International Journal of Advanced Research in Education and Society
e-ISSN: 2682-8138 | Vol. 8, No. 2, 620-632, 2026
https://asianscholarsnetwork.com/asnet-journals

Emotional Engagement and STEM-Integrated ESL Learning: A Psychological Perspective

Fariha Diyana Awang Ali[1*], Rashidin Idris[2], Khairil Bariyyah Hassan[3], Nur Anis Munirah Elias[4], Norazlina Hanim Shamsudin[5], Marina Mohamad Amir[3], Ahmad Salahuddin M Azizan[6], Kamariah Hussein[7]

[1] Faculty of Education, Open University Malaysia, Malaysia
[2] Department of Social Sciences, Faculty of Education and Social Sciences, Universiti Selangor, Malaysia
[3] Department of Computing, Faculty of Communication, Visual Art and Computing, Universiti Selangor, Malaysia
[4] Faculty of Education and Humanities, UNITAR International University, Malaysia
[5] Department of Business Management and Sports Industry, Faculty of Business and Accountancy, Universiti Selangor, Malaysia
[6] Faculty of Social Sciences and Humanities, Open University Malaysia, Malaysia
[7] Faculty of Technology and Applied Science, Open University Malaysia, Malaysia

*Corresponding Author: fariha_diyana@oum.edu.my

Received: 7 February 2026 | Accepted: 21 April 2026 | Published: 1 May 2026

DOI: https://doi.org/10.55057/ijares.2026.8.2.50

Abstract: *Emotional engagement has surfaced as a vital psychological category affecting second language learning, particularly in learner-focussed and interdisciplinary settings. Integrated STEM disciplines (science, technology, engineering, and mathematics) are becoming increasingly popular in English as a Second Language (ESL), particularly as a pedagogical approach that encourages meaningful use of language through real-world problem-solving and inquiry-based tasks. Existing studies exploring cognitive and linguistic outcomes of STEM-integrated ESL learning are plentiful; limited attention, however, has been paid to the psychological factor, emotional engagement in similar contexts. This conceptual paper argues that emotional engagement serves as a mediating psychological English-as-a-second language (ESL) construct between learning integrated science, technology, engineering and mathematics (STEM). Using educational psychology theories, in particular emotional engagement theory, control-value theory of achievement emotions and sociocultural approaches to learning, this paper presents a conceptual framework designed to connect STEM-oriented instructional approaches with learners' emotional engagement and ESL learning outcomes. It argues that STEM tasks that facilitate emotional engagement can generate positive emotions including enjoyment, interest and confidence which in turn increase ESL learners' willingness to communicate, language use and sustained engagement with ESL learning. Pedagogical, curriculum design and future empirical research implications are presented.*

Keywords: Emotional Engagement; STEM-integrated ESL; Educational Psychology; Learner Emotions; Interdisciplinary Learning

1. Introduction

Recently, the infusion of Science, Technology, Engineering and Mathematics (STEM) pedagogies into English as a Second Language (ESL) instruction has drawn growing scholarly

interest for their potential to improve cognitive and linguistic outcomes for learners. However, learning by nature is a psychological experiment where affective factors are at play in deciding motivation, engagement and performance. In this perspective, I situate emotional engagement within this paper as a superordinate psychological construct in the context of STEM-integrated ESL learning to provide an analytical framework through which the implications of learners' emotional experiences on their participation and achievement can be examined in integrated contexts.

Even though research into STEM-integrated ESL instruction is growing, the focus of existing studies has mostly been on cognitive achievement, linguistic performance and skills development whilst emotional processes have not received sufficient attention. This gap is striking given the increasing amount of evidence from educational psychology and applied linguistics that emotions play a major role in language learning participation and results (Wang & Xu, 2025; Zhong et al., 2025; Ali et al., 2024). Although affective dimensions are recognised as crucial for language acquisition, recent systematic reviews reveal they have received little attention in ESL research (He et al., 2025; Ali et al., 2024). Therefore, theoretical and empirical inquiry is still needed that places emotional variables at the center of STEM-integrated language learning contexts.

This paper theorises emotional engagement within STEM pedagogical practices as a mediating variable through which to examine ESL learning outcomes. Previous studies revealed a dynamic interplay between emotional aspects (e.g. enjoyment, anxiety, boredom, willingness to communicate) and engagement / language performance (Lin et al., 2025; Wang & Xu, 2025). Nonetheless, few have explored how pedagogical innovations (like STEM integration) produce emotional responses and how such emotions serve as psychological mechanisms that mediate learning.

The most widely accepted ESL instruction methods so far have often been associated with limited emotional involvement such as grammar drills and textbook-based exercises in teacher centre classrooms. These practices may lead to language anxiety, a lack of motivation, and an unwillingness to communicate for learners (Nazarieh, 2025; Lin et al., 2025). On the other hand, STEM-integrated ESL education offers authentic and significant contexts for language use in inquiry-based tasks, problem-solving activities, and collaborative projects. These contexts may encourage positive emotional experiences such as curiosity, enjoyment and a sense of achievement, which improve learner's engagement and participation.

However, current English as a second language (ESL) research has not sufficiently theorised the psychological mechanisms of emotional engagement in STEM-integrated ESL contexts. More recent research has showed a necessity to develop more sophisticated theoretical frameworks for examining how emotions impact engagement patterns in language learning contexts as well as have highlighted the need to investigate how interrelated emotions simultaneously shape aspects of the learning process (Li, 2025). This paper attempts to fill this gap by theorising emotional engagement as a mediating construct from a psychological perspective and by investigating how features in STEM pedagogy activate emotional processes that impact ESL learning outcomes. This framework allows for theory in integrated language education to be developed and has implications regarding designing emotionally motivated STEM-based ESL instruction.

2. Emotional Engagement in Learning: A Psychological Overview

Emotional engagement refers to learners' affective reactions including interest, enjoyment, enthusiasm, confidence and also unpleasant feelings like anxiety and boredom. Such emotions change over the course of learning and influence how intensely and qualitatively learners engage in tasks (Han et al., 2024). Emotional engagement is particularly dynamic in ESL settings where communication demands real-time processing and reveal experiences of wins and losses. This dynamic flow of emotional flow shapes learners' openness to engaging in the language-learning process and their responses to their language-learning experiences (Wang et al., 2024).

Emotional engagement is conceptually different from behavioral and cognitive engagement, although they are often interrelated. It denotes mainly affective reactions of learners prior to the learning process (Han et al., 2024). Motivation and psychological capital interact with emotional engagement to determine the distribution of cognitive effort by learners. Research indicates that both intrinsic motivation and emotional engagement combine to affect academic achievement (Liu et al., 2024).

As learners in ESL must be able to communicate, negotiate meaning and take frequent linguistic risks, emotional states are crucial to learning success. Thus, positive emotional climates promote engagement and experimentation with new language forms (Alrabai & Algazzaz, 2024). It has also demonstrated that teacher emotional support adds to learners' confidence and enjoyment, thus increasing their emotional engagement on tasks in the classroom empowerment. Low support conversely diminishes emotional salience and participation (Alrabai & Algazzaz, 2024).

Positive emotions, such as enjoyment and interest, increase learners' engagement and help them persevere when they face difficulties. They additionally promote superior academic achievement along motivational and emotional lines (Liu et al., 2024). In ESL contexts, emotional literacy assists learners in managing emotions and builds confidence and communicative risk-taking. This results in greater participants´ propensity to speak up during interactive tasks.

Negative emotions especially anxiety and boredom dampen engagement by limiting attention and saturating working memory. This leads to a low willingness to communicate by learners in ESL classrooms (Ali & Mokhtar, 2026; Awang Ali et al., 2025; Wang et al., 2024; Ali & Azamri, 2023). Research on emotional literacy also suggests that boredom and anxiety undermine learners' confidence and motivation to participate in meaningful language use. These feelings can over time hinder the development of language overall.

3. STEM-Integrated ESL Learning as an Emotionally Engaging Context Format

STEM-integrated ESL contexts promote emotional engagement through three main features:

a. Meaning and Relevance
Once integrated in STEM ESL contexts, students are even more emotionally invested in the learning process, and problem-based peer-oriented environments ubiquitous to real-world problems make language learning embedded and relevant for them. When learners are encouraged to think and speak in English, to vocalize thoughts, rationales for their solutions,

and engage jointly in navigating towards the solution, scientific and mathematical reasoning becomes less opaque (Ali & Mokhtar, 2026; Awang Ali et al., 2025; Ali & Azamri, 2023; Su & Guo 2023). The purposeful nature of such tasks worked to raise perceived task value, because students can see the practical relevance of what they are learning. This on-going and inherent truth breeds enjoyment and builds intrinsic motivation so that learning is fluid and relevant.

When English instruction integrated with STEM disciplines within structured motivational frameworks like the ARCS model; Attention, Relevance, Confidence and Satisfaction additional emotional engagement is developed. In this framework, Quintuña and Herrera (2024) argue that a focus on relevance and confidence-building reinforces positive emotional experiences while being sufficient to sustain motivation for an extended period. It is also mentioned by Lee and Stephens (2020), that when students work in English on authentic scientific and technological problems, they start to view language as a purposeful instrument for investigation rather than an isolated subject of learning, hence specifically promoting deep understanding and interdisciplinary connections.

Research also underscores the power of framing English learners as capable participants in rigorous STEM practices. Sultana (2021) Thus, having students participate in experiments or design processes where data is interpreted and problems are collaboratively solved turns language into a tool of which to interact with the world around them. Engagement in this way builds learner agency, boosts self-efficacy and motivation. The perceived task value and intrinsic motivation of students are highly increased when they realize the relationship between learning English and academic or career paths in the field, where they can catch more opportunities.

Not only does doing these amplifies their benefits, but incorporating social-emotional learning strategies and creative elements often found in STEAM. According to Elmi (2020), positive learning and cognitive engagement happen when there are supportive relationships and emotionally responsive practices. In a similar vein, Hawari and Noor (2020) show how hands-on, student-centered and collaborative interdisciplinary projects provide meaningful contexts that build confidence in students and create emotional safety. In concert, these findings suggest that real-world, problem-induced ESL–STEM environments successfully enhance emotional engagement, foster confidence, and maintain intrinsic interest.

b. Collaboration and Social Interaction

Emotional Calibration: STEM-embedded ESL contexts highlight collaboration, socially shared meaning making, and social interaction which result in enhanced emotional engagement. Teaching collaboratively fosters psychologically safe spaces, providing a collective solution-focused learning atmosphere rather than perfectionistic linguistic anxiety (Ali & Mokhtar, 2026; Awang Ali et al., 2025; Idris et al., 2024; Sultana et al., 2021). Likewise, integrated STEM settings emphasize “language-inuse” (Idris et al., 2024; NASEM, 2018) focusing on teacher-facilitated functional communication across multiple modalities while minimizing tension and discomfort around formal accuracy. Focusing on meaningful participation instead of correctness, these approaches strengthen learners’ confidence and further encourage engagement.

Furthermore, peer-based frameworks confer social belonging on students, which drastically reduces fear of negative evaluation (LaCosse et al., 2020). By experiencing and participating together, students start to see academic struggle as normal and common rather than individual

and personalized. Active, project-based learning further supports this emotional engagement by normalizing error making as a part of exploration and growth (Ali & Mokhtar, 2026; Campbell & Damico, 2023). These spaces lower anxiety and foster resilience, enabling students to engage more meaningfully.

Furthermore, integrated and student-centered pedagogical approaches strengthen emotional safety, as they place learning at the core of peer support and group problem-solving (Quintuña & Herrera, 2024). Project-based and multidisciplinary activities develop soft skills and facilitate peer-supportive atmosphere (Hawari & Noor, 2020). These frameworks help learners feel more secure in learning contexts that tend to be high-stakes and performance-based, by making long-term academic work collaborative.

Lastly, social-emotional learning strategies promote emotional engagement as they foster empathy, relationships with opportunity and supportive adults and peers (Elmi, 2020). Well-designed collaborative instructional designs establish inclusive environments in which learners feel supported and less vulnerable to negative judgment (Atobatele et al., 2024). Across these studies, peer interaction serves as a foundational support enabling shared meaning-making, lessening language anxiety and strengthening psychological safety that ultimately empowers learners to confidently participate in STEM-integrated ESL classrooms.

c. Process-Oriented Learning

Process-based learning, with its ethos of exploration, experimentation, iteration and development is key to STEM-integrated ESL contexts that engage learners emotionally. Learning is framed as a developmental practice in this environment instead of a performative chore. Mistakes are normalized as part of the learning process in a natural progression, relieving learners' anxiety around making language mistakes and building up their confidence to participate (Idris et al., 2024).

Such Sadig (2024) describes that this must be the focus and why emotional intelligence strategies within integrate (up to October 2023), encouraging risk taking and perseverance. By learning to work together and be aware of themselves, students are more tolerant of the ups-and-downs that come with deep learning. Fostering a supportive environment, this framework alleviates language anxietyin and recontextualize errors as progressive experiences in both personal and academic growth.

In addition to individual grit and resilience, McCoy describes how pedagogical structures that intentionally promote collaboration by design are quite simply some of the most emotionally engaged at the same time. According to Quintuña and Herrera (2024), integrated and interactive models of learning support shared meaning-making and collective problem-solving. These approaches make a safe psychological place for learning, reduce the fear of negative evaluation (which arises if everyone works only on their own performance) and increase learners' confidence within the socially supporting context.

One engaging finding is that LaCosse et al. highlight the need for belonging in maintaining this engagement. (2020), who find that when students view academic challenges as common and shared experiences, they are more likely to persist. By fostering an iterative mindset where failures are considered opportunities to develop, this approach renders the trial-and-error process more attainable due to its natural fit into methodical learning. In fact, students become independent learners and take risks in learning which motivates them to explore more and to experiment constantly all through their studies.

4. Theoretical Foundations Linking Emotion, STEM, and ESL Learning

This conceptual paper draws on several theoretical perspectives to explain the role of emotional engagement in STEM-integrated ESL learning.
According to control-value theory, the emotions of learners are affected by the perception that they have control over learning tasks and value of tasks. When ESL is integrated into STEM subjects, we likely provide learners more independence to investigate issues and make choices, which may increase their perception and control. Simultaneously, this increases task value perception because real-world relevance of STEM tasks is increased. These factors and others contribute to positive achievement emotions including enjoyment and pride that supports continued engagement and learning (Idris et al., 2024).

From a sociocultural view, learn is mediated by social interaction, tools and cultural practices (Wan Hamedi et al., 2025; Hussein et al., 2025). Emotions in this theory are not individual traits but socially constructed experiences arising from interactions in the classroom. Activities designed to integrate STEM within ESL lessons provide such rich social contexts where emotions are mediated through collaboration, dialogue, and shared problem-solving (Qiu et al., 2025; Idris et al., 2024; Wang, Xin & Chen, 2024; Wang&Ye, 2021). Such emotionally supportive exchanges propel learners through their zone of proximal development and foster both linguistic and cognitive development.

Positive psychology postulates that positive emotions are also instrumental in broadening cognitive and behavioural repertoires of the learner. In the context of language learning, positive emotions (i.e., enjoyment and interest) have been related to learners' willingness to communicate along with resilience (Zong & Yang, 2025). By integrating curiosity and enjoyment of ESL learning with STEM matters, STEM-integrated ESL learning promotes well-being, which is one of the factors supporting long-term language development as documented by LaCosse et al. (2020).

5. Proposed Conceptual Framework

This paper presents a conceptual framework in which STEM-integrated ESL instructional practices are considered as antecedents influencing learners' emotional engagement and, subsequently, mediating ESL learning outcomes based on the theoretical discussion. In the proposed framework:

a) The extent to which learners experience positive emotions toward these features (e.g. inquiry-based instructional tasks, collaboration, real-world problem-solving) has been shown to impact their engagement and learning outcomes in STEM-integrated instruction environments.
b) They classify emotional engagement in terms of positive emotions including interest, enjoyment and confidence but also reduced anxiety.
c) ESL outcomes include willingness to communicate, language proficiency, and sustained engagement.
d) Emphasis on emotional engagement could be that underlying critical psychological mechanism elucidating the rationale of how and why STEM-integrated ESL learning works to improve language learning outcomes.

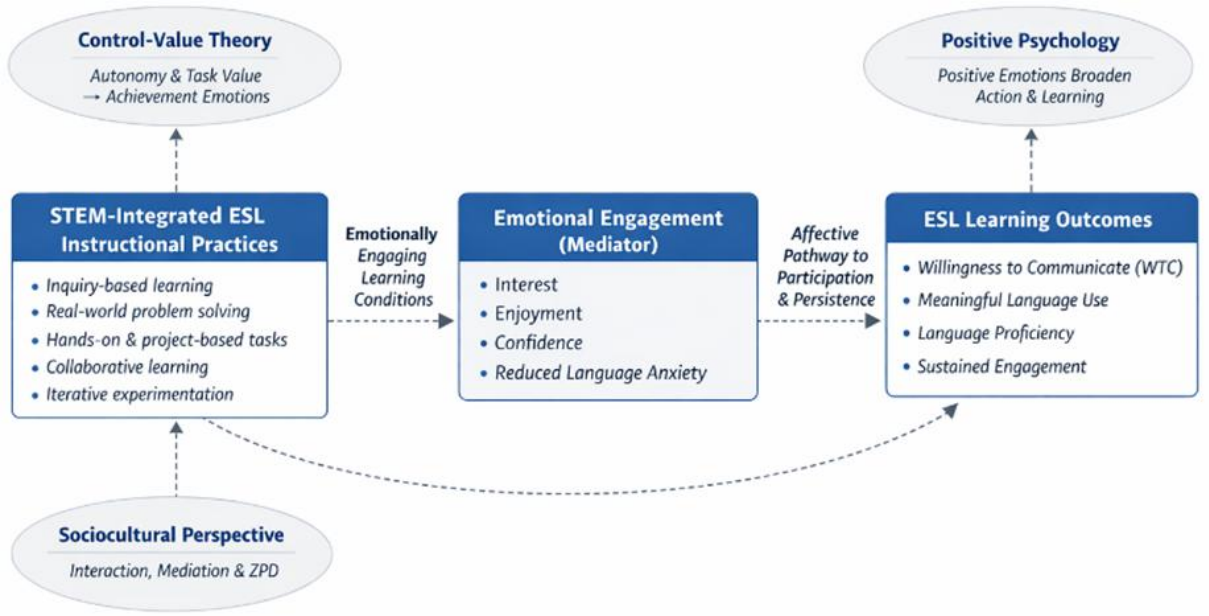

Figure 1: The proposed conceptual diagram

STEM-integrated ESL instruction, emotional engagement and ESL learning outcomes. Some examples of strategies that make use of STEM-integrative instructional practices: inquiry-based tasks, solving real-world problems, collaborative learning and hands-on projects are STEM pedagogical input that shape how learners experience the classroom. The proposed practices aim indirectly to impact ESL learning drawing on psychological mediating variable which is emotional engagement. The levels of emotional engagement are reflected in learners' interest, enjoyment, confidence and low level of language anxiety which arises while undertaking any of the STEM based ESL activities. By having positive emotions as learners, they are ready to talk and learn the English language in a meaningful way by not giving up on the whole sequence. In conclusion, this framework posits effective and emotionally engaging STEM-integrated instruction facilitates ESL learning outcomes that are contextualised within the learners' emotional experiences in interdisciplinary language learning contexts.

6. Directions for Future Research

Future research needs to transcend conceptual conversations by offering empirical evidence on emotional engagement as a type of psychological mechanism that connects STEM-integrated pedagogy with ESL outcomes. These include systematically comparing traditional and STEM-based ESL classrooms, employing validated emotion measures (e.g., enjoyment, anxiety) rooted in frameworks for understanding the personal experience such as Pekrun's control value theory (Pekrun, 2021), and applying both quantitative and qualitative methods to explore how emotions shape communication and performance (Dewaele & Li, 2020; Reschly et al., 2020). Studies should also investigate differences between age groups, cultural and educational settings to evaluate the generalisability of emotional engagement (English, 2021; Wang et al., 2021), while longitudinal designs are required to establish whether positive emotional experiences result in sustained language development (Fredrickson, 2020). In addition, the mediation of classroom emotional climate by teacher behaviors (Ryan & Deci, 2020), teaching pathways for specific STEM tasks that effectively engage students must be critically considered to move towards an evidence-based, context-sensitive and pedagogically effective ESL practices (English, 2021; Pekrun, 2021).

Acknowledgement
The authors would like to express sincere gratitude to everyone who contributed, both directly and indirectly, to the completion of this study.

Conflict of Interest Statement
The authors declare that there is no conflict of interest regarding the publication of this study.

References

Ali, F.D.A & Mokhtar, M. (2026). Technology Integration in Kindergarten ESL Classrooms: Teachers' Experiences, Pedagogical Adaptation, and Well-Being. International Journal of Advanced Research in Education and Society, 8 (2), 550-555. https://doi.org/10.55057/ijares.2026.8.2.43

Ali, F.D.A, Idris, R., Zaid, N.N.M., Amir, M.M., Shuhaimi, N.I.M & Mutalib, A. (2024). Revolutionizing ESL Mastery: The Transformative Impact of Blended Learning on Language Proficiency in Selangor, International Journal of Academic Research In Progressive Education And Development, 13 (3), 3034-3050. http://dx.doi.org/10.6007/IJARPED/v13-i3/22394

Ali, F. D. A. & Azamri, N.M. (2023). The Students' Perception of the Implementation of Online Collaborative Learning in ESL Writing Class, Asian Journal of Research in Education and Social Sciences, 5(3). e-ISSN: 2682-8502

Alrabai, F., & Algazzaz, W. (2025). Testing experimental-based models on the influence of teacher emotional support on students' basic psychological needs, emotions, and emotional engagement. *Applied Linguistics*. https://doi.org/10.1093/applin/amaf036.

AlTwijri, L., & Alghizzi, T. (2024). Investigating the integration of artificial intelligence in English as foreign language classes for enhancing learners' affective factors: A systematic review. *Heliyon*, 10. https://doi.org/10.1016/j.heliyon.2024.e31053.

Atobatele, F. A., Akintayo, O. T., & Mouboua, P. D. (2024). The impact of instructional design on language acquisition in multilingual STEM classrooms. Engineering Science & Technology Journal, 5(5), 1643-1656.

Awang Ali, F. D., Muhd Zaimi, F. H., Mohd Bakhri, N. H., Nazri, N. S., Zakaria, N. L., & Handeri, A. Z. (2025). Challenges in phraseology: An ESL study at SPACE UTM. International Journal of Education, Psychology and Counseling, 10(59), 533–543.

Bakır-Yalçın, E., & Usluel, Y. (2023). Investigating the antecedents of engagement in online learning: do achievement emotions matter? *Education and Information Technologies*, 29, 3759 - 3791. https://doi.org/10.1007/s10639-023-11995-z.

Barba, D., Grignoli, D., & D'Ambrosio, M. (2022). Emotional syntax: from social construction to virtual function. Society Register, 6, 25 - 40. https://doi.org/10.14746/sr.2022.6.4.02.

Bowen, B., & Peterson, B. (2018). Exploring Authenticity Through an Engineering-Based Context in a Project-Based Learning Mathematics Activity. Journal of Pre-College Engineering Education Research (J-PEER). https://doi.org/10.7771/2157-9288.1073.

Campbell, L. O., & Damico, N. (2023). Investigating an instructional model for integrated STEM in teacher education. Journal of STEM Teacher Education, 58(1), 6.

Chen, H., & Zhang, M. (2022). The relationship between basic psychological needs satisfaction and university students' academic engagement: The mediating effect of emotional intelligence. *Frontiers in Psychology*, 13. https://doi.org/10.3389/fpsyg.2022.917578

Chiu, C. (2025). Investigating Student Engagement in an ESP Sophomore English Course in Taiwan. *Journal of Language Teaching and Research*. https://doi.org/10.17507/jltr.1603.06.

Dai, K., & Wang, Y. (2024). Enjoyable, anxious, or bored? Investigating Chinese EFL learners' classroom emotions and their engagement in technology-based EMI classrooms. *System*. https://doi.org/10.1016/j.system.2024.103339.

Derakhshan, A. (2022). Revisiting Research on Positive Psychology in Second and Foreign Language Education: Trends and Directions. Language Related Research. https://doi.org/10.52547/lrr.13.5.2.

Dewaele, J. & Li, C. (2020) Emotions in Second Language Acquisition: a critical review and research agenda. Foreign Language World 196 (1), pp. 34-49. ISSN 1004-5112.

Dirk, J., & Nett, U. (2022). Postscript: Uncovering the situational impact in educational settings: Studies on motivational and emotional experiences. *Learning and Instruction*. https://doi.org/10.1016/j.learninstruc.2022.101661.

Dovchin, S. (2021). Translanguaging, Emotionality, and English as a Second Language Immigrants: Mongolian Background Women in Australia. *TESOL Quarterly*. https://doi.org/10.1002/tesq.3015.

Elmi, C. (2020). Integrating social emotional learning strategies in higher education. European journal of investigation in health, psychology and education, 10(3), 848-858.

English, L. D. (2021). Advancing elementary and middle school STEM education. International Journal of STEM Education, 8, 45. https://doi.org/10.1007/s10763-017-9802-x

Estévez, I., Rodríguez-Llorente, C., Piñeiro, I., González-Suárez, R., & Valle, A. (2021). School Engagement, Academic Achievement, and Self-Regulated Learning. *Sustainability*. https://doi.org/10.3390/su13063011.

Fernández-Cárdenas, J., Wegerif, R., Mercer, N., & Rojas-Drummond, S. (2015). Re-Conceptualizing "Scaffolding" and the Zone of Proximal Development in the Context of Symmetrical Collaborative Learning. The Journal of Classroom Interaction, 50, 54-72.

Fredrickson B. L. (2004). The broaden-and-build theory of positive emotions. Philosophical transactions of the Royal Society of London. Series B, Biological sciences, 359(1449), 1367–1378. https://doi.org/10.1098/rstb.2004.1512

Forsblom, L., Pekrun, R., Loderer, K., & Peixoto, F. (2021). Cognitive appraisals, achievement emotions, and students' math achievement: A longitudinal analysis. Journal of Educational Psychology. https://doi.org/10.1037/edu0000671.

Garner, P., Gabitova, N., Gupta, A., & Wood, T. (2017). Innovations in science education: infusing social emotional principles into early STEM learning. *Cultural Studies of Science Education*, 13, 889 - 903. https://doi.org/10.1007/s11422-017-9826-0.

Gehlot, L. (2021). Cognitive Development by Zone of Proximal Development (ZPD). Journal of Education Culture and Society. https://doi.org/10.15503/jecs2021.2.432.444.

Han, L., Osman, S. Z. M., & Che, J. (2024). Impact of online learning interactive experience on language learners' emotional engagement. Eurasian Journal of Applied Linguistics, 10(1), 115–126. http://dx.doi.org/10.32601/ejal.10111

Hawari, A. D. M., & Noor, A. I. M. (2020). Project Based Learning Pedagogical Design in STEAM Art Education. Asian Journal of University Education, 16(3), 102-111.

He, P., Hamid, A. H. A., & Nor, M. Y. M. (2025). Investigating Affective Learning Within Teaching Strategies for ESL College Students: A Systematic Review. International Journal of Learning, Teaching and Educational Research, 24(5).

Hillman, S., Elsheikh, A., Abbas, N., & Scott, B. (2024). Teaching English in an engineering international branch campus: a collaborative autoethnography of our emotion labor. *International Review of Applied Linguistics in Language Teaching*, 62, 1349 - 1374. https://doi.org/10.1515/iral-2024-0078.

Hopkyns, S., & Dovchin, S. (2024). Translanguaging and emotionality of English as a second

language (ESL) teachers. *International Review of Applied Linguistics in Language Teaching*, 62, 1257 - 1278. https://doi.org/10.1515/iral-2024-0094.

Hussein, K., Awang Ali, F. D., Ne'matullah, K. F., Khairundin, S. A., Shamsudin, N. H., & Shanmugam, J. (2025). Adapting pedagogical scaffolding for digital natives through technology. International Journal of Modern Education, 7(26), 766–776.

Idris, R., Bacotang, J., Safar, M., Abdurahman, M. F. K., Hamid, H. A., Salleh, M. A., ... & Sulaiman11, M. A. (2024). Redefining Horizons: Delving into Personality Trends and Diverse Challenges in STEM Education Across Malaysia. International Journal of Advanced Research in Future Ready Learning and Education, 13(1). 2083-2095. e-ISSN: 2226-6348

Keller, M., Rinas, R., Janke, S., Dickhäuser, O., Dresel, M., & Daumiller, M. (2024). Intertwining self-efficacy, basic psychological need satisfaction, and emotions in higher education teaching: A micro-longitudinal study. *Social Psychology of Education*, 27, 3119 - 3152. https://doi.org/10.1007/s11218-024-09888-1

LaCosse, J., Canning, E., Bowman, N., Murphy, M., &Logel, C. (2020). A social-belonging intervention improves STEM outcomes for students who speak English as a second language. *Science Advances*, 6. https://doi.org/10.1126/sciadv.abb6543.

Lee, O., & Stephens, A. (2020). English learners in STEM subjects: Contemporary views on STEM subjects and language with English learners. Educational researcher, 49(6), 426-432.

Leersnyder, J., Mesquita, B., & Boiger, M. (2021). What Has Culture Got to Do with Emotions? 62-119. https://doi.org/10.1093/oso/9780190079741.003.0002.

Li, C. (2024). Task-specific emotions in L2 writing: A control-value theory approach from a positive psychology perspective. Studies in Second Language Learning and Teaching. https://doi.org/10.14746/ssllt.43371.

Li, M. (2024). Modeling the role of rapport and classroom climate in EMI students' classroom engagement. Acta Psychologica, 245, 104209.

Lin, Y., Wang, B., Zhang, G., & Su, Y. (2025). The relations among foreign language anxiety, academic buoyancy and willingness to communicate in EFL classroom. Frontiers in Psychology, 16, 1634054.

Li, L., Gow, A., & Zhou, J. (2020). The Role of Positive Emotions in Education: A Neuroscience Perspective. *Mind, Brain, and Education*, 14, 220-234. https://doi.org/10.1111/mbe.12244.

Linnenbrink-Garcia, L., Patall, E., & Pekrun, R. (2016). Adaptive Motivation and Emotion in Education. *Policy Insights from the Behavioral and Brain Sciences*, 3, 228 - 236. https://doi.org/10.1177/2372732216644450.

Liu, Y. S., & Chen, Y. (2024). The impacts of learning motivation, emotional engagement and psychological capital on academic performance in a blended learning university course. *Frontiers in Psychology*, 15. https://doi.org/10.3389/fpsyg.2024.1357936.

Liu, Y., Zhang, H., Jiang, M., Chen, J., & Wang, M. (2024). A systematic review of research on emotional artificial intelligence in English language education. *System*. https://doi.org/10.1016/j.system.2024.103478.

Lo, M. (2024). The intraindividual dynamics of university students' motivation and emotions: The role of autonomy-supportive learning climates and learning activities. The British journal of educational psychology. https://doi.org/10.1111/bjep.12703.

Mesquita, B., & Boiger, M. (2014). Emotions in Context: A Sociodynamic Model of Emotions. Emotion Review, 6, 298 - 302. https://doi.org/10.1177/1754073914534480.

Miao, J., Tian, X., Zhang, L., Zhang, B., &, L. (2025). An analysis of the empirical research on SL/FL teaching and learning based on positive psychology: a systematic literature review. BMC Psychology, 13. https://doi.org/10.1186/s40359-025-02576-5.

Mihai, M., Albert, C., Mihai, V., & Dumitras, D. (2022). Emotional and Social Engagement in the English Language Classroom for Higher Education Students in the COVID-19 Online Context. *Sustainability*. https://doi.org/10.3390/su14084527

Nazarieh, M. (2025). Enhancing ESL learning through mindfulness: Strategies for engagement and emotional well-being. Communication and Linguistics Studies, 11(2), 53-58.

Ou, C., Xu, S., Lu, C., Zhou, S., & Xiao, H. (2021). The Effects of Autonomy-Supportive and Controlling Teaching Behaviors on Primary Students' Stem Learning Performance and Flow Experience. Journal of Baltic Science Education. https://doi.org/10.33225/jbse/21.20.942.

Ozturk, O. (2021). STEM Integrated English Lessons. SALEE: Study of Applied Linguistics and English Education. https://doi.org/10.35961/salee.v2i02.248.

Padilla, S. X. Q., & Caldas, V. A. H. (2024). Modelo ARCS y neurociencia educativa: Enfoque transformador para la enseñanza integrada de inglés y STEM. Revista Multidisciplinaria Voces De América Y El Caribe, 1(2), 119-142.

Parisa Abdolrezapour, Mariusz Kruk & Nasim Ghanbari (2025) New horizons in emotional literacy and second language learning, The Language Learning Journal, 53:3, 287-291. https://doi.org/10.1080/09571736.2025.2473122

Park, S., Holloway, S., Arendtsz, A., Bempechat, J., & Li, J. (2011). What Makes Students Engaged in Learning? A Time-Use Study of Within- and Between-Individual Predictors of Emotional Engagement in Low-Performing High Schools. Journal of Youth and Adolescence, 41, 390 - 401. https://doi.org/10.1007/s10964-011-9738-3.

Parker, P., Perry, R., Hamm, J., Chipperfield, J., Pekrun, R., Dryden, R., Daniels, L., & Tze, V. (2021). A motivation perspective on achievement appraisals, emotions, and performance in an online learning environment. International Journal of Educational Research, 108, 101772. https://doi.org/10.1016/j.ijer.2021.101772.

Pekrun, R., Marsh, H. W., Elliot, A. J., Stockinger, K., Perry, R. P., Vogl, E., Goetz, T., van Tilburg, W. A. P., Lüdtke, O., & Vispoel, W. P. (2023). A three-dimensional taxonomy of achievement emotions.Journal of Personality and Social Psychology, 124(1), 145–178. https://doi.org/10.1037/pspp0000448

Pekrun, R. (2021). The control-value theory of achievement emotions: Recent developments and future directions. Educational Psychology Review, 33, 1–31. https://doi.org/10.1007/s10648-006-9029-9

Pekrun, R. (2024). Control-Value Theory: From Achievement Emotion to a General Theory of Human Emotions. Educational Psychology Review, 36. https://doi.org/10.1007/s10648-024-09909-7.

Petrović, D., Pedić Duić, P., & Pavin Ivanec, T. (2025). Student-reported early-career STEM teachers' classroom management, emotional engagement, and students' interest in subject: a multilevel analysis: D. Petrović et al. European journal of psychology of education, 40(3), 73.

Pierson, A., Clark, D., & Brady, C. (2021). Scientific modeling and translanguaging: A multilingual and multimodal approach to support science learning and engagement. Science Education. https://doi.org/10.1002/sce.21622.

Prayogo, A., Khotimah, K., Istiqomah, L., & Maharsi, I. (2023). Students' emotional engagement in online classes: a conceptual framework. The International Journal of Information and Learning Technology. https://doi.org/10.1108/ijilt-04-2023-0052.

Putwain, D., Schmitz, E., Wood, P., & Pekrun, R. (2020). The role of achievement emotions in primary school mathematics: Control-value antecedents and achievement outcomes. The British journal of educational psychology. https://doi.org/10.1111/bjep.12367.

Qiu, X., Lo, Y., Ge, H.,&Bui, G. (2025). Second language learner engagement in computer-mediated interactive oral tasks. Studies in Second Language Learning and Teaching. https://doi.org/10.14746/ssllt.41317.

Reschly, A. L., Huebner, E. S., Appleton, J. J., & Antaramian, S. (2020). Engagement as flourishing: The contribution of positive emotions and relationships. School Psychology, 35(4), 282–295. https://doi.org/10.1002/pits.20306

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination perspective. Contemporary Educational Psychology, 61, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Sadiqzade, Z. (2024). Fostering Emotional Intelligence in Language Learners. Journal of Azerbaijan Language and Education Studies, 1(1), 67-76.

Sapuan, N. A., Awang Ali, F. D., Mohamed Musli, A. B., & Idris, R. (2025). Conquering the fear: Navigating second language speaking anxiety among ESL learners in a Selangor private university. International Journal of Research and Innovation in Social Science, 9(3), 5146–5152. https://doi.org/10.47772/IJRISS.2025.903SEDU0371

Shao, K., Stockinger, K., Marsh, H., & Pekrun, R. (2023). Applying control-value theory for examining multiple emotions in L2 classrooms: Validating the Achievement Emotions Questionnaire – Second Language Learning. Language Teaching Research, 30, 288 - 316. https://doi.org/10.1177/13621688221144497.

Shan, Q., Xu, Y., Yusoff, Y., & Mutalib, A. (2025). EFL university students' emotional engagement in AI-mediated learning contexts: A sentiment analysis. *British Educational Research Journal*. https://doi.org/10.1002/berj.4193.

Shen, H., Ye, X., Zhang, J., & Huang, D. (2024). Investigating the role of perceived emotional support in predicting learners' well-being and engagement mediated by motivation from a self-determination theory framework. *Learning and Motivation*. https://doi.org/10.1016/j.lmot.2024.101968.

Steen-Utheim, A., & Wittek, A. (2017). Dialogic feedback and potentialities for student learning. Learning, Culture and Social Interaction, 15, 18-30. https://doi.org/10.1016/j.lcsi.2017.06.002.

Su, Q., & Guo, S. (2023). STEM-based principles and strategies to cultivate students' social and emotional learning. STEM Education Review. https://doi.org/10.54844/stemer.2023.0374.

Suardipa, I. (2020). Proses Scaffolding Pada Zone of Proximal Development (ZPD) Dalam Pembelajaran., 4, 79-92.

Sultana, N., Kahwaji, H., & Kurup, P. (2021). The influence of teaching English in STEM education for ESL learners amidst a changing world after COVID19. International Journal of Learning and Teaching, 7 (2), 175-180.

Thomas, M., & Rosenberg, A. (2024). Teachable moments in support of K-12 social and emotional learning in the TESOL Practicum. TESOL Journal. https://doi.org/10.1002/tesj.911.

Tran, T., Nguyen, T., & Huynh, A. (2024). Exploring the Social and Emotional Aspects of Teaching and Learning English As A Foreign Language. VNU Journal of Foreign Studies. https://doi.org/10.63023/2525-2445/jfs.ulis.5185.

Tu, Y., Wang, Q., & Huang, C. (2025). Facilitating Students' Emotional Engagement in Synchronous Online Learning: A Systematic Literature Review. *The International Review of Research in Open and Distributed Learning*. https://doi.org/10.19173/irrodl.v26i1.7732.

Wan Hamedi, W. H., Awang Ali, F. D., Abdullah, W. Y., Ab Hamid, H., Shuhaimi, N. I. M., & Amir, M. M. (2025). AI as a digital scaffold: An integrative review of Vygotsky's zone of proximal development in modern education. International Journal of Modern

Education, 7(26), 579–589.
Wang, R., & Xu, Q. (2025). Emotional intelligence and language learning performance of EFL learners in China: chain mediating effects of willingness to communicate and foreign language learning boredom. Frontiers in Psychology, 16, 1702948.
Wang, P., Ganushchak, L., Welie, C., & van Steensel, R. (2024). The dynamic nature of emotions in language learning context: Theory, method, and analysis. Educational Psychology Review, 36. https://doi.org/10.1007/s10648-024-09946-2
Wang, Y., Derakhshan, A., & Zhang, L. J. (2021). Researching and Practicing Positive Psychology in Second/Foreign Language Learning and Teaching: The Past, Current Status and Future Directions. Frontiers in psychology, 12, 731721. https://doi.org/10.3389/fpsyg.2021.731721
Wang, F., & Ye, Z. (2021). On the Role of EFL/ESL Teachers' Emotion Regulation in Students' Academic Engagement. *Frontiers in Psychology*, 12. https://doi.org/10.3389/fpsyg.2021.758860.
Wu, H. (2025). Promoting Second Language Learners' Well-Being: A Positive Psychology Review of Factors, Practices, and Directions. International Journal of Positivity & Well-Being. https://doi.org/10.61518/ijpw-121.
Watt, H. (2025). Mapping the emotional landscape of teaching and learning. *The British Journal of Educational Psychology*, 95, S212 - S219. https://doi.org/10.1111/bjep.70018.
Xi, J., & Lantolf, J. (2020). Scaffolding and the zone of proximal development: A problematic relationship. Journal for The Theory of Social Behaviour. https://doi.org/10.1111/jtsb.12260.
Yang, L., & Li, R. (2024). Modelling Chinese EFL learners' engagement in language MOOCs: a control-value perspective. Computer Assisted Language Learning. https://doi.org/10.1080/09588221.2024.2386543.
Yin, J., Goh, T., & Hu, Y. (2024). Interactions with educational chatbots: the impact of induced emotions and students' learning motivation. *International Journal of Educational Technology in Higher Education*, 21, 1-23. https://doi.org/10.1186/s41239-024-00480-3.
Yonai, E., & Blonder, R. (2024). "Powered by emotions": Exploring emotion induction in out-of-school authentic science learning. Journal of Research in Science Teaching. https://doi.org/10.1002/tea.21982.
Zhen, R., Liu, R., Ding, Y., Wang, J., Liu, Y., & Xu, L. (2017). The mediating roles of academic self-efficacy and academic emotions in the relation between basic psychological needs satisfaction and learning engagement among Chinese adolescent students. *Learning and Individual Differences*, 54, 210-216. https://doi.org/10.1016/j.lindif.2017.01.017.
Zhong, J., Ismail, L., & Lin, Y. (2025). Investigating EFL Students' Engagement in Project-Based Speaking Activities: From a Multi-Dimensional Perspective. Frontiers in Psychology, 16, 1598513.
Zong, Y., & Yang, L. (2025). How AI-Enhanced Social–Emotional Learning Framework Transforms EFL Students' Engagement and Emotional Well-Being. European Journal of Education. https://doi.org/10.1111/ejed.12925.