

PAPER

Learning Management by Online Classroom Collaboration with a Community Enterprise: Taking Lessons from Thailand

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ABSTRACT

This study proposes and evaluates a tri-dimensional model for online learning in response to disruptions caused by a global health crisis. It examines learners' attitudes, student and community stakeholder satisfaction, and differences in academic performance between STEM and non-STEM students. A total of 288 undergraduate students enrolled in business and technology programs participated in the study. Utilizing a mixed-methods approach, the study explores three core dimensions: (1) learners' attitudes toward online learning, assessed using the uses and gratifications theory (UGT), focusing on cognitive, affective, and social needs, and analyzed using structural equation modeling (SEM); (2) student satisfaction and community feedback on online marketing deliverables, measured using descriptive statistics; and (3) comparative academic performance across disciplines, evaluated using inferential statistical tests. The findings reveal that all UGT variables significantly influence learners' attitudes. Students expressed high satisfaction with the model's real-world relevance, and community stakeholders reported similar satisfaction with the student-generated outputs. Furthermore, STEM students achieved significantly higher academic performance than their non-STEM peers.

KEYWORDS

online learning management, design thinking, problem-based learning (PBL), learning satisfaction, uses and gratifications theory (UGT)

1 INTRODUCTION

Global health crises have long disrupted public health, economies, and education systems. Events such as the Spanish flu, SARS, and more recently, the COVID-19 pandemic, have accelerated the shift from face-to-face to online learning, prompting educators to adopt new strategies to sustain educational delivery. Key efforts have focused on technological readiness, learner engagement, and crisis-responsive

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pedagogy [1–3]. Studies have also examined online instructional models and teachers' experiences under emergency constraints [4–6]. Despite widespread implementation, the long-term effectiveness of online learning remains uncertain, requiring continued innovation and adaptability. In Thailand, the equitable education fund (EEF) reported that school closures during the pandemic exacerbated disparities in digital access and learning quality. Students faced challenges such as limited internet connectivity, lack of devices, and reduced peer interaction, contributing to stress and significant loss of learning. These conditions affect not only immediate academic outcomes but also long-term human capital development. In response, various countries have introduced mitigation strategies, including expanding internet access, distributing devices, and providing teacher training [7]. Improving online learning to enhance student engagement during crises reflects the goals of 21st-century education, which emphasizes community relevance and sustainability. When students address real-world problems through well-designed online learning, education becomes a transformative force for individuals and society [8, 9]. This study focuses on an online Electronic Commerce course offered to both STEM and non-STEM students. While prior research has compared these groups in traditional settings, this study investigates their learning in a fully online environment, aiming to:

1. Examine learners' attitudes toward online learning during the health crisis using the uses and gratifications theory (UGT).
2. Assess satisfaction with an instructional model integrating problem-based learning (PBL) and design thinking, including feedback from community stakeholders.
3. Compare learning achievement between STEM and non-STEM students in the online course.

This study makes three significant contributions. First, it adopts a tri-dimensional research approach, offering empirical findings that enhance the existing body of knowledge concerning learners' attitudes, satisfaction, and academic achievement in online learning during the global health crisis. Second, it demonstrates the potential of online classrooms as effective platforms for addressing community needs. The assessment of community satisfaction with students' work reveals that learning management during a public health emergency can promote meaningful collaboration between educational institutions and local communities. Third, the study provides a research guideline by emphasizing the importance of multi-dimensional frameworks that support more comprehensive and in-depth investigations. In addition, it introduces an instructional model that integrates PBL with design thinking, equipping learners with critical competencies such as problem-solving, creative thinking, and collaboration within online learning environments.

2 LITERATURE

2.1 The uses and gratification theory

Uses and gratification theory has been widely applied in media and communication research to understand users' motivations for engaging with various platforms, from traditional media such as newspapers and television to digital technologies [10, 11]. The theory posits that individuals actively choose media to satisfy specific psychological, cognitive, and social needs. In education, UGT has been used to analyze learner

behavior in technology-enhanced environments. Studies conducted in developing countries, including Thailand, indicate that cognitive, affective, personal integrative, and social integrative needs significantly influence students' motivation to adopt mobile learning systems. Building on this, Chen [12] developed the uses and gratification expectancy model (UGEM) by integrating UGT with expectation confirmation theory (ECT) to explore learners' intentions in using mobile English-learning games. The study found that this integrated model offers a more comprehensive explanation of user attitudes, satisfaction, and continued usage. Overall, UGT provides a robust framework for examining how learners interact with educational technologies. Its focus on motivation and satisfaction makes it especially relevant for the design of effective online learning environments.

2.2 Problem-based learning

PBL is a student-centered instructional approach that engages learners in constructing knowledge through real-world problems. This method promotes analytical thinking, domain-specific problem-solving, and collaborative learning [13–15]. Students typically work in small groups, allowing for dialogue and peer interaction, while instructors serve as facilitators who support inquiry rather than deliver direct instruction [16, 17]. Authentic problems stimulate curiosity and encourage learners to seek information that is directly applicable to the task, fostering self-directed learning and research skills [18, 19]. Assessment in PBL emphasizes the application of knowledge to real-life contexts rather than rote memorization [20]. Through this process, students develop both academic competencies and transferable skills essential for lifelong learning. During the COVID-19 pandemic, PBL gained renewed attention as a viable model for online learning. For example, Ping et al. [21] applied PBL in an online programming course, reporting higher student satisfaction and improved academic performance compared to traditional methods. Similarly, online classrooms incorporating PBL through seminars and applied activities achieved extensive engagement, exceeding 994 hours of instructional time. These findings underscore the potential of PBL to maintain or enhance instructional quality in online settings, affirming its adaptability and pedagogical effectiveness in both crisis and non-crisis contexts.

2.3 Design thinking process

Design thinking is a structured, iterative approach to problem-solving that prioritizes innovation and user-centered solutions. It emphasizes understanding users' needs, defining key challenges, and developing targeted responses [22]. Widely applied in business and industry, design thinking has also gained prominence in education, where it is integrated into curricula across disciplines such as engineering, social sciences, medicine, and teacher education [23]. In educational contexts, design thinking fosters creativity, empathy, and critical thinking by engaging students in human-centered problem-solving. It enables learners to tackle complex, real-world challenges through experiential learning processes [24]. Recent research highlights the alignment between design thinking and PBL, noting shared emphasis on inquiry, collaboration, and real-world application. When combined, these approaches enhance learners' engagement and support the development of essential 21st-century skills [25, 26]. This convergence highlights the potential of

combining PBL and design thinking to cultivate essential 21st-century skills in learners through experiential, solution-oriented learning environments. Table 1 presents a summary of selected studies that illustrate the diversity of learning management models discussed in recent literature.

Table 1. Summary of related studies on learning management models

Researcher	Learning Management Models	Findings
Hira and Anderson [27]	Project-Based Learning	The study analyzed how PBL supports student motivation during the COVID-19 shift to online learning. Interviews with 11 teachers revealed that PBL's collaborative and student-centered nature helps sustain motivation. However, challenges remain in replicating in-person engagement, and teachers emphasized the need for additional support structures to maintain student involvement in remote settings.
You [28]	Team project-Based learning	The study investigated the relationships among team efficiency, psychological safety, team interaction, and creativity in student project-based learning. The results indicated that psychological safety had a direct effect on both team efficiency and team interaction.
de la Torre and Berbegal-Mirabent [29]	Game-Based learning	Findings from the implementation of a game-based learning approach to motivate students in non-STEM programs demonstrated a positive influence on learning outcomes and partially transformed students' learning behaviors.
Anand Shankar Raja and Kallarakal [30]	Massive Open Online Courses (MOOCs)	The study on the adoption of MOOCs for learning management during the global health crisis suggested that stakeholders particularly governments and MOOCs providers should actively contribute by supporting tuition related logistics and promoting student engagement through enhanced learning activities.

Recent literature highlights the adoption of various learning management models aimed at enhancing student motivation and addressing challenges posed by global health crises. However, limited research has explored how online learning environments involving collaboration with external stakeholders, such as community enterprises, can be effectively managed, particularly during times of crisis. This study addresses that gap by applying UGT to examine factors influencing learners' attitudes toward online learning during the recent global health emergency. It introduces an instructional model that combines PBL with the design thinking process. This model was implemented in an online electronic commerce course where students collaborated with local community enterprises to develop content marketing strategies using design thinking to solve real-world challenges. The study also compares academic performance between STEM and non-STEM students who participated in the model. The findings aim to inform the development of practical frameworks for managing online learning in diverse educational settings, while also highlighting the potential of online classrooms to engage with and address real-world community needs. In this way, the classroom becomes not only a site of academic growth but also a platform for generating solutions to broader societal challenges.

3 RESEARCH METHODOLOGY

This study followed a three-phase research design. The target population comprised undergraduate students enrolled in business and technology-related programs. A purposive sampling technique was adopted to select participants with direct experience in the instructional model under investigation. Specifically,

students from an electronic commerce course, intentionally designed to integrate PBL with design thinking, were selected to align with the study's objectives. The final sample included 288 students: 157 from STEM disciplines (science, technology, engineering, and mathematics) and 131 from non-STEM fields (such as humanities, business, and social sciences). As Ke and Hoadley [31] noted, no standard framework exists for evaluating online learning communities. Therefore, methodological design and sample size must be contextually determined. This study's parameters were established accordingly to reflect the characteristics of the online learning environment and the research goals.

4 FIRST PHASE: A STUDY OF FACTORS AFFECTING LEARNERS' ATTITUDES TOWARD ONLINE LEARNING

The first phase of this study examined the factors shaping learners' attitudes toward online learning during the global health crisis. As digital technologies become increasingly embedded in daily life, students' engagement with online platforms is influenced by individual motivations, perceived usefulness, and satisfaction. Grounded in the UGT, which posits that media use is driven by specific psychological, cognitive, and social needs, this phase explored how UGT variables influence learners' perceptions of online learning. UGT has been widely applied to digital learning environments, including mobile and blended learning [10, 11, 32], making it a suitable framework for this investigation. This study focused on three UGT variables:

Cognitive need: Cognitive need refers to learners' pursuit of knowledge and engagement in tasks that stimulate critical and creative thinking [11, 33, 34]. During the pandemic, students were challenged to apply interdisciplinary knowledge to real-world problems, requiring effective use of digital tools and intrinsic motivation. Prior research consistently links cognitive need to positive attitudes toward online learning.

Hypothesis 1: Cognitive need positively affects learners' attitudes toward online learning during a global health crisis.

Affective need: Affective need encompasses emotional motivations and the role of educational tools in supporting emotional learning outcomes [35]. Studies have reported heightened stress and anxiety in online learners, often due to isolation and uncertainty. Platforms that facilitate emotional awareness and regulation can enhance learning experiences.

Hypothesis 2: Affective need positively affects learners' attitudes toward online learning during a global health crisis.

Social need: Social need reflects the desire for interaction with peers and instructors. Engagement with both classmates and external stakeholders, such as community enterprises, was integral to this study's learning activities [36]. Social interaction has been shown to significantly influence learners' acceptance of online platforms.

Hypothesis 3: Social need positively affects learners' attitudes toward online learning during a global health crisis.

4.1 Data analysis and results

Partial least squares structural equation modeling (PLS-SEM) was used to examine factors influencing technology acceptance in online learning. This technique is well-suited for estimating complex relationships among latent variables, particularly in exploration studies with moderate sample sizes. The analysis followed a two-step procedure: (1) evaluation of the measurement model and (2) evaluation of the structural model [37–39].

4.2 Measurement model

The measurement model was assessed for internal consistency, convergent validity, and discriminant validity. Internal consistency was evaluated using Cronbach's alpha and Composite Reliability (CR), both of which exceeded the 0.70 threshold ($\alpha = 0.809 - 0.929$; $CR = 0.885 - 0.949$). Convergent validity, assessed via Average Variance Extracted (AVE) and factor loadings, also met acceptable standards ($AVE = 0.639 - 0.926$; all loadings > 0.50), as shown in Table 2. Discriminant validity evaluated using the Fornell–Larcker criterion, confirmed that each construct's AVE square root exceeded its correlations with other constructs (refer the Table 3) These results indicate that the measurement model demonstrated satisfactory internal consistency, convergent validity, and discriminant validity. Consequently, the analysis proceeded to structural model assessment.

Table 2. Measurement model

Constructs	Items	Loadings	Cronbach's	CR	AVE
Cognitive need (CN)	CN1	0.909	0.828	0.885	0.659
	CN2	0.907			
	CN3	0.926			
	CN4	0.890			
Affective need (AN)	AN1	0.836	0.929	0.949	0.824
	AN2	0.829			
	AN3	0.750			
	AN4	0.828			
Social need (SN)	SN1	0.888	0.876	0.915	0.729
	SN2	0.785			
	SN3	0.789			
	SN4	0.823			
Attitude (ATT)	ATT1	0.805	0.809	0.876	0.639
	ATT2	0.865			
	ATT3	0.869			
	ATT4	0.875			

Table 3. Correlation matrix and the square root of the AVE

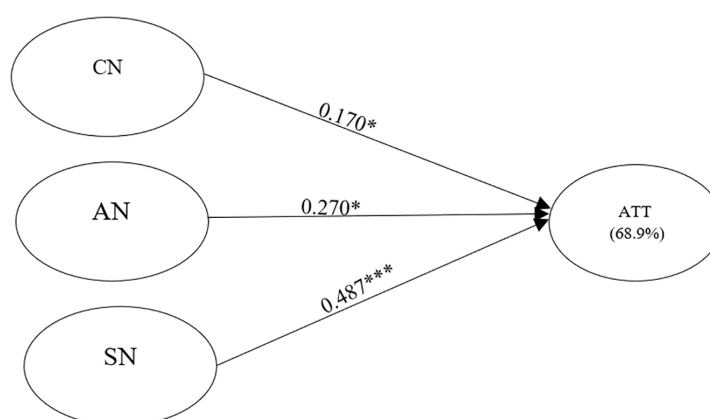
	CN	AN	SN	ATT
CN	0.908			
AN	0.572	0.811		
SN	0.672	0.741	0.800	
ATT	0.649	0.719	0.797	0.854

4.3 Structural model

The structural model was assessed using the bootstrapping method to test the proposed hypotheses (H1, H2, and H3) and evaluate the strength and significance of the path coefficients. Results are summarized in Table 4, presenting standardized path coefficients (β) and t-statistics. All three hypotheses were statistically supported. Cognitive need, affective need, and social need each had significant positive effects on learners' attitudes toward online learning during the global health crisis. The model accounted for 68.9% of the variance in learners' attitudes, indicating strong explanatory power. Figure 1 displays the standardized path coefficients within the research framework.

Table 4. Hypotheses results

Path	Coefficients(β)	T-Value	P Values	Supported
CN \rightarrow ATT	0.170	2.289	0.024	Yes
AN \rightarrow ATT	0.270	2.308	0.023	Yes
SN \rightarrow ATT	0.487	4.271	0.000	Yes

**Fig. 1.** Standardized path coefficients

Notes: *** $p < 0.001$; * $p < 0.05$; R^2 values are shown in parentheses.

5 SECOND PHASE: LEARNERS PERCEIVED SATISFACTION WITH INSTRUCTIONAL MANAGEMENT

In this phase, the instructor implemented an instructional approach that integrated the design thinking process with the PBL model. The aim was to enhance

learners' engagement with real-world problems and to promote creativity, critical thinking, and collaborative skills. This instructional design encouraged students to work alongside community stakeholders in addressing authentic challenges through structured, iterative learning activities. The following section outlines how the design thinking process was employed to facilitate learning in this context.

5.1 Design thinking process

The initial phase of the design thinking process, Empathize, focuses on developing a deep understanding of users' needs, expectations, and challenges. Figure 2 presents an empathy map that captures the needs and concerns of a selected community enterprise group. Based on this analysis, students identified key issues to be addressed and collaboratively engaged in brainstorming sessions with community members via online platforms to co-develop potential solutions.

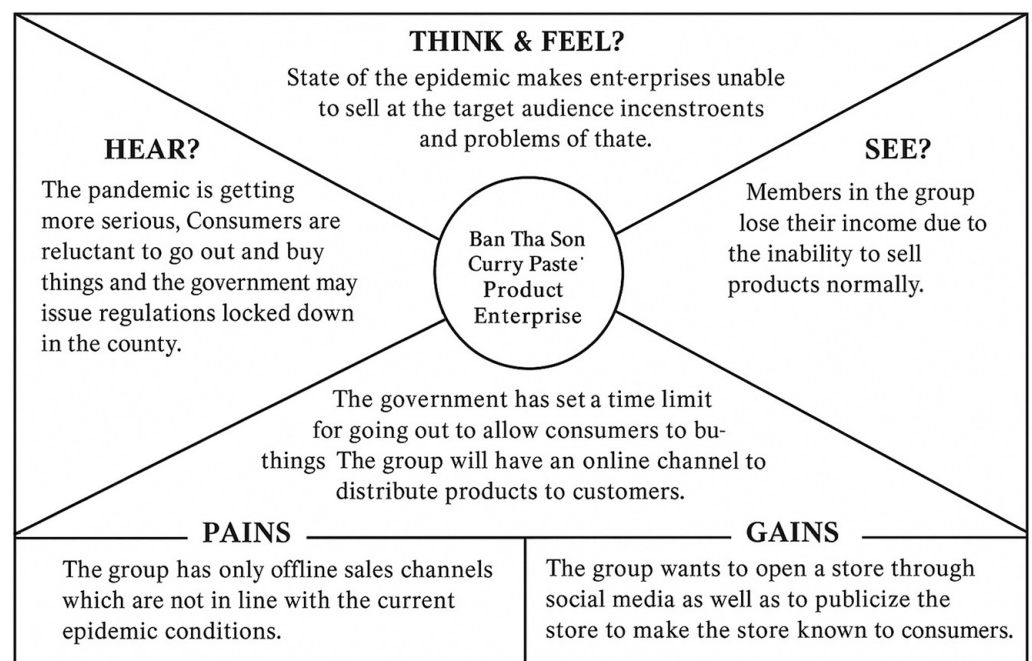


Fig. 2. Empathy map

Students analyzed the requirements of local community enterprises and identified a strong interest in using social media to enhance business visibility. In response, they applied content marketing principles to create promotional materials, including infographics and short videos, which were disseminated through dedicated Facebook pages functioning as virtual storefronts. The outputs were refined through iterative feedback from instructors, peers, and community members. During the Prototype and Test stages, community feedback was collected and discussed in class. Final submissions were evaluated based on two criteria: 1) the satisfaction of community stakeholders, particularly the Ban Tha Son Curry Paste Enterprise, and 2) student satisfaction with the integrated design thinking and PBL framework. As illustrated in Figure 3, students from both STEM and non-STEM backgrounds reported high satisfaction, especially in terms of instructional clarity, supportive learning environments, and structured facilitation. These results highlight the

effectiveness of the instructional model in fostering meaningful engagement and active participation.

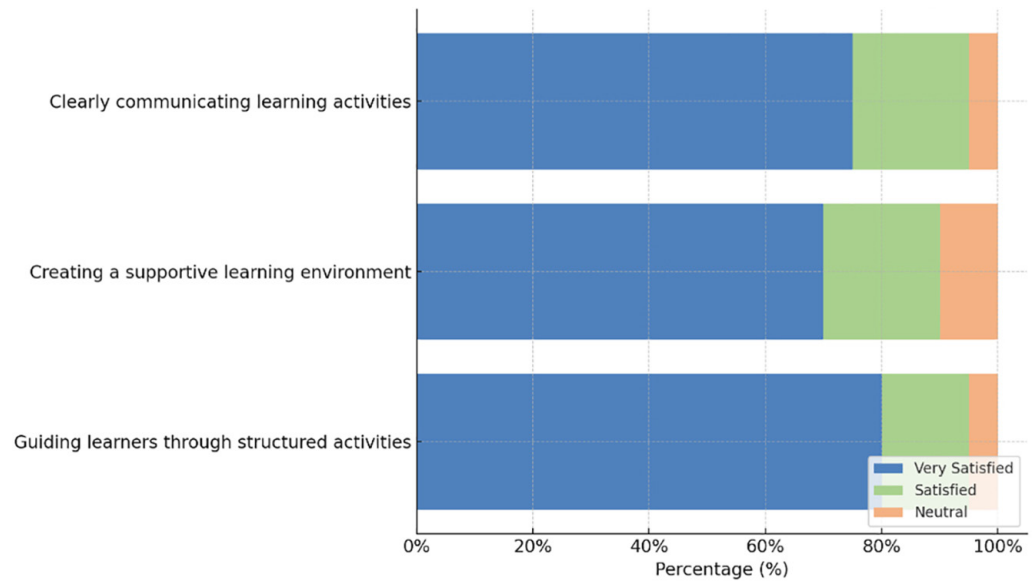


Fig. 3. Learners' satisfaction with teachers' learning management methods

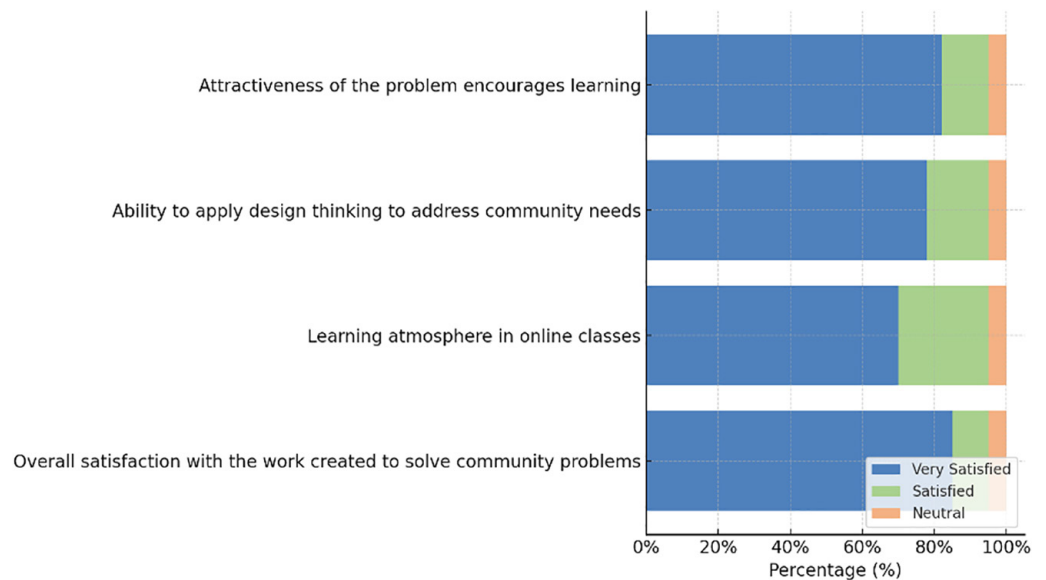


Fig. 4. Learners' satisfaction with the problem-based learning management model

As shown in Figure 4, learners reported a high level of satisfaction with the PBL model across several key areas. These included the relevance and appeal of the problems presented, the opportunity to apply design thinking to real community needs, the effectiveness of the online learning environment, and the quality of student-produced outputs. The consistently positive responses suggest that the instructional model effectively supported learner engagement and the development of practical problem-solving skills in a meaningful, real-world context. As shown in Figure 5, the community enterprise expressed high satisfaction with the Facebook-based content marketing developed by students, particularly the visual materials. Overall content satisfaction was rated highest, reflecting its usefulness and alignment

with the enterprise’s communication goals. High ratings were also given to color usage and visual appeal. While the clarity and relevance of information received slightly lower, yet still positive feedback, the results indicate that the student-created content effectively addressed the community’s needs in promoting its identity and products through social media.

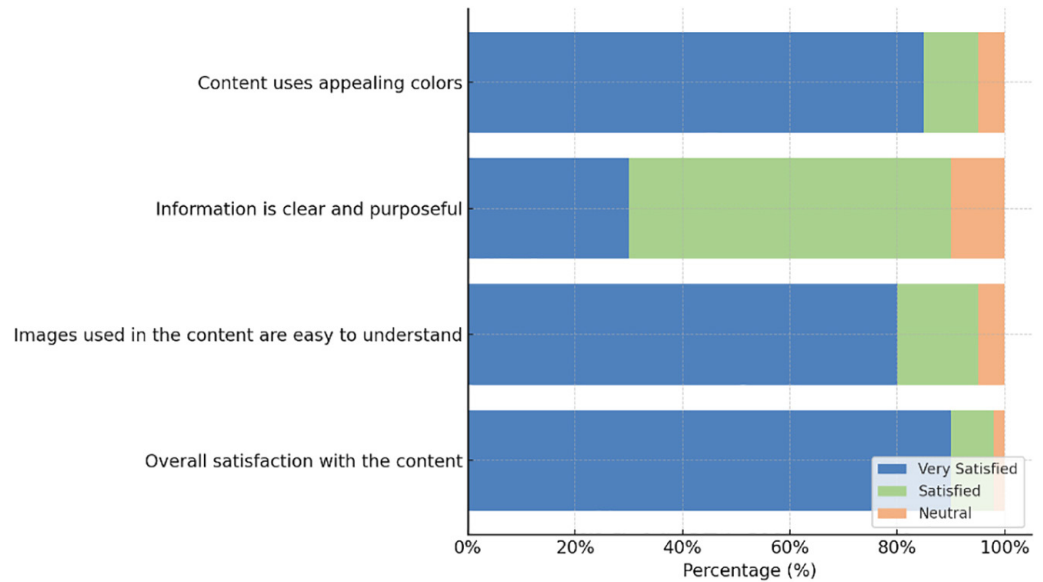


Fig. 5. Community enterprise’s satisfaction with Facebook-based content marketing

6 THIRD PHASE: COMPARISON OF LEARNING ACHIEVEMENT BETWEEN STEM AND NON-STEM STUDENTS

While design thinking is widely used in STEM education [40–42], its relevance in business education has also been emphasized [43]. In this study, design thinking was integrated with a PBL approach in an electronic commerce course offered to both STEM and non-STEM students. The course aimed to foster interdisciplinary learning by combining scientific and creative competencies. To assess the impact of the instructional model, student performance was evaluated after completing design thinking-based activities and developing solutions for real community challenges. Both qualitative and quantitative criteria aligned with learning objectives were used. Achievement scores were then analyzed using an independent samples t-test to compare STEM and non-STEM cohorts.

Table 5. Comparison of learning achievement between STEM and non-STEM learners

Variable	Student Group	n	Mean	SD	t	p
Learning Score	STEM	157	8.96	0.89	3.99	0.0001
	Non-STEM	131	7.64	1.72		

The results presented in Table 5 indicate that the mean learning achievement scores for students in the STEM and non-STEM groups were 8.96 and 7.64 out of 10, respectively. An independent samples t-test revealed that the STEM group significantly outperformed the non-STEM group ($p < 0.05$). This finding is consistent with existing literature, which emphasizes that STEM-based learning activities often

foster higher-order thinking, creativity, and innovation. It is likely that students from STEM disciplines, who are generally more familiar with structured, inquiry-based, and solution-focused learning environments, were better equipped to navigate the design thinking process. As a result, they demonstrated superior performance in applying the approach to real-world problem-solving tasks compared to their non-STEM peers.

7 DISCUSSION AND CONCLUSION

7.1 General discussion and theoretical implications

Managing instructional models during global crises presents new challenges for educators. This study adopted a three-dimensional approach to examine online learning, focusing on learners' attitudes, instructional design, and comparative learning outcomes. The first dimension explored learners' attitudes using the UGT, incorporating cognitive, affective, and social needs. All three factors significantly influenced attitudes toward online learning, with social need showing the strongest effect. This reflects students' desire for interaction with peers and instructors, consistent with previous findings (Thongsri et al. 2019). Cognitive need followed, especially relevant courses involving real-world tasks such as content marketing for community enterprises. Affective need had less influence, likely due to the limited emotional engagement typically found in virtual environments. The second dimension focused on the integration of design thinking within a PBL framework, utilizing real community-based problems. Two key findings emerged. First, collaboration with community enterprises enhanced relevance and motivation, encouraging students to generate actionable solutions. Second, design thinking supported an iterative, user-centered process, transforming online classrooms into problem-solving laboratories. This model demonstrates potential for managing learning in crisis contexts. The third dimension compared learning outcomes between STEM and non-STEM students. While STEM students achieved higher project scores, both groups produced outputs that were selected for use by the community. This highlights the need to further develop problem-solving competencies among non-STEM learners to enable them to contribute effectively in real-world contexts.

Theoretically, this study contributes to an expanded understanding of how PBL and design thinking can be combined to support educational innovation. Unlike traditional PBL, which emphasizes problem analysis and reporting, design thinking fosters innovation through iterative development and user focus. Clear communication between instructors and students remains a critical success factor, ensuring shared understanding of learning goals and instructional frameworks, particularly in online settings.

7.2 Practical implications

This study offers several practical implications for educators, instructional designers, and policymakers. Integrating design thinking with PBL can enhance students' creativity, engagement, and ability to solve real-world problems, particularly when authentic community challenges are embedded in the learning process. Social interaction also plays a vital role in shaping positive attitudes toward online learning. Therefore, instructional strategies should actively promote interaction

between peers and instructors through collaborative activities and continuous feedback. Additionally, non-STEM learners may require targeted support to navigate innovation-driven learning models. Providing scaffolding tools such as templates, structured feedback, and introductory workshops in design thinking can help bridge the skill gap and promote more equitable outcomes. Clear and consistent communication of learning objectives, course structure, and expectations is also crucial for the successful implementation of complex instructional models. This is especially important in online settings, where miscommunication can hinder student engagement and performance. Collectively, these insights support the development of adaptive, student-centered learning environments that respond effectively to evolving educational and societal needs.

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