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How perceptions of reports and transactions influence ERPsim game-based learning performance

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Abstract

This study examines the impact of students' perceptions on their performance in ERPsim-based game learning environments, utilizing the Technology Acceptance Model (TAM) as a theoretical framework. Specifically, it explores how perceived usefulness and ease of use of ERPsim reports and transactions influence performance outcomes. Data were collected from 96 students who participated in the ERPsim Distribution Game as part of their coursework in enterprise resource planning (ERP) systems. Regression analysis revealed that perceived ease of use, particularly in transactional tasks, significantly predicted performance, despite the overall regression model not reaching statistical significance. These findings highlight the importance of simplifying transactional processes and improving system usability to enhance student performance in simulation-based ERP learning environments. The study underscores the value of applying TAM in experiential learning contexts, demonstrating how students' attitudes toward system usability align with their engagement and outcomes. This study is expected to contribute to the growing body of knowledge on simulation-based learning and offers an insight for future studies to explore additional system features and conduct longitudinal analyses across diverse learning environments.

Keywords: enterprise resource planning (ERP) systems, ERPsim, usefulness, ease of use, simulation games

Introduction

ERPsim is a suite of computer-based simulation games developed by ERPsimLab at HEC Montréal to facilitate experiential learning with SAP ERP systems. These simulations immerse participants in managing virtual companies within competitive market environments, offering a dynamic learning-by-doing approach (ERPsimLab, 2024). Adopted by over 225 universities and various corporations globally, ERPsim serves as an effective tool for teaching ERP systems and business processes (Léger et al., 2021). Despite its widespread use, research on students' perceptions of ERPsim games remains limited, particularly regarding their perceived usefulness, ease of use, and impact on performance. Understanding these perceptions could provide valuable insights for improving simulation design and optimizing learning outcomes in academic and professional settings.

This study aims to investigate how students' perceptions of usefulness and ease of use regarding reports and transactions within the ERPsim game environment influence their performance outcomes. The analysis draws on survey data collected from college students participating in the ERPsim Distribution Game as part of an ERP systems course. Theoretically, the research advances understanding of user acceptance and experience in ERPsim simulations and the SAP ERP platform, contributing to broader discourse on computer self-efficacy and system usage. By focusing on the interplay between user perceptions and

performance, the study addresses a gap in existing literature, particularly in experiential learning contexts. Practically, the findings provide actionable insights for refining ERPsim game design, enhancing usability, and aligning features with user expectations to optimize educational outcomes. The research bridges theoretical frameworks like the Technology Acceptance Model with practical applications, offering educators and developers evidence-based strategies to improve simulation-based training effectiveness while maintaining realistic expectations of user acceptance and performance.

Literature Review

The Technology Acceptance Model (TAM), introduced by Davis (1989), serves as a foundational framework for understanding individuals' adoption of information technologies, emphasizing two core cognitive factors: perceived usefulness (PU) and perceived ease of use (PEOU). PU reflects the degree to which a user believes a technology will enhance their performance or productivity, while PEOU captures the perceived effortlessness of interacting with the system. These constructs shape users' attitudes toward the technology, which subsequently influence their behavioral intention to adopt it and their actual usage patterns. Over three decades, TAM's robustness has been validated across diverse technological contexts, including e-learning platforms, healthcare systems, mobile applications, and enterprise software like ERP systems (Venkatesh & Davis, 2000; Legris et al., 2003; King & He, 2006). Studies in domains ranging from organizational workflows to educational tools have consistently reaffirmed TAM's predictive power, particularly in assessing how user perceptions align with system engagement and outcomes (Venkatesh et al., 2003; Holden & Karsh, 2010). This broad applicability underscores TAM's value as a theoretical lens for evaluating user acceptance in both practical and academic settings.

Building on this established framework, the present study applies TAM to investigate how students' perceptions of ERPsim's reporting and transactional functionalities influence their performance within the simulation game. ERPsim provides a unique context to explore the interplay between user perceptions and learning outcomes. By analyzing survey data from students engaged in the ERPsim Distribution Game, this research examines whether PU and PEOU of in-game reports and transactions predict performance metrics. This approach extends TAM's application beyond traditional workplace technology adoption to dynamic, educational simulations, addressing gaps in understanding how system usability impacts skill development in experiential environments. The findings aim to bridge theoretical insights with practical implications, offering educators and developers evidence-based strategies to refine ERPsim's design - such as streamlining transactional interfaces or enhancing report clarity - to better align with user expectations.

Simulation Games in Education

Educational research increasingly highlights the effectiveness of simulations in improving learning outcomes across disciplines by fostering higher-order cognitive skills through immersive, problem-based environments. These tools enable students to engage with realistic scenarios that require critical decision-making, analytical reasoning, and practical application of knowledge. For example, Shaffer et al. (2005) emphasize how simulations and video games cultivate engagement and problem-solving abilities by situating learners in dynamic, experiential contexts. Supporting this, Chen and Chen's (2011) meta-analysis of simulation-based instruction in engineering education demonstrates significant gains in conceptual understanding, technical competencies, and problem-solving skills, illustrating their ability to bridge theoretical knowledge with real-world practice. Such findings reinforce simulations' pedagogical value as tools that not only deepen comprehension but also prepare learners for complex, authentic challenges.

Complementing these insights, studies stress that the educational impact of simulations depends heavily on design elements such as intuitive interfaces, clear guidance, and user-friendly navigation. Jensen & Averill

(2014), for instance, link the usability of engineering mechanics simulations to students' perceptions of ease of use and learning effectiveness, emphasizing the role of interface design and system functionality. Similarly, Clark et al. (2020) identify intuitiveness and accessibility as critical factors in digital educational games, noting their influence on user engagement and task efficiency. Well-designed systems reduce cognitive load, streamline interactions, and enhance perceived usefulness - key components of the TAM. When simulations align usability with pedagogical goals, they optimize performance by enabling learners to focus on skill development rather than struggling with system complexity. Together, these perspectives underscore the interplay between instructional design and user experience in maximizing the educational potential of simulations, offering actionable principles for creating tools that balance functionality, accessibility, and learner-centered engagement.

ERPsim Games

ERPsim is a suite of simulation-based educational tools designed to facilitate the teaching and learning of ERP concepts and practices. Developed by ERPsimLab at HEC Montréal, the platform offers a range of simulation games tailored to different functional and operational areas of business. These include the Distribution game (now succeeded by the Maple Introduction Game), as well as various editions of Logistics (Introduction, Extended, and Platinum), Manufacturing (Introduction, Extended, and Advanced), and Retail (Introduction and Extended) simulations.

All ERPsim games operate on the SAP ERP system, a leading enterprise software platform that dominates the global ERP market, with over twelve million users across more than 121,000 installations worldwide (Lauchlan, 2022). By engaging with ERPsim games, students gain practical, hands-on experience in managing virtual companies within a competitive environment, using real-time data and transactions in the SAP ERP system. This experiential approach allows learners to apply theoretical knowledge in simulated business contexts, thereby enhancing their understanding of integrated business processes and decision-making within ERP environments.

Previous research has explored the effectiveness of ERPsim in enhancing students' comprehension of ERP systems and in developing key skills such as problem-solving and decision-making. For example, Garg et al. (2017) investigated the impact of ERPsim on learning outcomes within an information systems course and found that participation in the simulation significantly improved students' understanding of ERP concepts, their ability to apply these concepts to practical business scenarios, and their problem-solving capabilities. Similarly, de Carvalho et al. (2019) examined the role of ERPsim in fostering student engagement and motivation in a higher education context. Their findings indicate that ERPsim positively influences students' interest, motivation, and involvement in the subject matter, suggesting that the simulation contributes not only to cognitive learning but also to affective engagement. These studies collectively underscore the pedagogical value of ERPsim as an educational tool for reinforcing ERP-related knowledge, enhancing analytical skills, and promoting active learning. Building upon this line of inquiry, the present study aims to investigate students' perceptions of the usefulness and ease of use of ERPsim, with particular attention to specific system features such as the reports provided and the transactional processes required within the game environment.

Methods and Data

This study utilized the ERPsim Distribution game as the primary simulation environment, with plans to extend the research to other ERPsim game editions in future phases. Although the ERPsim Distribution game has recently been replaced by the Maple Introduction game, the core system features and functional components remain consistent between the two versions. Léger et al. (2021) provides a more

comprehensive description of the ERPsim Distribution game. The layout of the ERPsim Distribution game reflects the structure of an SAP ERP interface used in a simulated wholesale distribution context. In this simulation, participants manage key business processes including planning, procurement, and sales for a virtual company engaged in distributing bottled water in the German market. The game is structured into three competitive rounds, with each round simulating twenty virtual business days, progressing at a rate of one minute per virtual day. This time-compressed format enables students to experience and respond to dynamic business conditions while making real-time decisions using SAP ERP functionalities.

In Round 1, participants are introduced to basic transactional activities, specifically (T1) modifying the price list and (T5) planning marketing expenditures. To inform these decisions, they have access to five key reports: (R1) inventory report, (R2) market price report, (R4) summary sales report, (R5) detailed sales report, and (R6) financial statements. In Round 2, the complexity increases as participants perform four transactions: (T1) changing the price list, (T5) planning marketing expense, (T4) executing the material requirements planning (MRP) run, and (T2) creating purchase orders. An additional report - (R3) purchase order tracking - is introduced, supplementing the five reports used in Round 1. By Round 3, participants manage five transactions, including the four from Round 2 and an additional task: (T3) creating sales forecast. The same six reports used in Round 2 are employed to guide decision-making. This structured progression of transactional complexity and reporting functions enables participants to gradually develop familiarity with SAP ERP functionalities while engaging in increasingly sophisticated business decision-making within the simulation environment.

To assess students' perceptions of the ERPsim Distribution game, participants were asked to rate their level of agreement regarding the perceived usefulness and ease of use of each report and transaction featured in the simulation game. These ratings were collected using a 7-point Likert-type scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Simulation game performance was operationalized as the total profit generated by each team during the simulation game, reflecting the effectiveness of their decision-making in managing a virtual company.

Data was gathered through a post-course survey administered to 96 students enrolled in an ERP systems course. The survey was conducted during the final week of the semester, following extensive hands-on practice with the SAP ERP system. Prior to participating in the ERPsim game, students engaged with various core business processes using SAP ERP system, including procurement, production planning and execution, fulfillment, and warehouse and inventory management. The ERPsim Distribution game was integrated into the course as a culminating activity to reinforce and apply their learning in a simulated, competitive business environment.

Results and Discussion

Table 1 outlines descriptive statistics for students' perceptions of the perceived usefulness (PU) of reports and transactions in the ERPsim Distribution game. Results indicate that both components were viewed as valuable for learning and decision-making, with reports slightly outperforming transactions in perceived usefulness. The low standard deviations for both components suggest consistent agreement among participants, reinforcing the reliability of these findings. These outcomes highlight ERPsim's effectiveness as a pedagogical tool, demonstrating its capacity to offer relevant, engaging resources that support experiential learning of ERP systems. The alignment between students' positive perceptions and ERPsim's design objectives underscores its role in bridging theoretical concepts with practical, hands-on application in business education.

Table 1. Descriptive Statistics of PU of Reports and Transactions

Perceived usefulness (PU)	Min.	Max.	Mean	Std. Dev.
Reports				
(R1) I find inventory report useful.	2	7	5.860	0.980
(R2) I find price market report useful.	2	7	5.940	1.084
(R3) I find purchase order tracking useful.	2	7	5.990	1.000
(R4) I find summary sales report useful.	2	7	6.160	0.966
(R5) I find sales order report useful.	1	7	5.770	1.318
(R6) I find financial statement useful.	2	7	5.970	1.090
Transactions				
(T1) I find it useful to maintain/change prices of products.	2	7	5.850	1.114
(T2) I find it useful to convert purchase requisition to purchase order.	2	7	5.630	1.163
(T3) I find it useful to create sales forecast.	2	7	5.720	1.112
(T4) I find it useful to execute MRP to calculate requirements.	1	7	5.700	1.134
(T5) I find it useful to plan marketing expense.	2	7	5.820	1.026

Table 2 details students' perceived ease of use (PEOU) ratings for reports and transactions in the ERPsim Distribution game. Results indicate that participants found both components easy to use, though reports received marginally higher PEOU scores than transactions. Moderate standard deviations reflect some variability in individual perceptions, suggesting that while usability was broadly positive, certain tasks posed greater challenges. Notably, complex planning transactions such as converting purchase requisitions to purchase orders and executing material requirements planning (MRP) were perceived as slightly more difficult, due to their procedural intricacy. These findings emphasize the overall usability of the ERPsim environment while underscoring opportunities to streamline specific transactional processes to enhance user experience and reduce cognitive demands in simulation-based ERP training.

Table 2. Descriptive Statistics of PEOU of Reports and Transactions

Perceived ease of use (PEOU)	Min.	Max.	Mean	Std. Dev.
Reports				
(R1) I find inventory report useful.	3	7	5.760	1.054
(R2) I find price market report useful.	2	7	5.860	1.092
(R3) I find purchase order tracking useful.	2	7	5.890	1.065
(R4) I find summary sales report useful.	3	7	6.110	0.916
(R5) I find sales order report useful.	1	7	5.820	1.223
(R6) I find financial statement useful.	3	7	5.970	1.109
Transactions				
(T1) I find it useful to maintain/change prices of products.	3	7	5.890	1.150
(T2) I find it useful to convert purchase requisition to purchase order.	3	7	5.740	1.154
(T3) I find it useful to create sales forecast.	2	7	5.450	1.264
(T4) I find it useful to execute MRP to calculate requirements.	3	7	5.600	1.090
(T5) I find it useful to plan marketing expense.	1	7	5.580	1.270

Table 3 summarizes descriptive statistics and reliability coefficients (Cronbach's alpha) for students' perceptions of PU and PEOU of reports and transactions of the ERPsim Distribution game. Reliability analysis indicates strong internal consistency across all four constructs – PU of reports, PU of transactions, PEOU of reports, and PEOU of transactions. Cronbach's alpha values ranged from 0.832 to 0.938, exceeding the commonly accepted threshold of 0.70, thus demonstrating that the items used to measure each construct were highly reliable. Notably, PEOU of reports showed the highest reliability, followed by

PU of reports, confirming the robustness of the measurement scales. These findings support the use of ERPsim Distribution game as an effective and well-received educational tool, with both its reporting and transactional features being perceived as useful and easy to use.

Table 3. Results of Reliability Analysis

Construct	Min.	Max.	Mean	Std. Dev.	Cronbach's Alpha
PU of Reports	2.00	7.00	5.9479	0.9222	0.9260
PU of Transactions	2.00	7.00	5.7438	0.9566	0.9130
PEOU of Reports	3.17	7.00	5.9028	0.9433	0.9380
PEOU of Transactions	3.60	7.00	5.6521	0.9192	0.8320

Table 4 presents the correlation matrix displaying Pearson correlation coefficients among four constructs: PU of reports, PU of transactions, PEOU of reports, and PEOU of transactions. A strong positive correlation is observed between PEOU of transactions and PEOU of reports, indicating that users who find transactions easy to use are likely to have similar perceptions of ease of use for reports. Additionally, PEOU of transactions is strongly positively correlated with PU of transactions, suggesting that greater ease of use for transactions is linked to their perceived usefulness. A similar positive relationship exists between PEOU of reports and PU of reports, reflecting that ease of use for reports enhances their perceived usefulness. Moderate correlations are also found between PEOU of transactions and PU of reports, as well as between PEOU of reports and PU of transactions. These findings demonstrate that PU and PEOU are interrelated, with stronger associations observed within the same construct (either PU or PEOU) for both reports and transactions. The results further support the TAM, reinforcing that PEOU positively influences PU and that students' experiences with one aspect of the system (transactions or reports) are interconnected with their perceptions of the other.

Table 4. Results of Correlation Analysis

		PU of reports	PU of transactions	PEOU of reports	PEOU of transactions
PU of reports	Pearson Correlation	1	.695**	.692**	.472**
	Sig. (2-tailed)		0.000	0.000	0.000
PU of transactions	Pearson Correlation	.695**	1	.602**	.712**
	Sig. (2-tailed)	0.000		0.000	0.000
PEOU of reports	Pearson Correlation	.692**	.602**	1	.647**
	Sig. (2-tailed)	0.000	0.000		0.000
PEOU of transactions	Pearson Correlation	.472**	.712**	.647**	1
	Sig. (2-tailed)	0.000	0.000	0.000	

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5 presents the results of regression analysis. The model summary reveals that the multiple regression model, which includes the four predictors including PU of reports, PU of transactions, PEOU of reports, and PEOU of transactions explains a modest proportion of the variance in the dependent variable - performance. The R Square value of 0.081 suggests that only 8.1% of the variance in the outcome variable can be explained by the model. When adjusted for the number of predictors, the Adjusted R Square further decreases to 0.032, signifying a limited explanatory power of the model. The standard error of the estimate is 0.73424, implying that the model's predictions, on average, deviate by approximately 0.73 units from the actual values. Overall, the results suggest that the model provides a weak fit and that the predictors included in the analysis have limited capacity to explain the variations in the dependent variable. These findings

highlight the need for further refinement of the model or the inclusion of additional variables to improve its predictive accuracy.

The ANOVA table provides an overall test of whether the regression model significantly predicts the dependent variable. The F-statistic is 1.645 with a significance value of .172. Since this p-value is greater than the conventional alpha level of 0.05, the result is not statistically significant. This means there is insufficient evidence to conclude that the combined set of predictors collectively explain a significant amount of variance in performance. In other words, the model does not significantly improve prediction of performance over using the mean alone. The coefficients table provides insight into the individual contribution of each predictor to the dependent variable. Among the four predictors, only PEOU of transactions has a statistically significant effect, indicating a moderate positive relationship with performance as students perceive transactional functions to be easier to use, their performance tends to improve. The other predictors do not have statistically significant effects. This suggests that students' perceptions of PU (both reports and transactions) and the PEOU of reports are not significant predictors of performance in this model.

Table 5. Results of Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.284[a]	0.081	0.032	0.73424

a. Predictors: (Constant), PU of reports, PU of transactions, PEOU of reports, PEOU of transactions

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.547	4	0.887	1.645	.172[b]
	Residual	40.433	75	0.539		
	Total	43.980	79			

a. Dependent Variable: Performance

b. Predictors: (Constant), PU of reports, PU of transactions, PEOU of reports, PEOU of transactions

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	5.216	0.598		8.719	0.000
	PU of reports	-0.036	0.142	-0.046	-0.257	0.798
	PU of transactions	-0.114	0.144	-0.150	-0.789	0.432
	PEOU of reports	0.024	0.143	0.031	0.170	0.865
	PEOU of transactions	0.285	0.141	0.364	2.023	0.047

a. Dependent Variable: Performance

Conclusion

This study contributes to the understanding of how student perceptions influence performance in ERPsim-based learning. While the overall regression model did not reach statistical significance, PEOU of

transactional tasks emerged as a notable predictor of student performance. This suggests that reducing complexity and improving usability in transactional processes can play a vital role in helping students perform better in simulation-based ERP learning environments. The results also underscore the value of applying the TAM in the context of experiential learning, revealing how students' attitudes toward system usability align with their engagement and outcomes. These findings support the continued use of ERPsim as a teaching tool, while highlighting the need for targeted improvements in simulation design to maximize student learning. Further research could expand on this work by exploring additional system features and conducting longitudinal studies across different academic settings.

A few limitations are recognized in this study. First, this study was conducted for an exploratory purpose, and the findings are limited to a specific ERPsim game, i.e., the ERPsim Distribution game. However, the implications suggested by the findings could be significant for those involved in developing and using other ERPsim games. Second, this study considered only system features related to reports and transactions of the ERPsim Distribution game. Other ERPsim games provide more or less system features than the ERPsim Distribution game does; however, the system features of the ERPsim Distribution game are core reports and transactions that participants need to operate the process of planning, procurement, and sales in the simulation game. Third, the results may be attenuated because of the small sample size and inherent problems related to perceptual studies. These limitations are certainly not exhaustive, but important ones. Obviously, these limitations, in turn, suggest several possibilities for future study.

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