

# Effect of Gamification-Based Digital Media Design Teaching on Online Education and Mediating Role of Online Social skills

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## Abstract

This study aimed to investigate the impact of gamification-based teaching on online digital media design education. Additionally, it examined the mediating role of online social skills in the relationship between gamification-based digital media design teaching and online learning quality. The research was conducted in two stages. Firstly, the Delphi technique was employed, involving 12 participants including scholars, internet experts, and students. Secondly, a survey was conducted with 360 students who completed a scale-based questionnaire assessing gamification-based digital media design teaching factors, online social skills, and online learning quality. The findings suggest that gamification-based digital media design teaching significantly affects the effectiveness of online digital design education. Moreover, the study confirms the mediating effects of online social skills in the relationship between gamification-based digital media design teaching and online learning quality.

*Keywords:* Gamification-Based Teaching, Digital Media Design, Online Education, Online Social skills

## 1. Introduction

### 1.1 Effects of COVID-19

The pneumonia pandemic caused by a novel coronavirus began in Wuhan, China in late 2019 and was officially named COVID-19 by the World Health Assembly. COVID-19 has had a profound impact globally, leading to changes in lifestyles and globalization patterns. Social patterns, eating habits, entertainment consumption, and study/work styles have undergone lasting changes at the individual level. At the global level, the pandemic has reshaped the industrial supply chain and disrupted the world order based on globalization (The News Lens, 2020). Amidst this crisis, there is an opportunity to promote distance learning as part of the post-COVID-19 "new normal" in daily lives, work, and learning. The

transition to online learning tests the ability of instructors and learners to interact and utilize digital technology, presenting both challenges and opportunities in teaching management and the effectiveness of online learning (Lu, 2020). Online courses face challenges such as low completion rates, student inattention, and the need for comprehensive learning structures (Wang, 2019). Compared to traditional classroom-based courses, online courses require students to possess more self-discipline and stronger time management skills. Additionally, online teaching may limit opportunities for learner-instructor connection and interaction, impacting the quality of learning experiences (Baum & McPherson, 2019). Studies have shown that learners in online courses may receive lower grades

compared to those in traditional classrooms, but online courses can also provide a platform for participation by individuals lacking self-confidence, through text-based or anonymous discussions. Maintaining high-quality online interactions is crucial for encouraging active learning in personalized courses and projects facilitated by technology (Baum & McPherson, 2019). Furthermore, students with higher levels of social skills demonstrate better self-regulation and motivation (Tseng, Yi & Yeh, 2019). Therefore, it is essential to ensure that the quality of online learning is comparable to that of conventional classroom learning.

Online courses have the potential to be considered "green" in the environmental sense, as they dematerialize learning content and significantly reduce carbon emissions from transportation by enabling remote learning, discussions, and work (Axios, 2020). This shift towards online education models utilizing digital platforms may lead to lasting changes in education. The adoption of online courses allows for changes in the software and hardware settings of traditional classrooms, reducing space requirements and expenses related to furnishings and personnel. The funds saved can be redirected towards purchasing and maintaining online hardware and software. In the case of design courses, which previously relied on hands-on practice in studios, new challenges have arisen in teaching design thinking and practices online. However, there is a lack of research on the effectiveness of online design thinking education (Dreamson, 2017). Digital media design, being primarily displayed on computer screens, is less dependent on studio-based learning compared to other types of design subjects. This

makes online education in digital media design highly feasible. Additionally, advancements in technology have provided new platforms and channels for conducting various online courses, including those focused on professional design (Dreamson, 2017). The development and application of technologies such as augmented reality and virtual reality have enhanced online courses by effectively integrating online and offline learning experiences. Learners can now visit multiple locations worldwide and interact with virtual environments generated by the internet.

## **1.2 Potential of Gamification-Based Digital Media Design Teaching**

In the Internet era, gaming has become a common experience for learners. Bado (2022) introduced game-based learning pedagogy, also known as learning gamification, as a prevalent educational theory and practice that incorporates learning through games. Games offer engaging and interactive experiences that make it easier for people to acquire new knowledge and skills. Gamified learning is an effective strategy that adds value to life through enjoyable experiences, allowing players to tackle problems instead of avoiding reality (Chou, 2017). Sandford et al. (2006) investigated the attitudes of teachers and students towards using computer games for teaching and learning. Teachers reported that games effectively motivated their students to learn, improved participation, and enhanced interactions among students in their courses. Lee and Hammer (2011) emphasized the importance of gamification as a method for guiding and rewarding students, maximizing their potential. For instance, the combination of gamified learning and various new technologies has proven to enhance the design

achievements of 3D architecture students in construction projects (Villagrasa et al., 2014). Gamified learning is an undeniable trend, as games are highly engaging and become more productive the longer they are played. The more time students spend on gamified learning, the more favorable their learning outcomes become (Li, 2016). Systematic analysis has shown that games can be effectively combined with learning to achieve optimal learning experiences. Gamification has emerged as a promising lifelong learning strategy, enhancing knowledge acquisition and fostering continuous skill development for comprehensive learning (Julieth et al., 2020). The impact of gamification on student motivation in social studies teaching has been found to increase motivation, which is considered a fundamental component of creativity. It is assumed that the creative skills of participants also improve as a result (Yildiz, Topcu & Kaymakci, 2021). The implementation of gamified learning in various educational settings is becoming increasingly common, and research is being conducted to understand its motivational and immersive aspects. However, there are ongoing discussions regarding the challenges associated with designing and implementing gamified learning systems (Moreno-Gera et al., 2008). Some teachers express concerns that gamification may have negative effects on the learning outcomes of students lacking discipline (Alabbasi, 2018). Hence, the purpose of this study was to investigate the impact of gamification on design education and provide insights into the ideal implementation of online digital media design education in the post-pandemic era. The study aimed to achieve the following objectives:

(1) Assess the effects of gamification-based digital media design teaching online on social skills and learning quality.

(2) Examine the mediating role of social skills in the relationship between gamification-based digital media design teaching online and learning quality.

## **2. Theoretical Study**

### **2.1 Rationale for Implementing Gamification-Based Digital Media Design Teaching**

Point accumulation, stamp collection, and becoming an expert in gaming experiences are all elements of gamification. However, gamified marketing activities (gamified online learning) not only involve points, rewards, and leader boards but also crucially rely on motivating target customers (students) to pay for the gamified content. Abramovich et al. (2013) argued that when incorporating activities that allow learners to earn badges in courses, it is essential to consider the capabilities and motivations of learners. An experiment conducted by Berkling and Thomas (2013) yielded negative results: students failed to independently prepare for projects or examinations because they couldn't grasp the key points in the course they attended. Gamified elements were used without a clear purpose, resulting in a slow and inefficient transition from the traditional classroom to an online learning environment. Similarly, Professor Lam from the University of Michigan suggested that course gamification might be nothing more than a superficial process of renaming assignments as 'quests' and scores as 'points,' without contributing to students' learning goals (Mak, 2013). Therefore, pre-class communication is necessary. Chou (2017) examined why various games became popular and

discovered that popular games stimulated eight core drives in individuals. These core drives form a theoretical framework known as the Octalysis framework. The framework has been established through extensive testing, adjustments, and

calibration based on game design theories, motivation psychology, and behavioral economics. It can explain the reasons behind people's actions, categorizing their motivations under these core drives (Chou, 2017).

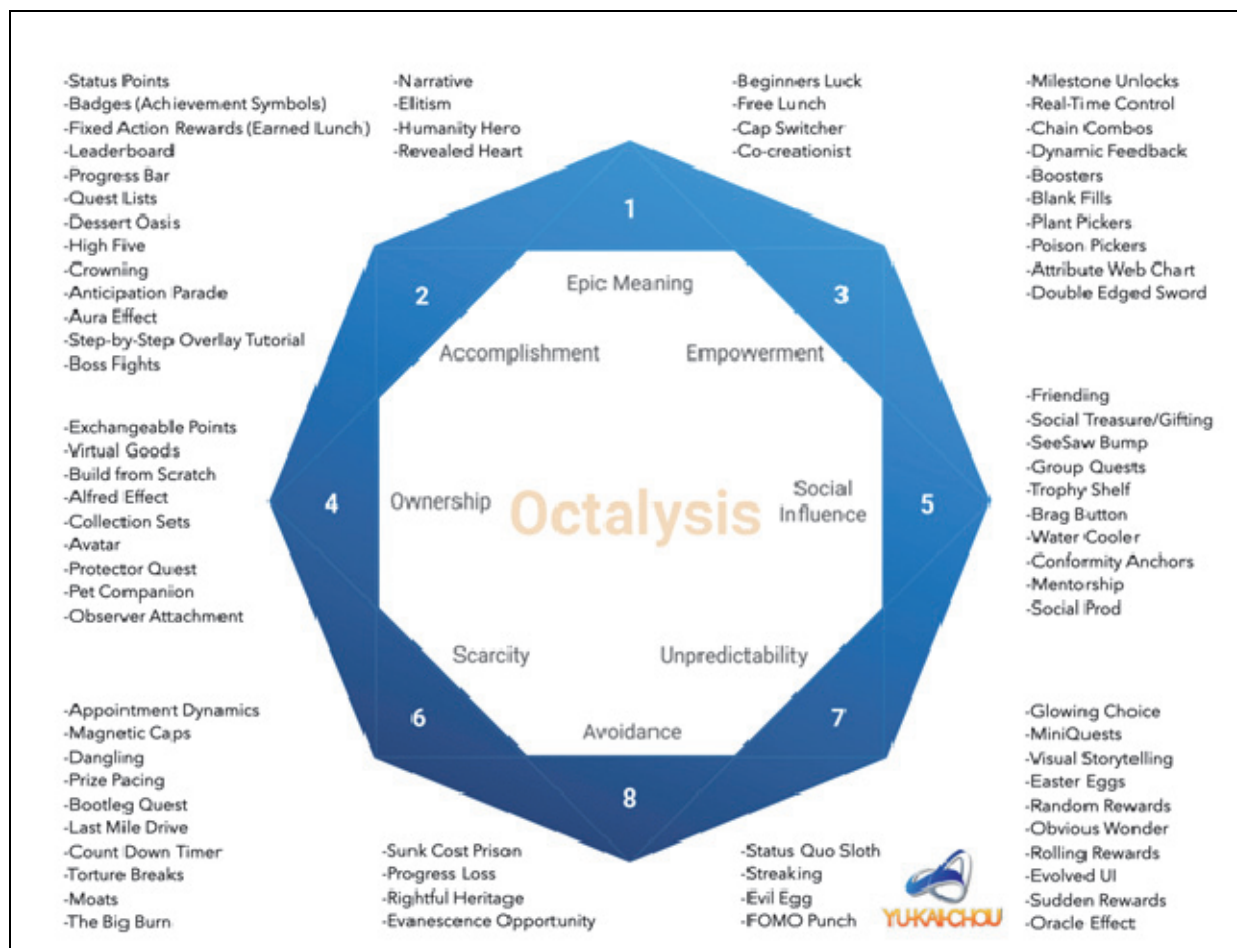


Figure 1. Eight Core Drives of Octalysis Framework. @carol

Source: Chou (2017). Actionable Gamification: Beyond Points, Badges, and Leaderboards. *Business Weekly*

1) Epic meaning and Calling; 2) Development and Accomplishment; 3) Empowerment of Creativity and Feedback; 4) Ownership and Possession; 5) Social influence and Relatedness; 6) Scarcity and Impatience; 7) Unpredictability and Curiosity; and 8) Loss and Avoidance (Chou, 2017).

Gamified learning is focused on learning activities and aims to motivate individuals to engage in desired learning behaviors or achieve specific learning

outcomes. It involves incorporating various game elements to evoke a gaming experience that helps accomplish these goals (Alahäivälä & Oinas-Kukkonen, 2016). Learning activities have a positive impact on learners' motivation by offering opportunities to acquire useful skills or participate in enjoyable tasks. However, they can also have a negative influence on motivation if the content is uninteresting or difficult. To address these factors, an activity-centered gamification design approach can

be employed. This approach involves reinforcing motivating factors, eliminating demotivating factors, and selecting motivating factors that align with both the drivers and barriers to motivation (Dichev et al., 2019). Additionally, the term "gamified digital media design learning" should be used in a non-gaming context, where game elements are integrated to provide incentives. However, scholars have expressed different opinions regarding perceived activity values and perceived abilities in learning activities. Learners' decisions to participate in specific learning activities may be influenced by their perceived abilities.

## 2.2 Online social skills

Education is a social activity, and the ability to engage socially is crucial for social learning (Laffey et al., 2006). According to the findings of Yang et al. (2006), social skills are defined by perceived peers' social presence, perceived written communication skills, perceived instructor's social presence, comfort with sharing personal information, and social navigation. Their study analysis indicates that different motivational factors have varying relationships with these social skill factors. Intrinsic goal orientation is associated with perceived peers' social presence, while self-efficacy explains the variance in perceived instructor's social presence and comfort with sharing personal information (Yang et al., 2006). The social displacement and social compensation hypotheses are commonly used theoretical frameworks to explain any inverse relationships between online video game involvement and social outcomes (Kowert, 2015), particularly in the context of gamification-based digital media design teaching. The findings demonstrate the validity of a social skills

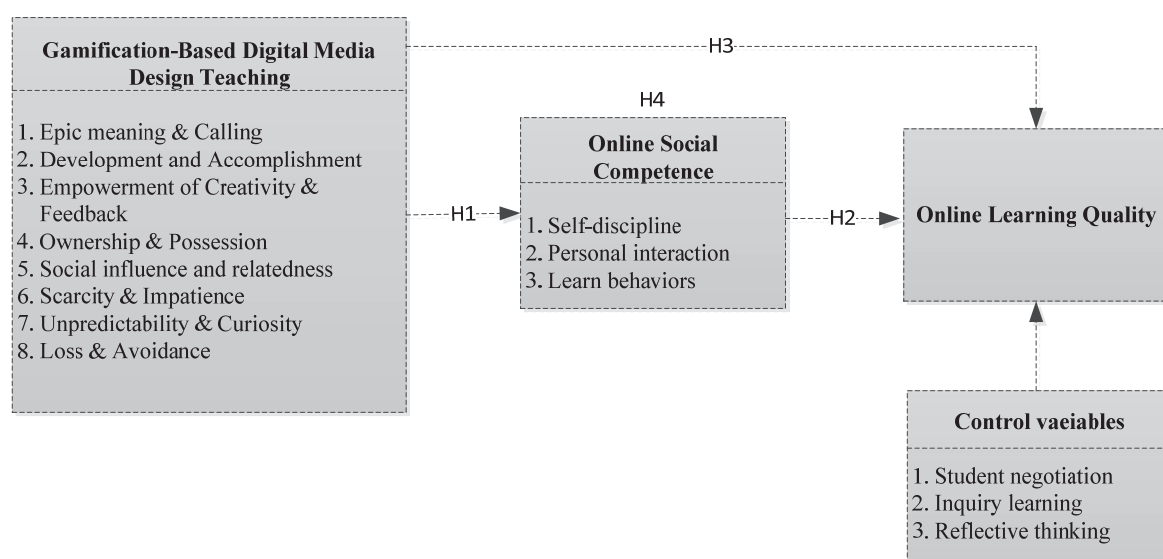
measurement tool for online learning, suggesting its potential value in technology research for collaborative and networked learning (Laffey et al., 2006). Therefore, it is crucial to understand the relationship between gamification-based teaching and online social skills in the field of digital media design education. Furthermore, Tsai et al. (2014) developed a scale to assess social skills. The scale measures three dimensions associated with social skills: self-discipline, personal interaction, and learning behavior. It consists of 48 items divided into seven subscales (autonomous behavior, emotional management, interpersonal relationship, communication expression, cooperation empathy, learning habit, and learning performance) to measure the theoretical dimensions of self-control, interpersonal interaction, and academic behavior.

## 2.3 Online Learning Quality

Strong measurement capabilities were discovered in the domains of emotion, motivation, and perception regarding the perceptions of adopted students regarding the quality of online education (Saadé, He, & Kira, 2007). Additionally, Oliver (2001) identifies and demonstrates several strategies to address these issues, which serve as means to support and sustain high-quality online learning programs within universities and the broader educational context. These strategies include: implementing proactive programs to enhance teachers' expertise in designing, developing, and delivering online instruction; employing programs to support and maintain student readiness; ensuring adequate technological infrastructure to support the programs; and utilizing strategies that facilitate the design and development of online programs based on customization and the reuse of learning materials (Oliver, 2001). The

negative experiences reported by students were attributed to delayed feedback from instructors, insufficient technical support, a lack of self-regulation and motivation, feelings of isolation, monotonous teaching methods, and poorly designed course content. These findings can help instructors comprehend students' perspectives on online learning and, ultimately, enhance their online instructional practices (Yang & Cornelius, 2004). To achieve improved learning outcomes, it is necessary to

enhance the quality of Telkom's network infrastructure, enhance the instructional quality delivered by lecturers, and provide credit subsidies for students (Giatman, Siswati, & Basri, 2020). Studies also indicate the importance of developing a consistent course structure across classes and offering extended technical support hours (Young & Norgard, 2006). Moreover, statistical measurement and evaluation are essential to validate the dimensions of online learning quality.



**Figure 2. Theoretical model**

## 2.4 The Variables and Hypotheses

Critics frequently highlight the lack of social interaction, engagement, and collaborative learning opportunities in online education (Laffey et al., 2006). Gamification is proposed as a sustainable approach to achieving the United Nations' Sustainable Development Goal 4 of ensuring quality education (Park & Kim, 2021). Osipov et al. (2015) developed a system that provides predefined teaching and learning materials accessible to both instructors and learners, while also utilizing gamification to enhance user motivation. The study measured the system's effectiveness in connecting unmotivated and

unfamiliar users (Osipov et al., 2015). However, it should be noted that despite the positive effects of gamification, teachers still need to consider aspects such as classroom management. Sulispera and Recard (2021) suggested that teachers establish clear rules and procedures for game-based activities to ensure students maintain a positive attitude and engagement during the learning process (Sulispera & Recard, 2021). On the other hand, Sukanto et al. (2020) argued that gamification-based learning can Online education is frequently criticised because it lacks social interaction, a sense of social engagement,



and the benefits of learning with others. (Laffey et al., 2006). The use of gamification as a sustainable method for achieving the United Nations' Sustainable Development Goal 4 of ensuring 'quality education' (Park & Kim, 2021). Osipov et al. (2015) created a system including predefined synchronised teaching and learning materials that both instructors and learners can access; the system also increases user motivation by means of gamification. The capacity of the system to successfully connect users who were unmotivated and unfamiliar with each other was measured (Osipov et al., 2015). Even though gamification gives positive effects, there are still many things that need to be concerned by the teacher, such as classroom management. The study of Sulispera and Recard (2021) suggested the teacher to have clear rules and procedures of playing game, so that students are behaving a good attitude towards classroom activity even though they engaged actively and motivated during the learning process (Sulispera & Recard, 2021). However, Sukanto et al. (2020) argued that gamification-based learning can improve the social skills of student. Therefore, the following hypothesis was proposed:

H<sup>1</sup>: Gamification-based digital media design teaching online has a significantly positive impact on online social skills.

Online social skills, facilitated through computer-mediated social mechanisms, are crucial for active participation and contribution in online learning environments (Laffey et al., 2006). Studies have examined the importance of online social skills and suggested that they can predict learning outcomes (Yang et al., 2006). Thus, the following hypothesis is proposed:

H<sup>2</sup>: Online social skills have a significantly positive

effect on the quality of online learning in a gamification-based digital media design teaching setting.

Moreover, Goggins et al. (2009) argued that fully online group work influences social skills, and perceived social skills mediate the relationship between social support and competitive pressure (Abrahamsen et al., 2008). Therefore, further investigation is needed to explore the role of online social skills in mediating learning quality in a gamification-based digital media design teaching setting. Consequently, the following hypothesis is proposed:

H<sup>3</sup>: Gamification-based digital media design teaching online has a significantly positive effect on the quality of online learning.

Additionally, the following hypothesis is proposed:

H<sup>4</sup>: Online social skills mediate the relationship between gamification-based digital media design teaching and the quality of online learning.

### 3. Method

#### 3.1 Hypotheses

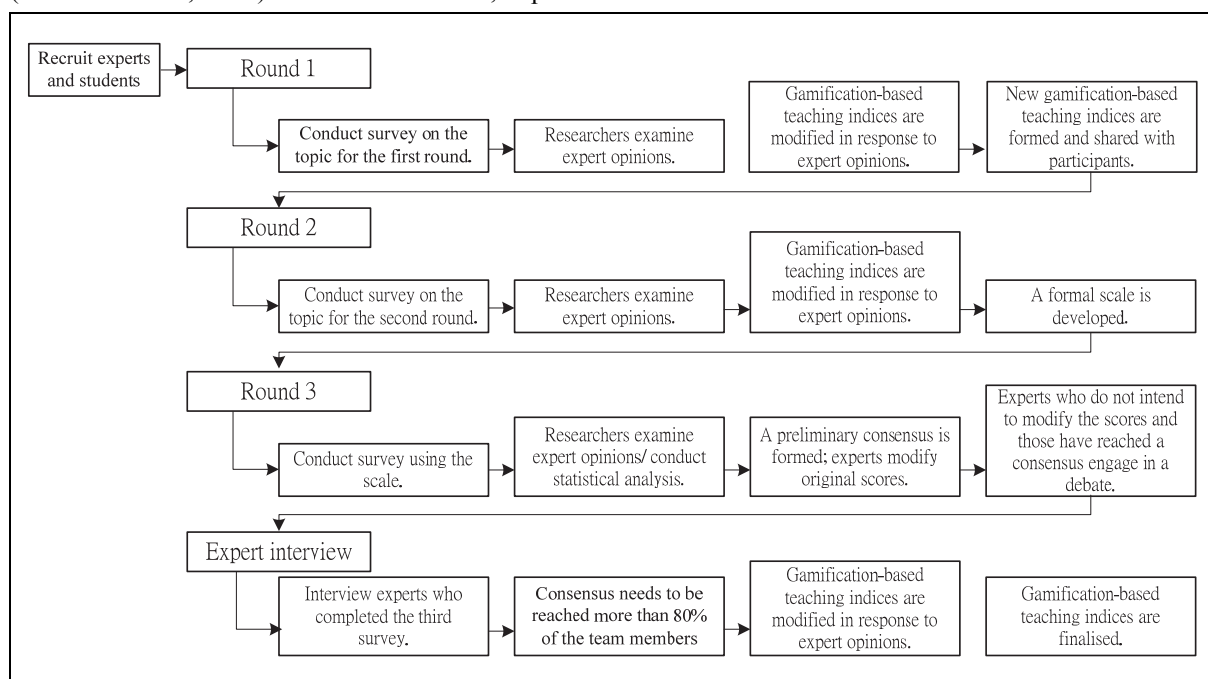
Based on the studies mentioned above, we developed the theoretical model for our study. The independent variable was gamification-based digital media design teaching, while the dependent variables were students' social skills and online learning quality. I hypothesized that social skills would mediate the relationship between gamification and online learning quality (Figure 2). Further information on the specific measures and dimensions used to assess the constructs can be found in the Measures subsection, which outlines the correlations between these variables.

#### 3.2 Design

## Stage 1:

The present study utilized the Delphi technique (Skulmoski et al., 2007), which is an iterative process involving data collection and analysis to gather and refine anonymous assessments provided by experts. This technique aims to reach a consensus through feedback and is particularly useful when the understanding of a problem or phenomenon is limited. It is commonly employed for predicting the direction of education development and understanding social trends (Chen, 2012; Rowe & Wright, 2001). Given the objective of providing valuable recommendations for the future of online digital media design education, the Delphi technique was deemed an appropriate research method. The survey conducted in this study consisted of four rounds, utilizing a modified Delphi technique to facilitate a thorough examination of expert opinions (Hohmann et al., 2020). In the initial round, experts

were asked open-ended questions related to the research topic, and their responses were collected. These responses were then categorized to develop structured discussion questions for subsequent rounds (Krijtenburg-Lewerissa et al., 2019). The participant pool for this study included experts in online learning, network technology, digital media design, and design education. Additionally, stakeholders, interest groups, and interested members of the public were invited to contribute their perspectives. To provide a more comprehensive insight, digital media design students from universities and research institutions were also invited to offer their suggestions from a user perspective. A total of 12 participants were selected for formal participation, while two others were placed on the waiting list. The process of defining the indices used in the study is elaborated in Figure 3.



**Figure 3. Implementation of gamified digital media design learning index definition process using Delphi technique**



## Stage 2:

### 3.2.1 Participants

A purposive sampling method was employed to select 400 students from seven colleges in Taiwan who had experience in online learning and were enrolled in digital media design departments. The sample included students from all years of study. Questionnaires were administered using Google Forms between April 1 and 21, 2022. A total of 386 students participated in the survey, and after excluding 26 incomplete or invalid questionnaires, 360 valid responses were obtained. Among the valid responses, 130 (36.11%) were from male respondents, and 230 (63.88%) were from female respondents. It should be noted that the gender distribution was not balanced, as design colleges tend to have a slightly higher proportion of female students. The distribution of respondents across academic years was as follows: 77 in the first year, 88 in the second year, 112 in the third year, and 83 in the fourth year.

### 3.2.2 Measures

The measurement of gamification-based digital media design teaching indices utilized the Gamification-Based Digital Media Design Teaching Index Scale, a 40-item scale developed by Chou (2017). This scale assesses the eight core drives (indices) in the Octalysis framework that are associated with teaching (Figure 1). Sample items from the scale include the following: "Helping peers to learn makes me a hero who saves others," "I complete all learning-related levels to put myself on the list of top players," "A game that involves editing a learning map is provided (e.g., taking control of land by completing a lesson)," "I form an alliance to compete with other alliances," "A delay mechanism

is implemented at the game level (e.g., earning a reward after 2 hours)," "I can complete a lesson to join an undisclosed online meeting," and "I lose the chance to enter the draw for prizes if I cannot complete a lesson within the indicated time limit." The item scores of the student respondents were averaged to calculate the gamification-based digital media design teaching score during the pretest phase (Cronbach's  $\alpha = .98$ , and Kaiser-Meyer-Olkin value = .935). The means of the 40 items ranged from 3.89 to 4.58, with standard deviations ranging from .51 to 1.11. These results were obtained through a consensus reached by scholars and experts who utilized the Delphi technique and conducted three rounds of investigations. The composite reliability of the eight indices was greater than .7, ranging from .77 to .91. The average variance extracted (AVE) for the indices was greater than .5, ranging from .54 to .68.

**Online social skills:** Online social skills were measured using a six-item scale developed by Tsai et al. (2014). This scale assesses three dimensions associated with social skills: self-discipline, personal interaction, and learning behaviors. The development of the social skills scale demonstrated validity through the following: 1) evidence based on test content, which was established by exploring relevant literature and obtaining expert validation; 2) high internal consistency reliability and 4-week-interval re-test reliability for all subscales. Sample items from the scale include: "Online learning helps me to learn autonomously," "Online learning benefits my interpersonal relationships," and "Online learning helps me to learn collaboratively."

The normalized factor loadings of the latent variable self-discipline on the observed variables

self-management and emotional management were .88 and .75, respectively (both  $> .7$ ). The normalized factor loadings of the latent variable personal interaction on the observed variables interpersonal relationship, communicative expression, and collaborative empathy were .76, .94, and .87, respectively (all  $> .7$ ). The normalized factor loadings of the latent variable learning behaviors on the observed variables learning habits and learning performance were .91 and .85, respectively (both  $> .7$ ; Tsai et al., 2014). For online social skills, the total composite reliability was .90 ( $> .7$ ), and the average variance extracted (AVE) was .59 ( $> .5$ ). Overall, the study demonstrated satisfactory reliability and validity.

**Online learning quality:** The measurement of online learning quality utilized the 15-item Online Learning Quality Questionnaire developed by Wu and Tsai (2004). This scale assesses three dimensions associated with online learning quality: student negotiation, inquiry learning, and reflective thinking. Sample items from the scale include: "I hope I have an opportunity to discuss the learning content with my classmates," "I hope I can approach a question through different methods," and "I hope to learn about how I can become an efficient learner." The normalized factor loadings of the latent variable student negotiation on the corresponding observed variables (including discussion and learning with classmates) were .85, .86, .84, .63, and .63 (all  $> .7$ ), respectively. The normalized factor loadings of the latent variable inquiry learning on the corresponding observed variables (including solving problems independently and approaching questions with different methods) were .76, .79, .80, .81, and .74 (all  $> .7$ ), respectively. The normalized factor loadings of

the latent variable reflective thinking on the corresponding observed variables (including becoming a learner with new thinking models and becoming an efficient learner) were .86, .88, .81, .76, and .69 (all  $> .7$ ), respectively (Wu & Tsai, 2004). For online learning quality, the total composite reliability was .93 ( $> .7$ ), and the average variance extracted (AVE) was .53 ( $> .5$ ).

### 3.2.3 Statistical analysis

Structural equation modeling (SEM) is a widely used research methodology in the social and behavioral sciences (Baumgartner et al., 1996). It consists of two main components: (i) the measurement of variables, which includes determining the variables to be measured, the measurement methods, and ensuring reliability and validity; and (ii) the examination of causal relationships among variables and the explanation of complex and unobserved variables. SEM serves as a statistical model for understanding the relationships among multiple variables (Hair et al., 2006). The SEM process involves two key steps: (i) validating the measurement model and (ii) fitting the structural model (Kenis & Knoke, 2002). In this study, the objective was to examine three latent constructs (gamification-based digital media design teaching indices, online social skills, and online learning quality) with a total of 14 indices and dimensions. To analyze the research hypotheses and investigate the relationships between variables, SEM was employed using IBM® SPSS® Amos, a powerful software for conducting SEM. This software facilitates the application of standard multivariate analysis methods such as regression, factor analysis, correlation, and analysis of variance. Specifically, AMOS (Analysis of Moment Structures) version 23.0 was utilized for

this study.

#### 4. Results and Discussion

The goodness-of-fit indices obtained in this study are as follows: CMIN ( $X^2$ : chi-square) = 115.314;  $df$  = 53,  $X^2/df$  ( $<3$ ) = 2.176; probability ( $p < .001$ ) = .000, GFI ( $>.90$ ) = .956, RMSEA ( $<.08$ ) = .057; RMR ( $<.08$ ) = .056; SRMR ( $<.1$ ) = .030; NFI ( $>.90$ ) = .980; NNFI ( $>.90$ ) = .981; CFI ( $>.90$ ) = .989; RFI ( $>.90$ ) = .966; IFI ( $>.90$ ) = .989; AGFI ( $>.90$ ) = .912; PNFI ( $>.5$ ) = .571; PCFI ( $>.5$ ) = .576; and CN ( $>200$ ) = 222 (Table 1). These indices demonstrate that the model's

goodness-of-fit is satisfactory and robust. Regarding the students' year of study, the results obtained from the Gamification-Based Digital Media Design Teaching Index Scale indicate that there were no significant differences among students in their first, second, third, and fourth year of study in terms of gamification-based digital media design teaching indices. However, in terms of gender, male respondents scored higher than female respondents in the 'Loss and avoidance' index ( $t = 4.60$ ;  $p = .03 < .05$ ).

**Table 1. Index of Confirmatory Factor Analysis (N=360)**

	GOF Index	Value of threshold	Value of estimation	Result t
Absolute Measures	CMIN( $X^2$ : chi-square)		115.314	–
	<i>Degree of freedom</i>	$1/2[p(p+1)]-k$	53	–
	<i>CMIN/DF</i>	$<3.00$	2.176	supported
	<i>Probability</i>	.001	.000	supported
	GFI	$>.90$	.956	supported
	RMSEA	$<.08$	.057	supported
	RMR	$<.08$	.056	supported
	SRMR	$<.1$	.030	supported
Incremental Fit Measures	NFI	$>.90$	.980	supported
	NNFI	$>.90$	.981	supported
	CFI	$>.90$	.989	supported
	RFI	$>.90$	.966	supported
	IFI	$>.90$	.989	supported
Parsimony Measures	AGFI	$>.90$	.912	supported
	PNFI	$>.5$	.571	supported
	PCFI	$>.5$	.576	supported
	CN	$>200$	222	supported

1.  $DF=1/2[p(p+1)]-k$  ( $p$ : no. of observed variables;  $k$ : no. of estimated (free) parameters) (Hair, Black, Babin & Anderson, 2010).

**Table 2. Testing of Hypotheses**

Hypothesis	Coefficients (Standardized Regression Weights)	Results
H <sup>1</sup>	.29***	Support
H <sup>2</sup>	.75***	Support
H <sup>3</sup>	.76***	Support

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

H<sup>1</sup>: The results of the analysis indicated a significant and positive correlation between gamification-based digital media design teaching and social skills (H<sup>1</sup>;  $\gamma^{gs} = .29$ ,  $p < .001$ ) (Table 2). Specifically, demanding gamification-based digital media design teaching showed positive associations with all indices of online social skills. These findings are consistent with Osipov et al. (2015), who suggested that gamification can establish a motivational system and facilitate access to synchronized teaching and learning materials for instructors and learners. Additionally, the results align with Sukamto et al. (2020), who argued that gamification in learning improves students' online social skills. Therefore, the significant indices for predicting online social skills in digital media design teaching were 'epic meaning and calling', 'development and accomplishment', 'empowerment of creativity and feedback', and 'ownership and possession' ( $p < .001$ ). Gamified digital media design learning enhances social interactions between teachers and students, inspires the development of online social skills, and improves students' learning outcomes. Thus, H1 is supported.

H<sup>2</sup>: The present study revealed a positive association between online social skills and online learning quality (H<sup>2</sup>;  $\gamma^{so} = .75$ ,  $p < .001$ ) (Table 2). Specifically, the indices of self-discipline, personal interaction, and learning behaviors were positively associated with online learning quality ( $p < .001$ ).

This finding aligns with the importance of socialization in social cognitive learning and online learning quality (Laffey et al., 2006). Furthermore, Yang et al. (2006) suggested further examination of the value of online social skills and their predictive role in learning outcomes. However, Goggins et al. (2009) argued that fully online group work reduces online social skills in an online teaching setting. Nevertheless, gamified digital media design learning promotes social activities, enhances communication between teachers and students, and fosters interactions among students, mitigating the disadvantages of online learning such as loneliness and reduced social engagement. Therefore, implementing gamification-based digital media design teaching in digital media design education can provide significant benefits, especially during the COVID-19 period. Thus, H<sup>2</sup> is supported.

H<sup>3</sup>: Online gamification-based digital media design teaching showed a positive association with online learning quality (H<sup>3</sup>;  $\gamma^{so} = .76$ ,  $p < .01$ ) (Table 2). Among the factors predicting online learning quality, online social skills, self-discipline, personal interaction, and learning behaviors were significant indices ( $p < .001$ ). Moreover, Goggins et al. (2009) suggested that while fully online teaching affects students' online social skills, online social skills are associated with learning outcomes (Abrahamsen et al., 2008). Hence, enhanced online social skills

contribute to improved learning achievement in an online teaching setting. Students with stronger online social abilities demonstrate higher levels of online learning quality. Thus, developing online social skills is crucial for students' online learning. Therefore, H<sup>3</sup> is supported.

H<sup>4</sup>: A mediator is a variable that influences the relationship between a predictor and a criterion (Baron & Kenny, 1986). The mediating effects were tested using the four-step method developed by Kenny and colleagues (Baron & Kenny, 1986; Kenny et al., 1998). H<sup>4</sup> examined the direct and indirect effects of online gamification-based digital media design teaching indices, online social skills, and learning quality. Table 1 shows that the path coefficient of online teaching indices on online social skills was .29 ( $p < .001$ ; testing step 1); the path coefficient of gamification indices on online learning quality was .76 ( $p < .001$ ; testing step 2); and the

path coefficient of online social skills on online learning quality was .75 ( $p < .001$ ; testing step 3). Furthermore, the path coefficient of online social skills on learning quality was .75 ( $p < .001$ ). This coefficient is smaller than the path coefficient (.96) indicating the effect of individual online social skills on learning quality (testing step 4). Therefore, a mediator (online social skills) was introduced, and the regression coefficient of online learning quality on gamification-based digital media design teaching indices decreased from .96 to .75. However, the predicted values increased. Based on the results of the four-step analysis (Table 3), gamification-based digital media design teaching indices influenced online learning quality through online social skills, indicating that online social skills play a mediating role. In an isolated online learning environment, online social skills enhance students' learning performance.

**Table 3. Testing of Mediating Effect through Application of Baron and Kenny's Theories**

Testing step in mediation model	Gasification Indices ↘ ↓ Online social skills ↗	
	Coefficients <sup>a</sup>	t-value
Step 1: Gasification Indices → online social skills	.29***	5.10
Step 2: Gasification Indices → Online learning quality	.76***	15.41
Step 3: Online social skills → Online learning quality	.75***	11.65
Step 4: Whole < single	.75 < .96	

Coefficients <sup>a</sup>: Standardised regression weights. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

Thus, H<sup>4</sup> is supported. According to several authors, the use of tools such as escape rooms and gaming questionnaires, among other innovative methodologies, effectively promotes and enhances specific technological and scientific content, significantly improving students' motivation in learning (Condor-Herrera, Acosta-Rodas & Ramos-Galarza, 2021). Additionally, gamification can stimulate critical thinking and communication skills among students (Rosli, Saat & Khairudin, 2017). As a facilitator in the educational setting, online social skills can enhance students' motivation in gamification-based teaching and improve online learning quality based on this study. For the open-ended questions, the majority of student respondents expressed their interest in learning gamified digital media design. Some of the comments supporting this opinion included phrases like "Great idea," "Looks very creative," "Awesome," and "It's fun." The respondents also offered positive suggestions, such as "We could create a leaderboard with our real names to rank our learning experiences like in a game," "We can use different frames for headshot photos," "We can look at games like AFK Arena for ideas on implementing land conquest mechanisms," and "We can integrate artificial intelligence into the actual game." A few student respondents had a negative view of gamified digital media design learning. Some of their comments included "I don't play games," "It depends on the quality of the games used; I won't participate if they're poorly made," and "Each person needs different amounts of time to learn. If you restrict our time, it affects our learning outcomes." Some students completely rejected the idea of gamified digital media design learning, with comments like

"Games designed solely for learning are unappealing to students and don't have any impact on learning outcomes. I don't like this idea." Some students also mentioned that "Gamification works better for subjects like Mandarin, English, and mathematics, where learning outcomes can be assessed using test scores. It may be less feasible for design-related subjects because assessments would become too standardized." The implementation of online learning should be based on the nature of the course content. Theoretical courses are suitable for online learning, while practical courses are better taught in traditional classroom settings. Dreamson (2017) proposed a learning model that prioritizes online gamified learning and supplements it with classroom teaching, which seems feasible. Additionally, gamification can be a valuable tool for teaching and learning languages, increasing learners' motivation and making the learning process more enjoyable (Al-Dosakee & Ozdamli, 2021), aligning with the hypotheses. Moreover, studies have indicated that online learning is less effective than traditional classroom learning in improving students' learning outcomes. However, due to the COVID-19 pandemic and the risk of mass shooting incidents, online learning has become a necessary option.

## 5. Conclusions

### 5.1 Theoretical Contribution

H<sup>1</sup>: Gamification-based digital media design teaching online has significant positive effects on online social skills.

Since online learning lacks face-to-face interactions and discussions, some learners may struggle to concentrate. Gamified digital media design learning enhances learner engagement, promotes interaction



with others, improves online social skills, and ultimately increases opportunities for collaborative learning. Thus, influential online courses enhance learners' social skills, leading to improved learning outcomes. Gamified digital media design learning fosters teamwork and creates a conducive learning environment, enabling learners to achieve their desired learning goals, particularly in areas such as 'epic meaning and calling,' 'development and accomplishment,' 'empowerment of creativity and feedback,' and 'ownership and possession.' However, this model may disadvantage learners with poor online social skills, necessitating efforts to improve their online learning experience. Furthermore, studies suggest that higher-quality gamified digital media design results in greater improvement in learners' social skills.

H<sup>2</sup>: Online social skills have significant positive effects on online learning quality in a gamification-based digital media design teaching setting.

Online learning can lead to restlessness and anxiety in students due to social isolation, and this issue may persist beyond the COVID-19 pandemic. Compared to traditional classrooms, online learning involves fewer interactions between instructors and learners. However, this study demonstrates that gamified digital media design learning can enhance online social skills by increasing instructor-learner interactions and learner engagement. Consequently, using gamification-based digital media design teaching methods can create interactive contexts and increase the overall learning outcomes for learners. Engaging in online virtual learning environments is crucial for modern learners. Enhancing online social skills and contributions to team activities help

learners integrate into the online learning environment. In summary, instructors create online digital media design education environments, while learners participate and facilitate related activities within those environments.

H<sup>3</sup>: Online gamification-based digital media design teaching has significant positive effects on online learning quality.

The limitations of online learning prevent instructors and learners from interacting as they would in a physical classroom. While this study confirms that gamified digital media design learning improves the online learning quality of students, it cannot fully replace traditional classroom learning. Face-to-face communication remains crucial, especially for practical courses like design, which require extensive instructor-learner interactions. Online learning should be seen as a teaching method that complements traditional classroom learning. Combining online and in-person learning remains necessary for design education, and further exploration of the integration of these two models is warranted. Nevertheless, due to the COVID-19 pandemic, online learning has become a significant trend. The requirements of online learning must be examined, and appropriate teaching strategies and course designs must be developed promptly to meet those requirements. Thus, teaching strategies should be adjusted based on the course content or the impact of the pandemic.

H<sup>4</sup>: Online social skills mediate the relationship between gamification-based digital media design teaching and online learning quality.

This study found that students' online social skills significantly influence the learning effectiveness in

online gamified digital media design education, highlighting the need for further investigation. Satisfactory online social skills play a crucial role in enhancing learners' outcomes in online learning. However, this also means that learners with poor social skills may struggle in the online learning environment. Therefore, a comprehensive online learning environment should cater to the different needs of learners with varying levels of online social skills, guiding them to acquire the necessary knowledge and skills. Gamified digital media design learning can aid learners in achieving this goal. In summary, gamified digital media design learning improves learners' online social skills and, consequently, their online learning quality.

## 5.2 Main Conclusions

Gamified digital media design learning involves integrating game elements in a non-gaming environment to motivate learners through gamification. However, learners' opinions on gamified digital media design learning vary based on their perceived value and abilities, which also influence their decision to participate in specific learning activities. This challenge can be transformed into an opportunity in digital media design education. By transitioning from individual learning to collaborative learning, overall learning outcomes can be improved. In this study, a student-centered learning model was transformed into a peer-centered learning model, enabling students to learn collaboratively in small groups and focus on completing gamified tasks and fostering a collective learning experience. This learning strategy is particularly suitable for moderate or underperforming students. While gamified digital media design learning benefits some students, others may find it

uninteresting or even perceive it negatively. Therefore, different teaching strategies are required to cater to learners with different attributes. Although gamified digital media design learning is a viable method, it may not be applicable to all students. Currently, online education is in high demand, and both teachers and students must adapt to this new teaching and learning style. The role of teachers is gradually shifting to that of learning motivation facilitators in terms of teaching strategies. Teachers should encourage students to actively participate in the learning environment through teaching activities. Students should become self-disciplined learners in online education and active contributors in the online learning environment, either by helping others or seeking assistance. Consequently, teachers become online gaming designers, and students become online gaming players.

## 5.3 Limitations

In this study, advanced research on gamification indices was conducted, and the proposed indices were verified by students as accurate and feasible. These indices serve as a reference for course design. However, further empirical research is needed to confirm the effectiveness of the proposed framework. Researchers can implement the gamification-based digital media design teaching indices to enhance learners' online social skills and verify the effectiveness of gamified teaching.

## 5.4 Future Research Directions

This study focused on knowledge-focused learning and did not explore learning experiences related to skills and attitudes, which should be the focus of future research to complement studies on cognitive, affective, and skills-related educational goals.

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