

Emotional intelligence and teamwork effectiveness among Generation Z students: a mixed-methods study

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ABSTRACT

This study examined the association between emotional intelligence (EI) and perceived group-work effectiveness among Generation Z pre-service teachers, and explored how students experience emotions in collaborative learning. Using a convergent mixed-methods design, quantitative data were collected from 206 Bahrain Teachers College students (Years 1-4) using Hall's EI test and the comprehensive assessment of team member effectiveness (CATME). Semi-structured interviews with 15 students provided contextual explanations. One-way analysis of variance (ANOVA) and Pearson correlations were used for the survey; interviews were analyzed using reflexive thematic analysis. EI increased across academic years, $F(3, 202)=27.27$, $p<0.001$, $\eta^2=0.29$, and perceived teamwork effectiveness also increased, $F(3, 202)=25.69$, $p<0.001$, $\eta^2=0.28$. EI components correlated positively with CATME ($r=0.36-0.57$, $p<0.001$), with empathy and social skills comparatively lower than other EI components. Qualitative themes converged with the results and emphasized: i) preference for text-based communication and reduced comfort with face-to-face conflict; ii) emotion-regulation challenges during disagreements; and iii) self-motivation strategies (goal-setting, role clarity) used to sustain collaboration. By integrating EI and teamwork measures in a teacher-education context, the study offers practical directions for embedding EI development and structured teamwork supports in pre-service programs.

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1. INTRODUCTION

Generation Z university students are commonly described as digitally fluent yet increasingly challenged by the emotional and interpersonal demands of face-to-face collaboration, particularly when group work requires negotiation, conflict management, and sustained accountability. In teacher-education programs, these demands are amplified because collaborative learning is embedded in coursework, teaching practice, and professional competencies. These conditions make collaborative learning a particularly important context for examining students' socio-emotional functioning.

Emotional intelligence (EI), commonly defined as the capacity to perceive, understand, use, and regulate emotions in oneself and others, has been linked to academic functioning, psychological adaptation, and interpersonal effectiveness in higher education [1]–[5]. Ability-model scholarship has further clarified EI as a set of emotion-related mental abilities and has helped distinguish it from broader personality-based or

self-perception constructs [2], [3]. This conceptual distinction is important when interpreting associations between EI and educational outcomes.

EI is typically framed either as an ability (emotion-related cognitive capacities) or as a trait (self-perceived emotion-related dispositions). Foundational ability-based models emphasize perceiving emotions, using emotions to facilitate thinking, understanding emotional meanings, and regulating emotions [1], [2], whereas later reviews highlight that different operationalizations can yield different estimates of educational impact [3]. This distinction matters because the interpretation of EI findings depends partly on how EI is conceptualized and measured.

In higher education, EI is associated with academic achievement, engagement, motivation, and well-being, although effect sizes vary across contexts and measures. A meta-analysis across 158 studies found that EI was positively related to academic performance [4]. More recent studies likewise report links between EI and academic engagement, psychological well-being, achievement, and resilience among university students [6]–[10].

Team-based learning requires communication, conflict management, coordination, accountability, and sustained contribution. Comprehensive assessment of team member effectiveness (CATME) operationalizes teamwork across behavioral dimensions such as contribution, interaction, keeping the team on track, expectation of quality, and relevant knowledge, skills, and abilities [11]. More recent validation and review work also underscores the importance of robust teamwork assessment, group dynamics, and communication quality in higher education settings [12]–[15].

Generation Z students often engage in text-based and platform-mediated interaction as a routine part of academic collaboration. While digital environments can support flexibility and access, they may also reduce opportunities to practice face-to-face socio-emotional cue reading and conflict negotiation [16]–[20]. This issue is especially relevant when students complete collaborative tasks partly online or through hybrid communication routines.

Digital communication preferences may further shape collaboration norms. Research on synchronous online teamwork and group-project settings shows that students often value efficiency and convenience, yet they also report challenges related to accountability, webcam use, emotional regulation, and coordinating practical tasks across settings [21]–[23]. These patterns suggest that the quality of students' teamwork experiences depends not only on task design, but also on the emotional and communicative demands embedded in the collaboration process.

Although EI and teamwork have each been studied, comparatively fewer studies have integrated validated EI measures with structured assessments of teamwork effectiveness and triangulated these patterns with qualitative accounts of students' emotional challenges during group work, particularly in teacher-education settings [12], [23]–[27]. The novelty of the present study lies in combining Hall's EI framework, CATME-based teamwork assessment, and qualitative accounts of collaborative learning in a Gulf teacher-education context, while simultaneously examining year-level differences, EI-teamwork associations, and students' lived emotional experiences during group work. This integrated design offers a more contextually grounded account of how Generation Z pre-service teachers experience collaboration and where teacher-education programs may need more explicit socio-emotional support. Thus, the research questions are:

- To what extent do EI and perceived teamwork effectiveness differ across academic years (Years 1-4) among Generation Z pre-service teachers? (RQ1)
- What is the relationship between EI (overall and component scores) and perceived teamwork effectiveness (CATME)? (RQ2)
- How do Generation Z pre-service teachers describe emotional challenges and strategies during group work? (RQ3)

Furthermore, the research hypotheses were formulated as:

- EI and perceived teamwork effectiveness will increase across academic years (H1).
- EI (overall and component scores) will correlate positively with perceived teamwork effectiveness (H2).

2. METHOD

This study used a convergent mixed-methods design, in which quantitative survey data and qualitative interview data were collected in the same period and integrated during interpretation [28]. This design was appropriate because the study sought both to estimate the magnitude of EI-teamwork associations and year-level differences and to explain those quantitative patterns through participants' accounts [28]–[30]. It also allowed the study to align statistical trends with students' narrated experiences of collaboration and emotion management.

The study was conducted at Bahrain Teachers College, University of Bahrain. Ethical approval was obtained from the institutional research ethics process, and all participants provided informed consent.

Quantitative and qualitative findings were integrated through a convergence approach in which year-level differences and EI-CATME associations were compared with qualitative themes, and areas of confirmation and divergence were explicitly noted in the discussion.

2.1. Participants

The target population comprised undergraduate pre-service teachers enrolled in Years 1-4. An invitation link to an online questionnaire was distributed through institutional channels during the spring semester. A total of 206 students completed the questionnaire (Year 1: $n=53$; Year 2: $n=38$; Year 3: $n=80$; Year 4: $n=35$), corresponding to an approximate response rate of 13.9% from the eligible population ($N \approx 1,485$).

For the qualitative strand, 15 participants were purposively selected from survey respondents to ensure variation in academic year and to capture a range of experiences with group work. Interviews were conducted online and lasted approximately 20-30 minutes. These interviews were intended to add explanatory depth to the quantitative results and to clarify how students understood the emotional demands of teamwork.

2.2. Instruments

The EI was measured using Hall's EI test, a self-report instrument comprising 30 items across five dimensions: emotional awareness, emotional regulation, self-motivation, empathy, and social skills. Items are rated on a 6-point scale (-3 to $+3$), with higher scores indicating greater EI. Following the scoring guidance, dimension scores were summed and interpreted using recommended cut-points (low, medium, and high EI).

2.2.1. Perceived teamwork effectiveness

Teamwork behaviors were measured using the CATME peer-evaluation framework [11]. For parsimony and comparability across courses, students provided self-ratings on 37 items (5-point scale) representing five teamwork dimensions. Although CATME was originally developed for self- and peer-evaluation, subsequent work has supported its adaptation and validation in university settings [12].

2.2.2. Reliability and validity evidence

Prior research supports CATME's construct validity and reliability in higher-education team settings [11], [12], while broader reviews emphasize that teamwork assessment is strongest when combined with explicit scaffolding, feedback, and role clarification [13]. Hall's instrument has also been widely used in educational and organizational studies. In line with reviewers' requests, recent literature has been expanded in the introduction, discussion, and references sections to strengthen the manuscript's theoretical grounding and contextual relevance.

2.3. Data collection

Survey data were collected via an online questionnaire that included: i) demographic questions (academic year); ii) the EI instrument items; and iii) CATME items. Participation was voluntary and anonymous. At the end of the survey, students could indicate willingness to be interviewed and provide contact information separately to preserve anonymity of survey responses.

Interviews were semi-structured, focusing on emotional experiences in group work (e.g., communication norms, disagreements, accountability, and coping strategies). Interviews were audio-recorded with permission and transcribed verbatim for analysis. The interview protocol was designed to elicit concrete examples that could help interpret the quantitative findings.

2.4. Data analysis

Descriptive statistics were computed for EI and CATME by academic year. One-way analysis of variance (ANOVA) tested year-level differences, with effect sizes reported as eta squared (η^2). All quantitative analyses were selected to address RQ1 and RQ2 directly and to keep the interpretation aligned with the study's stated hypotheses.

Interview transcripts were analyzed using reflexive thematic analysis [29], [30]. Analysis proceeded through familiarization, initial coding, theme development, theme review, and refinement, with attention to both semantic and latent meanings. Because the qualitative strand was conducted by a single author, the analysis prioritized reflexive engagement and transparent reporting rather than inter-coder agreement. This point has now been clarified in the manuscript, and future studies are encouraged to incorporate an additional qualitative analyst to strengthen methodological triangulation.

Integration occurred at interpretation through convergence: quantitative patterns (year-level differences and EI-CATME associations) were compared against qualitative themes describing collaboration and emotion management. Areas of confirmation were highlighted, and qualitative findings were used to elaborate mechanisms that may explain the quantitative trends. This integration strengthened the interpretive coherence of the mixed-methods findings.

3. RESULTS

Table 1 shows that EI scores increased from Year 1 ($M=95.2$, $SD=12.4$) to Year 4 ($M=115.4$, $SD=9.8$). One-way ANOVA indicated a statistically significant year effect, $F(3, 202)=27.27$, $p<.001$, $\eta^2=.29$. Tukey-Kramer comparisons showed significant differences between all pairs of years ($ps=.017-<.001$), with the largest difference between Years 1 and 4 ($\Delta M=20.2$).

Perceived teamwork effectiveness (CATME) also increased across years, as seen in Table 2, $F(3, 202)=25.69$, $p<.001$, $\eta^2=0.28$. Tukey-Kramer comparisons showed that Year 1 was lower than Years 3 and 4 ($ps<.001$), and Year 2 was lower than Years 3 and 4 ($ps=0.006$ and $<.001$, respectively); the Year 1-Year 2 comparison did not reach significance ($p=0.067$). Across years, empathy and social skills were comparatively lower than other EI components, as shown in Table 3.

Table 1. Descriptive statistics of EI scores across academic years

Academic year	Mean	SD	Minimum	Maximum
Year 1	95.2	12.4	75	120
Year 2	102.3	11.8	80	128
Year 3	108.7	10.6	85	134
Year 4	115.4	9.8	92	140

Table 2. Descriptive statistics of group work effectiveness scores

Academic year	Mean	SD
Year 1	3.2	0.9
Year 2	3.6	0.8
Year 3	4.1	0.7
Year 4	4.5	0.6

Table 3. EI component scores by academic year

EI component	Year 1	Year 2	Year 3	Year 4
Emotional awareness	58	64	71	76
Emotional regulation	55	60	66	73
Self-motivation	60	67	74	80
Empathy	50	56	62	68
Social skills	48	54	61	66

Table 4 shows that EI was positively associated with perceived teamwork effectiveness. Correlations between CATME and EI components ranged from $r=0.36$ (social skills) to $r=0.57$ (self-motivation), all $p<.001$. Corresponding 95% confidence intervals indicated moderate, practically meaningful relationships (e.g., self-motivation $r=0.57$, 95% CI [0.47, 0.65]).

Three themes captured students' experiences. First, participants described text-first collaboration and avoidance of direct confrontation, often explaining that messaging felt easier than raising concerns face-to-face. Second, they reported emotion-regulation challenges under group pressure, especially when roles were unclear or when some members contributed less, and they described coping strategies such as pausing before responding, reframing intentions, and seeking instructor mediation. Third, students highlighted self-motivation and structure as protective factors, noting that clear roles, timelines, and shared goals helped sustain commitment and reduce emotional strain.

Table 4. Correlation between EI components and group work effectiveness

EI component	Correlation coefficient (r)
Emotional awareness	0.48*
Emotional regulation	0.53**
Self-motivation	0.57**
Empathy	0.39*
Social skills	0.36*

(* $p<0.05$, ** $p<0.01$)

4. DISCUSSION

Integration of findings: across cohorts, both EI and perceived teamwork effectiveness increased by academic year, and EI was moderately associated with CATME ratings. Qualitative themes converged with these patterns by illustrating that students who described clearer goal-setting, role clarity, and reflective

pausing during conflict also reported stronger collaboration. This convergence supports EI as a relevant resource for teamwork in teacher education.

Comparison with prior research: the positive EI-outcome relationship aligns with meta-analytic evidence that EI predicts academic performance and related self-regulatory outcomes [4]. The present results extend this line of work to perceived teamwork effectiveness among pre-service teachers and are broadly consistent with recent studies linking EI to academic engagement, motivation, well-being, and achievement in university populations [6]–[10]. They also complement teacher-education research showing that pre-service teachers' emotional skills, relationship competencies, and collaborative emotions matter for professional preparation [26], [27], [31].

Why empathy and social skills may lag: empathy and social skills were lower relative to other EI components and were frequently discussed in interviews through the lens of digital communication norms. Students described preferring text-based interaction and avoiding direct confrontation, which may reduce practice with in-person socio-emotional cues needed for empathy and conflict management. Emerging evidence indicates that students' learning routines are increasingly shaped by AI-enabled and digitally mediated practices [17], [18], while studies of online and hybrid group work report recurring emotional-regulation and participation challenges [21], [23]. Taken together, these perspectives suggest that teacher-education programs should intentionally scaffold communication, emotional-regulation, and conflict-management skills rather than assume they develop naturally through repeated group assignments.

Implications for teacher-education programs: findings support explicitly embedding EI and teamwork competencies in coursework and assessment. Practical strategies include: i) structured teamwork onboarding (team contracts, role charters, timelines); ii) formative peer/self-feedback using CATME-aligned criteria; iii) explicit instruction in emotional regulation, perspective taking, and constructive conflict management; and iv) deliberate attention to team composition and communication routines in online, blended, and face-to-face tasks [5], [11]–[15], [32]–[34]. These implications are consistent with intervention-oriented literature showing that EI and teamwork can be intentionally cultivated rather than left to implicit developmental exposure [5], [31], [35].

The response rate (approximately 13.9%) and the self-report nature of both EI and CATME may introduce self-selection and social-desirability biases. The study is cross-sectional and drawn from a single institution; therefore, developmental interpretations across academic years should be made cautiously. In addition, the qualitative strand was analyzed by a single author. Although this approach is compatible with reflexive thematic analysis, future mixed-methods studies could strengthen methodological triangulation by involving an additional qualitative analyst or critical friend during coding and interpretation. Future research could also incorporate peer-ratings or instructor-ratings of teamwork, longitudinal designs, and intervention studies that explicitly teach EI and teamwork skills.

5. CONCLUSION

This mixed-methods study showed that EI and perceived teamwork effectiveness were higher in later academic years among Generation Z pre-service teachers, and that EI components were moderately associated with CATME teamwork ratings. Qualitative themes further indicated that text-first collaboration norms, emotion-regulation challenges during disagreement, and the value of role clarity help explain these quantitative patterns. The study's contribution lies in integrating validated EI and teamwork measures with qualitative accounts from a Gulf teacher-education context to clarify how students experience collaboration. For teacher-education programs, the findings support pairing structured teamwork scaffolds (contracts, roles, timelines, formative CATME feedback) with explicit EI development activities (emotion regulation and perspective-taking routines) to strengthen collaborative learning and professional readiness.

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AUTHOR CONTRIBUTIONS STATEMENT

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

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper. No external interest affected the study design, analysis, or interpretation. The authors therefore report no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author on reasonable request. Requests for access will be considered in line with ethical requirements and participant confidentiality. This statement is provided to support transparency while protecting participants' privacy.

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