International Journal of Evaluation and Research in Education (IJERE)
Vol. 15, No. 2, April 2026, pp. 1103~1113
ISSN: 2252-8822, DOI: 10.11591/ijere.v15i2.37371

Belonging mediates the relationship between emotional contagion and digital competence among university students

Mohamed Ali Nemt-allah[1], Ghada Mahros Abdelhafiez[2], Randa Rabie Abdelbadie[3], Soma Abdelrazek Elfeshawy[4], Sara Awadallah Mohammed[5], Ashraf Ragab Ibrahim[1]
[1]Department of Educational Psychology and Statistics, Faculty of Education, Al-Azhar University, Dakahlia, Egypt
[2]Department of Mental Health, Faculty of Education for Girls, Al-Azhar University, Assiut, Egypt
[3]Department of Educational Psychology and Statistics, Faculty of Education for Girls, Al-Azhar University, Assiut, Egypt
[4]Department of Mental Health, Faculty of Humanities, Al-Azhar University, Dakahlia, Egypt
[5]Department of Psychology, Faculty of Humanities, Al-Azhar University, Dakahlia, Egypt

Article Info

Article history:

Received Oct 21, 2025
Revised Jan 20, 2026
Accepted Feb 23, 2026

Keywords:

Digital competence
Emotional contagion
Higher education
Mediation analysis
Sense of belonging

ABSTRACT

Emotional contagion (EC) significantly influences student experiences in university settings, yet its relationship with digital competence—a key requirement for contemporary academic success—remains unclear. This study examined the mediating role of sense of belonging in the relationship between EC and digital competence among Egyptian university students. Two samples from Al-Azhar University were recruited: a psychometric validation sample (N=486) and a main study sample (N=737). Participants completed validated Arabic versions of the sense of belonging inventory, the susceptibility to emotional contagion (SEC) scale, and the digital competence scale for university students. Data were analyzed using correlation analyses and structural equation modeling (SEM) with bootstrap testing. Results showed that sense of belonging partially mediated relationships between both types of EC and digital competence. Positive EC had significant direct effects on belonging (β=.354) and digital competence (β=.195), with 39.4% of its total effect mediated through belonging. Negative EC also had significant direct effects on belonging (β=-.119) and digital competence (β=-.141), with 23.4% mediated through belonging. These findings suggest that higher education institutions should implement belonging-enhancement initiatives to strengthen digital competence and maximize the benefits of positive EC while mitigating negative emotional influences.

Corresponding Author:

Mohamed Ali Nemt-allah
Department of Educational Psychology and Statistics, Faculty of Education, Al-Azhar University
Tafhna Al-Ashraf, Dakahlia, Egypt
Email: mohamednamatallah.2026@azhar.edu.eg

1. INTRODUCTION

Emotional contagion (EC) represents the automatic and often unconscious transfer of emotions between individuals through various channels including facial expressions, body language, vocal tone, and digital communication [1], [2]. This fundamental mechanism of social cohesion operates extensively in university settings, where students engage in frequent, close interactions that facilitate emotional transmission [3], [4]. The phenomenon manifests across both physical and virtual environments, with emotional content rapidly spreading through social media platforms and online learning spaces [5], [6]. Within academic contexts, EC significantly influences student experiences by shaping group dynamics, affecting rapport with instructors, and impacting motivation and learning outcomes [7], [8]. Understanding

this process becomes particularly crucial as universities increasingly integrate digital platforms into educational delivery, expanding the reach and complexity of emotional transmission among student populations.

In the contemporary educational landscape, digital competence has emerged as a fundamental requirement for university students, defined as the ability to effectively use digital tools, platforms, and technologies to access, evaluate, create, and communicate information while solving problems and collaborating online [9], [10]. This multifaceted skillset encompasses technical proficiency, information literacy, digital communication, and responsible digital behavior [11], [12]. The COVID-19 pandemic sped up the shift to online and hybrid learning, making digital competence a fundamental requirement rather than an optional skill [11], [12]. Students demonstrating higher digital competence exhibit superior academic performance, enhanced engagement, and greater adaptability in managing digital learning environments [9], [13], [14]. Furthermore, digital competence significantly influences employability and career readiness, as modern workplaces increasingly demand proficiency in digital communication, problem-solving, and content creation [9], [15]–[17].

In university settings, sense of belonging functions as a fundamental psychological factor characterized by feelings of acceptance, value, and connection within the academic community [18], [19]. Rooted in social psychology, this construct aligns with Baumeister and Leary [20] belongingness hypothesis and self-determination theory, positioning belonging as essential for well-being and intrinsic motivation [21]. This multidimensional construct encompasses social connectedness with peers and faculty, feelings of respect and inclusion, and identity integration within university culture [22], [23]. Research consistently demonstrates that belonging significantly influences both student motivation and well-being, with stronger belonging associated with enhanced academic engagement, persistence, and reduced dropout intentions [24], [25], while simultaneously fostering greater happiness, resilience, and psychological adaptation, particularly among marginalized student populations [26], [27].

Recent scholarship has revealed a complex relationship between EC and digital competence among university students. Research demonstrates that digital literacy can mediate the relationship between emotional intelligence and stress, with higher digital skills enabling better use of online resources for stress management [28], [29]. Studies further indicate that enhanced digital competence is associated with reduced digital anxiety and improved emotional regulation in online environments [30]–[32]. Additionally, digital skills and mobile self-efficacy have been shown to mediate stress and engagement in virtual learning contexts [33]. However, inconsistencies exist, as some studies suggest emotional intelligence remains a stronger predictor of well-being than digital skills alone [19], while others highlight how excessive digital connectivity can negatively impact emotional intelligence [34], indicating context-dependent relationships requiring further investigation.

According to self-determination theory, belonging fulfills fundamental psychological needs, transforming emotional experiences into motivational states necessary for sustained engagement and competence development in digital learning environments [21]. This social-emotional integration fosters confidence and engagement in digital environments, translating emotional resonance into active participation and skill development [35]–[38]. Mediation models demonstrate that belonging links emotional capacities to positive outcomes, such as life satisfaction and academic engagement [39], [40]. Given these theoretical foundations, an empirical investigation is warranted to clarify whether belongingness mediates the relationship between EC and digital competence, informing interventions that strengthen both social connection and digital skill development among university students.

Despite growing interest in EC, sense of belonging, and digital competence, significant research gaps persist that limit our understanding of these constructs in higher education contexts. EC research predominantly relies on homogeneous, college-aged samples from Western populations, with minimal exploration of its mechanisms in educational settings and its role in fostering belonging among university students [40], [41]. Similarly, sense of belonging studies suffer from inconsistent measurement approaches and frequently underreport experiences of diverse student populations, while rarely examining mediating mechanisms linking belonging to academic outcomes [19], [22], [42], [43]. Digital competence research primarily focuses on pre-university educators rather than university students, with limited attention to demographic variations and mediation pathways [21], [44], [45]. These limitations are particularly pronounced in non-Western contexts, where cultural factors may influence emotional expression, social bonding, and technology adoption differently, underscoring the need for studies in diverse settings to enhance generalizability and inform context-specific interventions.

This study addresses these gaps by investigating whether sense of belonging mediates the link between EC and digital competence among Al-Azhar University students in Egypt. Drawing on a sample of undergraduate students from this institution, which represents a unique blend of traditional Islamic education and modern digital integration. By focusing on this population, the study seeks to elucidate how emotional dynamics in a culturally conservative yet digitally evolving academic environment influence skill

development, providing empirical evidence to support targeted interventions that enhance belonging and digital proficiency. Ultimately, this investigation contributes to the literature by offering insights into non-Western university contexts, potentially guiding policy and practice in Egyptian higher education to foster resilient, digitally competent graduates. Based on the theoretical frameworks and empirical gaps, this study was guided by the following questions (RQ):

- What are the relationships between EC (positive and negative), sense of belonging, and digital competence among Egyptian university students? (RQ1)
- Does sense of belonging mediate the relationship between positive EC and digital competence? (RQ2)
- Does sense of belonging mediate the relationship between negative EC and digital competence? (RQ3)

2. METHOD

2.1. Research design

This study employed a cross-sectional, correlational design and applied structural equation modeling (SEM) to test mediation pathways. This design captures variable relationships at a single time point, offering insight into how emotional, social, and technological factors interact within the current educational context. SEM was selected because it simultaneously tests multiple relationships while accounting for measurement error and enables examination of both direct and indirect effects in mediation models [46], [47].

2.2. Participants

Participants were recruited using convenience sampling through classroom announcements and university social media groups. The study comprised two samples from Al-Azhar University in Egypt: a psychometric validation sample (N=486) and a main study sample (n=737). Inclusion criteria were: i) current undergraduate enrollment; ii) aged 17-22 years; iii) Arabic language proficiency; and iv) informed consent. Exclusion criteria included graduate student status and incomplete survey responses (<80% completion). Table 1 presents the demographic characteristics of both samples. The psychometric sample included participants aged 18-22 years (M=19.45, SD=1.09), while the main sample ranged from 17-22 years (M=19.13, SD=1.14). All participants were recruited from Al-Azhar University's Faculty of Education for Boys in Tafhna Al-Ashraf, Faculty of Education for Girls in Assiut, and Faculty of Humanities in Tafhna Al-Ashraf. Data collection was conducted electronically via Google Forms during the second semester of the 2024-2025 academic year.

Sample sizes were determined based on SEM guidelines. Kline [46] recommends a minimum of 200 participants for SEM, while Byrne [47] suggests at least 10 participants per estimated parameter. With approximately 50 estimated parameters, the main sample (N=737) exceeds the minimum requirement of 500 participants, providing sufficient power to detect medium effect sizes. Hair *et al.* [48] support samples of 500+ for complex models with multiple latent variables to ensure stable parameter estimates. The psychometric validation sample (N=486) meets recent guidelines by White [49] for confirmatory factor analysis (CFA), which recommend a sample size of 200+ participants for adequate model estimation. Both samples provide adequate statistical power for their respective analytical purposes.

Table 1. Demographic characteristics of psychometric and main samples

Variable	Options	Psychometric sample (N=486)		Main sample (n=737)	
		N	%	N	%
Academic year	First year	106	21.8	328	44.5
	Second year	150	30.9	101	13.7
	Third year	152	31.3	194	26.3
	Fourth year	78	16.0	114	15.5
Gender	Male	192	39.5	333	45.2
	Female	294	60.5	404	54.8
Residence	Urban	135	27.8	191	25.9
	Rural	351	72.2	546	74.1

2.3. Measures

The sense of belonging inventory was employed to assess students' sense of belonging as a multidimensional construct within the university context [50]. The scale comprises 25 items distributed across four dimensions: perceived peer, perceived faculty support, perceived classroom comfort, and perceived isolation. Participants responded using a 5-point Likert scale ranging from 1 (completely untrue) to 5 (completely true). The original English version was translated into Arabic and back-translated by four linguistic experts to ensure semantic equivalence. CFA conducted on the psychometric sample demonstrated acceptable model fit indices: Chi-square to degrees of freedom ratio (χ^2/df)=2.056, goodness of fit index

(GFI)=.915, adjusted goodness of fit index (AGFI)=.897, comparative fit index (CFI)=.926, normed fit index (NFI)=.866, incremental fit index (IFI)=.927, and root mean square error of approximation (RMSEA)=.047. Reliability analysis revealed satisfactory internal consistency: perceived peer support (ω=.745, α=.758), perceived faculty support (ω=.853, α=.852), perceived classroom comfort (ω=.858, α=.847), and perceived isolation (ω=.712, α=.702).

The susceptibility to emotional contagion (SEC) scale was utilized to measure individual differences in SEC [51]. This 8-item measure assesses two independent dimensions: susceptibility to positive EC (positive SEC; 4 items) and susceptibility to negative EC (negative SEC; 4 items). The scale employs a 5-point Likert response format ranging from strongly disagree to strongly agree, with positive items coded such that 5 indicates strong agreement and negative items reverse-coded such that 1 indicates strong agreement. The scale does not yield a total score, as the two dimensions are theoretically and empirically distinct. Following translation and back-translation procedures, CFA supported the two-factor structure with good fit indices: χ^2/df=2.792, GFI=.973, AGFI=.949, CFI=.965, NFI=.947, IFI=.965, and RMSEA=.061. Both dimensions demonstrated adequate reliability: positive SEC (ω=.763, α=.763) and negative SEC (ω=.764, α=.763).

The digital competence scale for university students was used to measure students' digital competence in digitally enhanced learning environments [10]. The scale consists of 10 items (refined from an original 23-item version) distributed across two dimensions: technical literacy (4 items) and digital skills (6 items). Responses are recorded on a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree), with total scores calculated by summing all items (range: 0-40), where higher scores indicate greater digital competence. After translation and back-translation procedures, CFA yielded acceptable fit indices: χ^2/df=4.339, GFI=.947, AGFI=.908, CFI=.947, NFI=.933, IFI=.947, and RMSEA=.083. The scale demonstrated good internal consistency for both dimensions: technical literacy (ω=.792, α=.791) and digital skills (ω=.830, α=.829).

2.4. Procedure

Following ethical approval and informed consent procedures, participants completed the survey measures electronically through Google Forms. The survey included brief informed consent covering purpose, voluntariness, confidentiality, and withdrawal rights. The survey included the three primary measures administered in a randomized order to control for potential order effects. All measures were presented in Arabic following rigorous translation and back-translation procedures conducted by four linguistic experts to ensure conceptual and semantic equivalence with the original English versions. No compensation was provided for participation. Survey completion required approximately 15-20 minutes.

2.5. Data analysis

Data analysis was conducted using SPSS-29 and AMOS-27. Harman's single-factor test indicated that the first factor explained 19.486% of the variance—well below the 50% benchmark—suggesting that common method bias was not a major issue. Correlation analyses were performed to examine bivariate relationships among the study variables, with factor means and standard deviations. SEM was employed to test the hypothesized mediation model, with sense of belonging specified as a mediator of the relationships between both positive and negative EC and digital competence. Indirect effects were tested using bootstrap procedures with 5,000 resamples and bias-corrected 95% confidence intervals (CI) to assess the significance of mediation pathways.

3. RESULTS

3.1. Preliminary analyses

Preliminary correlation analyses revealed significant relationships among all study variables, as seen in Table 2. Positive EC demonstrated moderate positive correlations with both sense of belonging (r=.404, p<.001) and digital competence (r=.398, p<.001). Conversely, negative EC exhibited significant negative correlations with sense of belonging (r=-.266, p<.001) and digital competence (r=-.317, p<.001). Sense of belonging showed a moderate positive link to digital competence (r=.475, p<.001). These correlations provided support for examining the hypothesized mediation model.

3.2. Mediation model testing

The mediation hypothesis was examined using SEM, with sense of belonging modeled as the mediator linking positive and negative EC to digital competence. The model demonstrated acceptable fit to the data across multiple indices (χ^2/df=2.056, GFI=.915, AGFI=.897, CFI=.926, NFI=.866, IFI=.927, Tucker Lewis index (TLI)=.918, RMSEA=.047, root mean residual (RMR)=.102), supporting the proposed structural relationships among the variables. Figure 1 presents the standardized path coefficients for the mediation

model, illustrating the direct pathways from both types of EC to sense of belonging and digital competence, as well as the pathway from sense of belonging to digital competence.

Table 2. Descriptive statistics and correlations among the study variables

Variable	1	2	3	4	M	SD
1. Positive EC	1				16.746	2.669
2. Negative EC	-.414**	1			10.168	3.875
3. Sense of belonging	.404**	-.266**	1		90.559	14.900
4. Digital competence	.398**	-.317**	.475**	1	28.331	8.330

Note. N=737. **p<.001 (two-tailed), M=mean, SD=standard deviations

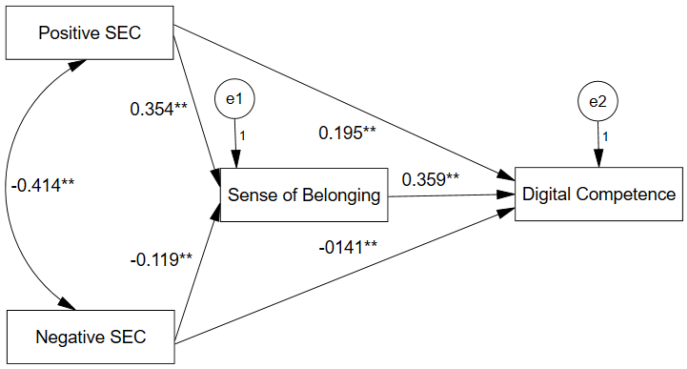

Figure 1. Standardized path coefficients for the mediation model

3.3. Direct, indirect, and total effects

Table 3 presents the standardized direct, indirect, and total effects from the structural equation model. Positive EC demonstrated significant direct effects on both sense of belonging (β=.354, p=.003) and digital competence (β=.195, p=.001), as well as a significant indirect effect on digital competence through sense of belonging (β=.127, 95% CI [.085, .173], p=.002). The total effect of positive EC on digital competence was β=.322 (p=.001), indicating that approximately 39.4% of this effect was mediated through sense of belonging. Similarly, negative EC showed significant direct effects on sense of belonging (β=-.119, p=.007) and digital competence (β=-.141, p=.002), with a significant indirect effect on digital competence through sense of belonging (β=-.043, 95% CI [-.076, -.016], p=.005). The total effect of negative EC on digital competence was β=-.184 (p=.002), with approximately 23.4% of this effect mediated through sense of belonging. Moreover, sense of belonging is a significant direct effect on digital competence (β=.359, p=.002), highlighting its crucial role in facilitating digital competence development.

These findings demonstrate that sense of belonging partially mediates the relationships between both positive and negative EC and digital competence among university students. The mediation effects were significant for both types of EC, though the mediation pathway was stronger for positive EC than for negative EC. Overall, the results support the hypothesized model and underscore sense of belonging as a mechanism through which EC influences digital competence development in higher education contexts.

Table 3. Standardized direct, indirect, and total effects in the mediation model

Path	Direct effect	Indirect effect	Total effect
Positive EC → belonging	.354***	---	.354***
Negative EC → belonging	-.119**	---	-.119**
Positive EC → competence	.195***	.127***	.322***
Negative EC → competence	-.141***	-.043**	-.184***
Belonging → competence	.359***	---	.359***

Note. EC=emotional contagion; competence=digital competence; **p<.01. ***p<.001

4. DISCUSSION

The present findings reveal that sense of belonging is a significant partial mediator in the relationships between EC and digital competence among Egyptian university students. The moderate positive correlation between positive EC and digital competence (r=.398) aligns with theoretical frameworks suggesting that emotional transmission facilitates social cohesion and collaborative learning [3], [7], [8]. Conversely, negative

EC's inverse relationship with digital competence (r=-.317) supports research indicating that negative emotional states can impede cognitive functioning and technological engagement [1], [2]. The mediation analysis demonstrates partial rather than full mediation for both pathways, as both types of EC retained significant direct effects on digital competence alongside their indirect effects through belonging [52], [53].

For positive EC, 39.4% of the total effect operates through sense of belonging, while 60.6% represents a direct pathway to digital competence. This partial mediation pattern suggests that positive emotional experiences facilitate digital competence through multiple mechanisms. The indirect pathway through belonging (β=.127) demonstrates that exposure to positive emotions enhances feelings of acceptance and connection within the academic community, which subsequently motivates engagement with digital learning environments [35]–[38]. However, the substantial direct effect (β=.195) indicates that positive EC also promotes digital competence through mechanisms independent of belonging, potentially including enhanced motivation, increased cognitive flexibility, and greater willingness to experiment with new technologies [7], [8], [21].

For negative EC, only 23.4% of the total effect on digital competence was mediated through sense of belonging, while 76.6% operated through direct pathways. This weaker mediation—compared to positive EC—suggests that negative emotions influence digital competence primarily through mechanisms other than belonging erosion. The indirect pathway (β=-.043) indicates that exposure to negative emotions modestly reduces belonging, which subsequently diminishes engagement with digital activities [26], [27]. However, the stronger direct effect (β=-.141) suggests that negative EC more substantially impairs digital competence through mechanisms such as increased cognitive load, attentional interference, avoidance behaviors, and reduced self-efficacy in technology use [1], [2], [30]–[32].

These asymmetric mediation patterns highlight belonging's differential role across emotional valences, with positive emotional experiences more strongly facilitating belonging and digital skill development than negative emotions undermine them. This asymmetry suggests that belonging functions as a protective psychological resource that amplifies benefits of positive social-emotional experiences while partially buffering against negative emotional influences [5], [6], [21]. The findings extend existing scholarship by positioning belonging as a critical social-emotional bridge connecting emotional transmission to technological competence development, while acknowledging that substantial direct pathways also operate independent of belonging processes [28]–[32], [39], [40]. This integration reconciles previous inconsistencies by demonstrating that emotional processes and digital competence interact through both social-relational and direct cognitive mechanisms.

5. SUGGESTION

These findings carry substantial implications for higher education policy and practice, particularly in culturally conservative yet digitally evolving contexts like Egyptian universities. Institutions should prioritize interventions that foster belonging and emotional wellness alongside digital skill training, recognizing that technical proficiency cannot be divorced from social-emotional integration. Orientation programs, peer mentorship initiatives, and collaborative digital learning activities that strengthen interpersonal connections may amplify digital competence more effectively than skills training alone. Faculty development programs should emphasize creating emotionally supportive classroom climates that enhance belonging, particularly for marginalized students who may experience belonging deficits. Furthermore, university mental health services should integrate belonging-enhancement strategies with digital literacy support, recognizing that EC within social networks significantly influences both psychological well-being and technological adaptation in contemporary academic environments.

These findings carry substantial implications for higher education policy and practice in digitally evolving contexts. Given that 39.4% of the effect of positive EC operates through belonging, institutions should implement structured peer mentorship programs pairing upper-year students with first-year students during orientation periods. The significant direct effect of belonging on digital competence (β=.359) indicates that collaborative digital learning activities—group projects using shared platforms, peer-led technology workshops, and discussion forums—should be systematically integrated into curricula. Faculty development programs should train instructors in creating emotionally supportive digital classrooms through personalized feedback, regular check-ins, and inclusive facilitation practices. Since negative EC reduced digital competence both directly and through erosion of belonging, university mental health services should establish digital wellness programs that combine peer support groups with digital literacy workshops. For marginalized students experiencing belonging deficits, targeted interventions such as identity-affirming mentorship and culturally responsive pedagogy in digital contexts may prevent compounding effects of emotional isolation on technological adaptation.

Future investigations should address these limitations through several methodological extensions. Longitudinal designs tracking EC, belonging, and digital competence across multiple academic years would clarify developmental sequences and enable stronger causal inferences. Cross-cultural comparative studies examining these relationships across diverse institutional types, religious orientations, and national contexts would enhance generalizability and illuminate cultural boundary conditions for observed effects. Mixed-methods approaches incorporating qualitative interviews and observational data could reveal specific belonging-building mechanisms and emotional transmission processes that quantitative methods alone cannot capture. Future research should also examine moderating factors such as personality traits, cultural values, and digital learning environment characteristics that may amplify or attenuate mediation pathways. Additionally, intervention studies testing belonging-enhancement programs' effects on both emotional resilience and digital skill acquisition would provide practical evidence for educational practice while strengthening causal understanding of these interconnected constructs.

6. CONCLUSION

This study demonstrates that sense of belonging partially mediates relationships between EC and digital competence among Egyptian university students, with 39.4% and 23.4% of positive and negative EC effects operating through belonging, respectively. These findings extend self-determination theory by positioning belonging as a psychological mechanism converting emotional experiences into technological engagement. However, the cross-sectional design limits causal inference, and the sample from a single religiously oriented institution constrains generalizability. Future research should adopt longitudinal, cross-cultural, and mixed-methods designs to examine specific belonging-building mechanisms. Intervention studies testing belonging-enhancement programs would provide practical evidence for educational practice. For institutions navigating digital transformation, these findings suggest that investing in belonging-building initiatives may enhance student well-being and accelerate digital literacy development, preparing technologically proficient graduates for digital professional landscapes.

ACKNOWLEDGMENTS

The authors sincerely thank the students who participated in this study.

FUNDING INFORMATION

The authors declare that they received no funding.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Mohamed Ali Nemt-allah	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
Ghada Mahros Abdelhafiez	✓	✓	✓				✓	✓	✓			✓		✓
Randa Rabie Abdelbadie	✓	✓		✓		✓	✓			✓	✓	✓	✓	✓
Soma Abdelrazek Elfeshawy	✓	✓	✓			✓		✓		✓	✓		✓	✓
Sara Awadallah Mohammed	✓	✓		✓			✓	✓		✓		✓		✓
Ashraf Ragab Ibrahim	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

Informed consent was obtained from all participants after explaining the study's purpose, procedures, risks, and benefits, following ethical guidelines and institutional approval.

ETHICAL APPROVAL

The study protocol was approved by the Research Ethics Committee of the Faculty of Education, Al-Azhar University, Egypt (Ref. No. EDU-REC-2025-156).

DATA AVAILABILITY

The data are available from the corresponding author, [MAN], upon reasonable request.

REFERENCES

[1] C. Herrando and E. Constantinides, "Emotional contagion: a brief overview and future directions," *Frontiers in Psychology*, vol. 12, p. 712606, Jul. 2021, doi: 10.3389/fpsyg.2021.712606.

[2] H. Liu, D. Zhang, Y. Zhu, H. Ma, and H. Xiao, "Emotions spread like contagious diseases," *Frontiers in Psychology*, vol. 16, p. 1493512, Apr. 2025, doi: 10.3389/fpsyg.2025.1493512.

[3] B. N. Frisby, "The influence of emotional contagion on student perceptions of instructor rapport, emotional support, emotion work, valence, and cognitive learning," *Communication Studies*, vol. 70, no. 4, pp. 492–506, Aug. 2019, doi: 10.1080/10510974.2019.1622584.

[4] Y. Lu, D. Wei, and Y. Li, "Teacher's emotional contagion on students: evidence from multi-method approaches," *Teaching and Teacher Education*, vol. 155, p. 104891, Mar. 2025, doi: 10.1016/j.tate.2024.104891.

[5] J. P. G. Gutierrez, A. M. Sanchez, A. Ibunes, D. H. Dela Cruz, T. A. Vasquez, and J. Reyes, "Evidence of digital emotion contagion: an experimental study on the emotional social media posts on university students' attitude," *SSRN Electronic Journal*, pp. 1–18, 2022, doi: 10.2139/ssrn.4109944.

[6] C.-C. Hung, X. Gao, Z. Liu, Y. Chai, T. Liu, and C. Liu, "CECM: a cognitive emotional contagion model in social networks," *Multimedia Tools and Applications*, vol. 83, no. 1, pp. 1001–1023, Jan. 2024, doi: 10.1007/s11042-023-15394-x.

[7] S. G. Barsade, C. G. V. Coutifaris, and J. Pillemer, "Emotional contagion in organizational life," *Research in Organizational Behavior*, vol. 38, pp. 137–151, 2018, doi: 10.1016/j.riob.2018.11.005.

[8] M. Wróbel and K. K. Imbir, "Broadening the perspective on emotional contagion and emotional mimicry: the correction hypothesis," *Perspectives on Psychological Science*, vol. 14, no. 3, pp. 437–451, May 2019, doi: 10.1177/1745691618808523.

[9] J. Cabero-Almenara, J. J. Gutiérrez-Castillo, F. D. Guillén-Gámez, and A. F. Gaete-Bravo, "Digital competence of higher education students as a predictor of academic success," *Technology, Knowledge and Learning*, vol. 28, no. 2, pp. 683–702, Jun. 2023, doi: 10.1007/s10758-022-09624-8.

[10] X. Wang, Z. Wang, Q. Wang, W. Chen, and Z. Pi, "Supporting digitally enhanced learning through measurement in higher education: development and validation of a university students' digital competence scale," *Journal of Computer Assisted Learning*, vol. 37, no. 4, pp. 1063–1076, Aug. 2021, doi: 10.1111/jcal.12546.

[11] K. Martzoukou, P. Kostagiolas, C. Lavranos, T. Lauterbach, and C. Fulton, "A study of university law students' self-perceived digital competences," *Journal of Librarianship and Information Science*, vol. 54, no. 4, pp. 751–769, Dec. 2022, doi: 10.1177/09610006211048004.

[12] Y. Zhao, M. C. S. Gómez, A. M. P. Llorente, and L. Zhao, "Digital competence in higher education: students' perception and personal factors," *Sustainability*, vol. 13, no. 21, p. 12184, Nov. 2021, doi: 10.3390/su132112184.

[13] H. J. Kim, A. J. Hong, and H.-D. Song, "The roles of academic engagement and digital readiness in students' achievements in university e-learning environments," *International Journal of Educational Technology in Higher Education*, vol. 16, no. 1, p. 21, Dec. 2019, doi: 10.1186/s41239-019-0152-3.

[14] M. Mehrvarz, E. Heidari, M. Farrokhnia, and O. Noroozi, "The mediating role of digital informal learning in the relationship between students' digital competence and their academic performance," *Computers & Education*, vol. 167, p. 104184, Jul. 2021, doi: 10.1016/j.compedu.2021.104184.

[15] M. Lucas, P. Bem-haja, S. Santos, H. Figueiredo, M. F. Dias, and M. Amorim, "Digital proficiency: sorting real gaps from myths among higher education students," *British Journal of Educational Technology*, vol. 53, no. 6, pp. 1885–1914, Nov. 2022, doi: 10.1111/bjet.13220.

[16] I. Potgieter, M. Coetzee, and N. Ferreira, "University students' digital world of work readiness in relation to their employability competency," *Journal of Learning Development in Higher Education*, no. 27, pp. 1–22, Apr. 2023, doi: 10.47408/jldhe.vi27.922.

[17] N. Zhou, J. Wang, X. Liu, L. Yang, and X. Jin, "The digital competence of Chinese higher education students and the linkage with their career adaptability," *Education + Training*, vol. 65, no. 6/7, pp. 939–954, Nov. 2023, doi: 10.1108/ET-08-2022-0315.

[18] K.-A. Allen *et al.*, "Belonging in higher education: a twenty-year systematic review," *Journal of University Teaching and Learning Practice*, vol. 21, no. 5, pp. 1–55, Apr. 2024, doi: 10.53761/s2he6n66.

[19] G. Dost and L. M. Smith, "Understanding higher education students' sense of belonging: a qualitative meta-ethnographic analysis," *Journal of Further and Higher Education*, vol. 47, no. 6, pp. 822–849, Jul. 2023, doi: 10.1080/0309877X.2023.2191176.

[20] R. F. Baumeister and M. R. Leary, "The need to belong: desire for interpersonal attachments as a fundamental human motivation," *Psychological Bulletin*, vol. 117, no. 3, pp. 497–529, May 1995, doi: 10.1037/0033-2909.117.3.497.
[21] K.-A. Allen, D. L. Gray, R. F. Baumeister, and M. R. Leary, "The need to belong: a deep dive into the origins, implications, and future of a foundational construct," *Educational Psychology Review*, vol. 34, no. 2, pp. 1133–1156, Jun. 2022, doi: 10.1007/s10648-021-09633-6.
[22] M. Y. Ahn and H. H. Davis, "Students' sense of belonging and their socio-economic status in higher education: a quantitative approach," *Teaching in Higher Education*, vol. 28, no. 1, pp. 136–149, Jan. 2023, doi: 10.1080/13562517.2020.1778664.
[23] E. L. van Gijn-Grosvenor and P. Huisman, "A sense of belonging among Australian university students," *Higher Education Research & Development*, vol. 39, no. 2, pp. 376–389, Feb. 2020, doi: 10.1080/07294360.2019.1666256.
[24] M. L. Pedler, R. Willis, and J. E. Nieuwoudt, "A sense of belonging at university: student retention, motivation and enjoyment," *Journal of Further and Higher Education*, vol. 46, no. 3, pp. 397–408, Mar. 2022, doi: 10.1080/0309877X.2021.1955844.
[25] M. Suhlmann, K. Sassenberg, B. Nagengast, and U. Trautwein, "Belonging mediates effects of student-university fit on well-being, motivation, and dropout intention," *Social Psychology*, vol. 49, no. 1, pp. 16–28, Jan. 2018, doi: 10.1027/1864-9335/a000325.
[26] J. M. Dopmeijer *et al.*, "The role of performance pressure, loneliness and sense of belonging in predicting burnout symptoms in students in higher education," *PLoS ONE*, vol. 17, no. 12, p. e0267175, Dec. 2022, doi: 10.1371/journal.pone.0267175.
[27] H. H. Yildirim, J. Zimmermann, and K. Jonkmann, "The importance of a sense of university belonging for the psychological and academic adaptation of international students in Germany," *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, vol. 53, no. 1–2, pp. 15–26, Jan. 2021, doi: 10.1026/0049-8637/a000234.
[28] R. K. Ibrahim *et al.*, "The mediating effect of digital literacy and self-regulation on the relationship between emotional intelligence and academic stress among university students: a cross-sectional study," *BMC Medical Education*, vol. 24, no. 1, p. 1309, Nov. 2024, doi: 10.1186/s12909-024-06279-0.
[29] D. Pipuš, "Managing digital stress: emotional intelligence as a key to coping and learning," in *Proceedings of the 7th World Conference on Education and Teaching*, Jul. 2025, pp. 100–110, doi: 10.33422/etconf.v4i1.1128.
[30] M. Händel, M. Stephan, M. Gläser-Zikuda, B. Kopp, S. Bedenlier, and A. Ziegler, "Digital readiness and its effects on higher education students' socio-emotional perceptions in the context of the COVID-19 pandemic," *Journal of Research on Technology in Education*, vol. 54, no. 2, pp. 267–280, Mar. 2022, doi: 10.1080/15391523.2020.1846147.
[31] R. Huttayavilaiphan, "Digital competence and anxiety in Thai university English education: impacts on teachers and students," *World Journal of English Language*, vol. 15, no. 1, pp. 225–251, Sep. 2024, doi: 10.5430/wjel.v15n1p225.
[32] X. Wang, R. Zhang, Z. Wang, and T. Li, "How does digital competence preserve university students' psychological well-being during the pandemic? An investigation from self-determined theory," *Frontiers in Psychology*, vol. 12, p. 652594, Apr. 2021, doi: 10.3389/fpsyg.2021.652594.
[33] C. G. A. P. Vargas, J. P. M. Muro, J. W. P. Delgado, D. K. E. Carrasco, A. F. Cueva, and B. G. Acosta-Enriquez, "Mediating role of digital skills and mobile self-efficacy in the stress and academic engagement of Peruvian university students in postpandemic virtual environments," *BMC Psychology*, vol. 12, no. 1, p. 481, Sep. 2024, doi: 10.1186/s40359-024-01982-5.
[34] N. Imjai, S. Aujirapongpan, J. Jutidharabongse, and B. Usman, "Impacts of digital connectivity on Thailand's Generation Z undergraduates' social skills and emotional intelligence," *Contemporary Educational Technology*, vol. 16, no. 1, p. ep487, Jan. 2024, doi: 10.30935/cedtech/14043.
[35] A. Dirin, M. Nieminen, T. H. Laine, L. Nieminen, and L. Ghalebani, "Emotional contagion in collaborative virtual reality learning experiences: an eSports approach," *Education and Information Technologies*, vol. 28, no. 11, pp. 15317–15363, Nov. 2023, doi: 10.1007/s10639-023-11769-7.
[36] X. Yang and J. Du, "The effect of teacher self-efficacy, online pedagogical and content knowledge, and emotion regulation on teacher digital burnout: a mediation model," *BMC Psychology*, vol. 12, no. 1, p. 51, Jan. 2024, doi: 10.1186/s40359-024-01540-z.
[37] L. Fernández-Rodrigo, A. Erta-Majó, and S. Tirocchi, "10 Facilitators of sense of belonging through digital competences: a qualitative study with educational science students," *Media Education*, vol. 14, no. 2, pp. 25–40, Dec. 2023, doi: 10.36253/me-14885.
[38] S. Yi, Y. Zhang, Y. Lu, and R. Shadiev, "Sense of belonging, academic self-efficacy and hardiness: their impacts on student engagement in distance learning courses," *British Journal of Educational Technology*, vol. 55, no. 4, pp. 1703–1727, Jul. 2024, doi: 10.1111/bjet.13421.
[39] K.-A. Allen, M. L. Kern, C. S. Rozek, D. M. McInerney, and G. M. Slavich, "Belonging: a review of conceptual issues, an integrative framework, and directions for future research," *Australian Journal of Psychology*, vol. 73, no. 1, pp. 87–102, Jan. 2021, doi: 10.1080/00049530.2021.1883409.
[40] Y. Liu, B. Zeng, and L. Chang, "Examining the links between sense of belonging, conflict resolution skills, emotional intelligence, and life satisfaction in Chinese universities," *BMC Psychology*, vol. 13, no. 1, p. 431, Apr. 2025, doi: 10.1186/s40359-025-02742-9.
[41] B. Michalec *et al.*, "A scoping review of emotional contagion research with human subjects: identifying common trends of previous research and potential areas for future research," *Frontiers in Psychology*, vol. 16, p. 1573375, May 2025, doi: 10.3389/fpsyg.2025.1573375.
[42] A. S. Dias-Broens, M. Meeuwisse, and S. E. Severiens, "The definition and measurement of sense of belonging in higher education: a systematic literature review with a special focus on students' ethnicity and generation status in higher education," *Educational Research Review*, vol. 45, p. 100622, Nov. 2024, doi: 10.1016/j.edurev.2024.100622.
[43] C. J. Fong *et al.*, "A scoping review of the associations between sense of belonging and academic outcomes in postsecondary education," *Educational Psychology Review*, vol. 36, no. 4, p. 138, Dec. 2024, doi: 10.1007/s10648-024-09974-y.
[44] V. Basilotta-Gómez-Pablos, M. Matarranz, L.-A. Casado-Aranda, and A. Otto, "Teachers' digital competencies in higher education: a systematic literature review," *International Journal of Educational Technology in Higher Education*, vol. 19, no. 1, p. 8, Dec. 2022, doi: 10.1186/s41239-021-00312-8.
[45] F.-I. Revuelta-Domínguez, J. Guerra-Antequera, A. González-Pérez, M.-I. Pedrera-Rodríguez, and A. González-Fernández, "Digital teaching competence: a systematic review," *Sustainability*, vol. 14, no. 11, p. 6428, May 2022, doi: 10.3390/su14116428.
[46] R. B. Kline, *Principles and practice of structural equation modeling*, 4th ed. New York: Guilford Press, 2016.
[47] B. M. Byrne, *Structural equation modeling with AMOS*, 3rd ed. New York: Routledge, 2016.
[48] J. F. Hair Jr., W. C. Black, B. J. Babin, and R. E. Anderson, *Multivariate data analysis*, 8th ed. Boston, MA: Cengage Learning, 2019.

[49] M. White, "Sample size in quantitative instrument validation studies: a systematic review of articles published in Scopus, 2021," *Heliyon*, vol. 8, no. 12, p. e12223, Dec. 2022, doi: 10.1016/j.heliyon.2022.e12223.
[50] M. Hoffman, J. Richmond, J. Morrow, and K. Salomone, "Investigating 'sense of belonging' in first-year college students," *Journal of College Student Retention: Research, Theory & Practice*, vol. 4, no. 3, pp. 227–256, Nov. 2002, doi: 10.2190/DRYC-CXQ9-JQ8V-HT4V.
[51] A. K. G. Marx, A. C. Frenzel, D. Fiedler, and C. Reck, "Susceptibility to positive versus negative emotional contagion: first evidence on their distinction using a balanced self-report measure," *PLoS ONE*, vol. 19, no. 5, p. e0302890, May 2024, doi: 10.1371/journal.pone.0302890.
[52] R. M. Baron and D. A. Kenny, "The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations," *Journal of Personality and Social Psychology*, vol. 51, no. 6, pp. 1173–1182, 1986, doi: 10.1037/0022-3514.51.6.1173.
[53] X. Zhao, J. G. Lynch, and Q. Chen, "Reconsidering Baron and Kenny: myths and truths about mediation analysis," *Journal of Consumer Research*, vol. 37, no. 2, pp. 197–206, Aug. 2010, doi: 10.1086/651257.

BIOGRAPHIES OF AUTHORS

Mohamed Ali Nemt-allah is an Educational Psychology and Statistics Department Lecturer at the Faculty of Education, Al-Azhar University, Tafhna Al-Ashraf, Egypt. His expertise centers on the intersection of psychology and education, emphasizing statistical methods in educational research and practice. His professional responsibilities encompass teaching, research, and student academic development in educational psychology and statistics. Dr. Nemt-allah contributes to advancing quantitative methodologies in educational research, helping bridge theoretical psychological concepts with practical educational applications through rigorous statistical analysis and interpretation. He can be contacted at email: mohamednamatallah.2026@azhar.edu.eg.

Ghada Mahros Abdelhafiez is an assistant professor of mental health at the Faculty of Education for Girls, Al-Azhar University, Assiut, Egypt. Her work promotes psychological and cognitive balance among university students through supportive educational environments. She integrates mental health concepts into curricula, supervises counseling programs and preventive initiatives addressing anxiety and depression, and conducts applied research on psychological resilience and emotional intelligence. She develops training and guidance programs that enhance communication skills, emotion regulation, and stress adaptation, contributing to students' academic success and professional readiness. She can be contacted at email: Ghada.Mahros12@azhar.edu.eg.

Randa Rabie Abdelbadie is an assistant professor of educational psychology at the Faculty of Education for Girls, Al-Azhar University, Assiut, Egypt. Her research focuses on psychological factors influencing academic learning, including achievement motivation, self-regulated learning, thinking strategies, problem-solving, and cognitive skills. She integrates contemporary educational psychology into curricula, designs training programs targeting positive thinking, emotional awareness, time management, and self-motivation, and creates psychologically supportive learning environments that foster confidence, creativity, and active participation. Her work contributes to developing educational policies and enhancing students' academic and professional development. She can be contacted at email: RandaBakr1342.el@azhar.edu.eg.

Soma Abdelrazek Elfeshawy a lecturer in mental health at the Department of Education, Faculty of Humanities, Al-Azhar University, Tafhna Al-Ashraf, Egypt. She chairs the Statistical Analysis Committee in the faculty's Measurement and Evaluation Unit and is a charitable Al-Azhar Sohba Kheir Association member. Her work focuses on community mental health awareness, workplace psychological support, child and adolescent development disorders, student mental health education, and research on human behavior and psychological problems. She develops guidance and training programs addressing stress, depression, and anxiety while fostering positive personality traits including self-confidence, effectiveness, optimism, creativity, and well-being. She can be contacted at email: somaelfeshawy.8@azhar.edu.eg.

Sara Awadallah Mohammed is a lecturer in the Department of Psychology, Faculty of Humanities, Al-Azhar University, Tafhna Al-Ashraf, Egypt. She focuses on promoting mental health through education, counseling, and research, enhancing psychological awareness and positive adaptation skills. Her expertise includes psychological counseling and student support, academic teaching, psychological assessment and clinical diagnosis using various instruments, institutional participation in quality assurance committees, and professional development. She holds a diploma in clinical psychology and conducts research in mental health, positive psychology, special needs populations, and counseling programs to support students' personal growth and academic success. She can be contacted at email: saramohammed.7124@azhar.edu.eg.

Ashraf Ragab Ibrahim is an Educational Psychology and Statistics Department lecturer at the Faculty of Education, Al-Azhar University, Tafhna Al-Ashraf, Egypt. He earned his Ph.D. in Educational Psychology with specialization in measurement and evaluation. His research portfolio encompasses psychometrics, scale development, and investigating the psychological impacts of educational technologies, including artificial intelligence applications in educational environments. Ibrahim's scholarly work examines academic and psychological variables in educational contexts, offering valuable insights into educational assessment and evaluation methodologies. He can be contacted at email: AshrafIbrahem.26@azhar.edu.eg.