

Research Article

Cite this article: Miraz, M. H., Salleh, N. M., Hasan, M. T., Sarkar, J. B., & Alam, M. F. (2025). The Role of Emoji Feedback on Students' Assessment and Learning Outcomes. *Educational Process: International Journal*, 18, e2025471. <https://doi.org/10.22521/edupij.2025.18.471>

Received July 2, 2025

Accepted August 26, 2025

Keywords: Emoji, Emotional, outcome, performance, feedback

Author for correspondence:

Dr Mahadi Hasan Miraz

✉ mahadimiraz1@gmail.com

✉ Associate professor, Department of Industrial Engineering, Istanbul Atlas University, Turkey.



OPEN ACCESS

© The Author(s), 2025. This is an Open Access article, distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution, and reproduction, provided the original article is properly cited.

The Role of Emoji Feedback on Students' Assessment and Learning Outcomes

Mahadi Hasan Miraz[✉], Narishah Mohamed Salleh[✉],
Mohammad Tariq Hasan[✉], James Bakul Sarkar[✉],
Mohammad Faridul Alam[✉]

Abstract

Background/purpose. This study investigates the impact of emoji feedback on students' assessments and learning outcomes. Aims include emotions in feedback systems to assess the effects of feedback, learning outcomes, and general performance, among other educational outcomes.

Materials/methods. This study employed a mixed-methods approach, combining a systematic literature review with Python and a conceptual framework design. This study is aligned with constructivist learning theory, cognitive load theory, and dual coding theory. Using a random sampling approach, the researchers collected data from 380 respondents at global universities. The author designed self-administered surveys using Google Forms, which were distributed via WhatsApp, social media, and email to collect data. PLS-SEM was used to investigate the validity and reliability of the data.

Results. This study revealed that expressive emoji feedback can make comments more interesting, emotionally meaningful, and understandable. This study presents a new feedback method that aligns with current digital communication trends to create a more stimulating, motivating, and productive learning environment, thereby advancing educational technology. The findings will provide legislators and educators with fresh information to adopt innovative feedback strategies that improve their pupils' learning experiences and outcomes.

Conclusion. Emojis were used for instructive feedback in this study. The academic use of emojis is understudied despite their prevalence in informal communication. This supports integrating nonverbal cues into feedback mechanisms to improve students' emotional and cognitive processing.

1. Introduction

Traditionally applied methods for providing evaluative feedback in the classroom can fail to fully engage students, elicit appropriate emotional responses, and enhance their understanding and implementation of feedback (Lee & Mao, 2024). A lack of adequate feedback mechanisms may negatively impact students' overall performance and learning outcomes (Kang, 2024). In recent years, modern technology has introduced innovative methods to enhance the feedback process (Marougkas et al., 2024). Using emoticons, sometimes referred to as "emotion comments," in comments is one approach to consider (Spencer-Oatey, 2023). With such emoticons, students may find comments more engaging and understandable when emoticons can succinctly convey emotions and contextual signals in the assessment feedback process (Alharbi & Mahzari, 2023). Although some previous studies have demonstrated the application of emoticons in the assessment feedback process, there remains a lack of accurate data on how well expressive feedback improves various aspects of student assessment (Rose et al., 2018). This was further supported by Su and Huang (2024), who stated that the effect of emoticons on whether expressive feedback can significantly improve student engagement, emotional responses to criticism, comprehension of criticism, learning outcomes, and general performance remains unknown. Emoji answers are one method of conveying sentiments and emotions with well-known digital symbols. This study investigates the relationships between expressive feedback, learning outcomes, emotional responses, feedback interpretation, student engagement, and overall performance.

Modern education, particularly online and hybrid learning, struggles to provide meaningful feedback (Niyomves et al., 2024). Feedback is generally regarded as a valuable tool for student learning and progress, although various variables limit its effectiveness (Morris et al., 2021). Students typically regard concepts as overly formal, imprecise, or formative, which reduces their drive. Students seldom interact with or comprehend feedback, inhibiting their ability to improve in the classroom. The transition to digital and asynchronous learning worsens it (Mhlanga, 2024). Suggestive notions in social situations include facial expressions, tone of voice, and gestures that indicate purpose or emotion in face-to-face communication. Thus, students may see written feedback as cold, uninteresting, or emotionally disconnected, which may lower motivation, interest, and engagement (Reidel & Salinas, 2024). These emotional characteristics are crucial because research shows that students' feedback attitudes directly impact their readiness to receive, consider, and act on it.

As digital communication has evolved, students are increasingly using emojis to convey their emotions, clarify tone, and enhance their social presence (Rahman & Bazmi, 2025). Emojis are widely used in casual contexts, but scientific study have ignored their potential for instructional feedback (Li, 2025). Feedback lacks emojis to address emotional and understanding weaknesses in digital learning contexts (Alshaya, 2025). The impact of emoji-enhanced feedback on students' emotional reactions, engagement, comprehension, and learning outcomes remains uncertain (Cui et al., 2024). These linked challenges—impersonal and hazy concepts, lack of emotional connection, poor comprehension, and unfamiliarity with digital communication conventions—highlight the need for new feedback methods (Chen et al., 2025). Thus, this research investigated whether emoji-based feedback might improve student learning by being more engaging, emotive, and effective in modern educational settings.

2. Literature Review

Recent, thorough research proves that expressive feedback boosts involvement and emotional well-being (Aubouin-Bonnaventure et al., 2024). For instance, another study by Serrano-Ausejo and Mårell-Olsson (2024) also showed that students who got expressive feedback reported feeling less anxious and more content with the learning process, which raised their academic standing. Virtual

learning environments are being used more frequently during the COVID-19 pandemic, emphasizing the need for remote settings (Aldosari et al., 2022). Ezeh et al. (2021) contend that expressive vocalizations significantly boost student engagement in online classrooms by providing students with a simple and rapid means of expressing their emotions and eliciting a prompt nonverbal reaction.

Emoji use is growing, as stated by Lukyanenko and Parsons (2020), who examine how they may be used as a motivational tool. In their study, Emoji comments were found to be less intimidating and more meaningful than ordinary text comments, and students were more engaged and contributed more (Al-Rawi et al., 2021). Recent research (Martins et al., 2019) has made further advances in knowledge. Emojis used in conjunction with text have been shown to enhance pupils' comprehension and comments (Weissman & Tanner, 2018). Emotions facilitate understanding comments by younger pupils and those with learning difficulties (Rowe & Fitness, 2018). In their research, Emoji users had less trouble interpreting emotional tone and reaction intentions (Rowe & Fitness, 2018). Test results and information retention were higher in pupils who received emotional feedback than in those who received routine comments (Winstone et al., 2017). A more positive learning environment was created by lessening feedback anxiety by understanding emotions and graphic elements (Linnenbrink-Garcia et al., 2016).

The potential of new digital technologies to enhance learning was the main topic of an early study on their relationship with education (Olofsson et al., 2015). Digital feedback enhances student-teacher interactions, and emotions offer quicker and more interesting input (Walter et al., 2015). Emotions can be a helpful tool for classroom communication. Likewise, expressive feedback can facilitate comprehension-improving visual signals for students of all ages (Bowen, 2014). The study concluded that emojis help people overcome language obstacles and simplify complex messages. This early work shed light on students' emotional reactions to expressed criticism. Emojis have a direct impact on expressive feedback and learning outcomes (Ciampa, 2014). However, discordant results indicate that the connection between these elements and learning outcomes remains unclear, despite higher emotional reactions and engagement (Anglin et al., 2013). The author stated that the 2024 to 2013 infographic was used via Python to demonstrate the article's neural network and relationship, as shown in Figure 1.

Neural Network Diagram for the literature review of Role of emoji feedback to changes students' assessment

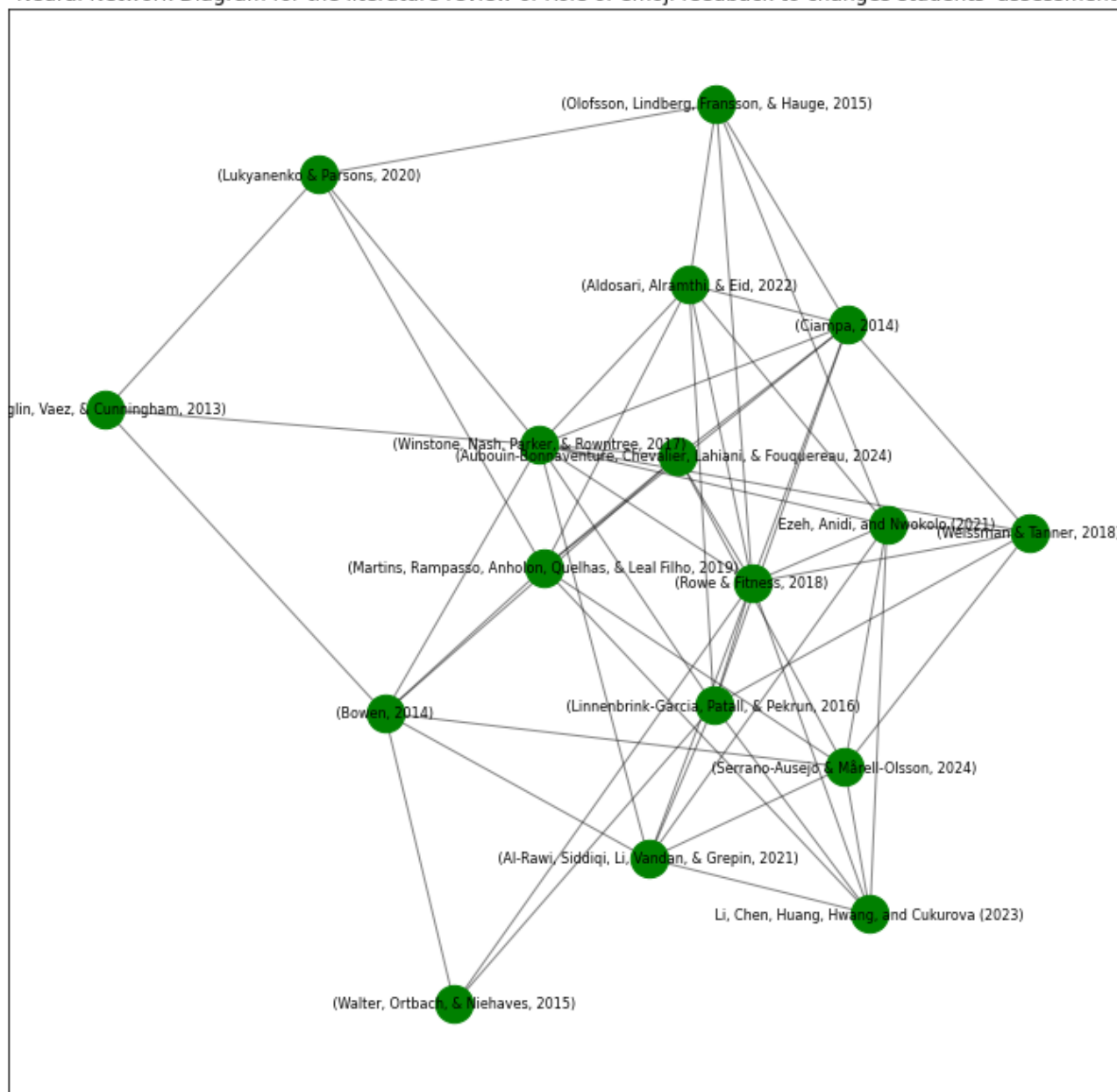


Figure 1. Neural Network of Literature Review (Source: Author's own creation)

2.1. Underpinning Theories

Constructivist learning theory, as Angraini et al. (2024) disclose, suggests that experiences and reflection on those experiences are how students acquire knowledge and understanding of the world. One of the dynamic and fascinating instruments that constructivism promotes to foster a more in-depth understanding and worthwhile learning is the use of emoticons. According to this theory, pupils who receive expressive feedback actively understand it, raising their awareness and participation. Students who can better understand the emotional and visual clues in emoticons will perform academically and practically better.

According to the cognitive theory by Vogel-Walcutt et al. (2011), if the instructional design reduces undue cognitive burden, students can allocate more mental resources to absorb and comprehend relevant material. Emoticons use easily comprehensible visual symbols, which can help pupils receive feedback and lessen their cognitive burden. Higher learning outcomes, retention, and comprehension are key factors that contribute to academic success.

The dual coding theory, as put forth by Yang et al. (2017), also supports the idea that people will better absorb information when it is presented to them in both spoken and visual forms. With dual coding, emoticons improve understanding and retention in written notes by serving as visual clues. Higher comprehension and emotional feedback criticism led to improved learning results and performance, as they inspired students to engage with the content and retain knowledge.

These ideas, taken together, provide a strong foundation for understanding how expressive feedback can enhance various aspects of student evaluation. Emoji feedback can more effectively engage students, evoke positive emotional reactions, enhance feedback processing, and ultimately lead to higher learning outcomes and academic performance by combining visual and emotional components. Theoretically, emoticon feedback is a valuable and novel method for student evaluation that facilitates hypothesis development.

2.2. Hypothesis Development

Feedback is inherent in both the learning process and educational theory, and helping students understand and interpret feedback significantly determines its effectiveness most of the time (Havnes et al., 2012). More visually striking and maybe emotionally impactful than conventional textual feedback, expressive feedback can help pupils pay attention and retain and absorb more material (Jeong et al., 2024). Learning depends critically on emotional engagement. Because emoticons are meant to express emotion, they can personalise and emotionally involve learning. Improving learning outcomes mostly depends on motivation, which this involvement can raise. According to Mayer's multimodal learning principles, people absorb information more effectively from a combination of words and images than from words alone (Frantiska Jr & Frantiska Jr, 2019). Emoticons are not images, but they serve a similar purpose of giving comments a visual component that can improve cognitive processing and memory of the information in the comments.

According to Kimbark et al. (2017), academic achievement and student involvement are strongly correlated. Effective content learning, class participation, and improved test results are all more likely in engaged students. Studies have shown that better academic performance is linked to receiving timely and appropriate feedback. Emojis can offer prompt, concise, and supportive comments, which are particularly helpful for younger groups used to digital communication (Suliman, 2024). Because emoticons clarify tone and provide emotional depth, they have been shown to improve communication, which is essential in feedback situations (Szeto et al., 2022). Students respond favorably and modify their learning practices, thereby reducing misunderstandings and enhancing the clarity of feedback.

Hypothesis 1: Emoji feedback and student engagement are significantly related to student assessment and performance.

Feedback may seem less intimidating and encouraging, encouraging learning (Williams, 2024). Though the emotional circumstances in which learning occurs have a significant impact. Positive feelings associated with learning activities can trigger emotional reactions, making the classroom more engaging and encouraging (Rowe & Fitness, 2018). Studies indicate that how feedback is given might affect how pupils understand and perceive it (Jones & Davison, 2021). More acceptance and drive to act on criticism are usually linked to a positive tone (Pekrun, 2017). Better educational results can result from efficiently transmitting positive signals or mitigating criticism by emotions. A study on digital communication indicates that emoticons are more effective than text in expressing feelings and intentions (Saramandi et al., 2024). Better student engagement is linked to emotional involvement through intimate and emotionally meaningful replies, such as emoji remarks (Kim et al.,

2022). Better performance overall and evaluation scores are well recognised to be correlated with more engagement (Hew et al., 2023).

Especially among young individuals, emotions are a fundamental component of daily communication (Rachmi et al., 2024). Including pupils who consider emoticons, a standard means of communication in instructional feedback, can be somewhat effective (Padgett et al., 2021). Emotions can transcend linguistic boundaries and convey instantaneous emotional cues that would take longer to interpret if conveyed exclusively through words. This instant awareness is necessary when cognitive and emotional processing are combined in feedback situations. One creative technique that aligns with contemporary communication patterns is incorporating emotions into feedback mechanisms; this approach will likely make pupils more receptive to and efficient at absorbing criticism. Emojis used in feedback can significantly impact how emotionally students react, increasing involvement and academic success (Zarkadoulas & Virvou); this feedback technique must be experimentally verified in educational contexts to evaluate actual results and deepen knowledge of its advantages and disadvantages.

Hypothesis 2: Emoji feedback and emotional response significantly relate to the student assessment and performance.

Emotions have a significant impact on memory, problem-solving, and attention, among other cognitive abilities. Generally speaking, positive emotions enhance cognitive function, facilitating improved information retention and understanding (Scheibe & Carstensen, 2010). However, negative feelings can worsen these processes (Johnson & Connelly, 2014). Practical experience and feedback are more likely to be applied by pupils who respond emotionally positively to them (Rowe & Fitness, 2018). This idea assumes that their emotions can directly influence pupils' motivation and involvement during learning. Positive feedback can boost motivation, which in turn increases effort and enhances performance. Additionally, feedback fosters constructive emotional reactions and increases the likelihood that the input will be accepted and utilized. Pupils are more likely to incorporate feedback into their learning processes when they emotionally understand and relate to it.

Research indicates that how pupils understand and react to criticism depends on its tone, especially its emotional overtones (Warburton et al., 2024). Positively and supportively delivered constructive criticism is more likely to be fully absorbed and incorporated into student learning (Waaramaa & Leisiö, 2013). Research indicates a relationship between academic achievement and emotional intelligence, suggesting that improved emotional management leads to better academic performance (Halimi et al., 2021). Feedback from this kind of leadership entails an emotional reaction and can directly impact involvement levels (Alotaibi et al., 2020). Including emotional impact in feedback techniques can improve the learning environment (Hooda et al., 2022). Teachers are advised to offer cognitively and emotionally encouraging comments and encourage improved comprehension and performance. Teachers who want to provide emotionally supportive and understandable feedback can benefit from training in emotional intelligence and effective feedback. Knowing the pupils' cultural background may help develop comments that optimize understanding and elicit positive emotional reactions (Olmos-Gómez et al., 2019). Through awareness and the use of these linkages, educators can enhance the effectiveness of their feedback, which will increase student involvement, comprehension, and, ultimately, academic performance (Kimbark et al., 2017).

Hypothesis 3: Emotional response and feedback comprehension are significantly related to the student assessment and performance.

There are many behavioural, emotional, and cognitive aspects of educational participation. It is hypothesized that highly involved students are more inclined to give their learning assignments their full attention, including processing and utilizing feedback, thereby improving learning results (Zhoc

et al., 2018). According to this view, students create new information by building upon their knowledge. When properly understood, feedback is vital for students to evaluate their comprehension, clear up misunderstandings, and—if interested—develop more profound ideas (Braumann et al., 2024). One aspect of this idea is pupils' capacity to comprehend and use criticism well. Knowledge of feedback is likely to increase with higher levels of engagement, as motivated students are more likely to seek, consider, and utilize feedback in ways that promote learning.

Several studies have positively correlated academic success and student involvement (class participation, homework completion, etc.) (Núñez et al., 2019). Students who participate are typically better at incorporating ideas into their work and paying closer attention to criticism. Studies have shown that students are more likely to use feedback to improve their performance when they comprehend it (Gan et al., 2021). The depth of understanding can also predict how well feedback transfers into academic success. The interaction between engagement and feedback comprehension suggests that students who are both engaged and able to comprehend feedback are best positioned for academic achievement (Vytasek et al., 2020). Their engagement motivates them to comprehend and emphasise feedback, while their comprehension of feedback deepens their engagement by making learning more meaningful.

Effective feedback should be clear, constructive, and tailored to the student's level of understanding (Hooda et al., 2022). Educators must ensure that feedback is informative and accessible, encouraging students to engage with and reflect on it. Strategies to enhance student engagement (interactive teaching methods, active learning environments, etc.) can indirectly boost the effectiveness of feedback (Pandita & Kiran, 2023). Engaged students are more likely to pay attention to and act on the feedback they receive. Continuous assessment and feedback can create a loop of engagement and learning, where students continually engage with feedback and improve, thereby incrementally boosting their performance (Göçen & Bulut, 2024). Educators can significantly enhance educational outcomes by creating environments where students are actively engaged and receive feedback that is clear, understandable, and actionable.

Hypothesis 4: Student engagement and feedback comprehension are significantly related to student assessment and performance.

Learning planning cannot exist without feedback, which is also necessary for successful learning (Bartel et al., 2024). According to the hypothesis, students who receive feedback can better identify the gap between their present knowledge or skill level and their intended learning objective (Ignacio et al., 2024). It takes pupils to grasp this criticism to close this gap. This idea holds that knowledge is created actively rather than acquired. Specific insights and directions that enable students to modify their cognitive frameworks depend mainly on feedback (Gan et al., 2021). This adaptation process cannot happen unless feedback is understood well; among these ideas are learners' capacities for introspection, progress monitoring, and feedback-based modification of their learning processes. Effective self-regulation and metacognition are linked to better learning outcomes, and they need an understanding of feedback.

Studies have repeatedly demonstrated that students are more likely to apply the feedback they receive to enhance their performance in the future when they comprehend it (Morris et al., 2021). Both formative assessments—continuous classroom work and tests—and summative assessments—final exams and large projects—show this improvement. Learning outcomes are frequently improved by more precise and easier-to-understand feedback, according to research relating feedback awareness to learning outcomes (Hartikainen et al., 2019). With this clarity, pupils can focus on regions that require work. Research has demonstrated that when students fully comprehend the material, qualitative feedback—which is often richer and more detailed—works remarkably well

(Morawski & Budke, 2019). Higher degrees of intellectual involvement and more profound learning from this kind of feedback translate into better performance.

Teachers should provide precise, doable criticism that matches the student's understanding level to enhance feedback comprehension (Winstone, 2022). Positive comments should point to both areas for development and strengths. Practical interpretation and feedback application are frequently areas in which students require instruction (Laudenbach et al., 2024). Instructional tactics can enhance learning outcomes, including teaching reading skills with effective feedback. A continuous feedback loop should be implemented where students get, comprehend, and apply feedback frequently (Laudenbach et al., 2024). This strategy promotes early involvement with criticism through the learning process. Teachers can significantly enhance learning outcomes and academic performance by helping students better understand feedback, emphasizing the importance of explicit, helpful, and continuous feedback methods in educational institutions (Morris et al., 2021). This idea supports the development of teaching strategies that enhance student comprehension and clarify feedback, thereby boosting academic performance.

Hypothesis 5: Feedback comprehension and learning outcomes significantly relate to student assessment and performance.

Therefore, this study constructs its conceptual framework in Figure 2. The variables are emoji feedback, student engagement, and emotional response, which lead to feedback comprehension and drive the learning outcome.

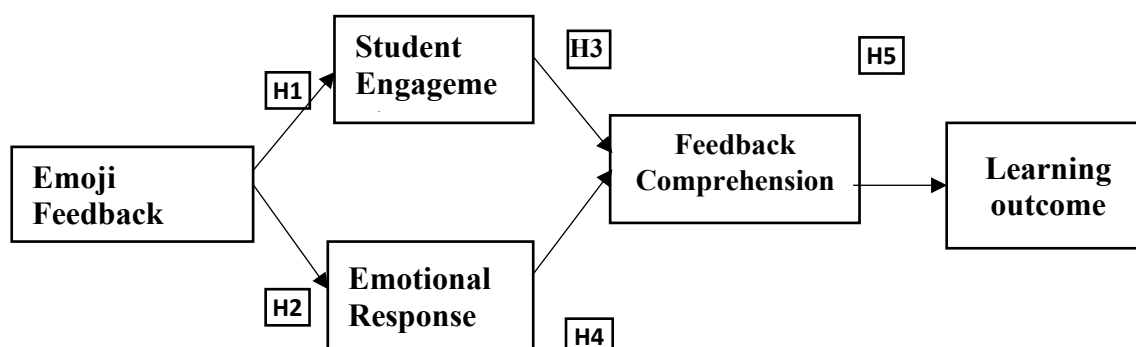


Figure 2. Conceptual Framework (Source: Author's own creation)

3. Methodology

Research Approach

The author used a quantitative research approach. The correlational research method is a quantitative approach that identifies and analyses relationships between variables without direct intervention. It determines the direction and strength of these relationships, with positive correlations indicating an increase and negative ones indicating a decrease. This method is practical in psychology, education, sociology, and the health sciences for studying naturalistic relationships. While it provides valuable insights, it does not prove causal relationships due to confounding factors or third-party influences.

Data Gathering

Data came from students from Kazakhstan, Russia, Uzbekistan, and China, and this global scope suggests a comparative or cross-cultural investigation to capture different perspectives or behaviours. The study used G*Power software to estimate the initial sample size, with a significance criterion of 5% and a medium effect size estimate of 0.15. The study employed a random sampling method to select higher education institutions that are unbiased and representative. Initially, 910 university students were invited to participate, but not all met the inclusion criteria. Some declined

or provided incomplete or inconsistent information. After careful examination and data quality checks, a sample of 380 students was selected for further analysis. This group provided valid and comprehensive data, forming the core of the study's data analysis. The researchers drew conclusions based on reliable and representative input from a large subset of the initially identified institutions, ensuring the study's unbiased and representative selection.

Sampling

International university students from these countries may have been sampled. Students as respondents propose that the study focus on academic issues, including schooling, technology use, and global trends influencing youth. 28 items

Possible Data-Gathering Tools

Quantitative research utilizes surveys, as outlined in Appendix A. The structured questionnaires comprise 23 items across 5 variables, as detailed in Appendix A. A uniform survey has been sent to get similar responses from different countries. The questionnaire was sent to respondents via email, Facebook, Twitter, and WhatsApp, and a link was created for them using Google Forms. Everyone responds by clicking the link and answering 23 questions to complete the online form. The online form requires completion of the entire questionnaire to close the link.

Goals, Scope

The researcher included international students to ensure that global or regional conclusions could be drawn. The method examines the regional, social, and cultural influences on cultural, educational, and behavioral differences.

Ethical Statement

This study adhered to ethical standards for human subjects, with participants being treated completely voluntarily and assured of anonymity. No personal information was collected, stored, or disclosed, and data was collected and analysed without preventing identification. Participants were informed of the research's purpose and scope, and their informed consent was obtained before data collection.

4. Results

This study's outer loading indicates that the individual Cronbach alpha value is 0.7, as supported by Table 1. Al-Emran et al. (2019) stated that a Cronbach alpha value above 0.70 is significantly accepted. Table 1 shows the external loadings of measuring items for each dimension in the study: Emoji Feedback (EF), Emotional Response (ER), Feedback Comprehension (FC), Learning Outcomes (LO), and Student Engagement. These loadings indicate the effectiveness of each item in measuring the target construct. Items with substantial external loadings, such as EF3 and EF4, are strong markers of EF. The Emotional Response (ER) has high loadings, with ER1 and ER2 exhibiting strong connections with the construct. Conceptual Comprehension (FC) exhibits substantial external loadings, with FC3 and FC4 serving as credible markers of Feedback Understanding. Learning Outcomes (LO) have an external loading over 0.9, indicating accurate measurement of Learning Enhancement. The Student Engagement (SE) scale has external loadings from 0.830 to 0.871, with SE3 and SE4 having the most significant loadings. Overall, all scale elements were fair to excellent, above the 0.7 level, indicating the measurement model's resilience and accurate measurement of constructs.

Table 1. Outer Loading (Source: Author own creation)

	EF	ER	FC	LO	SE
EF1	0.822				
EF2	0.722				
EF3	0.893				
EF4	0.896				
EF5	0.831				
ER1		0.908			
ER2		0.917			
ER3		0.819			
ER4		0.885			
ER5					
FC1			0.890		
FC2			0.837		
FC3			0.891		
FC4			0.875		
LO1				0.920	
LO2				0.948	
LO3				0.956	
LO4				0.924	
LO5				0.928	
SE1					0.846
SE2					0.835
SE3					0.871
SE4					0.870
SE5					0.830

Table 2 presents the construct reliability of the variables, including Cronbach's alpha and composite reliability, which exceed the threshold value of 0.7, as supported by Hair et al. (2019). The Average Variance Extracted (AVE) is above 0.5 and is endorsed as above the threshold, as Ramayah et al. (2017) stated. Overall, research on construct reliability and validity reveals a solid measurement approach. Emoji Feedback's CA of 0.891 and rho of 0.905 suggest good internal consistency. The composite reliability (CR) of 0.920 supports the scale's reliability; however, the average variance

extracted (AVE) of 0.698, which is slightly over 0.50, may be increased for optimal convergent validity. Emotional Response is very reliable with a CA of 0.905, rho of 0.914, and CR of 0.934. The resulting variance coefficient (AVE) of 0.779 indicates high convergent validity, exceeding the tolerable threshold. The Understanding of Feedback scale has good internal consistency, with a CA of 0.897, rho_A of 0.902, and CR of 0.928. Good convergent validity (AVE = 0.763) indicates that this measure is well-defined and reliable.

The Learning Outcomes Scale is reliable, with a CA of 0.964, rho_A of 0.965, and CR of 0.972. One of the strongest scales in the research, its AVE of 0.875 suggests outstanding convergent validity. Finally, student engagement exhibits strong dependability, with CA = 0.904, rho = 0.905, and CR = 0.929. This construct's AVE of 0.723 indicates strong convergent validity. All research constructs have good internal consistency, high composite reliability, and adequate convergent validity, showing that the measurement model is well described and reliable for measuring the significant variables.

Table 2. Construct Reliability and Validity (Source: Author's own creation)

	CA	rho_A	CR	AVE
Emoji Feedback	0.891	0.905	0.920	0.698
Emotional Response	0.905	0.914	0.934	0.779
Feedback Comprehension	0.897	0.902	0.928	0.763
Learning outcome	0.964	0.965	0.972	0.875
Student Engagement	0.904	0.905	0.929	0.723

Table 3 presents discriminant validity findings for emoji feedback, emotional reaction, feedback understanding, learning learning, and student engagement. The components exhibit moderate to high correlations, indicating that they are connected yet distinct. Emoji Feedback has moderate correlations with Emotional Response and Feedback Comprehension but low correlations with Learning Outcomes and Student Engagement. Emotional Responsiveness strongly correlates with Feedback Understanding, Learning Outcomes, and Student Engagement, highlighting its importance in feedback and its close connection to cognitive and emotional learning. Feedback understanding is strongly tied to cognitive and behavioral elements of student learning, while learning outcomes have modest correlations with other categories, including Emoji Feedback and Student Engagement. Student participation correlates reasonably with all other categories, with the strongest connection based on Emotional Response. These findings support the conclusion that the measuring model captures different, but related, learning experiences since the constructs are fully independent. To prove the difference, the square root of the AVE for each construct must be compared to these correlations to ensure that each construct is more closely connected to its own indicators than to the indicators of other constructs.

Table 3. Discriminant Validity (Source: Author own creation)

	EF	ER	FC	LO	SE
EF					
ER	0.581				
FC	0.578	0.732			
LO	0.414	0.624	0.679		

SE	0.554	0.695	0.626	0.501
----	-------	-------	-------	-------

Figure 3 illustrates the system-generated measurement model using SEM-PLS, providing an overview of the item's reliability and validity. This structural equation modelling (SEM) route map of our study's components includes emoji feedback (EF), emotional reaction (ER), feedback comprehension (FC), learning outcomes (LO), and student engagement. The graph displays the correlations between various constructs, with arrow values indicating the strength of the associations between them. Emoji feedback (EF) and student engagement (SE) exhibit a moderate positive path coefficient of 0.254. The correlation of 0.956 between feedback perception (FC) and learning outcome (LO) is positive and statistically significant. Each construct comprises multiple items, denoted by yellow boxes (e.g., EF1 and EF2 for Emoji Feedback), and factor loadings indicate the strength of association between each item and the underlying construct. EF1, with a factor loading of 0.822, highly relates to Emoji Feedback. The figure also displays each construct's squared multiple correlation (R^2), indicating the extent to which its predictors explain the variation. Learning Outcomes (LO) and Understanding Feedback (FC) have strong R^2 values, suggesting good predictability. The figure illustrates how the elements of your study interact and shape the model.

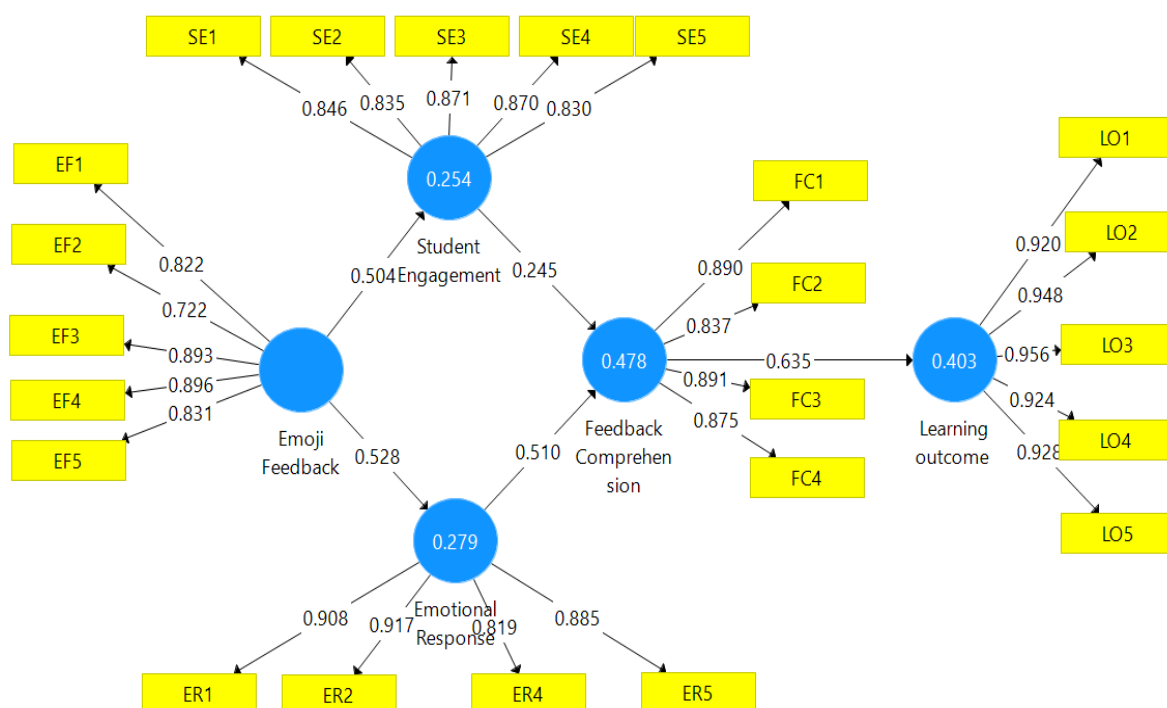


Figure 3. Measurement Model (Source: Author's own creation)

Table 4 presents the study's construct relationship route coefficients and their statistical significance. Emoji Feedback and Emotional Response have a positive path coefficient of 0.651 and a standard deviation of 0.030. The t-value of 18.653 and p-value of 0.001 indicate that emojis have a significant influence on students' emotions. Emoji Feedback has a path coefficient of 0.521 and a standard deviation of 0.045 in relation to student engagement. With a t-value of 16.570 and a p-value of 0.030, this effect is statistically significant but smaller than the emotional response effect.

The path coefficient of 0.412 and the standard deviation of 0.077 between emotional reaction and intellectual knowledge are also noteworthy. Statistically, students' emotional responses significantly influence their comprehension of feedback ($t = 5.688$, $p = 0.023$). Understanding Feedback enhances Learning outcomes with a path coefficient of 0.621 and a standard deviation of

0.073. This link is statistically significant (t -value = 5.667, p -value = 0.011), indicating that feedback comprehension is crucial to learning.

Finally, Student Engagement improves Learning Outcome with a path coefficient of 0.454 and a standard deviation of 0.023. This link is substantial, although weaker than feedback perception ($t=6.711$, $p=0.019$). All relationships in the study are statistically significant, varying in strength. Emoji feedback, emotional response, and Feedback Comprehension had the most significant effects, indicating that these features are critical to student engagement and learning outcomes.

Table 4. Path Coefficient (Source: Author own creation)

Relationships	Beta Values	SD	T Values	P Values
Emoji Feedback -> Emotional Response	0.651	0.030	18.653	0.001
Emoji Feedback -> Student Engagement	0.521	0.045	16.570	0.030
Emotional Response ->Feedback comprehension	0.412	0.077	5.688	0.023
Feedback comprehension-> Learning outcome	0.621	0.073	5.667	0.011
Student Engagement-> Learning Outcome	0.454	0.023	6.711	0.019

Path coefficients and statistical significance of research correlations are shown in Table 5. A high positive path coefficient of 0.654, t -value of 26.344, and p -value of 0.013 reveal a statistically significant impact of emoji feedback on emotional reaction. Emoji feedback also improves feedback understanding, with a path coefficient of 0.543, a t value of 24.059, and a p value of 0.025. Emoji feedback has a substantial link with learning results, with a path coefficient of 0.723, a t -value of 27.348, and a very significant p -value of 0.001. Emoji feedback also boosts student engagement, with a path coefficient of 0.650, a t value of 34.570, and a p value of 0.020. Emotional reactions influence feedback implementation, as shown by a small positive impact on feedback perception (path coefficient 0.548, t value 5.662, p value 0.001). Emotional responses to feedback increase learning outcomes ($\beta = 0.328$, t -value = 3.317, p -value = 0.001). Understanding feedback improves learning outcomes, with a path coefficient of 0.421, a t -value of 5.662, and a p -value of 0.024, supporting the premise that it is essential. The path coefficient of 0.721, t value of 3.317, and p value of 0.005 show that student engagement improves feedback interpretation. Finally, student involvement positively influences learning outcomes with a path coefficient of 0.354, a t value of 6.701, and a p value of 0.027; however, this effect is less than that of other components. These findings indicate that emoji thinking has a strong impact on emotional reactions, conceptual comprehension, student engagement, and learning outcomes. Emotional reactivity, feedback understanding, and student engagement are linked, highlighting their importance in learning outcomes.

Table 5. Path Coefficient (Source: Author own creation)

Relationships	Beta Values	SD	T Values	P Values
Emoji Feedback -> Emotional Response	0.654	0.040	26.344	0.013
Emoji Feedback -> Feedback comprehension	0.543	0.031	24.059	0.025
Emoji Feedback -> Learning outcome	0.723	0.030	27.348	0.001
Emoji Feedback -> Student Engagement	0.650	0.025	34.570	0.020
Emotional Response ->Feedback comprehension	0.548	0.097	5.662	0.001

Emotional Response -> Learning outcome	0.328	0.099	3.317	0.001
Feedback comprehension-> Learning outcome	0.421	0.033	5.662	0.024
Student Engagement->Feedback comprehension	0.721	0.030	3.317	0.005
Student Engagement-> Learning Outcome	0.354	0.033	6.701	0.027

Figure 4 illustrates the structural model constructed by the system using SEM-PLS (structural equation modeling with partial least squares), which demonstrates the relationships between the study's items and the reliability and validity of the measurement items. Path coefficients show the strength of latent variable correlations in the model. The graphic may also display factor loadings for each component, indicating the extent to which it contributes to its construction. Items with high factor loadings predict components well. The model may provide R² values for each endogenous variable, indicating the percentage of variance explained by predictors and revealing its explanatory strength.

This structural model helps evaluate measurement item reliability and validity. Factor loadings measure item internal consistency, whereas the model measures construct validity, including convergent and discriminant validity. These aspects may help you determine whether the model fits the data and aligns with theoretical principles. Low item loadings or weak concept links may suggest measurement or conceptualisation issues, which the model might enhance. In summary, Figure 4 clearly illustrates the relationship between structure and measurement quality in your research, enabling you to understand the model's robustness and the reliability and validity of the items.

Figure 4 states the system-generated structure model by SEM-PLS. It gives a view of the item's reliability and validity.

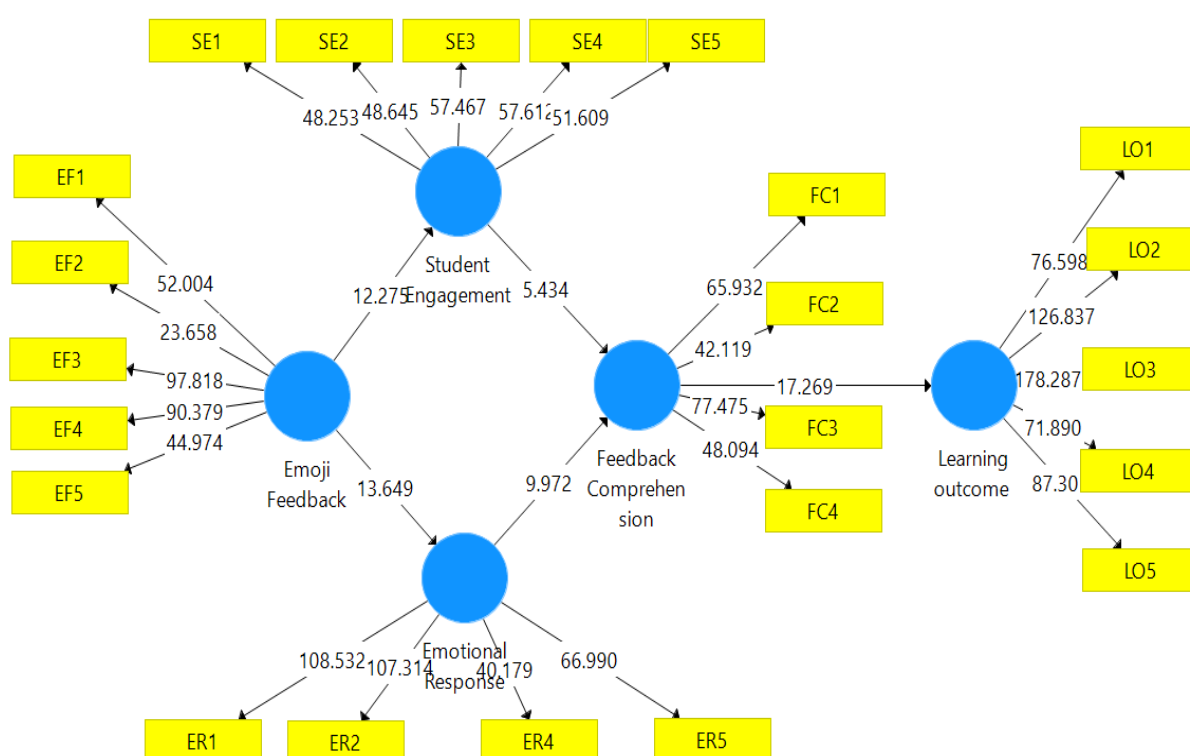


Figure 4. Structure Model (Source: Author own creation)

The hypothesis testing of the association between study items is presented in Table 6. Statistically significant relationships validate all five hypotheses. Hypothesis 1 explores the association between emoji responses (EF) and student engagement (SE). The p-value of 0.031 supports the hypothesis. Hypothesis 2, which evaluates the association between emoji reactions (EF) and students' emotional responses (ER), is similarly supported since the p-value is 0.025. Hypothesis 3 tests the association between student engagement (SE) and feedback understanding (FC). A p-value of 0.001 strongly supports the hypothesis. Hypothesis 4 examines the relationship between Emotional Response (ER) and Feedback Understanding (FC) and finds a substantial influence, thereby verifying the hypothesis. Finally, hypothesis 5 evaluates the impact of feedback understanding (FC) on learning learning (LO) and finds a significant association ($p = 0.010$).

All five hypotheses are supported, as their p-values are all below 0.05. These findings demonstrate that emoji feedback improves Emotional Response, Student Engagement, Understanding Feedback, and Learning Outcomes, proving its importance in learning.

Table 6. Hypothesis Result (Source: Author own creation)

Hypothesis	Relationship	P-value	Result
Hypothesis 1	EF->SE	0.031	Supported
Hypothesis 2	EF->ER	0.025	Supported
Hypothesis 3	SE->FC	0.001	Supported
Hypothesis 4	ER->FC	0.034	Supported
Hypothesis 5	FC->LO	0.010	Supported

5. Discussion

The hypothesis testing results of this study provide important insights into the relationships between emoji feedback, emotional response, student engagement, feedback comprehension, and learning outcomes. Each hypothesis was supported, indicating that the items are related and that emoji feedback is important in improving students' learning experiences. The following discussion examines the results of each hypothesis in more detail.

Hypothesis 1 tested the relationship between emoji perceptions and student engagement. The significant positive path ($p = 0.031$) indicates that emoji feedback can significantly enhance student engagement. Findings consistent with this research suggest that emotionally expressive concepts like emojis can create a personalised and interactive learning environment. Emoji ideas can motivate students to engage more actively in the course material and with the teacher by adding an emotional and visual dimension to the imagination. This supports the notion that emotional elements in feedback are critical in promoting deep participation in the learning process. The use of emojis can help students develop a greater awareness of their emotions. A correlation exists between the use of emotions in remarks and improvements in process efficiency, self-awareness, and self-control, all of which are essential for accomplishing academic goals. This suggests that incorporating emotions into remarks can lead to these improvements. Because students may now more easily and joyfully express their experiences and ideas, participation in feedback processes increases. Even the quietest students are encouraged to participate fully in the feedback process because emotions are visible.

The 2nd hypothesis examined the relationship between emoji feedback (EF) and emotional response (ER). This hypothesis, which showed significant results ($p = 0.025$), indicated that emoji

feedback significantly impacts students' emotional reactions. The right kind of emoji feedback can elicit encouragement and support, enhancing students' emotional engagement with the learning process. This finding supports previous studies highlighting the role of emotional participation in learning, showing that feedback, especially when presented visually, can help create an emotionally supportive learning environment. Emotional depth and speed are conveyed via emoticons, not plain comments, which can be misunderstood. Whether a pupil is confused, joyful, frustrated, or satisfied, teachers can quickly determine that feeling. Because of this real-time understanding of emotional states, teachers can react quickly to problems by providing extra help or modifying teaching methods to better suit the needs of their students. Emojis can help teachers create a more supportive and encouraging learning environment. They provide a straightforward means of expressing essential concepts and facilitate the reading of comments, therefore increasing their accessibility to a larger audience of pupils. Students can better understand the demands placed on them and identify areas where they need to improve their academic performance by using emoticons. This enhances their ability to do well in school.

The 3rd hypothesis focused on the effect of students' engagement (SE) on feedback comprehension (FC). Strong statistical support for this relationship ($p = 0.001$) indicates that more engaged students can better understand the concepts. This may be due to increased motivation and attention when students are more engaged in the learning process. Engaged learners are more able to interpret and apply concepts effectively, leading to a deeper understanding of the material. This finding reinforces the importance of student collaboration as a mediator in the learning process, particularly in how feedback is received and implemented. The positive impacts that student engagement remarks have on comprehension and involvement are directly responsible for the improved learning outcomes supported by hypothesis 3. When it comes to education, this is the situation that exists.

Hypothesis 4 tested the effect of emotional responsiveness on feedback comprehension. The results ($p = 0.034$) showed that emotional responses to feedback were positively related to students' understanding. This suggests that students who express positive emotions upon receiving feedback have a better chance of processing and understanding it successfully. This supports the notion that emotional engagement with feedback can enhance cognitive processes such as comprehension. Learners who feel encouraged or supported by positive feedback may be more receptive to the information provided, leading to a better understanding of the content. Students will likely apply their feedback to their academic work, enabling them to remember information more effectively and acquire a deeper mastery of the material (Hypothesis 4). When students take an active role in their education, they are more likely to incorporate the criticism they receive into their academic work.

Hypothesis 5 examined the relationship between feedback perception (FC) and learning outcomes. This hypothesis, which showed statistically significant results ($p = 0.010$), indicates that the ability to understand feedback plays a crucial role in influencing learning outcomes. Students who understand the feedback they receive are in a better position to improve their academic performance. This finding underscores the importance of explicit and active thinking, which students can readily understand and apply to their work. It also demonstrates that when properly understood, feedback can lead to genuine improvements in learning outcomes, supporting the notion that understanding feedback is a crucial factor in academic success. When individuals are provided with continuous feedback and adjustments responsive to their changing needs, they can better stay on course and fulfil the learning objectives they have set for themselves, aligned with the hypothesis. As a result, the pupils will have an easier time staying on track. It is also possible for students to become more emotionally aware with the assistance of emojis, which ultimately leads to increased engagement, improved overall performance, and a deeper understanding of the input. In conclusion, educators can use emoticons to construct dynamic, responsive, and encouraging classrooms for the

children in their classes. Furthermore, utilising expressive feedback can improve a wide range of evaluations of those being evaluated.

In conclusion, the results of the five hypotheses demonstrate the relevance of the components of the learning process. Feedback using emojis has been shown to positively impact students' emotional response and engagement, affecting feedback comprehension and learning outcomes. These results emphasise the importance of combining emotional and interactive elements in feedback to improve its effectiveness. Additionally, this insight has significant implications for educational practice, suggesting that teachers should incorporate coherent, explicit, and critical thinking to foster student success.

Significance of the Study

This innovative study examines how emojis affect students' emotions, engagement, and feedback interpretation. It offers a more nuanced and emotional response than written or oral comments in line with digital communication trends. Most learning studies focus on cognitive traits, but this examines how students' emotional reactions to emoji feedback boost engagement and learning. In emoji interactions, emotional input is an understudied aspect. The study integrates student involvement, emotive reactions, feedback interpretation, and learning outcomes. Most research separates these variables. A new paradigm examines how affective and feedback-related processes affect student learning. Distance and digital learning need better feedback. This study suggests engaging students with emoticons, which are commonly used in online communication but not in formal feedback systems, to address these changes. A study examines digital feedback systems and personalised, emotionally intelligent teaching aids. Emoji is used in affective learning, engagement, and feedback loop theories.

Implications

Educational institutions should prioritize student participation in evaluations by incorporating modern methods, such as expressive feedback, into their feedback policies. Motivating emotionally sensitive youngsters and helping them overcome their fear of criticism can aid in their ability to handle it. This helps create a lively and engaging learning atmosphere. Teacher education programmes should cover the emotional effects of criticism and the use of emoticons and other methods to convey encouraging and constructive messages.

Students who recognize emotions are better able to comprehend and remember difficult feedback. For improved comprehension, emotional input must be included in digital platforms and educational materials. Curriculum developers should have dynamic and visual components in feedback mechanisms that align with cognitive theories supporting multimodal learning strategies. Emoji comments raise comprehension and participation, which helps to improve learning results. Teachers should utilize this strategy to enhance the effectiveness of formative and ongoing evaluations. Schools and other educational institutions must monitor how creative feedback techniques affect student performance and consistently apply this information to enhance assessment and feedback procedures.

Once emoji-based feedback is integrated into the user-friendly interfaces of EdTech platforms, teachers can efficiently deliver it. This work develops unique assessment tools that challenge feedback methods and include emotional and visual feedback. Applications: Legislators should regulate comment emoticons to make them uniform and available in all educational institutions. Money and resources for their development would motivate educational institutions to adopt novel feedback techniques more. Emotion feedback, widely used in student evaluations, uniquely improves performance, engagement, emotional reactions, and learning outcomes.

6. Conclusion

Including emotional feedback on student examinations is an advanced approach to understanding and improving learning. Critical areas where this innovative approach clarifies include "learning outcomes," "emotional response," "student engagement," "comprehension of feedback," and general "performance." Student engagement was substantially boosted when emotions were used as a feedback mechanism. Students found it easier to express their ideas about the subject since the emotions were straightforward and understood, which increased involvement and yielded more trustworthy answers. The emotion system recorded many emotional responses so teachers could quickly determine how their children felt. This real-time emotional input enabled teachers to promptly address issues, fostering a supportive and responsive learning environment. Emojis helped me to understand the comments better. The frequently complex and arduous conventional feedback methods might be crippling. But emoticons provide notes and a brief, understandable visual summary for students of all ages. The students could use it since they were more interested and understood their feedback. Higher calibre work, knowledge retention, and more academic performance followed from this. In all, the students performed substantially better. Better feedback, emotional support, and more participation have improved learning. Students were less anxious and more motivated, and could better achieve their learning goals. It has been demonstrated that "expressive feedback" in student assessments is a powerful tool for improving several learning processes. This approach provides a comprehensive strategy for improving student performance by obtaining emotional reactions, increasing participation, simplifying the comprehension of feedback, and favourably influencing learning outcomes. Such innovative approaches will become crucial when education advances to offer a more prosperous, encouraging, and responsive learning environment.

6.1. Limitations

Emojis play a crucial role in student evaluation and learning outcomes, but they have several limitations. They may not have universal meanings, varying across cultural contexts and personal experiences. The subjective nature of emojis can also complicate evaluations. Emojis lack the tangible and measurable characteristics of traditional feedback methods, making comparing their impact on student outcomes difficult. They can oversimplify concepts, leaving students with fuzzy ideas instead of precise guidance. The variety of study methods can also limit the effectiveness of emojis.

6.2. Recommendations

It is crucial to consider factors such as cultural diversity, socioeconomic status, and education level to enhance the research on emoji responses in student evaluation and learning outcomes. Researchers should combine emoji feedback with textual or vocal input to avoid oversimplification. Future research should utilize a standardized collection of emojis with unambiguous meanings and experiment with a smaller sample group to gain a deeper understanding of emoji comprehension. Additionally, studies should examine the long-term effects of emoji impressions on learning, motivation, and memory, tracking students' performance and understanding how different learning styles affect emoji idea change. Emoji comments should be introduced subtly and used in formative assessment, quizzes, and formal feedback sessions to maximize efficacy without jeopardizing classroom performance. Ethics should be prioritised, with clear rules for proper emoji usage and constructive feedback. Additionally, future studies should evaluate how learning management systems and mobile apps affect emoji feedback usage to match digital technologies' pedagogical efficacy.

7. Suggestion

This cutting-edge feedback mechanism can help education stakeholders adapt to digital communication trends, producing a more engaging, motivating, and productive learning environment. These changes can lead to more personalised and engaging evaluation methods and improve students' academic performance.

Declarations

Author Contributions. Mahadi Hasan Miraz: Review-editing, writing, and original manuscript preparation. All authors have read and approved the published version of the article.

Conflicts of Interest. The authors declare no conflict of interest.

Funding. This study received financial support for APC from Institute for Advanced Research, United International University, Dhaka, Bangladesh (Research Grant No. IAR-2025-PUB-056) & Sunway University Malaysia.

Ethical Approval. This study adhered to ethical standards for human subjects, with participants being treated completely voluntarily and assured of anonymity.

Data Availability Statement. Data will be available on request.

References

- Al-Emran, M., Mezhuyev, V., & Kamaludin, A. (2019). PLS-SEM in information systems research: a comprehensive methodological reference. In: *Hassanien, A., Tolba, M., Shaalan, K., Azar, A. (eds) Proceedings of the International Conference on Advanced Intelligent Systems and Informatics 2018. AISI 2018. Advances in Intelligent Systems and Computing, 845, 644-653. Springer, Cham.* https://doi.org/10.1007/978-3-319-99010-1_59
- Alshaya, S. A. (2025). Enhancing Educational Materials: Integrating Emojis and AI Models into Learning Management Systems. *Computers, Materials & Continua*, 83(2), 3075. <https://doi.org/10.32604/cmc.2025.062360>
- Anglin, G. J., Vaez, H., & Cunningham, K. L. (2013). Visual representations and learning: The role of static and animated graphics. In *Handbook of research on educational communications and technology* (pp. 854-905). Routledge.
- Angraini, L. M., Kania, N., & Gürbüz, F. (2024). Students' Proficiency in Computational Thinking Through Constructivist Learning Theory. *International Journal of Mathematics and Mathematics Education*, 2(1), 45-59. <https://doi.org/10.56855/ijmme.v2i1.963>
- Aubouin-Bonnaventure, J., Chevalier, S., Lahiani, F.-J., & Fouquereau, E. (2024). Well-being and performance at work: a new approach favourable to the optimal functioning of workers through virtuous organisational practices. *International Journal of Organizational Analysis*, 32(4), 608-623. <https://doi.org/10.1108/ijoa-01-2023-3584>
- Bartel, L., Ochs, M., Hirmer, T., & Henrich, A. (2024). Design Principles for a Study Planning Assistant in Higher Education. In *Proceedings of the 2024 Conference on Human Information Interaction and Retrieval* (pp. 243-253).
- Bowen, J. (2014). Emotion in the classroom: An update. *To Improve the Academy*, 33(2), 196-219.
- Braumann, S., van de Pol, J., Kok, E., Pijera-Díaz, H. J., van Wermeskerken, M., de Bruin, A. B., & van Gog, T. (2024). The Role of Feedback on Students' Diagramming: Effects on Monitoring Accuracy and Text Comprehension. *Contemporary Educational Psychology*, 76, 102251. <https://doi.org/10.1016/j.cedpsych.2023.102251>
- Chen, Q., Wu, Q., & Jacucci, G. (2025). Democratic Moderation: Exploring the Use and Perception of Votekicking in Social Virtual Reality. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems* (pp. 1-18).
- Ciampa, K. (2014). Learning in a mobile age: an investigation of student motivation. *Journal of Computer Assisted Learning*, 30(1), 82-96.

- Cui, J., Dandan, Y. R., Yang, B., & Jing, Y. (2024). Which emoji are markers of sarcasm among Chinese teenagers using the WeChat app? *Heliyon*, 10(23), e39796. <https://doi.org/10.1016/j.heliyon.2024.e39796>
- Ezeh, N. G., Anidi, O. C., & Nwokolo, B. O. (2021). Body Language as a Communicative Aid amongst Language Impaired Students: Managing Disabilities. *English Language Teaching*, 14(6), 125-134. <https://doi.org/10.5539/elt.v14n6p125>
- Frantiska, J. (2019). Words. *Interface Development for Learning Environments: Establishing Connections Between Users and Learning*, 65-84. <https://doi.org/10.1007/978-3-030-14482-1>
- Gan, Z., An, Z., & Liu, F. (2021). Teacher feedback practices, student feedback motivation, and feedback behavior: how are they associated with learning outcomes? *Frontiers in Psychology*, 12, 697045. <https://doi.org/10.3389/fpsyg.2021.697045>
- Göçen, A., & Bulut, M. A. (2024). Teaching ethics in teacher education: ICT-enhanced, case-based and active learning approach with continuous formative assessment. *Journal of Academic Ethics*, 22(3), 447-465.
- Hair, J. F., Ringle, C. M., Gudergan, S. P., Fischer, A., Nitzl, C., & Menictas, C. (2019). Partial least squares structural equation modeling-based discrete choice modeling: an illustration in modeling retailer choice. *Business Research*, 12(1), 115-142. <https://doi.org/10.1007/s40685-018-0072-4>
- Halimi, F., AlShammari, I., & Navarro, C. (2021). Emotional intelligence and academic achievement in higher education. *Journal of Applied Research in Higher Education*, 13(2), 485-503. <https://doi.org/10.1108/jarhe-11-2019-0286>
- Hart, S. R., Stewart, K., & Jimerson, S. R. (2011). The student engagement in schools questionnaire (SESQ) and the teacher engagement report form-new (TERF-N): Examining the preliminary evidence. *Contemporary School Psychology: Formerly" The California School Psychologist"*, 15(1), 67-79. <https://doi.org/10.1007/bf03340964>
- Hartikainen, S., Rintala, H., Pylväs, L., & Nokelainen, P. (2019). The concept of active learning and the measurement of learning outcomes: A review of research in engineering higher education. *Education Sciences*, 9(4), 276. <https://doi.org/10.3390/educsci9040276>
- Havnes, A., Smith, K., Dysthe, O., & Ludvigsen, K. (2012). Formative assessment and feedback: Making learning visible. *Studies in educational evaluation*, 38(1), 21-27. <https://doi.org/10.1016/j.stueduc.2012.04.001>
- Hew, K. F., Huang, W., Du, J., & Jia, C. (2023). Using chatbots to support student goal setting and social presence in fully online activities: learner engagement and perceptions. *Journal of Computing in Higher Education*, 35(1), 40-68. <https://doi.org/10.1007/s12528-022-09338-x>
- Hooda, M., Rana, C., Dahiya, O., Rizwan, A., & Hossain, M. S. (2022). Artificial intelligence for assessment and feedback to enhance student success in higher education. *Mathematical Problems in Engineering*, 2022(1), 5215722. <https://doi.org/10.1155/2022/5215722>
- Ignacio, M. J., Julhamid, N., & Asiri, M. (2024). Teachers' feedback and English academic achievement of grade 8 and 9 students at Sulu State College Laboratory High School. *Journal of Education and Academic Settings*, 1(1), 1-19. <https://doi.org/10.62596/fvr96v47>
- Jaeger, S. R., Cardello, A. V., & Schutz, H. G. (2013). Emotion questionnaires: A consumer-centric perspective. *Food Quality and Preference*, 30(2), 229-241. <https://doi.org/10.1016/j.foodqual.2013.05.015>

- Jeong, J. Y., Oh, J., & Jeong, J. W. (2024). Enhancing learner experience with instructor cues in video lectures: A comprehensive exploration and design discovery toward a novel gaze visualization. *Education and Information Technologies*, 29(16), 21411-21447.
- Johnson, G., & Connelly, S. (2014). Negative emotions in informal feedback: The benefits of disappointment and drawbacks of anger. *Human Relations*, 67(10), 1265-1290. <https://doi.org/10.1177/0018726714532856>
- Jones, C. A., & Davison, A. (2021). Disempowering emotions: The role of educational experiences in social responses to climate change. *Geoforum*, 118, 190-200. <https://doi.org/10.1016/j.geoforum.2020.11.006>
- Kang, J. (2024). Benefits and Challenges of Mobile-Learning Brought to Student Learning Outcomes in Higher Education: A Systematic Review from 2014-2023. *International Journal of Academic Research in Progressive Education and Development*, 13(1), 2107-2123. <https://doi.org/10.6007/ijarped/v13-i1/20698>
- Kim, M., Knotts, T. L., Albers, N. D., & James, K. E. (2022). Emoji use as a catalyst for relationship building and sustaining attention in online classes: An empirical study. *Education Sciences*, 12(12), 874. <https://doi.org/10.3390/educsci12120874>
- Kimbark, K., Peters, M. L., & Richardson, T. (2017). Effectiveness of the student success course on persistence, retention, academic achievement, and student engagement. *Community College Journal of Research and Practice*, 41(2), 124-138. <https://doi.org/10.1080/10668926.2016.1166352>
- Kyndt, E., Govaerts, N., Verbeek, E., & Dochy, F. (2014). Development and validation of a questionnaire on informal workplace learning outcomes: A study among socio-educational care workers. *The British Journal of Social Work*, 44(8), 2391-2410. <https://doi.org/10.1093/bjsw/bct056>
- Laudenbach, M., Brown, D. W., Guo, Z., Ishizaki, S., Reinhart, A., & Weinberg, G. (2024). Visualizing formative feedback in statistics writing: An exploratory study of student motivation using DocuScope Write & Audit. *Assessing Writing*, 60, 100830. <https://doi.org/10.1016/j.asw.2024.100830>
- Lee, I., & Mao, Z. (2024). Writing teacher feedback literacy: Surveying second language teachers' knowledge, values, and abilities. *Journal of Second Language Writing*, 63, 101094. <https://doi.org/10.1016/j.jslw.2024.101094>
- Li, J. (2025). Sentiment analysis of text based on emoji attention mechanisms: a new approach to online course evaluation. *International Journal of Information and Communication Technology*, 26(8), 70-86. <https://doi.org/10.1504/ijict.2025.145724>
- Linnenbrink-Garcia, L., Patall, E. A., & Pekrun, R. (2016). Adaptive motivation and emotion in education: Research and principles for instructional design. *Policy Insights from the Behavioral and Brain Sciences*, 3(2), 228-236. <https://doi.org/10.1177/2372732216644450>
- Lukyanenko, R., & Parsons, J. (2020). Research perspectives: design theory indeterminacy: what is it, how can it be reduced, and why did the polar bear drown? *Journal of the association for information systems*, 21(5), 10-17705.
- Marougkas, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2024). How personalized and effective is immersive virtual reality in education? A systematic literature review for the last decade. *Multimedia tools and applications*, 83(6), 18185-18233. <https://doi.org/10.1007/s11042-023-15986-7>

- Martins, V. W. B., Rampasso, I. S., Anholon, R., Quelhas, O. L. G., & Leal Filho, W. (2019). Knowledge management in the context of sustainability: Literature review and opportunities for future research. *Journal of Cleaner Production*, 229, 489-500. <https://doi.org/10.1016/j.jclepro.2019.04.354>
- Mhlanga, D. (2024). Digital transformation of education, the limitations and prospects of introducing the fourth industrial revolution asynchronous online learning in emerging markets. *Discover education*, 3(1), 32. <https://doi.org/10.1007/s44217-024-00115-9>
- Morawski, M., & Budke, A. (2019). How digital and oral peer feedback improves high school students' written argumentation—A case study exploring the effectiveness of peer feedback in geography. *Education Sciences*, 9(3), 178. <https://doi.org/10.3390/educsci9030178>
- Morris, R., Perry, T., & Wardle, L. (2021). Formative assessment and feedback for learning in higher education: A systematic review. *Review of Education*, 9(3), e3292. <https://doi.org/10.1002/rev3.3292>
- Niyomves, B., Kunacheva, N., & Sutadarat, S. (2024). Hybrid Learning: A combination of face-to-face and online learning. *Journal of Education and Learning Reviews*, 1(3), 11-20. <https://doi.org/10.60027/jelr.2024.673>
- Núñez, J. C., Regueiro, B., Suárez, N., Piñeiro, I., Rodicio, M. L., & Valle, A. (2019). Student perception of teacher and parent involvement in homework and student engagement: The mediating role of motivation. *Frontiers in Psychology*, 10, 444577. <https://doi.org/10.3389/fpsyg.2019.01384>
- Olmos-Gómez, M. d. C., Estrada-Vidal, L. I., Ruiz-Garzón, F., López-Cordero, R., & Mohamed-Mohand, L. (2019). Making future teachers more aware of issues related to sustainability: An assessment of best practices. *Sustainability*, 11(24), 7222. <https://doi.org/10.3390/su11247222>
- Olofsson, A. D., Lindberg, J. O., Fransson, G., & Hauge, T. E. (2015). Uptake and use of digital technologies in primary and secondary schools—a thematic review of research. *Nordic Journal of Digital Literacy*, 10(Jubileumsnummer), 103-121. <https://doi.org/10.18261/issn1891-943x-2015-jubileumsnummer-08>
- Padgett, C., Moffitt, R. L., & Grieve, R. (2021). More than words: Using digital cues to enhance student perceptions of online assignment feedback. *The internet and higher education*, 49, 100789. <https://doi.org/10.1016/j.iheduc.2020.100789>
- Pandita, A., & Kiran, R. (2023). The technology interface and student engagement are significant stimuli in sustainable student satisfaction. *Sustainability*, 15(10), 7923. <https://doi.org/10.3390/su15107923>
- Pekrun, R. (2017). Emotion and achievement during adolescence. *Child Development Perspectives*, 11(3), 215-221. <https://doi.org/10.1111/cdep.12237>
- Rachmi, R., Asri, A., Nuswantoro, P., & Mokodenseho, S. (2024). The Influence of Emotional Intelligence and Effective Communication on Interpersonal Relationship Quality and Life Satisfaction in Indonesia. *The Eastasouth Journal of Social Science and Humanities*, 1(02), 68–83. <https://doi.org/10.58812/esssh.v1i02.213>
- Rahman, R., & Bazmi, B. (2025). L2 Students' Rapport Management with their Teacher Using Emojis in WhatsApp Messaging. *Language, Identity and the Digital Realm*, 1(2), 89-132.
- Ramayah, T., Yeap, J., Ahmad, N. H., Halim, H. A., & Rahman, S. A. (2017). Testing a confirmatory model of Facebook usage in SmartPLS using consistent PLS. *International Journal of Business and Innovation*, 3(2), 1-14.

- Reidel, M., & Salinas, C. (2024). If students don't feel it, they won't learn it: Early career secondary social studies educators plan for emotional engagement. *The Journal of Social Studies Research*, 48(2), 87-101. <https://doi.org/10.1177/23522798231219967>
- Rose, D. H., Robinson, K. H., Hall, T. E., Coyne, P., Jackson, R. M., Stahl, W. M., & Wilcauskas, S. L. (2018). Accurate and informative for all: Universal design for learning (UDL) and the future of assessment. *Handbook of accessible instruction and testing practices: Issues, innovations, and applications*, 167-180. https://doi.org/10.1007/978-3-319-71126-3_11
- Rowe, A. D., & Fitness, J. (2018). Understanding the role of negative emotions in adult learning and achievement: A social functional perspective. *Behavioral Sciences*, 8(2), 27. <https://doi.org/10.3390/bs8020027>
- Saramandi, A., Au, Y. K., Koukoutsakis, A., Zheng, C. Y., Godwin, A., Bianchi-Berthouze, N., Jewitt, C., Jenkinson, P. M., & Fotopoulou, A. (2024). Tactile emoticons: Conveying social emotions and intentions with manual and robotic tactile feedback during social media communications. *PLoS One*, 19(6), e0304417. <https://doi.org/10.1371/journal.pone.0304417>
- Scheibe, S., & Carstensen, L. L. (2010). Emotional aging: Recent findings and future trends. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 65(2), 135-144. <https://doi.org/10.1093/geronb/gbp132>
- Scherr, S., Polst, S., Müller, L., Holl, K., & Elberzhager, F. (2019). The perception of emojis for analyzing app feedback. *International Journal of Interactive Mobile Technologies*, 13(2), 19-36. <https://doi.org/10.3991/ijim.v13i02.8492>
- Serrano-Ausejo, E., & Mårell-Olsson, E. (2024). Opportunities and challenges of using immersive technologies to support students' spatial ability and 21st-century skills in K-12 education. *Education and Information Technologies*, 29(5), 5571-5597. <https://doi.org/10.1007/s10639-023-11981-5>
- Spencer-Oatey, H. (2023). Culture, Emotion, and (Im) politeness Evaluations. In *Advancing (Im) politeness Studies: Cultural, Digital and Emotional Aspects* (pp. 15-32). Springer. https://doi.org/10.1007/978-3-031-37064-9_2
- Strijbos, J.-W., Pat-El, R., & Narciss, S. (2021). Structural validity and invariance of the feedback perceptions questionnaire. *Studies in Educational Evaluation*, 68, 100980. <https://doi.org/10.1016/j.stueduc.2021.100980>
- Suliman, W. M. M. (2024). Emojis in EFL Communication: An Analysis of the Language-Like Functions in Emoji Use by Saudi Female Learners. *Theory and Practice in Language Studies*, 14(1), 154-159. <https://doi.org/10.17507/tpls.1401.18>
- Szeto, M. D., Barber, C., Ranpariya, V. K., Anderson, J., Hatch, J., Ward, J., Aguilera, M. N., Hassan, S., Hamp, A., & Coolman, T. (2022). Emojis and emoticons in health care and dermatology communication: narrative review. *JMIR dermatology*, 5(3), e33851. <https://doi.org/10.2196/33851>
- Vogel-Walcutt, J. J., Gebrim, J., Bowers, C., Carper, T., & Nicholson, D. (2011). Cognitive load theory vs. constructivist approaches: which best leads to efficient, deep learning? *Journal of Computer Assisted Learning*, 27(2), 133-145.
- Vytasek, J. M., Patzak, A., & Winne, P. H. (2020). Analytics for student engagement. *Machine learning paradigms: Advances in learning analytics*, 158, 23-48. https://doi.org/10.1007/978-3-030-13743-4_3

- Waaramaa, T., & Leisiö, T. (2013). Perception of emotionally loaded vocal expressions and its connection to responses to music. A cross-cultural investigation: Estonia, Finland, Sweden, Russia, and the USA. *Frontiers in Psychology*, 4, 47905. <https://doi.org/10.3389/fpsyg.2013.00344>
- Walter, N., Ortbach, K., & Niehaves, B. (2015). Designing electronic feedback—analyzing the effects of social presence on perceived feedback usefulness. *International Journal of Human-Computer Studies*, 76, 1-11. <https://doi.org/10.1016/j.ijhcs.2014.12.001>
- Warburton, W. A., Mohi, S., Sweller, N., Tarabay, C., Spencer, L., & Olsen, K. (2024). Violent and prosocial music: Evidence for the impact of lyrics and musical tone on aggressive thoughts, feelings, and behaviors. *Aggressive behavior*, 50(3), e22148. <https://doi.org/10.1002/ab.22148>
- Weissman, B., & Tanner, D. (2018). A strong wink between verbal and emoji-based irony: How the brain processes ironic emojis during language comprehension. *PLoS One*, 13(8), e0201727. <https://doi.org/10.1371/journal.pone.0201727>
- Williams, A. (2024). Delivering Effective Student Feedback in Higher Education: An Evaluation of the Challenges and Best Practice. *International Journal of Research in Education and Science*, 10(2), 473-501. <https://doi.org/10.46328/ijres.3404>
- Winstone, N. E. (2022). Characterising feedback cultures in higher education: an analysis of strategy documents from 134 UK universities. *Higher education*, 84(5), 1107-1125. <https://doi.org/10.1007/s10734-022-00818-8>
- Winstone, N. E., Nash, R. A., Parker, M., & Rowntree, J. (2017). Supporting learners' agentic engagement with feedback: A systematic review and a taxonomy of recipience processes. *Educational psychologist*, 52(1), 17-37. <https://doi.org/10.1080/00461520.2016.1207538>
- Yang, S.-B., Hlee, S., Lee, J., & Koo, C. (2017). An empirical examination of online restaurant reviews on Yelp. com: A dual coding theory perspective. *International Journal of Contemporary Hospitality Management*, 29(2), 817-839. <https://doi.org/10.1108/ijchm-11-2015-0643>
- Zarkadoulas, D., & Virvou, M. (2024). Emotional expression in mathematics e-learning using emojis: A gender-based analysis. *Intelligent Decision Technologies*(Preprint), 1-21. <https://doi.org/10.3233/idt-240170>
- Zhoc, K. C., Chung, T. S., & King, R. B. (2018). Emotional intelligence (EI) and self-directed learning: Examining their relation and contribution to better student learning outcomes in higher education. *British Educational Research Journal*, 44(6), 982-1004. <https://doi.org/10.1002/berj.3472>

About the Contributor(s)

Mahadi Hasan Miraz,

Associate Professor, Department of Industrial Engineering, Istanbul Atlas University, Turkey

Email: mahadimiraz1@gmail.com

ORCID: <https://orcid.org/0000-0003-3008-7090>

Narishah Mohamed Salleh,

Department of Business Analytics, Sunway University, Malaysia.

Email: narishahm@sunway.edu.my

ORCID: <https://orcid.org/0000-0002-9834-9731>

Mohammad Tariq Hasan, Ph.D.

Associate professor, School of Business & Economics, United International University, Bangladesh

Email: tariq@bus.uiu.ac.bdORCID: <https://orcid.org/0000-0003-0810-5395>**James Bakul Sarkar, Ph.D.**

Professor, School of Business & Economics, United International University, Dhaka, Bangladesh

Email: jmssarkar@bus.uiu.ac.bdORCID: <https://orcid.org/0009-0000-1329-8983>**Mohammad Faridul Alam, DBA**

Professor, Department of Accounting, American International University-Bangladesh, Bangladesh

Email: mf.alam@aiub.eduORCID: <https://orcid.org/0000-0003-2393-1783>**Online Appendix A. Variable and Source (Source: Author's own creation.)**

Variable	Items	Adopted from
Student Engagement	I am willing to engage myself to learn more about the lesson.	(Hart et al., 2011)
	I am eager to engage myself in any lesson.	
	I am enthusiastic about getting involved with my classmates.	
	I am always into discussion if necessary to learn more about the lesson.	
	I am passionate about surrounding myself with my classmates.	
Feedback Comprehension	I always check my teacher's responses and feedback for my lesson.	(Strijbos et al., 2021)
	Feedback gives me more understanding of how I need to comply.	
	Feedback gives me a better understanding of my lesson.	
	Comment gives me a better understanding of my lesson.	
Emotional Response	Teacher feedback is an emotional response to me.	(Jaeger et al., 2013)
	Feedback impression means a lot to me.	
	The teacher's emotional response gives me positive vibes.	
	The teacher's emotional response is short but gives inner views.	

Emoji Feedback	Emojis can elicit more information than written comments.	(Scherr et al., 2019)
	I like emoji feedback instead of comments.	
	I prefer emoji feedback instead of a written statement.	
	I desire emoji feedback instead of a written statement.	
	Emojis can express more information than written comments.	
Learning Outcome	Using all feedback methods, I need to upgrade my outcome.	(Kyndt et al., 2014)
	The findings are my lesson that comes with good results.	
	Learning outcomes are important to me.	
	The outcome of learning is a key essential for every individual student.	
	I am always concerned about improving my lessons.	

Publisher's Note: *The opinions, statements, and data presented in all publications are solely those of the individual author(s) and contributors and do not reflect the views of Universitepark, EDUPLJ, and/or the editor(s). Universitepark, the Journal, and/or the editor(s) accept no responsibility for any harm or damage to persons or property arising from the use of ideas, methods, instructions, or products mentioned in the content.*
