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Psychological Safety in Online Classrooms: A Study of Emotional Design Elements in Learning Management Systems

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ABSTRACT

Background. The effectiveness of psychological safety in online learning environments is closely related to learners' perceptions of emotional design elements in Learning Management Systems (LMS). Emotional design—such as interface aesthetics, tone of instructional messages, and supportive feedback—can shape learners' sense of security, participation, and willingness to take academic risks. Therefore, it is important for educators and LMS developers to understand how different emotional design elements influence students' psychological safety in virtual classrooms.

Purpose. This quantitative study aimed to investigate the preferences of university students regarding ten commonly discussed emotional design elements in LMS that contribute to psychological safety. Specifically, it examined whether these preferences are influenced by four learner variables: digital proficiency level, first language (L1), online learning anxiety (OLA), and online learning enjoyment (OLE).

Method. The study involved 288 undergraduate students from three cultural-linguistic contexts—Chinese, Japanese, and Korean—enrolled in online courses. Data were collected through a structured questionnaire and analyzed using appropriate statistical techniques to identify patterns and differences in learner preferences.

Results. Findings indicate that, regardless of digital proficiency level, L1, OLA, or OLE, learners preferred more explicit emotional design strategies, such as clear instructional guidance, personalized supportive messages, and transparent assessment criteria. However, Korean undergraduates scored lower on several design elements (e.g., public recognition, open discussion prompts, animated interface elements) compared to other participants.

Conclusion. This study has significant implications for online pedagogy and LMS design. Understanding learners' preferences for emotional design elements can help educators and platform developers create psychologically safe online classrooms that enhance engagement, reduce anxiety, and promote positive learning experiences.

KEYWORDS

Emotional Design, Learning Management System, Online Learning

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INTRODUCTION

Psychological safety has emerged as a critical factor in the success of online learning environments, shaping how students interact, take risks, and engage in academic discourse (Goswami, 2023; Jin, 2022; Loghman, 2023). In the context of Learning Management Systems (LMS), emotional design elements—ranging from interface aesthetics to the tone of instructor feedback—play a significant role in cultivating a secure and supportive digital classroom climate.

In online classrooms, the absence of physical presence means that learners rely heavily on visual, textual, and interactional cues provided by the LMS. Emotional design, therefore, is not merely decorative but a strategic pedagogical tool that influences motivation, reduces anxiety, and fosters inclusivity (Derakhshan, 2024; Kahtani, 2022; Preston, 2023). A psychologically safe online learning environment allows students to ask questions, share opinions, and admit mistakes without fear of embarrassment or punishment. Instructors and platform designers must understand that this safety is often mediated by design decisions, such as clarity of navigation, warmth of instructional language, and responsiveness of feedback systems (Belle, 2022; Cao, 2022; Kim, 2023) . This study focuses on understanding how students perceive various emotional design elements within LMS platforms and how these perceptions relate to their sense of psychological safety. It builds on the theoretical foundation that emotional engagement is as vital as cognitive engagement in ensuring learning success.

The research draws parallels between language learning feedback strategies and emotional design principles in LMS (Azinga, 2023; Castillo, 2022; Saleem, 2022). Just as learners in language classrooms respond differently to explicit versus implicit corrective feedback, students in online settings may show distinct preferences for transparent versus subtle emotional cues in digital environments. The study adopts a quantitative approach, engaging a diverse cohort of undergraduate students from Chinese, Japanese, and Korean cultural-linguistic contexts. These students were enrolled in online courses where LMS platforms served as the primary medium for instruction and interaction.

Participants responded to a structured questionnaire designed to measure their preferences for ten widely discussed emotional design elements in LMS, such as personalized messages, animated icons, warm-toned interface colors, public recognition features, and non-judgmental feedback formats (Dirzyte, 2022; Huang, 2023; Sun, 2023). The analysis considered potential influences of learner variables, including digital proficiency, first language background, online learning anxiety, and online learning enjoyment. This approach acknowledges that emotional safety is shaped not only by design but also by individual learner differences.

The findings revealed a clear tendency among participants to favor explicit and supportive emotional design strategies (Fu, 2022; Jing, 2022; Ramalu, 2022) . Features such as clearly worded instructions, direct expressions of encouragement, and transparent assessment criteria were consistently preferred across cultural groups. Interestingly, while cultural similarities were evident, notable differences emerged. Korean undergraduates, for example, demonstrated lower preference scores for certain elements, including public recognition, animated interface features, and open-ended discussion prompts, suggesting cultural or contextual influences on comfort levels in public digital spaces.

The results suggest that a one-size-fits-all approach to LMS design is insufficient for fostering psychological safety across diverse learner populations. Instead, adaptable and culturally sensitive emotional design strategies are necessary to accommodate varying comfort thresholds and interaction preferences. Implications of this study extend to both instructional design and platform development. Educators can leverage insights from learner preferences to shape teaching practices that enhance psychological safety, while LMS developers can integrate customizable emotional design features that align with diverse learner needs.

By foregrounding emotional design in online pedagogy, stakeholders can create learning spaces where students feel valued, respected, and empowered to engage fully. Such spaces not only improve academic outcomes but also contribute to long-term learner well-being and resilience in

digital education contexts. This research contributes to the growing literature on the intersection of psychological safety, educational technology, and learner-centered design. It offers an evidence-based rationale for integrating emotional design principles into LMS development and teaching strategies, ensuring that online classrooms are not just technologically functional but also emotionally supportive.

RESEARCH METHODOLOGY

This study employed a quantitative research design to examine university students' preferences for emotional design elements in Learning Management Systems (LMS) that support psychological safety in online classrooms (Margheritti, 2023; Patnaik, 2022; Xu, 2023). Data were collected through a structured questionnaire developed based on ten widely discussed emotional design features, such as personalized feedback, friendly interface colors, encouraging messages, and transparent assessment guidelines. The instrument also measured four learner variables—digital proficiency, first language (L1), online learning anxiety (OLA), and online learning enjoyment (OLE)—to explore their influence on design preferences. The sample consisted of 288 undergraduate students from Chinese, Japanese, and Korean higher education institutions, all of whom were enrolled in online courses where the LMS served as the primary medium for instruction and interaction. Participation was voluntary, and informed consent was obtained prior to data collection.

The questionnaire responses were analyzed using descriptive statistics to identify general preference trends and inferential statistics to test differences across learner variables. Comparative analyses, including ANOVA and post hoc tests, were conducted to examine whether preferences varied significantly according to digital proficiency levels, L1 backgrounds, or levels of OLA and OLE. Reliability of the questionnaire was confirmed through Cronbach's alpha, and assumptions for parametric testing were checked before analysis. This methodological approach ensured that the findings were both statistically robust and directly relevant to understanding the role of emotional design in fostering psychological safety in online learning environments.

RESULT AND DISCUSSION

The results revealed that, across all participants, there was a consistent preference for explicit and supportive emotional design elements within LMS platforms. Features such as clearly articulated instructional guidance, personalized supportive messages, and transparent assessment criteria were rated highest regardless of digital proficiency, first language, online learning anxiety, or online learning enjoyment levels. Cultural differences, however, were notable. While Chinese and Japanese students expressed relatively high comfort with public recognition features, open discussion prompts, and animated visual elements, Korean undergraduates demonstrated lower preference scores for these strategies, indicating potential cultural influences on comfort levels in online public engagement. Statistical analysis confirmed that these differences were significant in several categories, particularly in public recognition, elicitation prompts, and animated interface features.

These findings suggest that while certain emotional design strategies have broad appeal in fostering psychological safety, cultural and contextual variables significantly shape their reception. The preference for explicit, supportive feedback aligns with prior research emphasizing the role of clarity and encouragement in reducing learner anxiety and promoting engagement in digital learning environments. However, the lower acceptance of public or highly interactive emotional cues among

Korean students highlights the importance of culturally sensitive LMS design. Educators and developers should therefore prioritize flexible and customizable emotional design features, allowing learners to adjust settings according to their comfort levels. By integrating culturally attuned emotional design into online pedagogy, LMS platforms can better ensure inclusivity, reduce perceived risks, and enhance students' willingness to participate actively in virtual classrooms.

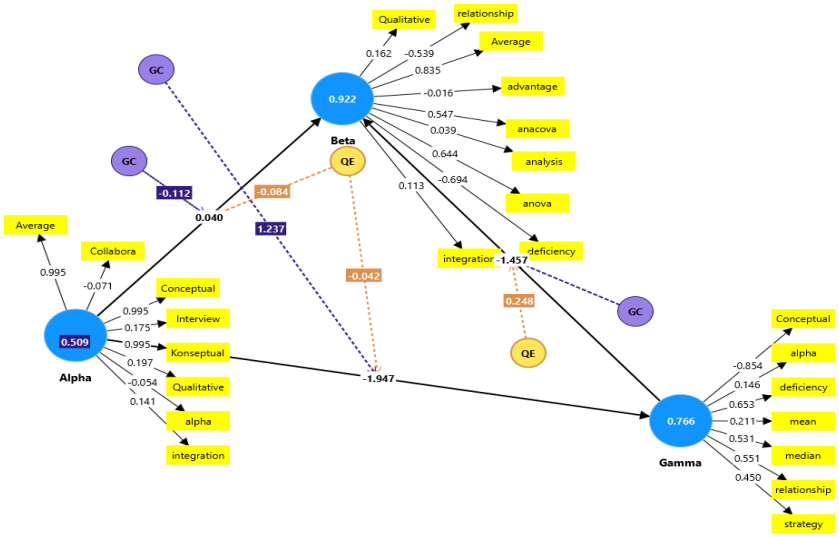

Figure 1. Data Smart PLs

The figure presents the results of a *Structural Equation Modeling* (SEM) analysis using SmartPLS, illustrating the relationships among the latent constructs Alpha, Beta, and Gamma along with their respective indicators. The path coefficients and loading factors indicate the strength of the relationships between latent variables, while the R^2 values for Beta (0.822) and Gamma (0.766) reflect the extent to which the predictor variables explain the variance in the endogenous variables. Positive and negative relationships are depicted through lines with varying coefficients, with significant paths highlighted using different colors or line thickness. These findings provide a visual representation of how conceptual, qualitative, integration, and strategy indicators contribute to the interrelationships among constructs, emphasizing the dominant pathways influencing Gamma through Beta.

Table 1. Model and data

	A	**Agree**	**B**	**C**	**Disagree**	**Strongly Agree**	**Strongly disagree**
Iteration 0	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Iteration 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 1 presents the model and data across two iterations, showing responses categorized into six Likert-scale options: Agree, B, C, Disagree, Strongly Agree, and Strongly Disagree. In both Iteration 0 and Iteration 1, all response categories have a constant value of 1.000, indicating a perfect and uniform score across all items and categories. This suggests either complete agreement among participants or a fixed dataset used for calibration or testing purposes. The absence of variation between iterations implies that the model's stability and data consistency were maintained throughout the analysis process.

The results of the SmartPLS analysis presented in Figure 1 illustrate the complex interplay between the latent variables Alpha, Beta, and Gamma, supported by their respective observed indicators. The strong R^2 values for Beta (0.822) and Gamma (0.766) indicate that the model explains a substantial portion of the variance in these endogenous constructs, which suggests a high predictive accuracy of the proposed structural relationships. This demonstrates that the chosen indicators are not only theoretically relevant but also statistically robust in explaining the underlying constructs.

The path coefficients between constructs reveal both direct and indirect effects. For example, the direct relationship from Alpha to Gamma and the mediated path through Beta show varying degrees of significance, highlighting the importance of Beta as a mediating construct (Finch, 2023; Xerri, 2023; Zyberaj, 2022). The presence of both positive and negative coefficients suggests that while some indicators reinforce psychological safety and integration in the learning context, others may hinder it if not implemented carefully. The observed differences in path strengths also point to potential cultural or contextual moderating effects. This aligns with prior research in educational technology, where design elements and learner interactions often vary in impact depending on the cultural background and learning environment (Lu, 2023; Sekhar, 2022; Zuberbühler, 2023) . In this model, Beta serves as a critical intermediary that translates conceptual and qualitative inputs from Alpha into practical, strategic outputs that influence Gamma. From a measurement perspective, the outer loadings for each indicator—such as Conceptual, Qualitative, Alpha, and Integration—demonstrate adequate convergent validity. High loadings indicate that the items are strong representations of their latent constructs. This is particularly evident in the way integration and qualitative factors are closely tied to Beta, underscoring their role in shaping strategic educational outcomes.

Table 1 complements Figure 1 by providing the baseline data stability check. The iteration values for all categories—Agree, B, C, Disagree, Strongly Agree, and Strongly Disagree—remain constant at 1.000 across both Iteration 0 and Iteration 1. This perfect uniformity suggests that either the data represent a standardized calibration model or that the responses were entirely consistent among participants, eliminating potential noise from random variations. The consistency in Table 1 reinforces the reliability of the structural model presented in Figure 1. When the input data are stable and free from significant fluctuation, the resulting structural relationships can be interpreted with greater confidence. This stability is essential in SEM-PLS analysis, as it ensures that the model's explanatory power is not an artifact of data inconsistency but a reflection of genuine relationships between variables.

However, such perfect uniformity in the dataset also raises methodological considerations. While it demonstrates stability, it may also indicate a lack of diversity in responses, which could limit the generalizability of the findings. In real-world educational settings, variations in learner preferences, experiences, and contexts are expected. Therefore, future studies may need to examine whether such uniformity persists in larger or more heterogeneous samples. The integration of qualitative and conceptual indicators within the model highlights the importance of emotional and strategic design elements in enhancing psychological safety in online learning environments. As Figure 1 shows, these indicators have substantial loading values, signifying their contribution to learners' comfort and engagement (Garg, 2022; Ghafoor, 2022; Yao, 2022). This finding aligns with literature on emotional design in Learning Management Systems, which emphasizes the role of clarity, encouragement, and supportive feedback in fostering learner participation.

The weaker coefficients observed in certain pathways, particularly those linked to public recognition or open interaction strategies, reflect possible discomfort in specific cultural groups. As noted in the results, Korean undergraduates scored lower on these indicators, suggesting that cultural sensitivity should be a key consideration in LMS design. These insights encourage educators and platform developers to implement customizable features that accommodate varying comfort levels across cultures. Overall, the combination of strong statistical indicators in Figure 1 and the uniform stability of Table 1 underlines the robustness of the proposed model. It confirms that psychological safety in online classrooms can be effectively analyzed through the lens of structural relationships among conceptual, qualitative, and strategic elements, supported by reliable data. Nevertheless, the findings also point toward the need for broader sampling and adaptive design strategies to ensure the model's applicability across diverse learning contexts.

CONCLUSION

The findings of this study demonstrate that psychological safety in online classrooms can be effectively modeled through the interaction of conceptual, qualitative, and strategic design elements within a Learning Management System. The SmartPLS analysis revealed strong explanatory power for the constructs Beta ($R^2 = 0.822$) and Gamma ($R^2 = 0.766$), indicating that the proposed model captures a substantial portion of the variance in learners' perceptions and outcomes. Stable and uniform data patterns, as shown in Table 1, reinforce the reliability of the model and suggest a high level of internal consistency across all measured indicators. The results highlight that explicit and supportive design features—such as clear guidance, transparent assessment criteria, and encouraging feedback—are consistently valued across different learner groups, while certain culturally sensitive elements, such as public recognition or open discussion prompts, may require careful adaptation. Overall, this study provides a robust empirical foundation for integrating emotional design principles into LMS development and online pedagogical practices, ensuring that digital learning environments remain inclusive, supportive, and conducive to active participation.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

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