THE IMPACT OF COOPERATIVE LEARNING MODELS ON LEARNING EFFECTIVENESS IN HOSPITALITY TECHNICAL AND PRACTICAL EDUCATION: THE MODERATING ROLE OF LEARNING MOTIVATION

Ying-Pei Shen

Assistant Professor, Department of Culinary Arts and Hotel Management,
Hungkuang University, TAIWAN.

beauty666@hk.edu.tw

ABSTRACT

This study aimed to examine the impact of cooperative learning on learning effectiveness among students enrolled in hospitality technical and practical courses at a university of science and technology, and to verify the moderating effect of learning motivation on the relationship between cooperative learning and learning effectiveness. The participants were students taking hospitality technical practice courses at Hungkuang University. Using a convenience sampling approach, questionnaire data were collected, yielding a total of 378 valid responses. The research instrument comprised three constructs: cooperative learning, learning motivation, and learning effectiveness. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to analyze the data and test the proposed hypotheses.

The results indicated that: (1) cooperative learning had a significant positive effect on learning effectiveness; (2) learning motivation significantly moderated the relationship between cooperative learning and learning effectiveness; and (3) the proposed model explained 30.6% of the variance in learning effectiveness, demonstrating satisfactory explanatory power. The findings confirm that cooperative learning is an effective instructional strategy for enhancing learning effectiveness in hospitality technical and practical courses, while learning motivation serves as a critical factor influencing the effectiveness of cooperative learning.

This study not only verifies the applicability of cooperative learning instructional models in hospitality practical teaching contexts but also provides empirical evidence regarding the moderating effect of learning motivation. The findings offer valuable implications for educators seeking to actively implement cooperative learning strategies and adopt appropriate motivational interventions to enhance students' learning motivation, thereby improving learning effectiveness and instructional quality in hospitality technical and practical education.

Keywords: Cooperative Learning; Learning Motivation; Learning Effectiveness; Hospitality Technical and Practical Education.

INTRODUCTION

In recent years, higher education has gradually shifted from traditional teacher-centered instruct-tional approaches to student-centered learning, emphasizing students' active participation, knowledge construction, and collaborative interaction. This transformation reflects the growing demand for developing twenty-first-century competencies, among which teamwork, communi-cation, and problem-solving skills have become essential educational objectives in higher education (Trilling & Fadel, 2009). Previous studies have indicated that, compared with traditional lecture-based instruction, active learning can effectively enhance

students' engagement and academic performance (Freeman et al., 2014). Consequently, identifying effective teaching strategies to improve learning outcomes has become a major concern in higher education.

Particularly in higher technological and vocational education, curriculum design emphasizes the integration of theory and practice. In addition to acquiring solid professional knowledge, students are expected to develop industry-relevant competencies and workplace skills through hands-on practice, teamwork, and problem-solving processes. In the field of hospitality technical and practical education, students are required to gradually construct professional knowledge and practical competencies through repetitive practice, peer interaction, simulated learning environments, and experiential learning activities. Given the highly interactive and collaborative nature of hospitality technical and practical courses, students' learning effectiveness is often influenced by the quality of peer collaboration and their level of learning engagement. Therefore, how to utilize cooperative learning strategies to promote student participation in the learning process, strengthen knowledge construction and skill development, and ultimately enhance learning effectiveness has become an important research issue in hospitality technical and practical education.

Among various instructional approaches, cooperative learning has been widely recognized as an effective strategy for promoting active learning and improving academic achievement. According to Social Interdependence Theory, students working toward shared goals through positive inter-dependddence and mutual cooperation can facilitate knowledge exchange and enhance problem-solving abilities, thereby improving learning outcomes (Johnson & Johnson, 2009). Previous research has further demonstrated that cooperative learning is more effective than competitive or individualistic learning environments in enhancing academic performance, learning engagement, and overall learning achievement (Roseth et al., 2008; Kyndt et al., 2013). As a result, cooperative learning has increasingly become an important instructional strategy in higher education curriculum design and teaching practice.

Research Background and Motivation

In hospitality practical courses, such as coffee brewing, tea preparation, beverage innovation design, and customer service training, students are required to complete learning tasks through group discussions, collaborative operations, and the sharing of learning outcomes. Therefore, cooperative learning is considered a highly suitable instructional approach for enhancing students' professional competencies and learning outcomes. However, the effectiveness of cooperative learning may be influenced by individual differences among students.

According to Self-Determination Theory (SDT), learning motivation is a crucial psychological factor affecting students' learning engagement, use of learning strategies, and academic performance (Deci & Ryan, 2000). Students with higher levels of learning motivation tend to demonstrate greater self-directed learning and sustained engagement, whereas those with lower motivation are more dependent on external support and encouragement. Consequently, even under the same cooperative learning environment, students with different levels of learning motivation may achieve different learning outcomes. This issue is particularly relevant in Coffee and Tea Practice courses, where students must devote substantial time to beverage preparation, sensory evaluation, and repetitive skill training. Students with stronger learning motivation are more likely to actively participate in team activities and achieve superior learning outcomes. This suggests that learning motivation may not only directly influence learning performance but may also affect the effectiveness of cooperative learning strategies.

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

A review of the relevant literature indicates that the positive impact of cooperative learning on learning effectiveness has been widely supported (Roseth et al., 2008; Kyndt et al., 2013). However, several research gaps remain. First, most existing studies have primarily focused on elementary and secondary school students or general university students, while empirical research involving students at universities of science and technology remains relatively limited. Given that universities of science and technology emphasize practice-oriented learning, teamwork, and the development of professional competencies, their learning environments differ substantially from those of traditional universities. Therefore, the findings of previous studies may not be directly applicable to this student population. In particular, within the field of hospitality practical education, empirical studies conducted in the context of **Coffee and Tea Practice** courses are still scarce.

Secondly, previous studies have primarily focused on the direct effect of cooperative learning on learning effectiveness, while relatively little attention has been given to examining the applicability and limitations of cooperative learning outcomes from the perspective of individual differences across various learning contexts. Although learning motivation has been widely recognized as being closely associated with students' learning engagement and academic performance, most studies have treated it as either an antecedent or an outcome variable. Comparatively few studies have investigated learning motivation as a moderating variable that may alter the relationship between cooperative learning and learning effectiveness. Therefore, the role of learning motivation in the process through which cooperative learning influences learning effectiveness warrants further investigation.

Based on the aforementioned research gaps, this study focuses on students enrolled in Coffee and Tea Practice courses within hospitality-related programs at universities of science and technology. The study aims to examine the effect of cooperative learning on learning outcomes and further investigate the moderating role of learning motivation in the relationship between cooperative learning and learning outcomes. It is expected that the findings will enrich the empirical evidence of cooperative learning theory within the context of hospitality practical education and clarify the role of learning motivation in the cooperative learning process. The results may also provide valuable implications for hospitality curriculum design, Coffee and Tea Practice instruction, and teaching practices in higher technological and vocational education.

Research Objectives

This study aims to investigate the relationships among cooperative learning, learning motivation, and learning effectiveness among students at universities of science and technology. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the study examines the proposed research framework and tests the research hypotheses to better understand the effect of cooperative learning on students' learning effectiveness and the moderating role of learning motivation. The specific research objectives are as follows:

1. To investigate the effect of cooperative learning on students' learning effectiveness in universities of science and technology.
2. To examine the moderating role of learning motivation in the relationship between cooperative learning and learning effectiveness.
3. To validate the proposed research model and examine the structural relationships among cooperative learning, learning motivation, and learning effectiveness through Partial Least Squares Structural Equation Modeling (PLS-SEM).

4. To provide theoretical and practical implications for curriculum development and the implementation of cooperative learning strategies in higher technological and vocational education based on the research findings.

CONTEXT AND REVIEW OF LITERATURE

The Relationship Between Cooperative Learning and Learning Outcomes

Cooperative Learning refers to an instructional strategy in which students work collaboratively in small groups to achieve shared learning goals and complete learning tasks through mutual assistance. Among the various cooperative learning approaches, the Student Teams–Achievement Divisions (STAD) and Teams–Games–Tournament (TGT) methods are considered the most representative. According to Social Interdependence Theory, when individuals interact under common goals, positive interdependence is established, encouraging group members to support one another, share knowledge, and collaboratively solve problems, thereby enhancing learning outcomes (Johnson & Johnson, 2009).

From a constructivist perspective, learning is not merely a process of one-way knowledge transmission but rather a process of knowledge construction through social interaction and collaboration (Vygotsky, 1978). Cooperative learning provides students with greater opportunities for discussion, reflection, and peer feedback, enabling them to deepen their understanding and improve their problem-solving abilities through knowledge exchange. Consequently, cooperative learning contributes positively to learning outcomes (Gillies, 2016).

Previous empirical studies have also demonstrated the positive effects of cooperative learning on learning outcomes. Through a meta-analysis, Roseth, Johnson, and Johnson (2008) found that cooperative learning significantly enhances academic achievement and learning outcomes compared with competitive or individualistic learning approaches. Kyndt et al. (2013), after synthesizing findings from multiple studies, further concluded that cooperative learning promotes knowledge acquisition, learning engagement, and overall academic achievement. In addition, Slavin (2015) argued that cooperative learning strategies such as STAD and TGT improve students' learning motivation and academic performance through mechanisms that combine group goals with individual accountability.

Based on the aforementioned theoretical perspectives and empirical evidence, cooperative learning facilitates students' learning outcomes through peer interaction, knowledge sharing, and collaborative teamwork. Therefore, the following hypothesis is proposed:

H1: Cooperative learning has a significant positive effect on learning outcomes.

The Moderating Effect of Learning Motivation on the Relationship Between Cooperative Learning and Learning Outcomes

Learning motivation refers to the psychological drive that encourages students to engage in learning activities and persist in their efforts to achieve learning goals (Pintrich & Schunk, 2002). According to Self-Determination Theory (SDT), individuals with higher levels of intrinsic learning motivation are more likely to actively participate in learning activities, seek knowledge, and demonstrate greater learning engagement (Deci & Ryan, 2000).

However, the effectiveness of cooperative learning may not be identical for all students. Based on Aptitude–Treatment Interaction Theory, students with different characteristics may respond differently to the same instructional strategy (Cronbach & Snow, 1977). When students possess a high level of learning motivation, their academic performance is often

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

driven primarily by internal motivation; therefore, the additional support provided by cooperative learning may contribute only marginally to their learning outcomes. In contrast, for students with lower levels of learning motivation, the peer support, team interaction, and shared-goal mechanisms embedded in cooperative learning may be more effective in stimulating learning engagement and enhancing academic performance.

Previous studies have also suggested that learning motivation may influence the effectiveness of cooperative learning. Slavin (2015) argued that the benefits of cooperative learning are largely derived from group rewards and peer interaction processes, and that these effects are particularly evident among students with lower levels of motivation. Similarly, Gillies (2016) indicated that cooperative learning can compensate for deficiencies in individual learning resources through peer support, thereby improving learning outcomes. Furthermore, Järvelä et al. (2016) found that students' pre-existing motivational levels influence both their degree of participation and the learning benefits gained during cooperative learning activities, suggesting that learning motivation may serve as an important contextual moderator.

Based on the aforementioned theoretical perspectives and empirical evidence, this study proposes that students with different levels of learning motivation may experience different learning benefits in cooperative learning environments. Therefore, the following hypothesis is proposed:

H2: Learning motivation moderates the relationship between cooperative learning and learning outcomes. Specifically, the effect of cooperative learning on learning outcomes varies according to students' levels of learning motivation.

METHOD

Research Instruments

Cooperative Learning Scale

Cooperative learning refers to the process through which students achieve learning goals by interacting, communicating, coordinating, and actively participating with group members during the learning process. In this study, cooperative learning consisted of two major components: Student Teams–Achievement Divisions (STAD) and Teams–Games–Tournaments (TGT).

The STAD component included two subscales. The first was the Group Cooperative Learning Scale, comprising 29 items that measured students' participation in teamwork, information seeking and sharing, communication with group members, critical and creative thinking, and harmonious interpersonal relationships within the group. The second was the Affective Skills in Cooperative Learning Scale, consisting of 20 items assessing students' affective and interpersonal competencies developed through cooperative learning activities.

The TGT component was measured using the Cooperative Learning Competition Participation Scale, which consisted of 25 items designed to assess students' engagement and participation in cooperative learning competitions.

The cooperative learning scale was developed based on the studies of Hung (2017) and Lin (2025), as well as the theoretical perspectives of social interdependence proposed by Johnson and Johnson (2009) and cooperative learning theory proposed by Slavin (2014).

Learning Motivation Scale

Learning motivation refers to students' psychological drive and willingness to engage in learning activities. The learning motivation scale used in this study was developed based on the work of Tsai (2021), as well as the learning motivation theories proposed by Pintrich and Schunk (2002) and Deci and Ryan (2000).

The scale consisted of nine items designed to measure students' learning interest, learning engagement, and willingness to continue learning.

Learning Effectiveness Scale

Learning effectiveness refers to students' self-evaluated outcomes following course participation, including knowledge acquisition, skill development, and overall learning achievement. The learning effectiveness scale was developed based on Bloom's (1956) **cognitive domain taxonomy** and the learning objectives of hospitality practical courses.

The scale was specifically designed by the researcher according to the theoretical knowledge and practical skill requirements of the Coffee and Tea Practice course. It comprised two dimensions: theoretical knowledge and practical skills, with a total of 30 items.

All measurement items in this study were assessed using a seven-point Likert scale, ranging from 1 = strongly disagree to 7 = strongly agree.

Participants and Sampling

The participants of this study were students enrolled in hospitality practical courses at Hungkuang University, located in Taichung, Taiwan. Considering the feasibility of research implementation and the accessibility of respondents, a convenience sampling method was adopted for questionnaire administration and data collection. Specifically, students enrolled in the Coffee and Tea Practice course were selected as the target population.

The students taking this course primarily came from departments related to Hospitality Management, Food Science and Technology, and Leisure and Recreation Management. The course emphasizes practical training, teamwork, interactive learning, and group-based competitions. Students are required to engage in group discussions, collaborative tasks, and joint completion of course assignments. Therefore, the course exhibits strong characteristics of cooperative learning, making it an appropriate context for examining the relationship between cooperative learning and learning effectiveness.

In addition, Hungkuang University is one of the major universities of science and technology in central Taiwan, comprising diverse colleges, including the College of Healthcare, International College of Hospitality, College of Human Ecology and Innovation, College of Intelligent Technology, and College of Nursing. Given its diverse student population and multidisciplinary educational environment, the sample possesses a certain degree of representativeness.

A convenience sampling approach was employed to conduct the questionnaire survey. Students enrolled in the Coffee and Tea Practice course were invited to participate regardless of their gender, academic year, or department. Data collection was conducted between September 2025 and January 2026. A total of 400 questionnaires were distributed. After data screening and validation procedures, 22 incomplete or invalid questionnaires were excluded. Consequently, 378 valid questionnaires were retained for analysis, yielding an effective response rate of 94.50%. The valid responses served as the basis for subsequent statistical analyses.

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

Data Analysis

This study employed SPSS and SmartPLS as the primary data analysis tools. First, SPSS was used to conduct descriptive statistical analyses, including frequency distributions and percentages, to summarize the demographic characteristics of the respondents. Subsequently, Partial Least Squares Structural Equation Modeling (PLS-SEM) was performed using SmartPLS to examine the proposed research framework and test the research hypotheses (Hair et al., 2022).

For the measurement model assessment, factor loadings, Cronbach's alpha, Composite Reliabi-lity (CR), and Average Variance Extracted (AVE) were evaluated to assess the reliability and convergent validity of the measurement scales. Generally, factor loadings should exceed 0.70, Cronbach's alpha and CR values should be greater than 0.70, and AVE values should exceed 0.50, indicating satisfactory reliability and convergent validity (Hair et al., 2022).

To assess discriminant validity, the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT) were employed. Discriminant validity is considered acceptable when the square root of the AVE for each construct exceeds its correlations with other constructs and when HTMT values are below 0.90 (Fornell & Larcker, 1981; Henseler et al., 2015).

For the structural model assessment, path coefficients (β), t-values, p-values, and coefficients of determination (R^2) were examined. A bootstrapping procedure with 5,000 resamples was conduc-ted to evaluate the statistical significance of the hypothesized relationships and to test the proposed hypotheses (Hair et al., 2022).

Furthermore, to examine the moderating effect of learning motivation, an interaction term (Cooperative Learning × Learning Motivation) was created in SmartPLS. The moderating effect was assessed by examining the influence of the interaction term on learning outcomes. A signifi-cant path coefficient for the interaction term ($p < .05$) indicates that learning motivation significantly moderates the relationship between cooperative learning and learning outcomes (Hair et al., 2022).

Finally, the overall model fit was assessed using the **Standardized Root Mean Square Residual (SRMR)** and the **Normed Fit Index (NFI)**. An SRMR value below 0.08 indicates a satisfactory model fit, whereas an NFI value closer to 1 suggests a better level of model fit (Hair et al., 2022). The final sample consisted of **378 valid responses**, which met the sample size requirements for **PLS-SEM** analysis and provided an adequate basis for subsequent hypothesis testing.

FINDINGS

Descriptive Statistics

As shown in Table 1, a total of 378 valid respondents participated in this study. Regarding gender, male students accounted for the majority of the sample, with 251 respondents (66.4%), while female students accounted for 127 respondents (33.6%).

With respect to nationality, most respondents were Taiwanese students, comprising 325 participants (86.0%), whereas international students accounted for 53 participants (14.0%).

In terms of academic major, students from the Department of Hospitality Management represented the largest proportion of the sample, with 157 respondents (41.5%), followed by

students from the Department of Food Science, with 149 respondents (39.4%), and students from the Department of Leisure and Recreation Management, with 72 respondents (19.0%).

Overall, the sample was predominantly composed of male students, Taiwanese nationals, and students majoring in hospitality management and food science. The demographic characteristics indicate that the sample is reasonably representative of the target population and provides an appropriate basis for subsequent analyses.

Table 1. Demographic Characteristics of the Respondents（N = 378）

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	251	66.4
	Female	127	33.6
Nationality	Taiwanese	325	86.0
	International Students	53	14.0
Department	Department of Culinary Arts and Hotel Management	157	41.5
	Department of Food Science and Technology	149	39.4
	Department of Sports and Leisure	72	19.0

Reliability and Convergent Validity Analysis

This study assessed the reliability and convergent validity of the measurement scales by examining factor loadings, Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). The results are presented in Table X.

The factor loadings of all measurement items ranged from 0.710 to 0.955, exceeding the recom-mendded threshold of 0.70 suggested by Hair et al. (2022), indicating satisfactory indicator reliability. Regarding internal consistency reliability, Cronbach's alpha values ranged from 0.876 to 0.978, all exceeding the recommended minimum value of 0.70. Similarly, Composite Reliability (CR) values ranged from 0.916 to 0.979, which also surpassed the recommended threshold of 0.70, demonstrating strong internal consistency and reliability of the constructs (Hair et al., 2022).

Furthermore, the Average Variance Extracted (AVE) values ranged from 0.550 to 0.802, all exceeding the minimum criterion of 0.50 recommended by Fornell and Larcker (1981). These results indicate that each latent construct was able to explain more than 50% of the variance in its corresponding indicators, thereby demonstrating adequate convergent validity.

Overall, the factor loadings, Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) values for all constructs met the recommended evaluation criteria for PLS-SEM. Therefore, the measurement scales used in this study exhibited satisfactory reliability and convergent validity, providing a sound basis for subsequent structural model assessment and hypothesis testing.

Table 2. Results of Reliability and Convergent Validity Analysis of the Measurement Model

Construct	Factor Loading Range	Cronbach's α	rho_A	Composite Reliability (CR)	AVE
Cooperative Learning	0.787–0.955	0.876	0.925	0.923	0.802
Learning Motivation	0.710–0.819	0.898	0.912	0.916	0.550
Learning Effectiveness	0.714–0.853	0.978	0.979	0.979	0.612

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

Assessment of Common Method Bias and Multicollinearity

Common method bias was assessed using Harman's single-factor test and the full collinearity approach. The results revealed that the first factor explained 49.190% of the total variance, which did not exceed the recommended threshold of 50%. In addition, the variance inflation factor (VIF) values for all constructs ranged from 1.363 to 2.118, remaining below the critical value of 3.3. Therefore, the results indicate that common method bias and multicollinearity are not significant concerns in the present study, and the data are suitable for further structural model analysis (Podsakoff et al., 2003; Kock, 2015).

Table 3. Results of Common Method Bias (CMB) and Collinearity Assessment

Assessment Method	Indicator	Value	Criterion	Result
Harman's Single-Factor Test	Variance Explained by the First Factor	48.021%	< 50%	Passed
Inner VIF Assessment	Cooperative Learning → Learning Effectiveness	1.363	< 3.3	Passed
Inner VIF Assessment	Learning Motivation → Learning Effectiveness	2.118	< 3.3	Passed
Inner VIF Assessment	Learning Motivation × Cooperative Learning → Learning Effectiveness	1.889	< 3.3	Passed

Table 4. HTMT Analysis for Discriminant Validity

Construct	Cooperative Learning	Learning Motivation	Learning Effectiveness	Learning Motivation × Cooperative Learning
Cooperative Learning	—			
Learning Motivation	0.393	—		
Learning Effectiveness	0.432	0.488	—	
Learning Motivation × Cooperative Learning	0.171	0.632	0.131	—

Model Fit Assessment

This study evaluated the model fit using the **Standardized Root Mean Square Residual (SRMR)** and the **Normed Fit Index (NFI)**. The results indicated that the SRMR value was **0.046**, which is below the recommended threshold of **0.08**, while the NFI value was **0.865**, exceeding the recommended threshold of **0.80**. These findings suggest that the proposed model demonstrates an acceptable overall fit and satisfies the requirements for analysis using **Partial Least Squares Structural Equation Modeling (PLS-SEM)**. Therefore, the structural model assessment and hypothesis testing can be conducted with confidence (Hair et al., 2022).

Table 5. Model Fit Assessment

Fit Index	Value	Recommended Criterion	Result
SRMR (Standardized Root Mean Square Residual)	0.046	< 0.08	Passed
NFI (Normed Fit Index)	0.865	> 0.80	Passed

Note. SRMR＝Standardized Root Mean Square Residual；NFI＝Normed Fit Index。

Hypothesis Testing

This study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the proposed hypotheses. The results revealed that cooperative learning had a significant positive effect on learning effectiveness ($\beta = 0.238$, $t = 4.717$, $p < .001$), indicating that students who engaged more actively in cooperative learning tended to achieve better learning outcomes. Therefore, H1 was supported.

Furthermore, the interaction effect between learning motivation and cooperative learning had a significant positive impact on learning effectiveness ($\beta = 0.129$, $t = 2.643$, $p = .008$), suggesting that learning motivation significantly moderates the relationship between cooperative learning and learning effectiveness. Thus, H2 was supported.

Regarding the explanatory power of the model, the R^2 value for learning effectiveness was 0.306, and the adjusted R^2 value was 0.301, indicating that cooperative learning and its interaction effect explained 30.6% of the variance in learning effectiveness. According to the guidelines proposed by Hair et al. (2022), an R^2 value above 0.25 can be regarded as having moderate explanatory power, suggesting that the proposed model demonstrates satisfactory predictive capability.

In terms of effect size, the f^2 value of cooperative learning was 0.060, representing a small effect size. The f^2 value of the interaction term between learning motivation and cooperative learning was 0.013. Although this value did not reach the threshold of 0.02 for a small effect size, it remained statistically significant, indicating that the moderating effect was relatively weak but still meaningful in explaining learning effectiveness (Cohen, 1988; Hair et al., 2022).

Table 6. Structural Model Results and Hypothesis Testing

Hypothesis	Path Relationship	Path Coefficient (β)	t-value	p-value	f^2	Result
H1	Cooperative Learning → Learning Effectiveness	0.238	4.717	< 0.001	0.060	Supported
H2	Learning Motivation × Cooperative Learning → Learning Effectiveness	0.129	2.643	0.008	0.013	Supported
	Learning Effectiveness (R^2)	0.306				
	Learning Effectiveness (Adjusted R^2)	0.301				

Note. β = Standardized path coefficient; f^2 = Effect size; R^2 = Coefficient of determination; Adjusted R^2 = Adjusted coefficient of determination. Significance levels were determined using the bootstrapping procedure in PLS-SEM.

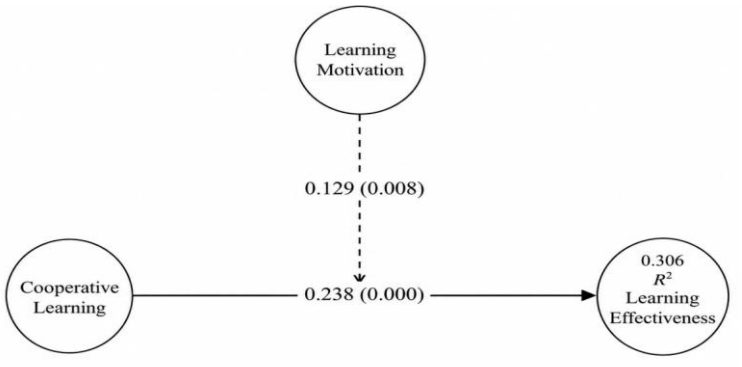

Figure 1. Moderating Effect Model of Cooperative Learning on Learning Effectiveness

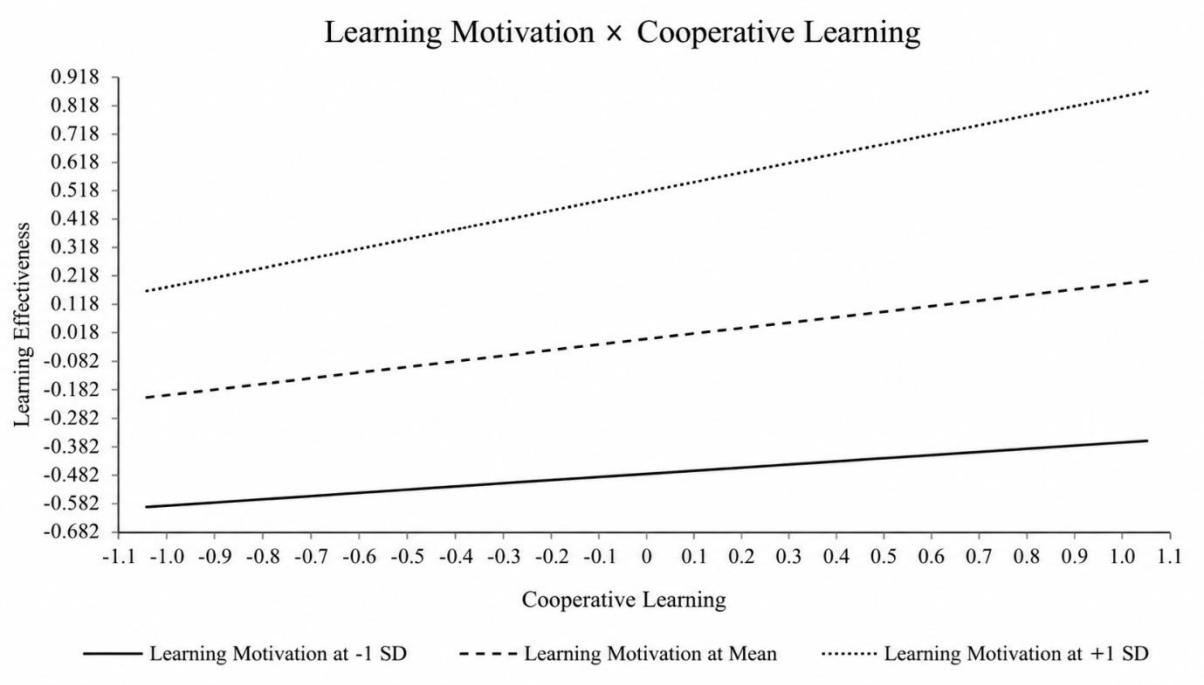

Figure 2. Moderating Effect of Learning Motivation on the Relationship Between Cooperative Learning and Learning Effectiveness

DISCUSSION

Conclusion

This study investigated the effect of cooperative learning on learning outcomes in the context of hospitality practical education and further examined the moderating effect of learning motivation among students at universities of science and technology. The results revealed that cooperative learning had a significant positive effect on learning outcomes, supporting H1. These findings indicate that students can effectively enhance their learning outcomes through participation in learning activities characterized by shared goals, peer interaction, knowledge sharing, and teamwork. In hospitality practical courses, students are required to engage in group practice, collaborative operations, and the completion of practical tasks. Therefore, cooperative learning contributes to the development of professional knowledge, practical skills, and problem-solving abilities. The findings are consistent with the principles of Social Interdependence Theory and support previous studies conducted by Johnson and Johnson (2009), Roseth et al. (2008), and Kyndt et al. (2013), which identified cooperative learning as an effective instructional strategy for improving student learning outcomes.

Furthermore, this study adopted Student Teams Achievement Divisions (STAD) and Teams Games Tournament (TGT) as the primary cooperative learning approaches. The results demonstrated that the cooperative learning environment established through STAD and TGT enhanced students' participation and engagement through peer support, team collaboration, and constructive competition, thereby improving learning outcomes. These findings suggest that STAD and TGT are not only applicable to traditional academic subjects but also highly effective in hospitality practical education.

In addition, learning motivation was found to significantly moderate the relationship between cooperative learning and learning outcomes, supporting H2. The results indicate that the positive effect of cooperative learning on learning outcomes becomes stronger when students

possess higher levels of learning motivation. This finding suggests that learning motivation not only influences students' learning engagement but also enhances the effectiveness of cooperative learning strategies. Students with higher learning motivation are more willing to participate actively in group discussions, share knowledge, and engage in teamwork, thereby maximizing the benefits of STAD and TGT instructional approaches.

Overall, the findings confirm that cooperative learning, particularly STAD and TGT, effectively enhances the learning outcomes of students in hospitality practical education. Learning motivation serves as an important contextual factor influencing the effectiveness of cooperative learning. The results not only contribute to the literature on cooperative learning and learning outcomes in vocational and technological education but also verify the applicability and effectiveness of STAD and TGT in hospitality practical courses. The findings further deepen the understanding of the mechanisms through which cooperative learning influences learning outcomes and provide valuable implications for curriculum design and instructional practices in hospitality practical education.

Theoretical Implications

The theoretical contributions of this study are twofold. First, this study further validates the applicability of Social Interdependence Theory within the context of vocational and technological higher education. Previous studies on cooperative learning have primarily focused on elementary, secondary, or general higher education settings. By examining students at a university of science and technology, the present study extends the application of cooperative learning theory to hospitality practical education and confirms its positive influence on learning outcomes.

Secondly, this study advances the cooperative learning literature by moving beyond the examination of direct effects and investigating the moderating role of learning motivation. The results indicate that the effectiveness of cooperative learning varies according to students' levels of learning motivation, suggesting that learning motivation serves as an important contextual factor influencing the impact of cooperative learning on learning effectiveness. These findings contribute to a deeper understanding of the mechanisms underlying cooperative learning and extend the theoretical development of hospitality practical education.

Practical Implications

Based on the findings, instructors at universities of science and technology are encouraged to actively integrate cooperative learning strategies, such as STAD and TGT, into course design. Activities including group discussions, team projects, problem-based learning, and game-based team competitions can effectively enhance students' learning outcomes.

Moreover, because learning motivation significantly influences the effectiveness of cooperative learning, instructors should not only focus on instructional design but also implement appropriate feedback mechanisms, goal-setting strategies, and learning support systems to strengthen students' learning motivation. Such efforts can maximize the benefits of cooperative learning.

From an institutional perspective, universities may further promote cooperative learning by providing professional development programs for faculty members, establishing cooperative learning communities, and implementing diverse assessment systems that support collaborative learning environments.

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

Limitations and Future Research

Several limitations should be acknowledged. First, the sample was drawn from a single university of science and technology, which may limit the generalizability of the findings. Future studies are encouraged to include participants from different regions and various types of higher education institutions.

Second, this study employed a cross-sectional survey design, which restricts the ability to establish causal relationships. Future research may adopt longitudinal or experimental designs to further investigate the causal mechanisms linking cooperative learning and learning outcomes.

Finally, this study focused solely on the moderating effect of learning motivation. Future studies may incorporate additional variables, such as self-efficacy, learning engagement, learning strategies, and team cohesion, to develop a more comprehensive model explaining the formation of learning outcomes.

REFERENCES

[1]. Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals.* Handbook I: Cognitive domain**.** David McKay.

[2]. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

[3]. Cronbach, L. J., & Snow, R. E. (1977). *Aptitudes and instructional methods: A handbook for research on interactions*. Irvington.

[4]. Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268.

[5]. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

[6]. Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410–8415.

[7]. Gillies, R. M. (2016). Cooperative learning: Review of research and practice. *Australian Journal of Teacher Education, 41*(3), 39–54.

[8]. Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage Publications.

[9]. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135.

[10]. Hung, Y.-F. (2017). *A study on the effects of integrating multiple graphic organizers into cooperative learning on learning effectiveness in social studies* (Master's thesis, University of Taipei, Taiwan).

[11]. Järvelä, S., Kirschner, P. A., Panadero, E., Malmberg, J., Phielix, C., Jaspers, J., Koivuniemi, M., & Järvenoja, H. (2016). Enhancing socially shared regulation in

collaborative learning groups: Designing for CSCL regulation tools. *Educational Technology Research and Development, 63*(1), 125–142.

[12]. Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher, 38*(5), 365–379.

[13]. Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration, 11*(4), 1–10.

[14]. Kyndt, E., Raes, E., Lismont, B., Timmers, F., Cascallar, E., & Dochy, F. (2013). A meta-analysis of the effects of face-to-face cooperative learning. *Educational Research Review, 10*, 133–149.

[15]. Lin, C.-C. (2025). *The effects of applying Kagan structured cooperative learning to project-based practical courses in mechanical clusters of vocational high schools on students' achievement goals and teamwork skills* (Master's thesis, National Taipei University of Technology, Taiwan).

[16]. Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education: Theory, research, and applications* (2nd ed.). Merrill Prentice Hall.

[17]. Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903.

[18]. Roseth, C. J., Johnson, D. W., & Johnson, R. T. (2008). Promoting early adolescents' achievement and peer relationships: The effects of cooperative, competitive, and individualistic goal structures. *Psychological Bulletin, 134*(2), 223–246.

[19]. Slavin, R. E. (2014). Cooperative learning and academic achievement: Why does groupwork work? *Anales de Psicología, 30*(3), 785–791.

[20]. Slavin, R. E. (2015). Cooperative learning in elementary schools. *Education 3–13, 43*(1), 5–14.

[21]. Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. Jossey-Bass.

[22]. Tsai, M.-T. (2021). *A study of integrating cooperative learning into story-drama modules to enhance students' cooperative learning and problem-solving abilities: A case study of a performing arts curriculum in an elementary school arts education project* (Master's thesis, Graduate Institute of Arts and Humanities Education, National Taiwan University of Arts, Taiwan).

[23]. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp