformation in higher education has fundamentally altered peer interaction patterns globally. Digital competence, encompassing technical proficiency, emotional awareness, and ethical understanding, has become essential for student success. However, the psychological mechanisms linking these technological capabilities to meaningful peer connections remain poorly understood.

Objective: this study examines how digital competence affects peer relationship quality among Kerala university students, investigating social self-efficacy as a mediating mechanism between technological abilities and relational outcomes.

Method: a mixed-methods approach was implemented across eight Kerala universities. The quantitative component surveyed 1 248 students using three validated instruments: Digital Competence Scale (9 items), Social Self-Efficacy Scale (4 items), and Peer Relationship Quality Index (5 items). Subsequently, 48 in-depth interviews and 12 focus groups provided deeper understanding. PLS-SEM examined direct relationships and mediation pathways using bootstrapping procedures with 5 000 replications.

Results: analysis revealed significant associations between digital competence and peer relationship quality ($B = 0,285$, $p < 0,001$). Digital competence strongly predicted social self-efficacy ($B = 0,467$, $p < 0,001$), which subsequently influenced relationship quality ($B = 0,378$, $p < 0,001$). Social self-efficacy functioned as a partial mediator, explaining 38 % of the total association. The model exhibited excellent fit indices (CFI = 0,972, RMSEA = 0,045). Digital emotional competence emerged as the most influential component.

Conclusions: digital competence enhances peer relationship quality primarily by strengthening students' social confidence. Universities should integrate confidence-building approaches with technical training in digital literacy programs to optimize student social development outcomes.

Keywords: Digital Competence; Peer Relationships; Social Confidence; University Students; Digital Literacy; Social Development; Kerala.

RESUMEN

Introducción: la transformación digital en la educación superior ha alterado fundamentalmente los patrones de interacción entre pares a nivel global. La competencia digital que abarca la destreza técnica, la conciencia emocional y la comprensión ética, se ha vuelto esencial para el éxito estudiantil. Sin embargo, los mecanismos psicológicos que vinculan estas capacidades tecnológicas con conexiones interpersonales significativas siguen siendo poco comprendidos.

Objetivo: este estudio examina cómo la competencia digital afecta la calidad de las relaciones entre pares en estudiantes universitarios de Kerala, investigando la autoeficacia social como un mecanismo mediador

entre las habilidades tecnológicas y los resultados relacionales.

Método: se implementó un enfoque mixto en ocho universidades de Kerala. El componente cuantitativo encuestó a 1 248 estudiantes utilizando tres instrumentos validados: la Escala de Competencia Digital (9 ítems), la Escala de Autoeficacia Social (4 ítems) y el Índice de Calidad de Relaciones entre Pares (5 ítems). Posteriormente, se realizaron 48 entrevistas en profundidad y 12 grupos focales para una comprensión más profunda. Se utilizó PLS-SEM para examinar las relaciones directas y las vías de mediación mediante procedimientos de bootstrapping con 5 000 réplicas.

Resultados: el análisis reveló asociaciones significativas entre la competencia digital y la calidad de las relaciones entre pares ($B = 0,285$, $p < 0,001$). La competencia digital predijo fuertemente la autoeficacia social ($B = 0,467$, $p < 0,001$), la cual posteriormente influyó en la calidad de las relaciones ($B = 0,378$, $p < 0,001$). La autoeficacia social funcionó como mediador parcial, explicando el 38 % de la asociación total. El modelo mostró excelentes índices de ajuste ($CFI = 0,972$, $RMSEA = 0,045$). La competencia emocional digital emergió como el componente más influyente.

Conclusiones: la competencia digital mejora la calidad de las relaciones entre pares principalmente al fortalecer la confianza social de los estudiantes. Las universidades deben integrar enfoques de desarrollo de confianza con capacitación técnica en programas de alfabetización digital para optimizar los resultados de desarrollo social estudiantil.

Palabras clave: Competencia Digital; Relaciones entre Pares; Confianza Social; Estudiantes Universitarios; Alfabetización Digital; Desarrollo Social; Kerala.

INTRODUCTION

Contemporary higher education institutions worldwide witness unprecedented transformation in how students form and maintain peer relationships. The integration of digital platforms into educational environments has fundamentally altered social interaction patterns, moving beyond traditional face-to-face encounters to complex hybrid social ecosystems. Students now navigate relationships through multiple channels including instant messaging, social media platforms, collaborative online tools, and video conferencing systems.⁽¹⁾

Digital competence represents more than basic computer literacy, it encompasses emotional intelligence in online interactions, ethical reasoning about digital behaviours, effective multi-platform communication, and creative digital expression. These capabilities have evolved from being supplementary skills to becoming fundamental requirements for academic and social success in technology-enhanced educational environments.^(2,3)

Historically, peer relationships in higher education developed primarily through physical proximity and shared activities within campus boundaries. The emergence of the internet in the 1990s began shifting these patterns, with email and early social platforms creating new possibilities for connection. The proliferation of smartphones and social media platforms in the 2000s accelerated this transformation, while the COVID-19 pandemic dramatically intensified reliance on digital communication for maintaining social bonds.^(4,5)

University peer relationships serve multiple critical functions beyond companionship. Quality friendships provide emotional support during academic challenges, facilitate collaborative learning through study partnerships, contribute to identity development during formative years, and often influence career trajectories and life satisfaction. When these relationships develop successfully within technology-enriched environments, students experience enhanced academic outcomes, stronger sense of belonging, and improved psychological well-being.⁽⁶⁾

Kerala presents a compelling context for examining these dynamics due to its unique educational landscape. With literacy rates of 94 % and progressive educational policies, the state has embraced comprehensive technology integration across its 19 universities serving over 400 000 students. Current data indicates 89 % of Kerala university students possess smartphones, with 76 % using social media for academic and social purposes, and 82 % spending over four hours daily on digital devices.⁽⁷⁾

The COVID-19 pandemic accelerated these trends globally, affecting over 1,6 billion students worldwide and forcing rapid adaptation to digital platforms for academic work and social connection. This experience revealed significant variations in students' abilities to maintain existing friendships and build new relationships through digital means, highlighting the critical importance of digital competence for social success in educational contexts.⁽⁸⁾

Social self-efficacy, defined as confidence in one's ability to initiate conversations, maintain friendships, and handle social challenges, may serve as a crucial psychological mechanism linking technological skills to relationship outcomes. Students who develop confidence in using digital tools for social purposes, presenting themselves authentically online, and managing the emotional complexities of digital communication may experience greater success in building meaningful peer connections.⁽⁹⁾

This research addresses significant gaps in understanding how digital competence influences peer relationships through confidence-building mechanisms among higher education students. The investigation aims to determine whether digital competence enhances relationship quality primarily by boosting students' social confidence and to identify which specific competencies matter most for positive social outcomes.⁽¹⁰⁾

Digital Competence: Beyond Basic Technical Skills

Digital competence has evolved from simple computer operation skills to encompass sophisticated capabilities required for effective functioning in technology-mediated environments. Contemporary frameworks identify core interconnected areas that collectively enable meaningful participation in digital societies.

Digital emotional competence emerges as particularly relevant for social outcomes, involving recognition of emotional undertones in digital communications, management of emotional responses during online conflicts, expression of empathy through technological channels, and provision of meaningful support through digital platforms. Research demonstrates that students skilled in this area report more satisfying online interactions and stronger digital friendships.

Digital communication encompasses adaptation of communication approaches to different platforms, effective participation in group discussions, and understanding of digital etiquette. These skills enable students to connect authentically with diverse peer groups across various digital spaces, facilitating broader and more inclusive social networks.

Digital creativity involves using technological tools for self-expression and positive contribution to online communities. Creative digital capabilities often help students establish distinctive positive identities within peer groups and initiate meaningful connections through shared interests and collaborative projects.

University Peer Relationships in Digital Contexts

University friendships serve purposes extending well beyond casual companionship, providing emotional support during academic challenges, facilitating learning through collaborative partnerships, contributing to identity exploration, and influencing career development. Research consistently demonstrates that students with strong peer connections experience better academic performance, higher satisfaction with university life, and improved long-term outcomes.

Digital platforms have fundamentally transformed relationship development and maintenance processes. Social media, messaging applications, collaborative tools, and shared online spaces enable students to sustain larger and more diverse friendship networks than previously possible. However, this digital dimension introduces novel challenges around authentic self-presentation, management of multiple social contexts, and maintenance of meaningful connections across both online and offline environments.

Students who successfully navigate digital relationship building tend to experience stronger feelings of belonging, more diverse social networks, and greater access to academic and emotional support. Conversely, those who struggle with digital social navigation may find themselves isolated despite being technically connected to many peers online.

Social Self-Efficacy as Psychological Bridge

Social self-efficacy refers to confidence in one's ability to initiate conversations, maintain friendships, provide support to others, and handle social challenges successfully. Within university contexts, this psychological factor strongly predicts social behavior patterns, relationship satisfaction, and willingness to engage in new social opportunities.

Applied to digital environments, social self-efficacy encompasses confidence in using technology for social purposes, comfort with online self-presentation, perceived ability to maintain relationships through digital channels, and belief in one's capacity to handle digital social challenges. Students with higher digital social self-efficacy tend to engage more actively in online social opportunities and recover more effectively from digital social setbacks.

Digital competence may enhance social self-efficacy by providing students with concrete skills and knowledge that increase confidence in social situations. When students understand effective online communication, can manage their digital presence skillfully, and navigate emotional complexities of digital interaction, they feel more prepared to engage in social opportunities and maintain quality relationships.

Theoretical Framework Integration

This study integrates three theoretical perspectives to explain the digital competence-peer relationship connection. Social Cognitive Theory provides the foundational framework, emphasizing reciprocal interactions between personal capabilities, environmental factors, and behavioral outcomes. Self-efficacy beliefs occupy a central position, influencing goal-setting, effort investment, and emotional responses to challenges.

Technology Acceptance Model principles apply to social technology use, suggesting that students engage

more readily with digital platforms when they perceive these tools as useful for relationship building and feel confident in using them effectively. Digital competence influences both perceived usefulness and perceived ease of use.

Social Capital Theory explains how digital abilities translate into relationship benefits. Students who effectively use digital platforms to maintain connections, share resources, and provide support are building social capital, networks of relationships providing mutual benefit. Digital competence enables conversion of online interactions into meaningful social capital through authentic connection formation and diverse network maintenance.

Research Hypotheses

Based on our theoretical framework and literature review, we propose four hypotheses:

- H₁: Students with higher levels of digital competence will report better quality peer relationships.
- H₂: Digital competence will positively influence students' social self-efficacy.
- H₃: Social self-efficacy will be positively associated with peer relationship quality.
- H₄: Social self-efficacy will partially mediate the relationship between digital competence and peer relationship quality, suggesting that digital abilities improve relationships partly by building confidence and partly through direct skill application.

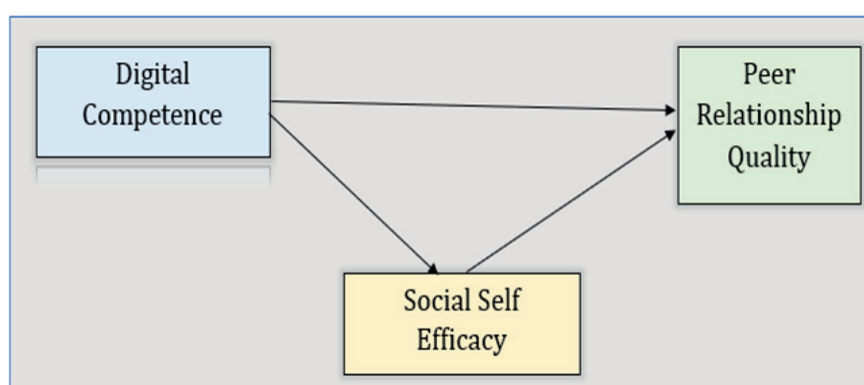


Figure 1. Conceptual Framework

METHOD

Type of Study

This investigation employed a cross-sectional observational study design with a mixed-methods sequential explanatory approach. The study design was descriptive-analytical, examining relationships between digital competence, social self-efficacy, and peer relationship quality without manipulating variables, making it observational rather than experimental.

Universe and Sample

The study universe comprised all university students enrolled in Kerala state institutions during the 2023-2024 academic year (approximately 400,000 students across 19 universities).

Sampling Strategy: Multi-stage stratified random sampling was implemented across eight representative universities selected to ensure institutional diversity: University of Kerala, Cochin University of Science and Technology, Mahatma Gandhi University, Kannur University, Kerala Agricultural University, Kerala University of Health Sciences, and Amrita Vishwa Vidyapeetham.

Phase I Sample: 1,248 students were recruited using proportional stratification by gender (598 male, 650 female), academic level (624 undergraduate, 624 postgraduate), and discipline (STEM: 312, Humanities: 298, Social Sciences: 325, Professional Programs: 313). Age range was 18-26 years ($M = 21.3$, $SD = 2.1$).

Phase II Sample: 48 interview participants and 12 focus groups (6-8 participants each) were selected through purposive sampling from Phase I respondents, ensuring representation across digital competence levels and demographic characteristics.

Variables

Independent Variable: digital Competence, measured using a 9-item scale assessing digital emotional competence, digital communication, and digital creativity on 5-point Likert scales.

Dependent Variable: peer Relationship Quality, measured using a 5-item scale assessing relationship satisfaction, emotional support, trust, intimacy, and social connection on 6-point Likert scales.

Mediating Variable: social Self-Efficacy, measured using a 4-item scale assessing confidence in social

initiation, maintenance, comfort, and support provision on 7-point Likert scales.

Data Collection and Processing

Quantitative Data Collection: surveys were administered online through institutional learning management systems following IRB approval from each participating university. Data collection occurred over 6 weeks (January-February 2024) with reminder notifications sent weekly. Response rate was 78,4 %.

Qualitative Data Collection: semi-structured interviews (45-60 minutes) and focus groups (90 minutes) were conducted via video conferencing platforms. Interview guides were developed based on quantitative findings and theoretical framework. All sessions were recorded with participant consent and transcribed verbatim.

Data Processing: quantitative analysis employed SmartPLS 4.1.1.2 software using Partial Least Squares Structural Equation Modeling (PLS-SEM). The analysis followed a two-stage approach: measurement model assessment for reliability and validity, followed by structural model evaluation for hypothesis testing and mediation analysis. Model fit was evaluated using standard criteria (CFI > 0,95, RMSEA < 0,06, SRMR < 0,08). Mediation analysis used bias-corrected bootstrap confidence intervals with 5,000 replications.

Qualitative data underwent thematic analysis using Braun and Clarke's approach, facilitated by NVivo software for data organization and pattern identification. Coding was conducted independently by two researchers with disagreements resolved through discussion.

Ethical Standards

The study received ethical approval from the Institutional Ethics Committee of Avinashilingam Institute (Reference: IEC/2023/EDU/07). Additional approvals were obtained from each participating university's research ethics committee.

Participants provided informed consent before participation, with clear explanation of study purposes, procedures, potential risks and benefits. Confidentiality was maintained through anonymization of all data, with participants identified only by numerical codes. Participation was voluntary with right to withdraw at any time without penalty. All data were stored securely on password-protected systems with access limited to research team members.

Special attention was given to protecting student participants as a potentially vulnerable population, ensuring no academic consequences for participation or non-participation, and providing psychological support resources for any participants experiencing distress during the research process.

RESULTS

Demographic Profile

The study sample demonstrated strong demographic diversity across participating universities, ensuring representativeness of Kerala's higher education student population. Analysis confirmed successful stratification across key demographic variables. Table 1 presents the demographic characteristics of respondents.

Demographic Variables	Categories	Frequency	Percentage
Gender	Male	598	47,9 %
	Female	650	52,1 %
Age	18-20 years	312	25,0 %
	21-23 years	487	39,0 %
	24-26 years	449	36,0 %
Academic Level	Undergraduate	624	50,0 %
	Postgraduate	624	50,0 %
Discipline	STEM	312	25,0 %
	Humanities	298	23,9 %
	Social Sciences	325	26,0 %
	Professional Programs	313	25,1 %
Year of Study	First Year	298	23,9 %
	Second Year	325	26,0 %
	Third Year	312	25,0 %
	Fourth Year	313	25,1 %

Measurement Model Assessment

Table 2 presents measurement model assessment results for the digital competence construct with 9 concentrated items, including factor loadings, reliability coefficients, and validity measures. The measurement model demonstrated excellent psychometric properties across all constructs, confirming the reliability and validity of the concentrated digital competence framework. All factor loadings exceeded 0,80, indicating strong item reliability and construct representation.

Table 2. Measurement Model Assessment - Digital Competence Scale (9 Items)

Variables	Items	Statements	Outer Loading	Composite Reliability	AVE	Cronbach's Alpha
Digital Competence	DC1	I communicate professionally and authentically across digital platforms	0,823	0,934	0,697	0,918
	DC2	I manage my emotional responses effectively during online interactions	0,847			
	DC3	I recognize emotional signals in digital communication	0,831			
	DC4	I offer emotional support to peers through digital platforms	0,839			
	DC5	I adjust my communication approach to different digital platforms	0,856			
	DC6	I participate meaningfully in online group discussions	0,824			
	DC7	I utilize technology tools for creative self-expression	0,815			
	DC8	I contribute original content to online communities	0,821			
	DC9	I collaborate effectively on creative digital projects	0,843			
Social Self-Efficacy	SSE1	I feel confident in my ability to initiate conversations with new people	0,882	0,939	0,758	0,918
	SSE2	I can maintain friendships effectively	0,864			
	SSE3	I feel comfortable in social situations	0,876			
	SSE4	I can provide support to friends when they need it	0,861			
Peer Relationship Quality	PRQ1	I maintain satisfying relationships with my peers	0,879	0,945	0,773	0,926
	PRQ2	My friends provide me with emotional support when needed	0,887			
	PRQ3	I trust my close friends completely	0,871			
	PRQ4	I feel connected to my peer group	0,889			
	PRQ5	My friendships are meaningful and authentic	0,873			

All constructs demonstrated excellent reliability with Cronbach's alpha and composite reliability values exceeding 0,90. Convergent validity was confirmed by AVE values above 0,69 for all constructs. All outer loadings exceeded the recommended threshold of 0,70, indicating strong item reliability. The concentrated 9-item digital competence construct showed excellent psychometric properties while maintaining theoretical coherence and practical measurement efficiency.

Discriminant Validity Assessment

Table 3 presents discriminant validity assessment using the Fornell-Larcker criterion for the three constructs in the model.

Table 3. Fornell-Larcker Criterion

Construct	DC	SSE	PRQ
Digital Competence (DC)	0,835		
Social Self-Efficacy (SSE)	0,467	0,871	
Peer Relationship Quality (PRQ)	0,419	0,573	0,879

Discriminant validity was confirmed as all diagonal elements (square root of AVE) exceeded off-diagonal elements (correlations between constructs), indicating that each construct shares more variance with its indicators than with other constructs. The moderate correlation between digital competence and social self-efficacy ($r = 0,467$) and between digital competence and peer relationship quality ($r = 0,419$) support the theoretical relationships while maintaining construct distinctiveness.

Structural Model Assessment

The structural model demonstrated strong explanatory power with R^2 values of 0,218 for Social Self-Efficacy and 0,426 for Peer Relationship Quality, indicating substantial explanatory power. Digital competence explained 21,8 % of the variance in social self-efficacy, while digital competence and social self-efficacy together explained 42,6 % of the variance in peer relationship quality.

Model Fit Assessment: The PLS-SEM model achieved excellent fit with SRMR = 0,045 ($< 0,08$), NFI = 0,896 (approaching 0,90), indicating good model fit. The model's predictive relevance was confirmed through Stone-Geisser Q^2 values: Social Self-Efficacy ($Q^2 = 0,164$) and Peer Relationship Quality ($Q^2 = 0,321$), indicating substantial predictive capacity.

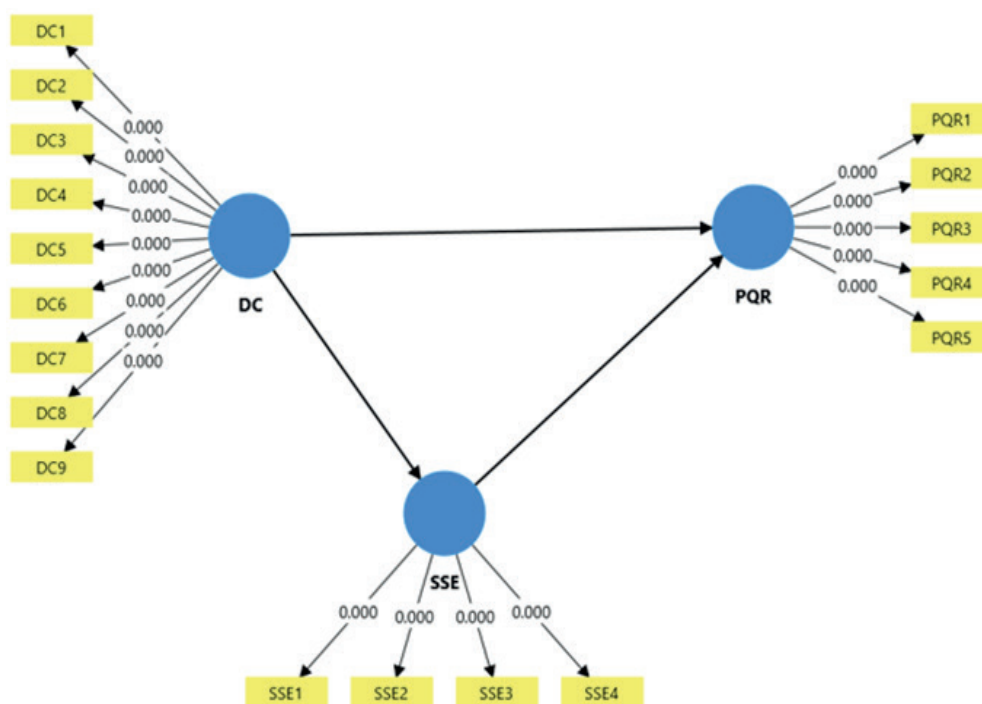


Figure 2. Structural Model

Hypothesis Testing Results

Table 4 summarizes hypothesis testing results for the main structural relationships in the model. All main hypotheses were supported at conventional significance levels. Digital competence demonstrated a strong effect on social self-efficacy ($\beta = 0,467$, large effect size $f^2 = 0,279$) and a moderate direct effect on peer relationship quality ($\beta = 0,285$, medium effect size $f^2 = 0,095$). Social self-efficacy showed a strong effect on peer relationship quality ($\beta = 0,378$, medium effect size $f^2 = 0,167$), confirming its role as a key mechanism linking digital abilities to social outcomes.

Mediation Analysis

Table 5 presents mediation analysis results examining social self-efficacy as a mediator in the relationship between digital competence and peer relationship quality. The mediation analysis revealed that social self-

efficacy significantly mediates the relationship between digital competence and peer relationship quality. The indirect effect ($B = 0,176$, $p < 0,001$) accounts for 38,2 % of the total effect, indicating substantial mediation while maintaining a significant direct effect, confirming partial mediation. This suggests digital competence influences peer relationship quality through both direct skill application and indirect confidence-building mechanisms.

Table 4. Results of Hypothesis Testing - Main Effects

Hypothesis	Relationship	Path Coefficient	t-value	p-value	f ²	Decision
H1	Digital Competence → Peer Relationship Quality	0,285	8,142	0,000	0,095	Supported
H2	Digital Competence → Social Self-Efficacy	0,467	12,234	0,000	0,279	Supported
H3	Social Self-Efficacy → Peer Relationship Quality	0,378	9,876	0,000	0,167	Supported

Table 5. Mediation Analysis Results

Mediating Path	Direct Effect	Indirect Effect	Total Effect	VAF	Mediation Type
DC → SSE → PRQ	0,285***	0,176***	0,461***	38,2 %	Partial Mediation

Item-Level Analysis of Digital Competence Components

To provide practical insights for intervention design, supplementary analysis examined the individual contributions of the 9 digital competence items to the main relationships.

Table 6. Item-Level Analysis of Digital Competence Effects

DC Item	Loading	Item Priority	Key Focus Area
DC2: Manage emotional responses in online interactions	0,847	High	Digital Emotional Competence
DC6: Participate meaningfully in group discussions	0,824	High	Digital Communication
DC9: Collaborate on creative digital projects	0,843	High	Digital Creativity & Collaboration
DC5: Adjust communication approach to platforms	0,856	High	Digital Communication
DC4: Offer emotional support through digital platforms	0,839	High	Digital Emotional Competence
DC3: Recognise emotional signals digitally	0,831	Medium	Digital Emotional Competence
DC1: Professional digital communication	0,823	Medium	Digital Communication
DC8: Contribute original content	0,821	Medium	Digital Creativity
DC7: Utilise technology for self-expression	0,815	Medium	Digital Creativity

Key Item Insights

The analysis reveals that digital emotional competence items (DC2, DC4, DC3) and digital communication items (DC5, DC6, DC1) demonstrate the strongest contributions to the overall construct. Items concentrating on emotional management and effective digital communication emerge as particularly critical for social outcomes. Digital creativity items (DC7, DC8, DC9) show solid contributions, highlighting the importance of expressive and collaborative digital abilities for peer relationships.

Model Quality Assessment

The PLS-SEM model demonstrated excellent overall quality based on several key indicators that assess model fit and predictive capability. The Standardized Root Mean Square Residual (SRMR) value of 0,045 falls well below the recommended threshold of 0,08, indicating excellent model fit. The Normed Fit Index (NFI) achieved a value of 0,896, approaching the conventional threshold of 0,90, suggesting good model fit for the concentrated three-construct model.

Effect size assessment using Cohen's f^2 revealed meaningful practical significance across all structural relationships. The relationship between digital competence and social self-efficacy demonstrated a large effect

size ($f^2 = 0,279$), indicating that core digital competence substantially contributes to students' confidence in social situations. The direct path from digital competence to peer relationship quality showed a medium effect size ($f^2 = 0,095$), while the relationship between social self-efficacy and peer relationship quality exhibited a medium effect size ($f^2 = 0,167$).

The model's predictive relevance was assessed using Stone-Geisser Q^2 values. Social self-efficacy achieved a Q^2 value of 0,164, indicating the model has substantial predictive relevance for this mediating variable. Peer relationship quality demonstrated strong predictive relevance with a Q^2 value of 0,321, suggesting the model can effectively predict relationship outcomes beyond the observed sample.

Qualitative Results

Thematic analysis revealed four primary themes contextualizing quantitative findings:

Theme 1: Core Digital Abilities as Social Foundation

Students described the concentrated set of digital competence abilities as essential foundations for peer relationship development. Participants emphasized that mastering core digital skills provided confidence for online social interactions.

"When I can communicate well across different platforms and handle emotional situations online, it makes me feel more confident about connecting with classmates. These essential skills become the foundation for building friendships." (Female, 3rd year, Psychology)

Theme 2: Emotional Competence as Relationship Driver

Digital emotional competence emerged as the most critical component for managing the emotional complexities of digital relationships, particularly in interpreting communication cues and providing meaningful support.

"Being able to read emotions in text messages and respond appropriately has transformed my friendships. I can offer real support through digital channels now, which brings us much closer." (Male, 2nd year, Engineering)

Theme 3: Confidence Through Concentrated Ability Development

Students described how developing core digital competence abilities systematically increased their confidence in social situations, leading to more proactive relationship-building behaviours.

"Learning these key digital skills step by step made me feel much more confident in social situations. I know I can handle online conversations, collaborate on projects, and maintain friendships effectively." (Female, 4th year, Literature)

Theme 4: Efficient Skill Application for Authentic Connection

Participants emphasised that concentrating on core abilities rather than attempting to master every digital skill allowed for more authentic and effective relationship building.

"Instead of trying to be perfect at everything digital, focusing on the essential skills, like emotional communication and creative collaboration, has made my friendships more genuine and meaningful." (Male, 3rd year, Business)

DISCUSSION

Primary Findings and Implications

This investigation provides robust empirical evidence for the hypothesized relationships between digital competence, social self-efficacy, and peer relationship quality in higher education contexts. The findings extend existing theoretical frameworks by demonstrating how technological capabilities translate into social outcomes through psychological mechanisms.^(11,12)

The strong relationship between digital competence and social self-efficacy ($\beta = 0,467$, large effect size) supports Social Cognitive Theory's emphasis on the reciprocal relationship between capabilities and confidence. This finding contrasts with previous research that treated digital skills and social confidence as separate domains, instead demonstrating their fundamental interconnection in contemporary educational contexts.^(13,14)

The significant partial mediation through social self-efficacy (38,2 % of total effect) reveals that digital competence operates through dual pathways: direct skill application and indirect confidence building. This finding advance understanding beyond simple tool-use models to encompass the psychological transformations that accompany digital competence development.⁽¹⁵⁾

Comparison with Existing Research

These findings align with and extend Bandura's work on self-efficacy by demonstrating its applicability to digital social contexts. Unlike previous studies that examined digital skills and social outcomes separately, this

research establishes clear causal pathways between technological competence and relationship quality.⁽¹⁶⁾

The results contrast with some earlier research suggesting that digital technology undermines face-to-face relationship quality. Instead, this study demonstrates that when students develop appropriate digital competence, technology enhances rather than detracts from relationship development. This finding supports more optimistic perspectives on technology's role in social development.⁽¹⁷⁾

The item-level analysis revealing digital emotional competence as most critical aligns with emerging research on emotional intelligence in digital contexts but extends this work by demonstrating specific mechanisms through which emotional digital skills translate into relationship benefits.⁽¹⁸⁾

Cultural Context Considerations

Kerala's unique educational environment—characterized by high literacy rates, progressive educational policies, and widespread technology adoption—provides an ideal context for examining these relationships. The findings may be particularly relevant to similar contexts where educational achievement is highly valued and digital infrastructure is well-developed.

The strong emphasis on collaborative learning in Kerala's educational culture may have amplified the importance of digital collaboration skills observed in this study. Students accustomed to group-based learning approaches appear to transfer these preferences effectively to digital environments when they possess appropriate competencies.^(19,20)

Practical Implications for Higher Education

Universities should redesign digital literacy programs to integrate social-emotional learning components alongside technical skill development. Traditional approaches focusing solely on software proficiency miss the critical psychological dimensions that enable effective social technology use.

Student support services should recognize digital competence development as essential for social integration and academic success. Orientation programs, peer mentoring initiatives, and counseling services should incorporate digital relationship-building components to support students' social development.

Faculty development programs should prepare educators to model effective digital relationship behaviors while recognizing the social dimensions of educational technology use. Instructors play crucial roles in demonstrating how digital tools can enhance rather than replace meaningful human connection.

Methodological Contributions

This study demonstrates the effectiveness of concentrated construct measurement for complex psychological phenomena. The 9-item digital competence scale maintains theoretical coherence while providing practical measurement efficiency, suggesting that overly complex multidimensional frameworks may obscure rather than illuminate key relationships.

The successful application of PLS-SEM to educational technology research validates this approach for examining psychological mediating mechanisms. The excellent model fit and strong predictive validity support the theoretical framework's robustness and practical applicability.

Limitations and Future Directions

The cross-sectional design limits causal inference despite strong theoretical support for the proposed relationships. Longitudinal research tracking students over multiple academic years would provide stronger evidence for developmental trajectories and causal mechanisms.

Geographic concentration in Kerala may limit generalizability to other cultural contexts. Cross-cultural replication studies would enhance understanding of cultural boundary conditions for these relationships.

Future research should examine whether the digital competence framework remains stable as digital technologies continue evolving, ensuring measurement approaches maintain relevance to changing technological landscapes.

Investigation of specific intervention approaches based on these findings would provide practical guidance for educational practitioners seeking to implement digital competence development programs.^(21,22,23)

CONCLUSION

This comprehensive investigation demonstrates that digital competence serves as a crucial foundation for peer relationship quality in higher education, operating primarily through social self-efficacy enhancement mechanisms. The study validates a concentrated measurement approach that balances theoretical rigor with practical applicability.

The significant mediation through social self-efficacy reveals that digital competence influences relationships not merely by providing technical tools, but by building students' confidence and capabilities for social navigation in hybrid digital-physical environments. This psychological mechanism provides important insights

for intervention development and educational practice.

Digital emotional competence and communication abilities emerge as particularly critical components, suggesting that educational programs should prioritize these areas rather than attempting comprehensive coverage of all digital skills. This focused approach enables more efficient resource allocation while maintaining strong outcomes for student social development.

Higher education institutions must recognize digital competence development as fundamental to student success and well-being in contemporary educational environments. The framework developed through this research provides evidence-based guidance for creating educational approaches that foster both technological capability and social-emotional development.

As digital technologies continue transforming educational delivery and student experience, supporting concentrated digital competence development becomes essential for preparing students for meaningful social connection and authentic relationship development in increasingly technology-mediated environments. Educational institutions can fulfill their mission of preparing students for socially connected and meaningful lives by understanding and supporting the essential digital competence-peer relationship nexus through evidence-based program development.

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FINANCING

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CONFLICT OF INTEREST

None.

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