Exploring Interactionism in Group Work through PLS-SEM Analysis

[*1]Haslinda Md Isa, [2]Noor Hanim Rahmat, [3]Saidah Ismail, [4]Rozita Che Omar

[1,2,3]Akademi Pengajian Bahasa, Universiti Teknologi MARA, Shah Alam, Malaysia

[4]Fakulti Bahasa dan Linguistik, Universiti Malaya

DOI: https://doi.org/10.47772/IJRISS.2026.102100029

Received: 14 June 2026; Accepted: 19 June 2026; Published: 24 July 2026

ABSTRACT

This study explores interactionism in group work by examining the relationships between behaviour, environmental factors, and personal characteristics using a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. Grounded in Lewin's (1947) interactionism theory, the study conceptualizes behaviour as a function of personal characteristics and environmental influences. Data were collected through a structured questionnaire adapted from established instruments measuring group work behaviour, satisfaction and self-confidence in learning, and individual attributes such as passion, commitment, and skills. The findings reveal that behaviour has significant relationships with both environmental factors and personal characteristics, with both paths demonstrating strong statistical significance and large effect sizes. The model also demonstrates substantial predictive relevance, indicating its robustness in explaining interaction dynamics. These results align with previous studies showing that environmental factors, such as learning context and task structure, shape group interaction experiences, while personal characteristics, including motivation and prior engagement, influence participation patterns. The study highlights that effective group work is driven by the dynamic interplay between internal and external factors rather than isolated variables. The findings provide important implications for educators to design structured, supportive learning environments and to foster positive learner attributes that enhance collaboration. Overall, this study contributes to the literature by offering a comprehensive interactionist model of group work dynamics and demonstrating the applicability of PLS-SEM in understanding complex relationships in collaborative learning contexts.

Keywords: interactionism, group work, behaviour, environmental factors, personal characteristics

INTRODUCTION

Background of Study

Collaborative group work (CGW) has become a central approach in education due to its potential to enhance learning, engagement, and teamwork skills. Prior studies highlight that students generally perceive group work as beneficial for developing both academic and interpersonal competencies, particularly in technology-enhanced and online environments (McKay & Sridharan, 2024). However, the effectiveness of CGW is influenced by various factors, including the learning environment, group composition, and interaction patterns. Environmental conditions such as online learning disruptions and technological settings can shape collaboration experiences, while structured elements like roles and task organization contribute to improved interaction and problem-solving (Anna & Spyros, 2025). Additionally, students' preferences for working with familiar peers and their perceptions of fairness and trust further demonstrate how personal and contextual factors influence group work dynamics (Bussberg & Taylor, 2026).

Despite extensive research, several issues remain unresolved. Many studies have focused on outcomes such as grades, which may not fully capture the complexity of group interactions, leading to increased emphasis on students' perceptions and experiences as more meaningful indicators of effectiveness (McKay & Sridharan, 2024). Furthermore, while research has identified factors such as friendship ties, literacy levels, and participation

patterns as influencing interaction behaviour, there is still limited understanding of how these personal characteristics and environmental factors interact dynamically within group settings (Lintner et al., 2024). The influence of group composition, size, and role structures on interaction remains inconsistent and context-dependent.

Therefore, a significant research gap exists in comprehensively examining group work interactions through an interactionist perspective that integrates personal and environmental influences. This study addresses this gap by applying a PLS-SEM approach to explore the complex relationships among these variables, offering a more holistic understanding of how interactionism shapes group work behaviour in educational contexts.

Research Objective, Research Questions, and Hypothesis

The research questions will be answered using SmartPLS analysis using both measurement and structural models.

Table 1 - Distribution of Research Objectives, Questions, Hypotheses

RO	RQ	RESEARCH HYPOTHESIS
To investigate if there is a significant relationship between Environment and Behaviour	Is there a significant relationship between Environment and Behaviour?	Ho1: There is no significant relationship between Environment and Behaviour
To investigate if there is a significant relationship between Personal Characteristics and Behaviour	Is there a significant relationship between Personal Characteristics and Behaviour?	Ho2: There is no significant relationship between Personal Characteristics and Behaviour
To investigate if there is a significant effect between Environment and Behaviour	Is there a significant effect between Environment and Behaviour?	Ho3: There is no significant effect between Environment and Behaviour
To investigate if there is a significant effect between Personal Characteristics and Behaviour	Is there a significant effect between Personal Characteristics and Behaviour?	Ho4: There is no significant effect between Personal Characteristics and Behaviour

LITERATURE REVIEW

Theoretical Framework

Social Learning Theory

In the social learning theory, Bandura (1971) states that learning occurs through observation, imitation, and modelling within a social context. According to this theory, individuals acquire new behaviours not only through direct experience but also by observing others' actions and the consequences of those actions. Key processes such as attention, retention, reproduction, and motivation determine whether observed behaviours are learned and applied. In classroom settings, this theory is highly relevant to group interactions, as students continuously observe their peers' behaviours, communication styles, and problem-solving approaches during collaborative tasks. Positive modelling, such as active participation, respectful communication, and effective collaboration, can encourage other group members to adopt similar behaviours. Conversely, disengagement or negative interactions may also be imitated, affecting overall group performance. Social reinforcement, including feedback and peer recognition, further strengthens desired behaviours in group work. Therefore, Social Learning Theory provides a strong framework for understanding how group dynamics and peer influence shape individual behaviour, highlighting the importance of structured and supportive group environments that promote positive interaction, cooperation, and shared learning in the classroom.

Social Interdependence Theory by Deutsch (1949)

According to Deutsch (1949), Social Interdependence Theory emphasizes that the way goals are structured within a group determines how individuals interact and, ultimately, influences group outcomes. The theory distinguishes between positive interdependence, where individuals work cooperatively toward shared goals; negative interdependence, where members compete against one another; and no interdependence, where individuals work independently. In learning contexts, positive interdependence is particularly crucial, as it encourages collaboration, mutual support, and shared responsibility among group members. When learners perceive that their success is linked to the success of others, they are more likely to engage in constructive behaviours such as helping peers, sharing ideas, and coordinating efforts. This fosters important group dynamics such as cohesion, trust, accountability, and effective communication. Conversely, poorly structured interdependence can lead to competition, conflict, or disengagement, negatively affecting group performance. Therefore, Social Interdependence Theory provides a valuable framework for understanding how task structure, shared goals, and mutual reliance influence group dynamics in learning, highlighting that well-designed collaborative tasks can promote meaningful interaction and enhance both individual and collective learning outcomes.

Past Studies on the Group Work Interactions

Studies on group work interactions highlight that learners' behaviour is shaped by both environmental conditions and personal characteristics within collaborative settings. McKay and Sridharan (2024) found that students generally perceive collaborative group work as beneficial for developing teamwork and self-evaluative skills, but environmental factors such as the shift to online learning during the COVID-19 pandemic introduced challenges like isolation and reduced collaboration. This indicates that the learning environment significantly influences how students interact and engage in group tasks. Similarly, Anna and Spyros (2025) demonstrated that structured environments, such as role-based collaboration in technology-enhanced settings, can support effective interaction, particularly when group cohesion is low, highlighting the importance of contextual organization in shaping group behaviour.

At the same time, personal characteristics and interpersonal dynamics play a crucial role in influencing interaction patterns. Lintner et al. (2024) revealed that students tend to interact more with peers they are familiar with, and those with higher literacy or active participation levels are more likely to initiate and receive interactions. Group composition, such as size and friendship ties, also affects communication patterns and engagement. Furthermore, individual preferences and prior interaction behaviours shape how collaboration unfolds within groups. Overall, these studies suggest that group work behaviour is not solely dependent on task structure but emerges from the dynamic interplay between environmental factors and personal characteristics, emphasizing the need for well-designed collaborative environments that consider both elements

Conceptual Framework and Proposed Model of the Study

Figure 1 below shows the conceptual framework (make a mind map or use the basic model from SmartPLS and the proposed model of the study. This study is done to predict a model to explore interactionism in group work based on Lewin's (1947) theory of group work.

This conceptual framework is anchored in Lewin's (1947) interactionism theory, which posits that behaviour is a function of personal characteristics and environmental factors, expressed in the formula $B = f(P, E)$**.** As illustrated in Figure 1, group work behaviour (B) emerges from the dynamic interplay between learners' internal traits and the surrounding learning environment. In this framework, behaviour (B) is operationalised through Bateman et al. (2002) constructs, including *purpose and goals, roles, team relationships,* and *intergroup relations*, which reflect how learners interact, coordinate tasks, and collaborate effectively in group settings. These elements represent observable manifestations of interaction patterns within collaborative learning environments.

The framework further conceptualises personal characteristics (P) and environmental factors (E**)** as key antecedents influencing behaviour. Personal characteristics (P) are represented through (Bateman et al., 2002)

constructs such as *passion and commitment* and *skills and learning*, which capture learners' intrinsic motivation, preparedness, and capability to contribute to group work. Meanwhile, environmental factors (E) are linked to Studnicka, Zarzycka, and Zalewski (2023) constructs, namely *satisfaction with current learning* and *self-confidence in learning*, which reflect learners' perceptions of their learning environment and their belief in their abilities. These environmental elements shape how learners engage, interact, and respond within group contexts. Through PLS-SEM analysis, the model examines how P and E jointly influence B, providing a holistic understanding of interactionism by integrating internal dispositions and contextual influences in shaping group work dynamics.

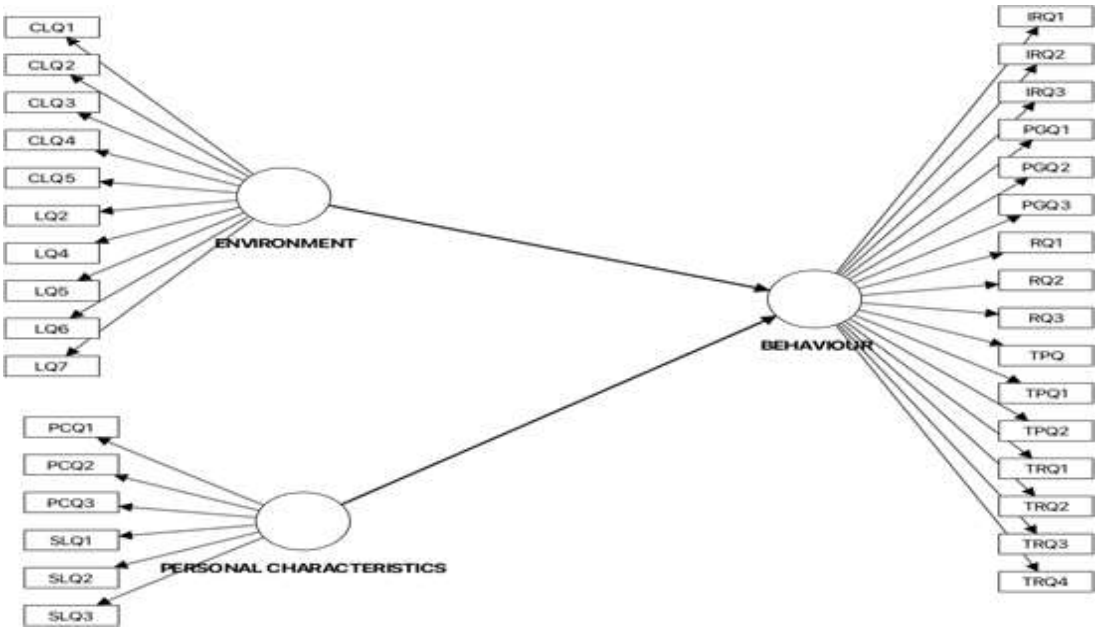

Figure 1 - The Conceptual Framework of the Study

METHODOLOGY

Research Design

This study employs a quantitative design. The research goal is to extend an existing theory and develop a predictive model. The model (Figure 1) chosen for this study is a hierarchical component model, Type II, which utilizes a formative model. A formative structural equation model (SEM) is a measurement model where the observed indicators *cause* or *form* the latent construct, rather than being caused by it (Fornell & Bookstein, 1982).

Population and Sample

The demographic analysis is presented in percentages. According to Ziegenfuss et al. (2021), researchers report demographic data in percentages to establish sample representatives and allow for generalizability to a larger population. Presenting in percentages also provides an overview of participants' characteristics and offers a clear and understandable picture of the sample makeup.

Table 2 - Percentage for Demographic Profile

Question	Demographic Profile	Categories	Percentage (%)
1	Gender	Male	15%
		Female	85%

2	Cluster	Science & Technology	50%
		Social Sciences, Humanities & Business	50%

According to the demographic profile of 169 respondents in Table 2, the majority of participants were female (85% females; 15% males). Regarding the participants' academic cluster, they were evenly divided: 50% from Science and Technology and 50% from Social Sciences, Humanities, and Business. This representation across academic clusters suggests that the sample is representative of both a range of disciplines and a greater female participation (as there was an equal number of participants in clusters). To sum up, the percentage reporting gives an overview of understanding participant characteristics and how they are interpreted into the studies being generalized.

Instrument

Table 3 presents the distribution of items included in the questionnaire. The instrument used a 5-point Likert scale with scale 1 is never. Scale 2 represents rarely. Scale 3 represents sometimes, while scale 4 is often and scale 5 is always.

Table 3 - Distribution for Item in Instrument

SECTION	INTERACTIONISM	VARIABLE	CONSTRUCT	ITEM INDICATOR	Tot
B	ENVIRONMENT (E)	STUDENT SATISFACTION AND SELF-CONFIDENCE IN LEARNING Studnicka (2023)	Satisfaction with Current Learning	5	10
			Self-Confidence in Learning	5	
C	BEHAVIOUR (B)	GROUP WORK Bateman et al. (2002)	Purpose and Goals (PG)	3	16
			Roles (R)	3	
			Team Processes (TP)	3	
			Team Relationships (TR)	4	
			Intergroup Relations (IR)	3	
D	PERSONAL CHARACTERISTICS (P)		Passion and Commitment (PC)	3	9
			Skills and Learning (SL)	3	
					35

The questionnaire, adapted from Lewin (1947), Studnicka (2023) and Bateman et al. (2002) comprises variables representing the Environment (10 indicators), Behaviour (16) indicators and Personal Characteristics (9 indicators).

Data Collection and Data Analysis

Data were collected using a Google Form. The data is then analyzed using SmartPLS 4 through two main stages. As suggested by Hair et al. (2017), data analysis is done at two levels: the measurement and structural model. The first stage is the measurement model, which measures the outer model. The second stage presents the structural model, which measures the inner model. The analyzed data is used to answer the research questions and also to confirm the model chosen.

FINDINGS AND DISCUSSION

The findings are presented in two stages. The first stage presents the measurement model, and the second stage reveals the structural model as well as answers research questions.

Measurement Model

In SmartPLS, the measurement model assesses the reliability and validity of the constructs. This is done by examining the relationships between them and their observable behaviour. The measurement model measures the outer model. Figure 3 below shows the measurement model for this study. Further detailed explanation of this model is elaborated in tables below. The measurement model is presented in terms of (i) reliability and (ii) validity.

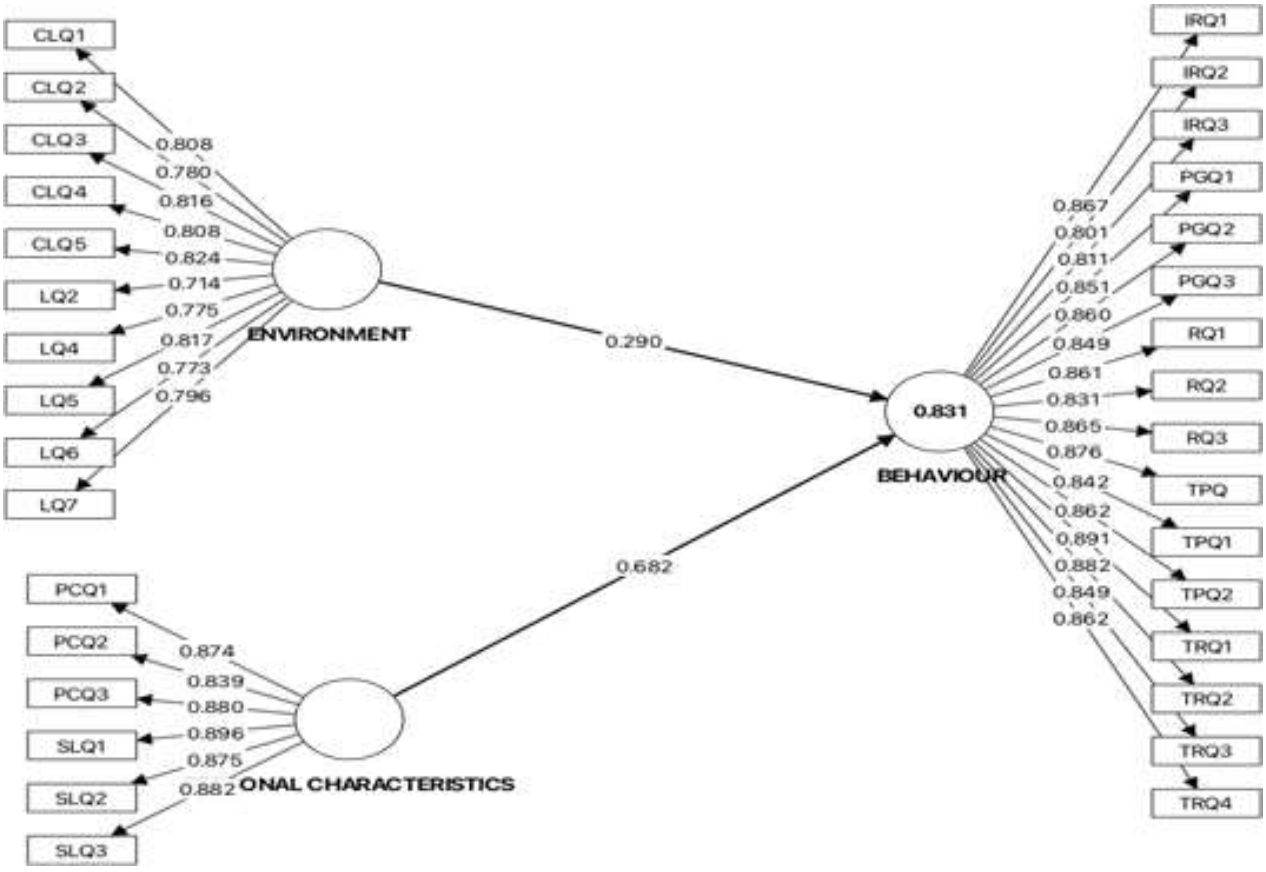

Figure 2 - Measurement Model

Reliability

According to Ringle and Sarstedt (2016), reliability is assessed by checking indicator reliability and internal consistency reliability. Internal consistency is done using Composite reliability (rho_c) and Cronbach's Alpha. The cut-off value for Cronbach's Alpha is 0.70 to 0.90. The cut-off values for composite reliability (rho_c) are 0.70-0.90. For indicator reliability, the factor loadings cut-off values are >0.70 and squared loadings ≥0.50. Finally, the cut-off values for Average Variance Extracted (AVE) ≥0.50.

Table 4 - Results for Reliability- Behaviour

CONSTRUCT / ITEM	FACTOR LOADING	CRONBACH'S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.975	0.977	0.729
IRQ1	0.867			
IRQ2	0.801			
IRQ3	0.811			
PGQ1	0.852			
PGQ2	0.86			
PGQ3	0.849			
RQ1	0.861			
RQ2	0.832			
RQ3	0.865			
TPQ	0.876			
TPQ1	0.842			
TPQ2	0.862			
TRQ1	0.891			
TRQ2	0.882			
TRQ3	0.848			
TRQ4	0.861			

Table 4 presents the reliability results for Behaviour. Factor loading of all items were found to be between 0.801 and 0.891. The loadings comply with the indicator reliability of more than 0.7. Next, the Cronbach's Alpha for Behaviour is 0.975, the composite reliability is 0.977, and the AVE is 0.729.

Table 5 - Results for Reliability- Environment

CONSTRUCT / ITEM	FACTOR LOADING	CRONBACH'S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.934	0.944	0.627
CLQ1	0.808			
CLQ2	0.78			
CLQ3	0.816			

CLQ4	0.808	
CLQ5	0.824	
LQ2	0.714	
LQ4	0.776	
LQ5	0.817	
LQ6	0.773	
LQ7	0.796	

Table 5 presents the reliability results for the Environment. Factor loading of all items were found to be between 0.714 and 0.824. The loadings comply with the indicator reliability of more than 0.7. Next, the Cronbach's Alpha for Environment is 0.934, composite reliability is 0.944 and AVE is 0.627.

Table 6 - Results for Reliability- Personal Characteristics

CONSTRUCT / ITEM	FACTOR LOADING	CRONBACH'S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.938	0.951	0.765
PCQ1	0.874			
PCQ2	0.839			
PCQ3	0.88			
SLQ1	0.896			
SLQ2	0.875			
SLQ3	0.882			

Table 6 presents the reliability results for Personal Characteristics. Factor loading of all items were found to be between 0.839 and 0.896. The loadings comply with the indicator reliability of more than 0.7. Next, the Cronbach's Alpha for Personal Characteristics is 0.938, composite reliability is 0.951 and AVE is 0.765.

Validity

According to Ramayah et al. (2018) for validity, the Discriminant validity (HTMT) needs to be <0.85 or <0.90.

Table 7 - Discriminant Validity (HTMT)

	BEHAVIOUR	ENVIRONMENT
ENVIRONMENT	0.809	
PERSONAL CHARACTERISTICS	0.928	0.757

Table 7 presents the discriminant validity of the model. The HTMT for Environment and Behaviour is 0.809 and is therefore valid. The interaction between Personal Characteristics and Environment is 0.757. The HTMT for personal characteristics and Environment is 0.928.

Franke and Sarstedt (2019) state that if the upper bound of the bootstrap confidence interval is significantly below 1.0, discriminant validity can still be claimed. So, all interactions met the threshold.

Structural Model

In SmartPLS, the structural model visualizes the hypothesized causal relationships between constructs. The structural model is thus formed after the researcher has established the reliability and validity in the measurement model. For the analysis of the structural model, the researcher runs bootstrapping and examines the collinearity, path coefficients of determination, effect size, PLS predict, and IPMA. In addition to that, the analysis in the structural model allows the researcher to answer research questions 1 & 2 and hypotheses 1 & 2. Figure 3 below shows the structural model for this study. Detailed explanation is elaborated in Tables below. The structural model is measured using (i) collinearity, (ii) Coefficients of determination (R^2), (iii) P-value, (iv) Effect Size (f^2), (v) PLS Predict, and (vi) IPMA.

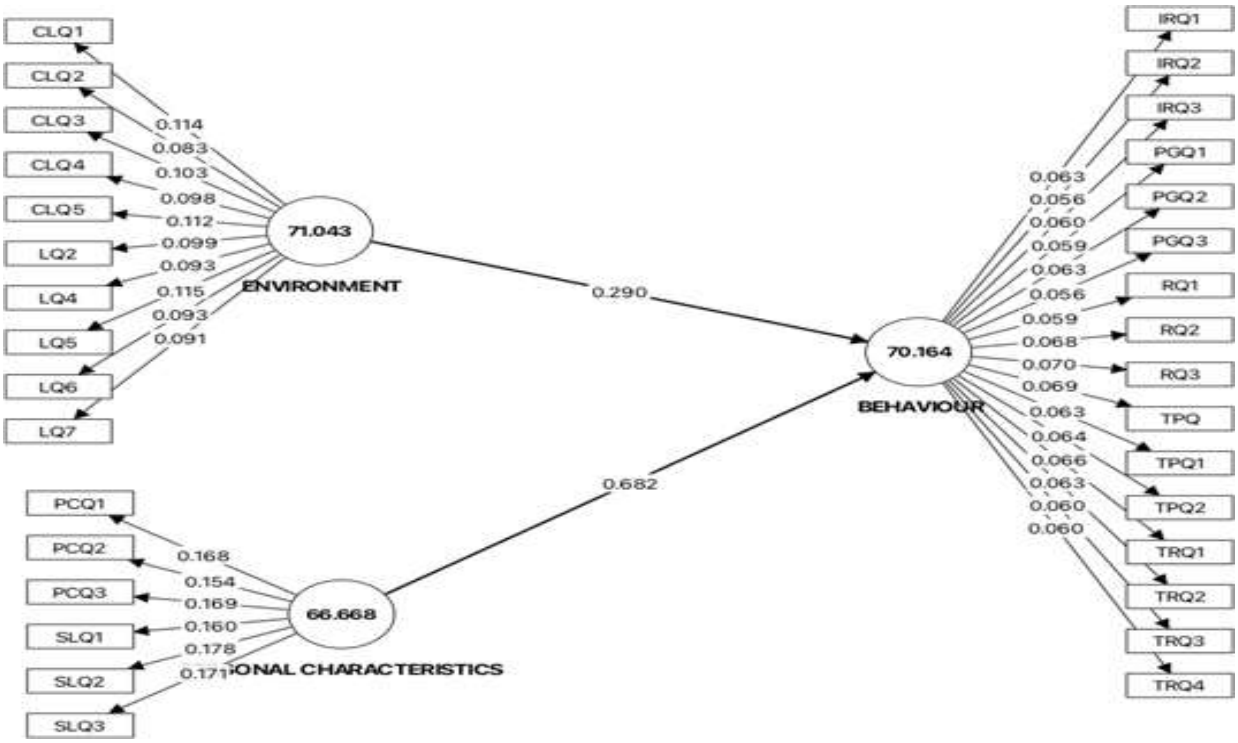

Figure 3 - Structural Model

Collinearity

According to Ringle and Sarstedt (2016), the cut-off value for collinearity inner model VIF is ≤ 5.0.

Table 8 - Collinearity

	Original sample (O)
ENVIRONMENT <-> BEHAVIOUR	0.775
PERSONAL CHARACTERISTICS <-> BEHAVIOUR	0.889
PERSONAL CHARACTERISTICS <-> ENVIRONMENT	0.71

Table 8 above presents the collinearity results for this study. According to Ringle and Sarstedt (2016) the inner model VIF must be less than or equal to 5.0. All interactions met the threshold for Collinearity.

Coefficients of determination (R^2)

According to Ramayah et al. (2018), for coefficients of determination (R^2) 0.2 to 0;7, depending on the field of study. Social Sciences and Economics follows the range above.

Table 9 - R^2

	Original sample (O)
BEHAVIOUR	0.831

Table 9 shows the results for coefficients of determination (R^2). Results indicate that the R^2 for Environment 0.601 (60%) and for Personal Characteristics is 0.831(83%).

P-Value

Table 10 - Interpretation for p-value

Thresholds	Interpretation	Decision
$p \leq 0.05$	Often considered statistically significant	Reject H_0
$p \leq 0.01$	Indicates very strong evidence against H_0	Reject H_0
$p > 0.05$	Weak or no evidence against H_0	Fail to reject H_0

According to Goodman (1999), a threshold of p-value is the cut-off for determining statistical significance, most commonly set at 0.05. Below is the table that interprets the threshold.

Table 10 shows the interpretation for p=value. According to Goodman (1999), if the p-value is $p \leq 0.05$, the data is often considered statistically significant, and the null hypothesis is rejected. If it is $p \leq 0.01$, then it indicates very strong evidence to reject the null hypothesis (H_0). However, a $p > 0.05$ is considered weak, and there is no evidence to reject the null hypothesis.

Table 11 - Path Coefficient for current study

	T statistics (|O/STDEV|)	P values
ENVIRONMENT -> BEHAVIOUR	5.944	0
PERSONAL CHARACTERISTICS -> BEHAVIOUR	14.251	0

Table 11 presents data to answer research questions and hypotheses. Path coefficients are presented in beta and t-value. The significant value (t-statistic) must be more than 1.65, and p-values must be less than 0.05 to show significant relationships.

The p-value for ENVIRONMENT -> BEHAVIOUR is p=0 (t=5.944); PERSONAL CHARACTERISTICS -> BEHAVIOUR is p=0 (t=14.251). Hence, both paths indicate significant relationships.

Effect Size (f^2)

According to Ramayah et al. (2018), the cut-off values for effect sizes (f^2) are 0.02 (small), 0.15 (medium), and 0.35 (large). Also, according to Hauf et al. (2024), for effect size, values from 0.02 to 0.15 are considered small. Values between 0.15 to 0.35 are considered medium while values 0.35 and above are considered large.

Table 12 - Effect Size

	Original sample (O)	Interpretation
ENVIRONMENT -> BEHAVIOUR	0.248	medium
PERSONAL CHARACTERISTICS -> BEHAVIOUR	1.369	large

Based on the results in Table 12, **ENVIRONMENT -> BEHAVIOUR** is medium, and **PERSONAL CHARACTERISTICS -> BEHAVIOUR** have large effect size.

PLS Predict (Q^2)

In PLS-SEM, it is stated that $Q^2 \geq 0$ (Ringle et al., 2024). Table 18 below reveals the PLS Predict (Q^2) for the dependent variable. The analysis reveals the Q^2 for all items in the dependent variable -connectedness.

Table 13 - PLS Predict (Q^2)

	Q^2predict	RMSE	MAE
BEHAVIOUR	0.826	0.423	0.313

Table 13 above shows the results for Q^2 Predict in the study. According to (Cohen, 1988), Q^2 Predict is used to interpret the magnitude of the predictive relevance. For **$Q^2 > 0$** indicates the model has predictive relevance. Secondly, **0.02** indicates **small** predictive relevance. Next, **0.15** indicates **medium** predictive relevance. Finally, **0.35** indicates **large** predictive relevance. Results for table 13 that Behaviour indicate large predictive relevance. The results, therefore, confirm the goodness of the model predicted in this study.

IPMA

IPMA or Importance-Performance Matrix Analysis. According to Ringle and Sarstedt (2016), IPMA is used to evaluate the performance and importance of the chosen constructs or indicators within a model. In this study, individual IPMA analyses were conducted for each construct and reported in Table 15 for Importance and Table 16 for Performance. The Importance/ Performance is presented in the form of Importance-Performance Maps in Figures 4 and 5.

According to Hauff et al. (2024) for PLS-SEM IPMA (Importance-Performance Map Analysis), there isn't a single "good score," but rather constructs with high importance (total effects) but low performance scores (rescaled 0-100) are key areas for improvement, indicating high potential for managerial action, while high importance/high performance is good, and low importance/low performance means less priority. Performance scores range 0-100, with higher values showing better attainment, but you interpret them *relative* to their importance.

Table 14 - Total Effects/ Importance

	BEHAVIOUR
ENVIRONMENT	0.29
PERSONAL CHARACTERISTICS	0.682

Table 15 - Latent Variables Average Performance (Performance)

	LV performance value, average
BEHAVIOUR	70.172

ENVIRONMENT	71.043
PERSONAL CHARACTERISTICS	66.668

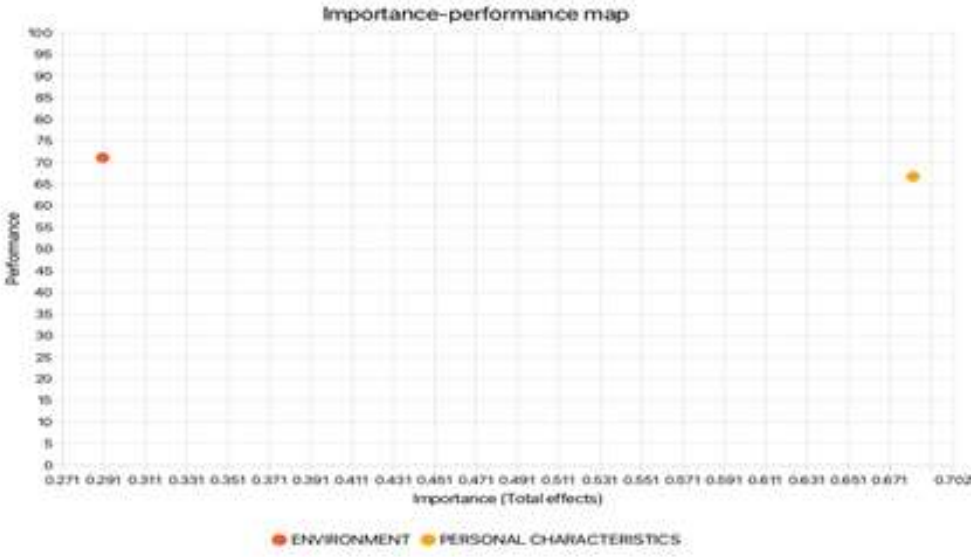

Figure 4 - IPMA for Behaviour

Figure 4 above shows the importance and performance analysis for the behaviour. When paired with Environment, there is a low Importance/High Performance (Importance = 0.775; Performance = 71.043). When paired with Personal Characteristics, there is a Medium Importance/High Performance (Importance = 0.682; Performance = 66.668).

CONCLUSION

Summary of Findings and Discussions

Table 16 - Outcome of Research Hypothesis

NO	Research Question	Research Hypothesis	Outcome
1	Is there a significant relationship between Environment and Behaviour?	Ho1: There is no significant relationship between Environment and Behaviour	Reject null hypothesis There is a relationship between Environment and Behaviour.
2	Is there a significant relationship between Personal Characteristics and Behaviour?	Ho2: There is no significant relationship between Personal Characteristics and Behaviour	Reject null hypothesis There is a relationship between Personal Characteristics and Behaviour.
3	Is there a significant effect between Environment and Behaviour?	Ho3: There is no significant effect between Environment and Behaviour	Reject null hypothesis There is a significant effect between Environment and Behaviour Effect= medium

4	Is there a significant effect between Personal Characteristics and Behaviour?	Ho4: There is no significant effect between Personal Characteristics and Behaviour	Reject null hypothesis There is a significant effect between Personal Characteristics and Behaviour Effect= large

Table 16 above shows the presentation of the outcome of the research questions and hypothesis. The null hypothesis is rejected for all research hypotheses.

This study set out to explore interactionism in group work by examining the relationships between behaviour, environmental factors, and personal characteristics using a PLS-SEM approach. The findings reveal that behaviour has significant relationships and strong effects on both environmental factors and personal characteristics, with both paths showing statistical significance and large effect sizes. These results support Lewin's (1947) interactionism formula that behaviour is shaped by the interplay between internal and external factors. The findings are consistent with previous studies which demonstrate that environmental conditions such as learning context and task structure influence collaboration (McKay & Sridharan, 2024; Anna & Spyros, 2025), while personal characteristics such as prior interaction patterns, skills, and familiarity affect engagement and participation (Lintner et al., 2024). Thus, this study reinforces that group work interactions are not isolated phenomena but emerge from a dynamic interaction between individual traits and contextual factors.

Implications and Suggestions for Future Research

The implications of this study suggest that educators should design group work activities that simultaneously address both environmental support and individual learner characteristics**.** Creating structured environments, fostering satisfaction and confidence, and promoting meaningful group roles can enhance interaction quality and learning outcomes. In addition, attention should be given to students' motivation, skills, and interpersonal relationships to ensure balanced participation and effective collaboration. From a methodological perspective, the use of PLS-SEM provides a robust framework to model complex interactionist relationships, offering valuable insights for both theory and practice.

For future research, it is recommended to extend this model by incorporating additional variables such as communication patterns or motivation, and to examine the model across different disciplines and learning contexts. Longitudinal and mixed-method approaches may also provide deeper insights into how interactionism evolves over time. Further studies could also explore the impact of different group structures or digital learning environments to better understand how interaction dynamics can be optimized in diverse educational settings.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to Professor Dr. Noor Hanim Rahmat for her invaluable guidance, continuous support, and willingness to share her knowledge throughout the completion of this paper. Her mentorship played a significant role in the success of this study. Special appreciation is extended to Saidah Ismail for her dedication and commitment to this project. The author also wishes to thank Dr. Rozita Che Omar for establishing a new research partnership, with the hope that this collaboration will continue to grow and lead to future academic endeavours. Finally, heartfelt thanks are extended to everyone who contributed directly or indirectly to the completion of this paper.

REFERENCES

1. Fornell, C. and Bookstein. F.L. (1982) Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-Voice Theory. Journal of Marketing Research, 19(4), 440-452. https://www.jstor.org/stable/3151718
2. Anna, G., & Spyros, V. (2025). Group dynamics in collaborative learning: Impact of emergent and scripted roles in tangible mobile augmented reality games. Computers and Education: X Reality, 7. https://doi.org/10.1016/j.cexr.2025.100102

3. Bandura, A. (1971). Social Learning Theory. General Learning Press.
4. Bateman, B., Colin Wilson, F., & Bingham, D. (2002). Team effectiveness: development of an audit questionnaire. Journal of Management Development, 21(3), 215–226. https://doi.org/10.1108/02621710210420282
5. Bussberg, N. W., & Taylor, L. L. (2026). Student Perceptions of Group Work and Group Formation Strategies. Journal of Statistics and Data Science Education, 34(2), 186–197. https://doi.org/10.1080/26939169.2025.2507765
6. Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences (2nd ed). Lawrence Erlbaum Associates.
7. Deutsch, M. (1949). A Theory of Cooperation and Competition. Human Relations, 2(2), 129–152.
8. Fornell, C., & Bookstein, F. L. (1982). Two Structural Equation Models:LISREL and PLS Applied to Consumer Exit-Voice Theory. Journal of Marketing Research, 19(4), 440–452. https://doi.org/10.1177/002224378201900406
9. Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. Internet Research, 29(3), 430–447. https://doi.org/10.1108/IntR-12-2017-0515
10. Goodman, S. N. (1999). Toward Evidence-Based Medical Statistics. 2: The Bayes factor. Academia and Clinic, 130(12). https://doi.org/10.7326/0003-4819-130-12-199906150-00019
11. Hair, J. F., Mathews, L., M., Mathews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. International Journal of Multivariate Data Analysis, 1(2), 107–123. https://doi.org/10.1504/IJMDA.2017.087624
12. Hauff, S., Richter, N. F., Sarstedt, M., & Ringle, C. M. (2024). Importance and performance in PLS-SEM and NCA: Introducing the combined importance-performance map analysis (cIPMA). Journal of Retailing and Consumer Services, 78, 103723. https://doi.org/10.1016/j.jretconser.2024.103723
13. Lewin, K. (1947). Frontiers in Group dynamics: Concept, method and reality in social science; social equilibria and social change. Human Relations, 1(1), 5–41. https://doi.org/10.1177/001872674700100103
14. Lintner, T., Diviák, T., & Nekardová, B. (2024). Interaction dynamics in classroom group work. Social Networks, 79, 14–24. https://doi.org/10.1016/j.socnet.2024.05.002
15. McKay, J., & Sridharan, B. (2024). Student perceptions of collaborative group work (CGW) in higher education. Studies in Higher Education, 49(2), 221–234. https://doi.org/10.1080/03075079.2023.2227677
16. Ramayah, T., Cheak, F., Ting, H., & Memon, M. A. (2018). Partial least Squares Structural Equation Modeling (PLS-SEM) using Smart PLS 3.0: An Updated Guide and practical guide to statistical analysis (2nd ed). Pearson.
17. Ringle, C. M., & Sarstedt, M. (2016). Gain more insight from your PLS-SEM results: The importance-performance map analysis. Industrial management & data systems, 116(9), 1865-1886. https://doi.org/10.1108/IMDS-10-2015-0449
18. Ringle, C. M., & Sarstedt, M. (2016). Using importance-performance matrix analysis (IPMA) in PLS-SEM: Using SmartPLS 3. Journal of Business Research, 69(8), 3169–3177.
19. Studnicka, K., Zarzycka, D., & Zalewski, J. (2023). Student satisfaction and self confidence in learning scale (SSCL)—reliability and validity test of the Polish version. Signa Vitae, 19(5), 104–111. https://doi.org/10.22514/sv.2023.069
20. Ziegenfuss, J. Y., Easterday, C. A., Dinh, J. M., JaKa, M. M., Kottke, T. E., & Canterbury, M. (2021). Impact of demographic survey questions on response rate and measurement: A randomized experiment. Survey Practice, 14(1), 1–11. https://doi.org/10.29115/sp-2021-0010

APPENDIX

Role Play /Activity And Teamwork

SECTION	INTERACTIONISM	VARIABLE	CONSTRUCT	ITEM INDICATOR	Tot
B	ENVIRONMENT (E)	STUDENT SATISFACTION AND SELF-CONFIDENCE IN LEARNING Studnicka (2023)	Satisfaction with Current Learning	5	10
			Self-Confidence in Learning	5	
C	BEHAVIOUR (B)	GROUP WORK Bateman, et. al. (2002)	Purpose and Goals (PG)	3	16
			Roles (R)	3	
			Team Processes (TP)	3	
			Team Relationships (TR)	4	
			Intergroup Relations (IR)	3	
D	PERSONAL CHARACTERISTICS (P)		Passion and Commitment (PC)	3	9
			Skills and Learning (SL)	3	
					35

Section B- Student Satisfaction And Self-Confidence In Learning (Sscl)

(i) Satisfaction with Current Learning (CL)

ITEM	1	2	3	4	5
CLQ1 The methods used in this role play /activity were supportive and effective					
CLQ2 The role play /activity provided me with a variety of educational materials and activities to promote my learning.					
CLQ3 I liked the way my instructor taught me the role play /activity					
CLQ4 The teaching materials used in this role play /activity were motivating and helped me learn.					
CLQ5 The way my instructor taught the role play /activity was appropriate to my way of learning.					

(ii) Self-Confidence in Learning (L)

ITEM	1	2	3	4	5
LQ2 I am confident that this role play/activity covered the essential content necessary to master the material covered in the curriculum.					
LQ4 My instructors used a variety of helpful resources to teach this role play/activity					
LQ5 It is my responsibility as a student to learn what I need during role play /activity classes.					
LQ6 I know how to get help when I do not understand the concepts in the role play/activity.					
LQ7 I know how to use role play exercises to learn the critical/key aspects of this course.					

Section C- Group Work

(i) Purpose and Goals (PG)

ITEM	1	2	3	4	5
PGQ1 Our team has a meaningful, shared purpose.					
PGQ2 We are strongly committed to a shared mission.					
PGQ3 We set and meet challenging goals.					

(ii) Roles (R)

ITEM	1	2	3	4	5
RQ1 Team members clearly understand their roles.					
RQ2 When an individual's role changes, an intentional effort is made to clarify it for everyone on the team.					
RQ3 Everyone values what each member contributes to the team					

(iii) Team Processes (TP)

ITEM	1	2	3	4	5
TPQ1 We address and resolve issues quickly.					
TPQ2 Our team works with a great deal of flexibility so that we can adapt to changing needs.					
TPQ3 When we choose consensus decision-making, we do it effectively.					

(iv) Team Relationships (TR)

ITEM	1	2	3	4	5
TRQ1 Team members appreciate one another's unique capabilities.					
TRQ2 Team members are effective listeners.					
TRQ3 Communication in our group is open and honest.					
TRQ4 Members of our team trust each other.					

(v) Intergroup Relations (IR)

ITEM	1	2	3	4	5
IRQ1 We are able to resolve conflicts with other teams collaboratively.					
IRQ2 We communicate effectively with other groups.					
IRQ3 Our collaborations with other teams are productive, worthwhile, and yield good results.					

(vi) Passion and Commitment (PC)

ITEM	1	2	3	4	5
PCQ1 Working on our team inspires people to do their best.					
PCQ2 People are proud to be part of our team.					
PCQ3 My team is proud of its accomplishments and optimistic about our work.					

(vii) Skills and Learning (SL)

ITEM	1	2	3	4	5
SLQ1 We have the skills we need to do our jobs effectively.					
SLQ2 We view everything, even mistakes, as opportunities for learning and growth					
SLQ3 Team members embrace continuous improvement as a way of life.					