

DOI: https://doi.org/10.48009/1_iis_2026_137

Teamwork skills and performance in simulated ERP learning

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Abstract

Enterprise Resource Planning (ERP) simulation games are increasingly used in business education to help students develop an understanding of integrated business processes while strengthening essential teamwork and decision-making skills. Although previous research has established the educational benefits of ERP simulations, relatively little is known about which specific teamwork competencies have the greatest influence on team performance in these learning environments. This study investigates the relationship between six teamwork competencies - communication, collaboration and cooperation, role clarity, leadership and decision-making, trust and conflict resolution, and adaptability - and perceived team performance during participation in the ERPsim Maple Introduction Game. Data were collected from 78 undergraduate students enrolled in an ERP systems course through a questionnaire administered immediately after the simulation. Correlation and multiple regression analyses were used to examine the relationships among the study variables. The results indicate that adaptability and leadership and decision-making were the strongest predictors of perceived team performance, whereas communication, collaboration and cooperation, role clarity, and trust and conflict resolution did not exhibit significant independent effects when all competencies were considered simultaneously. These findings suggest that while effective teamwork depends on multiple complementary skills, the ability to adapt to changing circumstances and make timely, coordinated decisions is particularly important in dynamic ERP simulation environments. By identifying the teamwork competencies most closely associated with successful simulation performance, this study extends the ERP education literature and provides practical guidance for educators seeking to design simulation-based learning experiences that better prepare students for collaborative work in enterprise systems.

Keywords: Enterprise resource planning (ERP), ERPsim, teamwork, experiential learning, adaptability, leadership, simulation-based learning

Introduction

Enterprise Resource Planning (ERP) systems play a central role in modern organizations by integrating core business functions, including procurement, production, inventory management, finance, and sales, into a single information system. This integration enables organizations to streamline operations, improve information sharing, and support data-driven decision-making across functional areas. However, realizing these benefits requires users to understand not only individual business processes but also how decisions made in one area affect operations throughout the organization. Developing this systems perspective remains a significant challenge in ERP education, as it requires students to move beyond learning isolated business functions toward understanding their interdependencies.

To address this challenge, universities have increasingly adopted ERP simulation games as an experiential learning approach in ERP systems courses. Unlike traditional lecture-based instruction, ERP simulations immerse students in realistic business scenarios where they apply theoretical knowledge while managing an integrated business. Students work collaboratively to analyze operational data, respond to changing market conditions, and make decisions under time constraints. Through this process, they gain practical experience with ERP systems while simultaneously developing teamwork, communication, leadership, and problem-solving skills that are essential in today's business environment.

The educational value of ERP simulation games has been well documented. Previous studies have shown that simulation-based learning enhances students' understanding of enterprise systems, improves engagement, and promotes active and experiential learning (Léger, 2006; Seethamraju, 2020; Cronan et al., 2021). Because ERP simulations require teams to coordinate decisions across multiple functional areas, teamwork is widely recognized as a key determinant of successful performance. Effective communication, collaboration, leadership, and adaptability enable teams to manage interdependent business processes and respond to the dynamic conditions created within the simulation environment.

Although the importance of teamwork in ERP simulations is well established, relatively little is known about the contribution of individual teamwork competencies to team performance. Much of the existing literature treats teamwork as a single construct or focuses on its overall influence without examining the unique role of specific competencies. Moreover, previous studies have largely relied on cross-sectional survey data and self-reported measures, providing limited insight into the relative importance of different teamwork dimensions when considered simultaneously. As a result, it remains unclear which competencies are most critical for success in ERP simulation environments.

Addressing this gap has both theoretical and practical significance. From a theoretical perspective, examining individual teamwork competencies provides a more refined understanding of collaborative performance in technology-supported learning environments. Rather than viewing teamwork as a single concept, this approach recognizes that effective teamwork consists of multiple, complementary competencies that may contribute differently to team performance. From a practical perspective, identifying the competencies most strongly associated with successful performance can help educators design simulation activities that intentionally foster the skills students are most likely to need in professional practice.

Accordingly, this study investigates the relationships between six teamwork competencies - communication, collaboration and cooperation, role clarity, leadership and decision-making, trust and conflict resolution, and adaptability - and perceived team performance during participation in the ERPsim Maple Introduction Game. Specifically, the study addresses the following research question: which teamwork competencies are most strongly associated with team performance in an ERP simulation learning environment?

This study contributes to the ERP education literature in two important ways. First, it extends previous research by examining six distinct teamwork competencies within a single analytical model, providing a more nuanced understanding of their relative associations with team performance. Rather than simply demonstrating that teamwork matters, the study identifies which competencies are most strongly related to successful performance in a dynamic simulation environment. Second, the findings offer practical guidance for educators seeking to design ERP simulation activities that better develop teamwork and decision-making skills, thereby enhancing students' preparedness for collaborative work in enterprise systems.

Finally, it is important to recognize the scope of this study. Although ERP simulation games recreate many characteristics of organizational decision-making - including integrated business processes, interdependent tasks, time pressure, and rapidly changing information - they remain educational simulations rather than direct representations of workplace environments. Consequently, the findings should be interpreted within the context of simulation-based learning and viewed as contributing to our understanding of teamwork in ERP education rather than as direct evidence of organizational behavior.

Literature Review and Hypotheses Development

ERP simulation games have become an important instructional strategy in ERP systems education because they bridge the gap between theoretical knowledge and practical application. By placing students in realistic business scenarios, these simulations allow them to experience the complexity of managing integrated business processes while making decisions in a dynamic and competitive environment. Unlike traditional lecture-based instruction, which often focuses on conceptual understanding, ERP simulations require students to analyze information, coordinate decisions across functional areas, and respond to changing market conditions in real time. This experiential learning approach not only strengthens students' understanding of enterprise systems but also develops the collaborative and decision-making skills required in modern organizations (Léger, 2006; Seethamraju, 2020).

The educational benefits of ERP simulations have been widely documented in the literature. Studies consistently report improvements in students' understanding of enterprise systems, engagement, critical thinking, and collaborative problem-solving abilities (Seethamraju, 2020; Cronan et al., 2021). Because participants work in teams to manage interconnected business functions such as procurement, production, inventory, sales, and finance, successful performance depends not only on technical knowledge but also on effective teamwork. Team members must communicate efficiently, coordinate decisions across functional areas, share information, and adapt their strategies as business conditions evolve. Consequently, teamwork has emerged as one of the most important determinants of successful learning and performance in ERP simulation environments.

Although previous research clearly demonstrates the importance of teamwork, our understanding of how individual teamwork competencies contribute to performance remains incomplete. Most ERP simulation studies treat teamwork as a broad, multidimensional construct or emphasize its overall contribution without examining the relative influence of specific competencies. As a result, it remains unclear whether all aspects of teamwork contribute equally to successful performance or whether certain competencies play a more prominent role in dynamic simulation environments.

In addition, much of the existing research relies on cross-sectional survey data collected from student participants and self-reported measures of teamwork and learning outcomes. While these studies provide valuable evidence of the educational effectiveness of ERP simulations, they offer limited insight into the unique contribution of individual teamwork competencies. Furthermore, relatively few studies have examined multiple teamwork dimensions simultaneously within a single analytical model, making it difficult to determine which competencies are most strongly associated with successful team performance.

To address these gaps, the present study examines six theoretically grounded teamwork competencies - communication, collaboration and cooperation, role clarity, leadership and decision-making, trust and conflict resolution, and adaptability - and investigates their relationships with perceived team performance during an ERP simulation. By evaluating these competencies within a unified empirical framework, this study provides a more comprehensive understanding of the teamwork skills that contribute to successful

performance in simulation-based learning environments and offers evidence that can inform both future research and instructional practice.

This study is grounded in established teamwork theory, which conceptualizes team effectiveness as the outcome of multiple interrelated competencies rather than any single individual behavior. Effective teams achieve superior performance by integrating complementary knowledge, skills, and attitudes that enable members to communicate effectively, coordinate their efforts, make informed decisions, resolve conflicts, and adapt to changing circumstances. Consequently, team performance is shaped not by isolated competencies but by the collective ability of team members to work together in pursuit of shared goals.

Salas et al. (2005) argue that successful teams possess a set of core competencies that facilitate coordination, information sharing, mutual support, and adaptability in complex work environments. Similarly, Mathieu et al. (2008) emphasize that effective teamwork results from the interaction of interpersonal processes, cognitive capabilities, and coordinated behaviors that allow teams to perform effectively under conditions of uncertainty and task interdependence. Together, these perspectives suggest that teamwork is a multidimensional construct in which several complementary competencies contribute to overall team effectiveness.

ERP simulation games provide an appropriate context for examining these competencies because they replicate many of the collaborative demands encountered in organizational settings. Throughout the simulation, participants must coordinate decisions across multiple business functions, interpret incomplete and rapidly changing information, respond to competitive pressures, and continually adjust their strategies as market conditions evolve. Although educational simulations cannot fully capture the complexity of organizational culture, political dynamics, or long-term strategic decision-making, they create authentic experiential learning environments that require participants to engage in many of the same collaborative processes found in practice.

Guided by this theoretical perspective, the present study examines six teamwork competencies that have been consistently identified in the teamwork literature and are particularly relevant to ERP simulation-based learning: communication, collaboration and cooperation, role clarity, leadership and decision-making, trust and conflict resolution, and adaptability. Together, these competencies provide a comprehensive framework for understanding how different aspects of teamwork contribute to team performance in a dynamic ERP simulation environment.

Effective teamwork is widely recognized as a multidimensional construct comprising several complementary competencies that collectively influence team performance. Although these competencies are conceptually distinct, they are highly interdependent in practice, particularly in dynamic environments where team members must coordinate decisions, share information, and respond to changing conditions. ERP simulation games provide such an environment by requiring participants to manage interconnected business processes while making timely decisions under conditions of uncertainty.

Among these competencies, communication serves as the foundation for effective teamwork by enabling team members to exchange information, coordinate activities, and develop a shared understanding of goals and priorities. Within an ERP simulation, communication facilitates the integration of decisions across purchasing, production, inventory management, pricing, and sales, ensuring that individual decisions support the team's overall strategy. Previous research consistently identifies communication as an essential component of successful teamwork, although its direct influence on performance has produced mixed findings, suggesting that communication often contributes indirectly by supporting other collaborative processes (Salas et al., 2005; Olivier & Dubé, 2017). Accordingly, the following hypothesis is proposed:

H1: Communication is positively associated with team performance in an ERP simulation environment.

Closely related to communication are collaboration and cooperation, which reflect the extent to which team members work toward shared objectives, coordinate responsibilities, and support one another throughout task completion. Because ERP simulations require highly interdependent decisions across multiple functional areas, collaborative behaviors enable teams to integrate diverse perspectives and respond more effectively to evolving business conditions. Previous ERP simulation studies consistently identify collaboration as an important characteristic of successful teams (Boudreau & Harkin, 2013). Therefore, the following hypothesis is proposed:

H2: Collaboration and cooperation are positively associated with team performance in an ERP simulation environment.

Another important component of effective teamwork is role clarity, which refers to team members' shared understanding of individual responsibilities and expectations. Clearly defined roles improve coordination by reducing ambiguity, minimizing duplicated effort, and increasing accountability. Tannenbaum et al. (1996) and Mathieu et al. (2008) have written about how importance of role clarity has been proven to be important in ERP simulations where participants will take on distinct roles. In ERP simulations, where multiple business functions operate simultaneously, role clarity enables participants to make decisions more efficiently while maintaining coordination across functional areas. Therefore, the following hypothesis is proposed:

H3: Role clarity is positively associated with team performance in an ERP simulation environment.

While communication, collaboration, and role clarity provide the structural foundation for teamwork, leadership and decision-making guide the team's ability to coordinate actions and respond strategically to changing business conditions. Effective leadership helps teams establish priorities, integrate information from multiple sources, and make timely decisions under pressure. Because ERP simulations require continuous evaluation of operational information and rapid adjustment of business strategies, leadership has consistently been identified as a critical determinant of team effectiveness in complex environments (Morgeson et al., 2010; Cronan et al., 2021). Accordingly, the following hypothesis is proposed:

H4: Leadership and decision-making are positively associated with team performance in an ERP simulation environment.

Successful teamwork also depends on the quality of interpersonal relationships. Trust and conflict resolution encourage open communication, knowledge sharing, and constructive management of disagreements. Teams characterized by high levels of trust are more likely to exchange ideas freely, while effective conflict resolution enables members to address differences without disrupting collaboration. Trust enables teams to cooperate and communicate effectively and to feel psychologically safe (Salas et al., 2005; DeChurch & Mesmer-Magnus, 2010). Teams that manage conflict well are usually able to maintain focus on their objective while achieving higher results (Hawks & Werner, 2014). High-trust teams are generally more willing to share important information and develop new strategies to address changes to their environment (Olivier & Dubé, 2017). Although empirical evidence regarding their direct relationship with performance is mixed, these competencies are consistently recognized as essential elements of effective teamwork. Therefore, the following hypothesis is proposed:

H5: Trust and conflict resolution are positively associated with team performance in an ERP simulation environment.

Finally, adaptability reflects a team's capacity to modify strategies, redistribute responsibilities, and respond effectively to changing circumstances. This competency is particularly relevant in ERP simulation environments, where teams must continually adjust their decisions in response to market fluctuations, competitor actions, and changing customer demand. Adaptive teams are better able to interpret new information, revise their plans, and maintain performance despite uncertainty (Burke et al., 2006; Seethamraju, 2020). Consequently, the following hypothesis is proposed:

H6: Adaptability is positively associated with team performance in an ERP simulation environment.

Taken together, the literature identifies communication, collaboration, role clarity, leadership, trust, and adaptability as complementary dimensions of effective teamwork. However, prior ERP simulation research has generally examined these competencies independently or treated teamwork as a single, multidimensional construct. Consequently, relatively little is known about their relative contributions to team performance when considered simultaneously. Addressing this gap, the present study evaluates six theoretically grounded teamwork competencies within a unified regression model to determine which competencies are most strongly associated with team performance in an ERP simulation learning environment.

Research Methodology

This study employed a quantitative, cross-sectional research design to examine the relationships between teamwork competencies and team performance in an ERP simulation learning environment. Data were collected immediately after students completed the ERPsims Maple Introduction Game to capture participants' perceptions of teamwork while their simulation experiences remained fresh. Although self-reported perceptions do not directly measure observed team behaviors, they provide valuable insight into how participants evaluated their collaborative experiences during the simulation.

The study was conducted using the ERPsims Maple Introduction Game, an experiential learning platform developed by ERPsims Lab at HEC Montréal and implemented within the SAP ERP system. The simulation requires student teams to manage a virtual wholesale maple syrup company by making integrated business decisions related to procurement, production planning, inventory management, pricing, sales, and financial performance. Throughout the simulation, participants monitor operational reports, analyze business performance, and adjust their strategies in response to changing customer demand, inventory levels, and competitor actions.

Unlike traditional classroom exercises, ERP simulations require teams to coordinate decisions across multiple functional areas under conditions of uncertainty and time pressure. These characteristics closely resemble many operational aspects of organizational decision-making and provide an authentic environment for studying collaborative behaviors. Nevertheless, the simulation remains an educational setting rather than a direct representation of organizational practice. Consequently, the findings should be interpreted within the context of simulation-based learning.

Participants consisted of 78 undergraduate students enrolled in an ERP Systems course at a university. Before participating in the simulation, students completed instructional modules covering SAP ERP navigation and core business processes, including procurement, production planning, inventory

management, order fulfillment, and financial accounting. The simulation formed a required component of the course's experiential learning activities and contributed to the course assessment, providing students with a meaningful incentive to participate actively in collaborative decision-making.

Immediately following the simulation, participants completed an anonymous questionnaire measuring their perceptions of teamwork and team performance. Administering the survey immediately after the simulation minimized recall bias while allowing students to reflect on their recent collaborative experiences. The survey instrument was adapted from validated teamwork scales developed by Salas et al. (2005) and Olivier and Dubé (2017). Six teamwork competencies were examined: communication, collaboration and cooperation, role clarity, leadership and decision-making, trust and conflict resolution, and adaptability. Perceived team performance served as the dependent variable. Each construct was measured using multiple items assessed on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The instrument was selected because it measures complementary dimensions of teamwork that have been widely applied in teamwork and ERP education research.

Data were analyzed using IBM SPSS Statistics. Descriptive statistics were first computed to summarize participants' perceptions of teamwork and team performance. Pearson correlation analysis was then conducted to examine the relationships among the six teamwork competencies. To evaluate the proposed hypotheses, multiple regression analysis was performed with perceived team performance as the dependent variable. This analysis allowed the unique contribution of each teamwork competency to be assessed while controlling for the remaining predictors.

Results

Table 1 presents the descriptive statistics for the study variables. Overall, participants reported favorable perceptions of teamwork throughout the ERP simulation, with mean scores exceeding 4.0 for most constructs. These results indicate that students generally perceived high levels of communication, collaboration, leadership, trust, adaptability, and overall team performance during the simulation. Although responses were consistently positive, moderate variability was observed across several teamwork competencies, particularly leadership and adaptability, suggesting meaningful differences in how teams coordinated decisions and responded to changing simulation conditions.

The reliability and validity of the measurement instrument were evaluated before testing the proposed hypotheses. As shown in Table 2, four constructs - collaboration and cooperation, role clarity, adaptability, and team performance - demonstrated acceptable internal consistency, with Cronbach's alpha values exceeding the recommended threshold of .70. Communication ($\alpha = .529$), leadership and decision-making ($\alpha = .573$), and trust and conflict resolution ($\alpha = .571$) produced lower reliability coefficients. Although these values are below the conventional standard for established scales, the constructs were retained because they represent theoretically important dimensions of teamwork and were adapted from previously validated instruments. Consistent with recommendations for exploratory research, these measures were considered appropriate for the present analysis but should be interpreted with caution. Exploratory factor analysis further supported the construct validity of the instrument by confirming that the survey items loaded on their intended constructs.

The relationships among the teamwork competencies were examined using Pearson correlation analysis, with the results presented in Table 3. Overall, the findings reveal positive associations among most of the study variables, indicating that effective teamwork consists of multiple complementary behaviors rather than isolated competencies. Communication was strongly correlated with leadership and decision-making,

collaboration and cooperation, and role clarity, while collaboration and cooperation demonstrated a strong positive relationship with trust and conflict resolution. Adaptability also showed positive associations with several teamwork competencies. These results suggest that although each competency represents a distinct aspect of teamwork, they collectively contribute to effective team functioning within the ERP simulation environment.

Table 1. Constructs and Descriptive Statistics of Items of Teamwork Skills and Performance

Constructs and items of teamwork skills and performance	N	Min	Max	Mean	Std. Dev.
A. Communication					
A1. Our team communicates clearly and effectively during the ERPsim games.	78	4	5	4.73	0.446
A2. Information is shared openly among team members.	78	4	5	4.85	0.363
A3. Team members are proactive in communicating important updates or changes.	78	2	5	4.69	0.670
A4. There are regular check-ins to ensure everyone is informed about the team's progress.	78	3	5	4.35	0.680
A5. When issues arise, team members discuss them openly to find solutions.	78	2	5	4.54	0.848
B. Collaboration and Cooperation					
B1. Team members actively collaborate to solve problems in the ERPsim games.	78	1	5	4.58	0.890
B2. Everyone is willing to help others when needed during the ERPsim games.	78	4	5	4.96	0.194
B3. Our team functions as a cohesive unit to achieve our game objectives.	78	4	5	4.73	0.446
B4. There is a strong sense of teamwork in our group.	78	2	5	4.65	0.735
B5. Team members respect each other's opinions and contributions.	78	3	5	4.81	0.485
C. Role Clarity					
C1. Each team member knows their specific responsibilities in the ERPsim game.	78	2	5	4.58	0.748
C2. There is a clear understanding of who is responsible for each task in the ERPsim games.	78	2	5	4.65	0.680
C3. Role confusion or overlapping is minimal in our team.	78	1	5	4.42	1.013
C4. Team members are assigned roles that align with their strengths and expertise.	78	2	5	4.54	0.751
C5. The team agrees on the roles and responsibilities from the start of the ERPsim games.	78	2	5	4.62	0.841
D. Leadership and Decision-making					
D1. Our team has a clear leader who helps guide decisions during the ERPsim games.	78	1	5	4.04	1.133
D2. Team decisions are made collaboratively, with input from all members.	78	2	5	4.65	0.735
D3. The team leader (if applicable) is effective at making decisions under pressure.	75	2	5	4.16	0.931
D4. We rely on group consensus when making important decisions in the ERPsim games.	78	2	5	4.62	0.688
D5. Our team is able to make quick and effective decisions when necessary.	78	1	5	4.35	1.004
E. Trust and Conflict Resolution					
E1. Team members trust each other to do their part in the ERPsim games.	78	4	5	4.77	0.424
E2. There is a high level of mutual respect among team members.	78	3	5	4.81	0.485
E3. When conflicts arise, they are addressed and resolved constructively.	78	3	5	4.77	0.508
E4. I feel comfortable sharing my ideas and concerns with my team.	78	3	5	4.77	0.508
E5. We maintain a positive and supportive atmosphere even when disagreements occur.	78	4	5	4.73	0.446
F. Adaptability					
F1. Our team adapts quickly to changes or unexpected challenges in the ERPsim games.	78	2	5	4.35	0.880
F2. When new information is presented, we adjust our strategies accordingly.	78	3	5	4.46	0.697
F3. The team is flexible and can change plans when necessary to meet objectives.	78	4	5	4.65	0.479
F4. We handle uncertainty or ambiguity in the simulation effectively.	78	2	5	4.42	0.974
F5. Team members are open to trying new approaches when current strategies are not working.	78	3	5	4.69	0.542
G. Overall Team Performance					
G1. Our team consistently meets the ERPsim game's objectives and goals.	78	3	5	4.46	0.638
G2. We are able to make decisions that lead to a successful outcome in the ERPsim games.	78	2	5	4.62	0.688
G3. Team members are highly engaged and motivated to succeed in the ERPsim games.	78	2	5	4.62	0.743
G4. Our team works efficiently, maximizing the resources available in the ERPsim games.	78	3	5	4.58	0.635
G5. We achieve better outcomes when compared to other teams in the ERPsim games.	78	1	5	4.19	1.117

Table 2. Reliability Analyses of Constructs of Teamwork Skills and Performance

Scale	Cronbach's alpha
A. Communication	0.529
B. Collaboration and Cooperation	0.772
C. Role Clarity	0.897
D. Leadership and Decision-making	0.573
E. Trust and Conflict Resolution	0.571
F. Adaptability	0.821
G. Overall Team Performance	0.793

Table 3. Correlation Analysis of Constructs of Teamwork Skills

Constructs		A	B	C	D	E	F
A	Pearson Correlation	1	.633**	.571**	.782**	.507**	.492**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001
B	Pearson Correlation	.633**	1	0.186	.511**	.708**	.413**
	Sig. (2-tailed)	<.001		0.102	<.001	<.001	0.000
C	Pearson Correlation	.571**	0.186	1	.647**	.246*	.273*
	Sig. (2-tailed)	<.001	0.102		<.001	0.030	0.015
D	Pearson Correlation	.782**	.511**	.647**	1	.338**	.295*
	Sig. (2-tailed)	<.001	<.001	<.001		0.003	0.010
E	Pearson Correlation	.507**	.708**	.246*	.338**	1	.644**
	Sig. (2-tailed)	<.001	<.001	0.030	0.003		<.001
F	Pearson Correlation	.492**	.413**	.273*	.295*	.644**	1
	Sig. (2-tailed)	<.001	0.000	0.015	0.010	<.001	
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Table 4. Regression Analysis of Constructs

Model Summary							
Model		R	R Square	Adjusted R Square	Std. Error of the		
1		.734 ^a	0.539	0.499	0.41924		
a. Predictors: (Constant), F, C, B, D, E, A							
ANOVA ^a							
Model		Sum of Squares		df	Mean Square	F	Sig.
1	Regression	13.997		6	2.333	13.272	<.001 ^b
	Residual	11.952		68	0.176		
	Total	25.949		74			
a. Dependent Variable: G							
b. Predictors: (Constant), F, C, B, D, E, A							
Coefficients ^a							
Model		Unstandardized Coefficients		Standardized		t	Sig.
		B	Std. Error	Beta			
1	(Constant)	0.553	0.893		0.619	0.538	
	A	0.102	0.254	0.065	0.403	0.688	
	B	0.349	0.196	0.259	1.783	0.079	
	C	-0.133	0.101	-0.157	-1.321	0.191	
	D	0.321	0.159	0.304	2.020	0.047	
	E	-0.306	0.286	-0.152	-1.070	0.288	
	F	0.547	0.121	0.522	4.500	0.000	
a. Dependent Variable: G							

Before conducting the regression analysis, multicollinearity diagnostics were examined to ensure that the independent variables did not exhibit excessive overlap. Variance Inflation Factor (VIF) and tolerance statistics indicated that multicollinearity was not a concern. All VIF values were below the recommended threshold of 5.0, and all tolerance values exceeded 0.20, indicating that the regression coefficients could be interpreted as the unique contribution of each teamwork competency after controlling for the remaining predictors.

Multiple regression analysis was then performed to determine the extent to which the six teamwork competencies predicted perceived team performance. Table 4 presents the results of multiple regression

analysis. The overall regression model was statistically significant and explained approximately 50% of the variance in team performance ($R^2 = .499$), indicating that the teamwork competencies collectively accounted for a substantial proportion of the variation in the dependent variable.

Among the six predictors, adaptability emerged as the strongest predictor of team performance ($\beta = .522$, $p < .001$), followed by leadership and decision-making ($\beta = .304$, $p < .05$). These findings suggest that teams that were better able to adjust to changing business conditions and coordinate timely decisions perceived higher levels of performance during the ERP simulation. In contrast, communication, collaboration and cooperation, role clarity, and trust and conflict resolution did not demonstrate statistically significant independent relationships with team performance after controlling for the remaining teamwork competencies. Although these variables were positively correlated with several teamwork dimensions, their unique contributions to perceived performance were not statistically significant within the regression model.

Taken together, the findings indicate that students generally experienced positive teamwork during the ERP simulation and that the teamwork competencies were positively related to one another. However, when examined simultaneously, adaptability and leadership and decision-making were the only competencies that demonstrated significant independent relationships with perceived team performance. These results provide the empirical foundation for the discussion of the study's theoretical and practical implications presented in the following section.

Discussion

This study examined the relationships between six teamwork competencies and perceived team performance in an ERP simulation learning environment. Although participants reported positive experiences across all dimensions of teamwork, the findings indicate that not all competencies contributed equally to team performance. When the six competencies were examined simultaneously, adaptability and leadership and decision-making emerged as the only significant predictors of perceived team performance. These findings suggest that while effective teamwork depends on a combination of complementary skills, some competencies assume greater importance in dynamic environments where teams must respond quickly to changing conditions and make coordinated decisions.

Among the competencies examined, adaptability demonstrated the strongest relationship with team performance. This finding highlights the importance of a team's ability to adjust strategies, reassess priorities, and respond effectively to changing business conditions during the simulation. ERP simulation environments are intentionally designed to create uncertainty through fluctuating customer demand, competitive pressures, and evolving operational conditions. Teams that successfully interpreted new information and modified their decisions accordingly were more likely to perceive higher levels of performance than teams that relied on static strategies.

The importance of adaptability is consistent with established teamwork theory, which identifies adaptive behavior as a defining characteristic of high-performing teams operating in complex and uncertain environments (Burke et al., 2006; Salas et al., 2005). It also supports previous ERP simulation research suggesting that experiential learning environments foster flexible problem-solving and continuous decision-making as students respond to changing business conditions (Seethamraju, 2020; Cronan et al., 2021). By examining multiple teamwork competencies within a single analytical model, the present study extends this literature by demonstrating that adaptability remains an important predictor of team performance even after accounting for other dimensions of teamwork.

Leadership and decision-making also showed a significant positive relationship with team performance. Effective leadership is particularly important in ERP simulations because teams must integrate information from multiple business functions, prioritize competing demands, and make timely decisions under considerable time pressure. Teams with stronger leadership capabilities were better positioned to coordinate activities, resolve operational challenges, and maintain a shared strategic direction throughout the simulation. This finding is consistent with previous studies identifying leadership as a critical component of effective teamwork in complex and rapidly changing environments (Morgeson et al., 2010; Hawks & Werner, 2014).

Taken together, these findings suggest that successful performance in ERP simulations depends on more than technical knowledge of ERP systems. While students must understand business processes and ERP functionality, they must also demonstrate the ability to coordinate team activities, respond to new information, and adapt their strategies as conditions evolve. These higher-order teamwork competencies appear to play a particularly important role in helping teams navigate the uncertainty and interdependence that characterize ERP simulation environments.

In contrast, communication, collaboration and cooperation, role clarity, and trust and conflict resolution did not demonstrate statistically significant independent relationships with team performance after controlling for the remaining teamwork competencies. This result should not be interpreted as evidence that these competencies are unimportant. Instead, it suggests that they may function as foundational elements of effective teamwork that support, rather than directly determine, team performance. Communication enables the exchange of information, collaboration promotes coordinated action, role clarity reduces ambiguity, and trust encourages open dialogue and constructive conflict management. Together, these competencies create the conditions necessary for effective teamwork, but their influence on performance may be expressed indirectly through a team's ability to exercise effective leadership and adapt to changing circumstances.

Because the present study employed a cross-sectional design, these potential indirect relationships could not be examined empirically. Future research should investigate whether communication, collaboration, trust, and role clarity influence team performance through mediating mechanisms such as leadership effectiveness or team adaptability. Longitudinal research designs and structural equation modeling would provide a more rigorous assessment of these relationships and offer a deeper understanding of how teamwork competencies interact in simulation-based learning environments.

Overall, the findings are consistent with previous ERP simulation research while providing a more detailed understanding of the relative contribution of individual teamwork competencies. Earlier studies have consistently demonstrated that teamwork contributes to successful ERP simulation outcomes (Boudreau & Harkin, 2013; Kohlbacher & Zimmermann, 2019), but they have generally treated teamwork as a broad, multidimensional construct. By examining six distinct competencies within a single regression model, the present study provides a more nuanced perspective on teamwork and identifies the competencies most strongly associated with perceived team performance. Rather than proposing a new theory of teamwork, the study offers incremental empirical evidence that refines existing knowledge of collaborative performance in ERP simulation environments.

The findings also have practical implications for ERP systems educators. Because adaptability and leadership emerged as the strongest predictors of team performance, ERP simulation activities should be designed to encourage students to think strategically, respond to changing business conditions, and make collaborative decisions under realistic constraints. Instructors can strengthen these competencies by introducing unexpected market events, rotating leadership responsibilities during successive simulation

rounds, and incorporating structured debriefing sessions that encourage teams to reflect on their decisions and identify opportunities for improvement. Assessment strategies should likewise extend beyond simulation outcomes to include teamwork processes, allowing students to receive feedback on both their technical performance and their collaborative skills.

The findings also provide practical insights for educators who use ERP simulations in ERP systems courses. Since adaptability and leadership were the strongest predictors of team performance, instructors should create learning activities that encourage students to respond to changing business conditions, take on leadership responsibilities, and reflect on their team decisions throughout the simulation. Providing regular feedback on teamwork behaviors and evaluating skills such as leadership, collaboration, and decision-making alongside simulation performance can help students develop the collaborative and critical thinking skills needed to succeed in today's technology-driven business environments.

Several limitations should be considered when interpreting the findings. First, the study employed a cross-sectional design using self-reported data collected immediately after the simulation. Although this approach captured participants' perceptions while minimizing recall bias, it does not permit causal conclusions. Second, the research was conducted with undergraduate students participating in an educational ERP simulation. While the simulation reproduces many operational characteristics of organizational decision-making, it cannot fully capture the complexity of organizational culture, incentive systems, or long-term strategic decision-making. Consequently, the findings should be interpreted within the context of simulation-based learning rather than generalized directly to workplace settings. Third, several teamwork constructs demonstrated lower internal consistency than is typically recommended for confirmatory research. Although these constructs were retained because they were theoretically important and adapted from previously validated instruments, future studies should continue refining the measurement scales.

Future research should build on these findings by incorporating objective ERP simulation performance measures, such as profitability, market share, inventory turnover, and simulation rankings, together with peer evaluations, instructor assessments, and behavioral data extracted from simulation logs. Combining subjective and objective measures would provide a more comprehensive understanding of how teamwork influences performance while reducing the potential for common method bias. Studies involving larger and more diverse samples would further strengthen the generalizability of the findings and provide additional insight into the development of teamwork competencies across different educational and organizational contexts.

Conclusion

This study examined the relationships between six teamwork competencies and perceived team performance in an ERP simulation learning environment. By investigating communication, collaboration and cooperation, role clarity, leadership and decision-making, trust and conflict resolution, and adaptability within a single analytical framework, the study provides a more comprehensive understanding of the teamwork competencies associated with successful performance in ERP simulation-based learning.

The findings indicate that adaptability and leadership and decision-making were the strongest predictors of perceived team performance. These results suggest that while effective teamwork depends on multiple complementary competencies, teams that can respond effectively to changing conditions and coordinate timely decisions are more likely to achieve successful outcomes in dynamic ERP simulation environments. In contrast, communication, collaboration and cooperation, role clarity, and trust and conflict resolution,

although important components of teamwork, did not demonstrate significant independent relationships with performance when examined alongside the other competencies.

This study contributes to the ERP education literature by moving beyond the broad treatment of teamwork commonly found in previous research and examining the relative influence of individual teamwork competencies. The findings provide a more nuanced understanding of teamwork in simulation-based learning and offer practical guidance for educators seeking to design learning activities that strengthen not only students' technical ERP knowledge but also the leadership and adaptive decision-making skills required in collaborative business environments.

The findings should be interpreted within the context of the study's limitations. The research was conducted with undergraduate students in an educational ERP simulation and relied primarily on self-reported measures of teamwork and performance. Although ERP simulations replicate many characteristics of organizational decision-making, they cannot fully capture the complexity of workplace environments. Consequently, the results are most appropriately viewed as contributing to the understanding of teamwork in simulation-based learning rather than as direct evidence of organizational behavior.

Future research should extend this work by incorporating larger and more diverse samples, objective performance measures generated by ERP simulations, and multiple sources of evaluation, including peer assessments, instructor observations, and behavioral data. Longitudinal research and advanced analytical approaches, such as structural equation modeling, would also provide deeper insight into how teamwork competencies interact and evolve over time.

Overall, this study reinforces the value of ERP simulation games as experiential learning tools that develop both technical and collaborative competencies. By identifying the teamwork competencies most closely associated with successful performance, the study provides evidence that can inform the design of more effective ERP simulation experiences and better prepare students for collaborative decision-making in today's integrated business environments.

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