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EXPLORING STUDENT PERCEPTIONS OF ERP SYSTEMS: THE ROLE OF USER EXPERIENCE IN SYSTEM PLAYFULNESS AND ANXIETY

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ABSTRACT

Aim/Purpose: This study addresses the gap in understanding how students' perceptions of the SAP ERP system - specifically system playfulness and system anxiety - evolve as they gain experience. The study seeks to determine how these perceptions influence user engagement and system adoption in academic environments, where ERP systems are increasingly integrated into curricula.

Background: Despite the widespread use of SAP ERP in education, little research has examined the dynamic nature of students' positive (playfulness) and negative (anxiety) perceptions as they interact with the system over time. This paper explores how increased experience with SAP ERP affects these key perceptual factors, offering insights relevant to both theory and practice.

Methodology: A pre-post test survey was conducted with 56 upper-level undergraduate business students enrolled in a course utilizing SAP ERP. Students' perceptions of system playfulness and system anxiety were measured using validated scales at two points during the semester: early (after initial exposure) and late (after extensive hands-on experience). Factor analysis confirmed the validity of the constructs, and paired t-tests assessed changes in perceptions over time.

Contribution: This study contributes to the literature by empirically demonstrating how user experience shapes both positive and negative perceptions of ERP systems in an educational setting. It provides evidence that system anxiety decreases and system playfulness increases with experience, informing strategies for improving ERP training and adoption.

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Findings	System playfulness and system anxiety are valid, distinct constructs influencing user perceptions of SAP ERP. As students gain more experience with SAP ERP, system anxiety significantly decreases, while system playfulness moderately increases. Despite increased experience, overall perceptions of playfulness remain neutral, suggesting that SAP ERP is not inherently engaging for students. The reduction in anxiety is more pronounced than the increase in playfulness, indicating that familiarity primarily alleviates negative perceptions rather than enhancing positive ones.
Recommendations for Practitioners	Training programs should prioritize reducing system anxiety through early, supportive, and hands-on exposure to ERP systems. Efforts to make ERP systems more engaging should be incorporated, but reducing apprehension may yield greater improvements in user satisfaction and adoption.
Recommendations for Researchers	Future studies should explore additional factors influencing playfulness and anxiety, such as instructional design, interface usability, and peer support. Research should examine whether similar perceptual changes occur in professional or non-academic contexts and with other ERP platforms.
Impact on Society	Improving the user experience of ERP systems in educational settings can better prepare students for digital workplaces, increase technology adoption rates, and reduce barriers to learning complex enterprise software.
Future Research	Future research should investigate interventions that explicitly target playfulness to enhance engagement, extending such studies across diverse populations and organizational settings to improve the generalizability of findings. Additionally, longitudinal designs that go beyond a single semester are needed to examine the lasting impacts of these experiences on individuals' perceptions over time.

Keywords	SAP ERP, system playfulness, system anxiety, user experience, educational technology

INTRODUCTION

Enterprise resource planning (ERP) systems are integrated software solutions that streamline and automate a company's core business processes, supporting efficient management and decision-making across departments. SAP, a global leader in ERP, serves over 440,000 customers in more than 180 countries as of 2023, offering industry-specific solutions for over 25 sectors (SAP, 2023). Through its University Alliances (UA) program, SAP partners with more than 3,500 educational institutions worldwide, incorporating its technologies into academic curricula to give students hands-on experience with business processes, sustainability, and analytics, while building skills essential for digital enterprises.

Despite SAP ERP's widespread use in education, little research examines how students perceive the system, particularly regarding factors such as system playfulness and system anxiety. While students increasingly engage with SAP ERP as part of their studies, the evolution of their perceptions over time remains largely unexplored. Understanding these perceptions is important, as they can influence engagement, learning outcomes, and adoption. Anxiety may reduce willingness to use the system, whereas playfulness can enhance motivation and usage.

This study explores how users' perceptions of SAP ERP change with increased experience, focusing on: (1) the impact of experience on system playfulness, (2) the impact of experience on system anxiety, and (3) the implications for instructional design and ERP adoption strategies. Theoretically, it contributes to research on positive and negative perceptions of information systems. Practically, it

offers insights to improve training, increase engagement, reduce anxiety, and support successful system adoption.

CONCEPTUAL CONSTRUCTS

BUSINESS PROCESSES AND SAP ERP SYSTEM

ERP systems are essential for integrating and streamlining an organization's core business processes. By consolidating operations into a single platform, ERP enables real-time data sharing and informed decision-making, enhancing efficiency and minimizing errors. In manufacturing, four core processes - procurement, production, fulfillment, and warehouse management - form the backbone of the supply chain, guiding the flow of goods from raw materials to finished products, as illustrated in Figure 1.

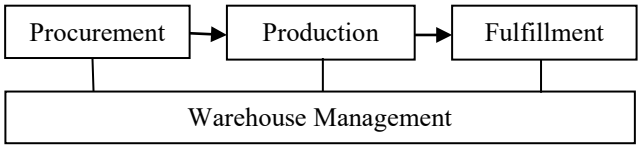

Figure 1. Business Processes

Procurement initiates the cycle by securing materials and resources for production. It involves selecting suppliers, negotiating contracts, purchasing raw materials, and managing inventory to maintain adequate stock without overordering. ERP systems automate and optimize these tasks, offering real-time insights into stock levels and supplier performance to prevent delays that could disrupt production.

Production transforms raw materials into finished products through planning, scheduling, and managing manufacturing activities. ERP integrates data on materials, schedules, and workforce availability, helping managers allocate resources efficiently, minimize waste, reduce downtime, and adjust plans to meet demand or address disruptions.

Fulfillment covers order processing, inventory management, shipping, and customer service. Efficient fulfillment ensures on-time delivery and customer satisfaction. ERP streamlines this process by updating inventory automatically, generating invoices, providing delivery timelines, and maintaining visibility across each step.

Warehouse management supports the entire supply chain by overseeing the storage and movement of goods. This includes receiving materials, storing them strategically, tracking inventory, and managing outbound shipments. Integrated ERP solutions enhance accuracy, prevent stockouts or overstocking, and ensure timely availability of materials for production and shipment.

While these four processes are directly tied to product creation and delivery, ERP systems also support other essential activities such as research and development, marketing, and customer service. Together, these processes form an interconnected network, ensuring a seamless flow of materials and products from procurement to final delivery.

POSITIVE AND NEGATIVE PERCEPTIONS OF THE SYSTEM

In information systems adoption research, system playfulness and system anxiety are key psychological factors shaping user perceptions. Playfulness reflects a user's tendency to engage with a system in an enjoyable, creative, and spontaneous way (Venkatesh & Bala, 2008), while anxiety refers to the apprehension or stress associated with system use (Igbaria et al., 1995). Early encounters with complex systems often lower playfulness and heighten anxiety as users navigate unfamiliar interfaces and

functions (Davis, 1989). With increased familiarity, anxiety typically decreases and playfulness grows, underscoring the dynamic nature of these constructs and the influence of experience on both positive and negative perceptions.

Building on evidence linking playfulness to richer user experiences, this study examines its role in SAP ERP use within an educational context. Using validated measures from Hackbarth et al. (2003), playfulness is assessed not merely as a by-product of ease of use but as a distinct, measurable dimension of ERP interaction. The same framework is applied to system anxiety, positioning it as a critical counterpoint to playfulness in understanding user experience. By applying a pre–post design, the study explores how both constructs evolve with exposure and training, offering insights into how managing negative affective responses alongside fostering engagement can enhance ERP adoption.

While prior research has examined playfulness, anxiety, and user perceptions in various settings, limited work has focused on SAP ERP specifically. Given SAP ERP's complexity and global reach in both academic and professional contexts, understanding perceptions through these two lenses is essential for improving training and adoption strategies. Investigating how experience shapes both positive and negative perceptions can help organizations tailor implementation to improve usability and acceptance (DeLone & McLean, 2003).

Recent studies in educational ERP contexts reinforce this view. Bamufleh et al. (2021) used an extended Unified Theory of Acceptance and Use of Technology (UTAUT) to highlight the roles of institutional support and perceived ease of use, as seen in a PeopleSoft ERP case in Saudi Arabia. Abu Madi et al. (2022) identified targeted training, stakeholder engagement, and change management as key success factors in public higher education ERP adoption, with direct benefits for reducing anxiety and encouraging engagement. Jo and Park. (2023) emphasized ease of use, stability, user participation, and strong support systems as drivers of satisfaction, underscoring the value of early exposure and responsive assistance.

Industry insights align with these findings. ECI Software Solutions (2024) noted that personalized dashboards, AI-driven assistance, mobile-first design, and intuitive interfaces can boost engagement and reduce intimidation, potentially enhancing playfulness. Jawad and Villatoro Amaya (2023) addressed UX challenges for novice ERP users, recommending standardized interface conventions and streamlined workflows for better accessibility. Xie et al. (2022) found that integrating GIS tools into ERP systems can increase perceived usefulness and positively influence playfulness.

Overall, improving ERP user experience in higher education requires more than reducing negative perceptions - it demands intentional design for engagement, personalization, and adaptability. Combining established constructs such as playfulness and anxiety with modern UX strategies can help guide learners from initial apprehension to confident, creative use of ERP systems.

DATA AND METHODS

Table 1 presents the study variables - system playfulness and system anxiety - along with their corresponding survey items and factor analysis results. Data were collected from 56 upper-level undergraduate business students enrolled in a business process integration course using the SAP ERP system. Delivered through the SAP University Alliance (UA) Program, the course offered a structured, hands-on learning environment for ERP processes. Perceptions of system playfulness and system anxiety were measured using a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree), with validated items adapted from Hackbarth et al. (2003). Surveys were conducted twice during the semester: the first in week 3, following basic training and practice with the fulfillment process, and the second in week 15, after additional training on procurement, production, and warehouse management. The twelve-week period between surveys involved extensive practical assignments and exercises, providing substantial exposure to SAP ERP and enabling a meaningful assessment of changes in perceptions over time.

Table 1. Factor analysis of playfulness and anxiety

Scale items	Factor 1 (playfulness)	Factor 2 (anxiety)
System playfulness (adopted from Hackbarth et al., 2003)		
Spontaneous	0.536	0.204
Unimaginative	0.446	0.246
Flexible	0.662	0.227
Creative	0.764	0.259
Playful	0.737	0.263
Unoriginal	0.365	0.157
Uninventive	0.298	0.162
System anxiety (adopted from Hackbarth et al., 2003)		
SAP does not scare me	-0.137	0.688
I have lots of self-confidence when it comes to working with SAP	-0.147	0.618
I get a sinking feeling when trying to use SAP	-0.260	0.445
I would feel comfortable working with SAP	-0.108	0.794
Generally, I feel okay about trying to process a new transaction in SAP	0.222	0.820
I am no good with SAP	-0.290	0.465
I am not the type to do well with SAP	-0.319	0.470
I do not feel threatened when others talk about SAP	-0.435	0.422

A principal component analysis confirmed a clear two-factor solution, representing system playfulness and system anxiety, and demonstrated good convergent and discriminant validity. Two playfulness items – 'unoriginal' and 'uninventive' - had factor loadings below the recommended 0.40 threshold, indicating weaker alignment with the construct in this context. All system anxiety items exceeded 0.40, showing strong construct alignment. Reliability analysis showed Cronbach's alpha values of 0.78 for playfulness and 0.81 for anxiety, both above the accepted 0.70 benchmark (Nunnally & Bernstein, 1994), indicating satisfactory internal consistency.

The low factor loadings for the two playfulness items suggest the need for refinement in future research. Possible approaches include rewording for clarity and relevance to ERP learning contexts, incorporating terms more directly tied to creativity and spontaneity, or developing new items based on qualitative feedback from ERP users. Testing revised items across educational and professional ERP settings would help determine whether the issue lies in wording, cultural factors, or the construct definition itself, ultimately improving the measurement of system playfulness in future studies.

RESULTS

Table 2 reports the mean scores for system playfulness and system anxiety from the first and second surveys. System playfulness remained in the moderate range at both time points, indicating generally neutral perceptions of the SAP ERP system. This aligns with prior research suggesting that ERP systems in educational contexts are often viewed as functional learning tools rather than sources of

intrinsic enjoyment or creativity (Bamufleh et al., 2021). In line with Jo and Park (2023), engagement in this setting appears driven more by perceived ease of use and utility than by playfulness, with students primarily focused on mastering functionality for academic purposes rather than engaging in exploratory or play-oriented interaction.

Table 2. Paired samples statistics of system playfulness and system anxiety

Factor	Pair	Mean	N	Std. deviation	Std. error mean
Playfulness	First survey	3.9413	56	0.9177	0.1226
	Second survey	4.0128	56	1.0007	0.1337
Anxiety	First survey	4.1719	56	1.0084	0.1348
	Second survey	4.4866	56	1.1059	0.1478

The consistency of moderate playfulness scores across both surveys reinforces previous findings that intrinsic engagement does not necessarily increase with experience alone (ECI Software Solutions, 2024; Jawad and Villatoro Amaya, 2023). This suggests that playfulness may be relatively insensitive to experiential learning unless supported by intentional instructional design or user interface features that actively encourage creativity and enjoyment.

In contrast, mean system anxiety in the first survey was also moderate, suggesting that students began the course with mild apprehension but no strong discomfort. This pattern is consistent with Igbaria et al. (1995) and Venkatesh and Bala (2008), who found that initial exposure to complex systems often produces moderate anxiety, mitigated by prior technology experience or introductory training. Interestingly, the second survey showed a slight increase in mean anxiety, potentially reflecting the 'complexity awareness' effect described by Xie et al. (2022), in which exposure to more advanced ERP functions - such as procurement, production, and warehouse management - can temporarily elevate anxiety before user confidence stabilizes.

Paired samples t-test results are presented in Table 3. No statistically significant difference was found for system playfulness ($p > .05$), supporting prior evidence that perceptions of playfulness in ERP learning environments tend to remain stable over time (Hackbarth et al., 2003). In contrast, system anxiety showed a statistically significant reduction ($p < .10$), indicating that repeated interaction and accumulated experience with SAP ERP reduced apprehension and increased user comfort. This finding aligns with the progressive adaptation effect described by Jo and Park (2023) and Venkatesh (2000), highlighting the value of structured, repeated exposure in overcoming negative emotional barriers, even when intrinsic playfulness does not increase.

Table 3. Results of paired samples test on system playfulness and system anxiety

Measure	Pair	Mean	Std. dev.	Std. error mean	95% Confidence interval of the difference		t	df	Sig. (2-tailed)
					Upper	Lower			
Playfulness	First survey - Second survey	-0.071	0.952	0.127	-0.183	0.326	-0.562	55	0.577
Anxiety	First survey - Second survey	-0.315	1.194	0.160	-0.635	0.005	-1.972	55	0.054

DISCUSSION

The stability of system playfulness scores across the semester indicates that students' initial impressions of SAP ERP's engaging qualities remained largely unchanged, even with increased familiarity. This suggests that, unlike constructs such as perceived ease of use or perceived usefulness - which often improve with experience (Venkatesh & Davis, 2000) - playfulness may be less influenced by experiential learning alone and more dependent on the system's inherent design and pedagogical framing. From a Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) perspectives, this highlights that intrinsic motivation-related constructs may require deliberate instructional interventions to shift meaningfully. For instructional designers, this underscores the value of embedding gamification elements, scenario-based simulations, and exploratory learning activities to actively cultivate playfulness, rather than relying on repeated exposure to produce such effects. Without these enhancements, learners are likely to view ERP use primarily as a functional requirement rather than an intrinsically rewarding activity.

In contrast, the statistically significant reduction in system anxiety supports prior findings that prolonged exposure, repeated interaction, and guided practice can reduce negative emotional responses to technology (Hackbarth et al., 2003; Venkatesh, 2000). This aligns with the affective dimension of user acceptance models, where lowering anxiety can precede improvements in perceived usability and adoption likelihood. However, a temporary rise in anxiety - observed between survey points - may have been triggered by the introduction of more complex processes such as procurement, production, and warehouse management. This pattern suggests that user adaptation is not always linear. From an instructional design perspective, this points to the need for anticipatory scaffolding when transitioning learners to advanced system functions. Strategies such as just-in-time support tools, interactive troubleshooting guides, and structured peer collaboration could help buffer against these temporary spikes in anxiety.

Overall, these findings emphasize the importance of aligning ERP instructional strategies with the psychological trajectory of learners. System anxiety can be steadily reduced through sustained exposure and structured practice, while playfulness requires intentional design efforts to foster engagement. For ERP adoption strategies, this means balancing investments between onboarding and early confidence-building measures, and longer-term initiatives that make the system more engaging, adaptive, and responsive to learner input. Such a dual-focus approach can enhance immediate learning experiences and foster lasting user satisfaction, increasing the likelihood of ERP adoption in future professional contexts.

CONCLUSION

This study examined how user perceptions of the SAP ERP system - specifically system playfulness and system anxiety - change with increased experience. Results show that playfulness remains relatively stable over time, suggesting that initial impressions of the system's engaging qualities persist even after substantial use. In contrast, system anxiety decreases significantly as familiarity grows, highlighting the value of repeated, hands-on exposure in reducing apprehension and building user confidence. While ERP adoption strategies should include features that encourage engagement, the greater instructional benefit lies in structured, supportive training environments that address anxiety early in the learning process.

The instructional implications are clear: early interventions should focus on building confidence through low-pressure, guided practice, gradually progressing from basic operations to more complex tasks. Structured onboarding, interactive tutorials, and peer support opportunities can accelerate anxiety reduction and smooth the adoption process. From an implementation perspective, ERP vendors and organizations should align strategies with the psychological trajectory of new users - front-

loading resources to address apprehension while progressively introducing features that encourage exploration and creativity.

This research has limitations. Focusing on only two perceptual constructs leaves other factors influencing ERP adoption unexplored. The controlled classroom setting, while useful for isolating effects, does not fully reflect professional environments. Additionally, the modest sample size limits generalizability. Future studies should expand the range of constructs, examine multiple ERP platforms and diverse user populations, and track changes over longer periods to capture the full trajectory of user adaptation. Such work would deepen theoretical understanding of ERP adoption and provide practical guidance for designing training programs and system features that promote confident, satisfied, and engaged users in both educational and organizational contexts.

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