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## GAMIFICATION SUPPORTING SMALL BUSINESS OWNERS' WORK-BASED LEARNING

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### ABSTRACT

Aim/Purpose	This study attempts to apply gamification to support the training of small business owners in business web development from a work-based learning perspective.
Background	Web design describes the process of creating a website and embodies many different aspects, such as webpage layout, content production, and graphic design. However, there are many obstacles that small business owners face when developing their websites, such as time and budget constraints, lacking technical skills, and difficulties with content creation.
Methodology	Based on the literature review, a gamified training program was developed for website development. The new website design and development training method was compared with the traditional lecture training method from small business owners' perspectives in the specific work-based learning context.
Contribution	This study contributes to the field of work-based learning by developing an innovative gamified training program for small business owners in website development learning.
Findings	The results confirm that the gamified training program improved learning outcomes and satisfaction. The results of this study help advance the understanding of work-based training program design and provide insights to support small business owners in learning new technologies.
Recommendations for Practitioners	Results confirm that this new training system is superior to the traditional lecture training method. While much attention has been directed to website design and development learning or business activities of small business owners, this study emphasizes the need for work-based learning in such a context.
Recommendations for Researchers	This study also shows a potential way for future research by combining technology education and small business owners' needs.

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Impact on Society	The results of this study show the advantages of gamified training programs. For their future training program selections, small business owners should pay more attention to gamified training and education systems in the market. Furthermore, gamified training and education systems not only help small businesses but also could be adopted by mid-size or even large companies in their training programs.
Future Research	Future research should be conducted to investigate to what extent gamification improves work-based learning and how to design gamification to improve work-based learning.
Keywords	work-based learning, small business, gamification, training and education

## INTRODUCTION

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Small businesses are an important component of the modern economy and play a vital role in people's daily life (Tobing et al., 2019). Small business growth and entrepreneurship have been the foundation of the liberalization process in the world economy (Kozan et al., 2012). Business owners have many characteristics, such as being risk-takers and exhibiting openness to change. These characteristics result in small business growth, success, and failure. A small business owner can be defined as the owner of a privately-owned corporation with few employees and relatively less revenue than other regular-sized businesses. To make their business successful, small business owners make a variety of personal, financial, and relational sacrifices. For example, when business owners and entrepreneurs are considering business growth, oftentimes, they have to work extended hours and give up a lot of free time. In summary, business owners sacrifice their financial assets/properties and personal resources such as time and knowledge (Kozan et al., 2012).

Due to different reasons and various barriers, small businesses have been lagging behind and are slow to adopt e-commerce applications (Changchit & Klaus, 2020). One of the main dilemmas business owners face is time and budget constraints. Although small business owners may want to produce a successful website, the budget and time constraints may make it infeasible. Even if they may have a budget for website development, outsourcing the project to an IT company could be time-consuming (King, 2018). This development time includes the time for the technical website development and the communications between the small business owners and the outside developers regarding the actual needs of these small businesses. In many cases, the results are not fully satisfied (Blanks & Jesson, 2017). Lastly, in order to respond swiftly to market changes, small business owners desire to adapt to such changes through their websites (Nelson & Gibb, 1996). Unfortunately, outsourcing regular website updates to a third party is not a practical solution. It is in the best interest of small business owners to learn how to design and develop their business websites to facilitate their collaborations with IT professionals and leverage their efforts on web development. Good collaborations will, in turn, lead to savings, fulfillment of their needs, and market gains. Learning does not have to be a knowledge absorption process in a structured and formal format (Yeo, 2008). Work-based learning (WBL), one of the best learning methods centered around reflection on work practices (Hamilton, 2019), could be an optimal solution for small business owners to effectively learn the necessary skills and knowledge (Down, 1999). We have developed a study to educate small business owners on website development with practical resources and reasonable costs. In this study, we compared in-class lecture training, one of the traditional teaching methods, with a gamification method as a tool for engagement to help business owners develop effective websites by themselves. To the knowledge of the authors, this is the first academic research using a gamified training method in small business owners' website development education.

The rest of this paper is organized as follows: 1) The literature review section provides an overview of prior research in gamification, learning, and work-based learning. 2) The research method section

elaborates the gamification and research design. 3) The results and discussions section summarizes and presents the findings. 4) The conclusions section presents the main contributions of this work.

## LITERATURE REVIEW

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### *GAMIFICATION*

Gamification is a term that is currently gaining popularity and drawing the attention of business professionals in the current technology-driven world. According to Swacha (2018), gamification describes the use of game design in non-game settings to engage the target audience. It describes the process of taking something that already exists, such as a website, and incorporating game elements to increase users' efficiency and effectiveness in completing specific tasks (Legaki et al., 2020). Gamification generates fun from the games, results in learning from game-designed tasks, and eventually improves the user's engagement, motivation, and performance (García et al., 2017).

Gamified tasks typically help users in the following aspects:

- provides individuals with flexibility and freedom if they have preferences in completing tasks;
- teaches progression through a series of pre-designed activities. Gamification tasks are often designed and organized as a sequence of activities with increasing levels of difficulties and cognitive workload;
- sometimes instills socialization through collaboration

From a business perspective, gamification is positively altering business models by creating new ways to develop longer-term engagement, lead to user trustworthiness, and allow businesses to create and increase loyalty (Legaki et al., 2020).

Gaming developers are experts at finding techniques that attract the audience in order to keep them engaged. Gamification has seen rapid adoption in business, management, marketing, and ecological initiatives (Dicheva et al., 2015). After realizing the effectiveness of gamification, educators have decided to implement it in the classroom setting. Currently, gamification teaching strategies are being utilized to engage students' learning. According to Alhammad and Moreno (2018), gamification has been considered one of the key emergents and extensively adopted teaching technologies in current education. This is mainly because learning is like a game and contains rules, levels, and even rewards (Zarzycka-Piskorz, 2016). Therefore, students need to obey the rules in order to move up to the next level, and in the end, there is most likely a reward (good grades or teachers' nice comments). Thus, with the integration of game-like components into the classroom, students will engage by unlocking the next level of their assignment or challenging other students (Bai et al., 2020). In order to make teaching more like a game and engage students, educators can incorporate user levels, create challenges, give a second chance, allow students to make choices, and give rewards and badges. In academia, gamification is based on the idea that it supports and motivates students and, as a result, can enhance learning outcomes (Sanchez et al., 2020).

Gamification in business applications falls into two main categories: improvement of loyalty solutions and employee engagement support (Dale, 2014). Businesses adopted gamification applications and programs to achieve the following benefits (Vinichenko et al., 2016):

- Increase in labor productivity
- Create motivation
- Improve change management
- Align employees' expectations and goals with the organizational vision

During the last two decades, many large organizations implemented gamification applications and programs, such as Goobles at Google, carpool game at SAP, and Kuds from IBM (Dale, 2014);

Grams, 2017). Recently, Micro, Small, and Medium Enterprises (MSMEs) are starting to seek solutions in gamification. One study (Saputra & Rahmatia, 2021) found that 83% of MSMEs in Indonesia adopted gamification to foster their employees' motivation. Gamification is becoming an efficient method/mechanism supporting organizations to immerse their workforce more deeply in business processes and tasks (Cardador et al., 2017).

### ***LEARNING***

Professional skills and knowledge are fundamental to successfully supporting employees in running business processes (Fang, 2012). Knowledge is more abstract means acquired from questioning, discussing, and problem-solving, whereas skills can be defined as the capacity to apply the knowledge and the cumulated experience gained through completing certain activities (Cormier & Hagman, 1987). Skills, which lead to an observable outcome, could be an initial format of knowledge, which can be summarized as an abstraction from behavior (Jessup, 1991). Learning is a cognitive process of understanding and bringing knowledge and skills together to interact with the learning process (Bransford et al., 1989).

According to the Kolb learning cycle theory (Kolb & Fry, 1975), there are four stages of the learning cycle:

- Concrete Experience (CE): learners gain initial experience by doing something;
- Reflective Observation (RO): learners review and reflect on the experience;
- Abstract Conceptualisation (AC): learners conclude and learn from the experience;
- Active Experimentation (AE): learners plan and try out what they have learned.

To ensure effective learning, learners must complete all four stages of the learning cycle (Fergusson et al., 2018). Furthermore, this theory emphasizes the centrality of the learner in any learning process (Down, 1999). Traditional learning encourages passive learning, factual, and abstract thinking whereas the needs of small business emphasizes more on active learning (Saepudin et al., 2020). This learning difference in small business enhances the importance of non-formal education in business training and education, such as work-based learning (Corrales-Herrero & Rodríguez-Prado, 2018).

### ***WORK-BASED LEARNING***

Work-based learning is a learning program/format that arises directly from workplace problems and concerns (Lester & Costley, 2010). It merges conceptual theories from practice, knowledge, and experience to educate learners and ensure they meet the needs of their job requirements (Sobiechowska & Maisch, 2006). According to Sweet (2018), there are multiple benefits that businesses can acquire from work-based learning:

- Work-based learning can raise enterprise productivity and innovation;
- Work-based learning is a powerful form of pedagogy;
- Work-based learning help enhance employees' career development;
- Work-based learning improves the quality of vocational training and education.

### **Training methods of work-based learning**

Work-based learning aims to blend the strengths of formal and informal education and provide authentic practical learning experiences. It can be learning for work, such as enrolling in college courses, or learning at work, such as attending in-house training in personal development programs. Cunningham and Dawes (2016) list thirty-seven work-based learning methods. We summarized them into four categories, shown in Table 1.

**Table 1: Work-based learning methods**

Category of WBL Methods	Current methods for work-based learning
<b>Feedback/Assessment/Critique from Colleagues and experts</b>	360 Feedback; Action Review; Benchmarking; Presentation; Consulting; Critical Friend; Discussion; Interviewing; Meetings; Peer review; Instruments; Video feedback; Video conference; Delegation from supervisor; Dialogue with colleagues and experts; Management walking about; Shadowing
<b>Training and Education</b>	Computer-based training; Counselling; Development center; Distance learning
<b>Learning from current work experience</b>	Mistakes; Observation Listening; Questioning/asking; Task group; Volunteering; Witnessing
<b>Self-learning activities</b>	Reading; Reflective learning; Research; Writing; Learning logs; Travel/visits; Repertory grid method

### Issues of current work-based learning

Work-based learning has been very successful for over 20 years in developing employability skills for college students and employees in organizations (Brodie & Irving, 2007). It helps minimize the knowledge and skill gaps between the classroom and the workplace and ensures that employability skills are transferred to new college graduates (Konstantinou & Miller, 2021). However, current work-based learning still encounters issues that obstruct the successful fulfillment of learning for work or at work (Brook & Corbridge, 2016), especially when it mainly focuses on graduate entrants (Hamilton, 2019).

**Cognitive overload.** According to the information processing theory (Atkinson & Shiffrin, 1968), during the process of learning, skills and knowledge are first stored in sensory memory, which filters out some information and only passes the most important ones to the next unit, named working memory. Working memory is a short-term memory unit that will encode the impressions of the information and store it in long-term memory as either semantic memories, procedural memories, or images. Since working memory has limited capacity, a potential issue of work-based learning could be cognitive overload, which happens when the learning tasks exceed our memory processing demand capacity (Chang & Ley, 2006). Cognitive overload can cause problems in filtering, selecting, and analyzing the available information, which, in turn, leads to low learning effectiveness and high learning anxiety (Bawden & Robinson, 2009). Furthermore, cognitive load in work-based learning negatively impacts learners' engagement, self-regulated learning, and learning outcomes (Dong et al., 2020; Hughes et al., 2018). Bakar et al. (2022) argued that enhancing cognitive load could improve work-based learning. Thorvald et al. (2019) demonstrated that technology should be adopted to create a better working environment, which would help employees develop better cognitive skills in their workplace.

**Scheduling.** In most work-based learning methods, except self-training activities, learners need to work with others to complete the training, such as trainees, colleagues, and consultants. Therefore, scheduling the training could be hard to fit everyone's calendar, and sometimes the training has to be postponed because of the scheduling issue. This issue could delay the learning process and reduce the effectiveness of work-based learning.

**Training quality.** Work-based learning programs are learning activities to develop and enhance learners' ability to solve problems in their daily professional jobs (Collis & Margaryan, 2005). Work-based problems are complex and often require integrated theoretical knowledge and professional skills of workplace experience. However, when cooperating with educational institutions, some of them have limited views and expertise to develop and provide sufficient and adequate training programs. This low-quality training will weaken the training effect (Orpen, 1999). In this case, business learners will be unable to solve workplace problems after their work-based learning training (Brook & Corbridge, 2016; Garnett, 2016).

### Gamification and work-based learning

Computer-based training is listed as one of the work-based learning methods (Cunningham & Dawes, 2016). It helps employees engage in repetitive job tasks, experience predicted failure, and ensure their capabilities to their job position requirements (Gupta et al., 2022). Therefore, gamification has been adopted in various workplaces and industries (Mitchell et al., 2020). Virtual Computer-aided design (CAD) training approved the efficiency of gamification applications in the manufacturing industry (Ulmer et al., 2021). In health care, Martinho et al. (2020) identified some physical, cognitive, social, and emotional benefits in supporting elderly care. Moreover, in the public sector, gamification showed the capability to address the complexity of procurement processes in employees' training (Kornevs et al., 2019).

Gamification shows the potential positive and innovative solutions to help organizations improve employees' work-based knowledge and skills with additional job engagement, loyalty, and vitality (Markopoulos et al., 2015). However, few studies have been undertaken using gamification for work-based learning purposes (Psani et al., 2020); although Buligina and Sloka (2019), and Jayalath (2021) suggest that it is a valuable training method that can overcome the issues of work-based learning and successfully achieve the purposes of training and education for work. Table 2 shows the advantages of gamification over the issues of current work-based learning.

Furthermore, gamification has several additional advantages which pertain to training small business owners in their needs. According to Knowles (1990), learning methods to educate adults should be self-directed and recognize the individual differences of the learner in terms of scheduling, place, and pace of their learning. Gamification perfectly satisfies these requirements so learners can decide when, where, and how to complete the training. Moreover, learning becomes easier and more acceptable when a learning process is divided into smaller and more manageable pieces, such as sub-skill lessons (Tóth & Tóvölgyi, 2016). Gamification uses multiple games to complete different training pieces and achieve knowledge transformation for the learners, which makes the training painless and readily available. Lastly, gamification empowers learners with flexibility in the training content they can control over their learning (Gee, 2005).

**Table 2: Advantages of gamification over the issues of current work-based learning**

Current issues of Work-based learning	Advantages from Gamification
Cognitive Overload	According to the cognitive theory of multimedia learning (Mayer, 2001), multimedia learning can reduce cognitive overload when dealing with complex information and concepts. Gamification adopts multimedia in the games. Therefore, it can help to diminish both cognitive overload and learner anxiety.
Scheduling	Since gamification is a self-training method, learners can take it based on their personal schedules.
Training Quality	During the development phase, all the required solutions were built into the games in the gamification. Before businesses adopt the games, they would be able to evaluate the qualification of the gamification training. Therefore, the quality of the training can be guaranteed through the training program assessment before the training starts.

Therefore, we propose that compared to traditional web design learning paths, such as in-class lectures/training and self-learning, gamified web design learning environment will improve the small business owners' learning outcomes.

## RESEARCH METHOD

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### *GAMIFICATION DESIGN*

According to the literature review and our website programming teaching experiences, we designed a gamified training system, including a group of games, to help small business owners with no programming experience in web design develop their business websites. Throughout all the games, we followed the Kolb learning cycle theory (Kolb & Fry, 1975) discussed in our literature review:

1. At the beginning of each game, we briefly explain the basic concepts and knowledge;
2. We then let the users try the primary activities to earn experiences, which is in line with the first step (concrete experience) in Kolb's theory;
3. Next step, we show users the correct examples. This corresponds to the second step (reflective observation) in Kolb's theory;
4. Then, we let the users conclude and learn from experience by summarizing the knowledge, which is the third step (abstract conceptualization) in Kolb's theory;
5. Lastly, we let users try different applications by themselves in the game, which aligns with the last step (active experimentation) in Kolb's theory.

Simmons et al. (2008) proposed a conceptual model of the Determinants of Small Business Website Adoption with seven website criteria, including website design, accessibility, navigability, content for relationship enhancement, content for promotion and image, relational interactivity, and transactional interactivity. Additionally, according to Lubinsky (2018), there are six components that every business website needs to ensure success, including an elegant design, a clear call to action, a story page, organic search ranking, social proof, and mobile responsiveness. Thus, we summarized key factors supporting a successful business website, such as aesthetics, navigation, server application, content, social network, and mobile application, and developed our gamified training content. Within a game map named My Home Page Land, there are eight games (Figure 1):

1. Art & Design game: asks users to draw desired page design and identifies mistakes they made to give them a good idea of designing a user-friendly website;
2. Fighting game: includes brief training videos to teach users the basic knowledge of web programming and 20 levels of gaming tasks for each website design language technology, such as HTML, JavaScript, Python, CSS, and SQL. Each level teaches users to program several specific web design functions/commands. After users pass all the levels, they will understand how to program a website;
3. Puzzle game: helps users understand how to upload web files to a server, operate database management activities on a server, and design better navigation for a website;
4. Story development games: help users to create brand stories, missions, and vision statements;
5. Simulation of establishing social networks: guides users to build linkages between a website to popular social networks;
6. Simulation of effects on mobile devices: asks users to compare the visual effects of a website on both PCs and mobile devices and understand the mobile responsiveness of a website;
7. Simulation of translating a website to a mobile application: asks users to build a mobile application from a website design.
8. Error-correcting games: asks users to test different website designs based on organic search ranking and other website characteristics, such as spelling, grammar, and keeping up-to-date information accurately.



Figure 1: Web Design Learning Game Interface

These eight games not only teach learners how to design and develop their websites but also allow them to build an understanding of the key factors supporting a successful business website. Through this gamified training, small business owners will be able to design and develop their business websites and efficiently maintain and update their websites with the knowledge they learned from the eight games. Table 3 shows the learning outcomes and technologies taught in each game.

Table 3: Learning outcomes and technologies associated with each game

Game Number	Learning Outcomes	Programming Technology
1	Understand best practices that designers can consider when building user interfaces for a commercial website (the guidelines were summarized from the laws of UX, <a href="https://lawsofux.com/">https://lawsofux.com/</a> )	
2	Understand the basic skills of HTML, CSS, JavaScript, Python, and Microsoft SQL	HTML, CSS, Javascript, Python, and SQL Server
3	Understand the concepts and operations of client-server, how to use Microsoft SQL server management system, and basic Database SQL (language)	Server operations, and Microsoft SQL Server
4	Understand the power of storytelling in web design and the 5 P's of storytelling (People, Place, Pictures, Platforms & Personal)	
5	Understand how to link to the popular social network websites	HTML, CSS, Javascript, and Python
6	Understand the differences between a website and a mobile app from a designer's perspective	Mendix
7	Understand how to use Mendix to convert a website to an App	Mendix
8	Understand how to conduct website and mobile application testing	Web testing

## RESEARCH DESIGN

### Population and sampling

Through a university Small Business Center, invitation emails were sent to 87 local small business CEOs. The location is a typical small town in the south of the United States with a 90,000 population. We did not choose any small IT companies because we assumed most of their CEOs should have basic website design knowledge. Our study is looking for CEOs who have no or limited IT backgrounds. We chose companies in the non-IT industries, including manufacturing, hospitality, retail, health services, insurance, and food and restaurant. Eventually, 38 CEOs agreed to participate in our study.



## Training procedure

We first asked if they would like to learn web programming by themselves. Unfortunately, none of these 38 CEOs showed any interest in the self-learning path. Therefore, we decided to compare only in-class and in-game training for web programming education. We completed the following steps for the website design training:

1. After a simple IT background review of all the CEOs, only 8 of them learned HTML at college, but they had never developed any websites by themselves;
2. We randomly divided the 8 CEOs who learned HTML into two groups (Groups 1 & 2) and the other CEOs into two groups (Groups 3 & 4). Lastly, we combined groups 1 and 3 as a new group (group A) and put CEOs from groups 2 and 4 into another new group (Group B). By doing this, we balanced the IT background of the CEOs in both final groups.
3. For Group A, we scheduled a one-month virtual training workshop (2 hours per day and 4 hours each Saturday or Sunday). Total training hours are 78 (42 hours for weekdays and 36 hours for weekends). Every day, we asked CEOs to complete a minor assignment. We would give them an e-badge every time they completed their assignment. We would award them a trophy at the end of the one-month training if they collected over 20 badges. We started the training from HTML and gradually taught the CEOs all the knowledge they needed for web design. Our training contents are identical to what we embedded into the web design learning game.
4. For Group B, we gave them a half-day virtual training on the game, such as how to use it, install it, and contact us for their questions.
5. We created 38 accounts on our training server. Then, we sent the account information to all 38 CEOs and asked them to log on to their accounts during their virtual training time to ensure they could log on to their server accounts successfully.
6. For Group B, after the half-day training, we asked the participants to start playing the web programming learning game. We told them that the system would record their learning time in the game and ask them to ensure that the total learning time should be equal to or over 78 hours during the one-month training period.
7. At the beginning of our training, we asked all CEOs to start building their business websites on a designated server, along with their training steps. We required them to record their daily working time on their business website design and development (not including their training time through the virtual workshop).
8. A month later, after both groups completed their training, we sent a short survey to all the CEOs asking questions about their training and programming experiences.

## Website project requirements

To cover most of the basic needs of a typical small business website, we gave the CEOs the following requirements and asked them to try their best to complete all the requirements during this one-month website design training. We defined a completion percentage table of the time consumption of activities in a simple business website design and development (Table 4). Therefore, we could evaluate the completion status of all the CEOs after they took the training.

1. Create at least six web pages, including the Homepage, About Us page, Productions/Services page, Customer Registration/Login page, Shopping Cart/Checkout page, and Customer Account Profile page. (15%)
2. Develop a database including at least one customer table in the database. (10%)
3. Create at least one brand story and a business mission and vision statement for the business. (5%)
4. Build a customer registration/login feature (needs to connect to the database). (10%)
5. Complete at least four links to popular social media networks and the feature of customer registration associated with customer social network accounts. (10%)

6. Develop a customer shopping cart/checkout feature (connect to the database and payment validation center). (25%)
7. Translate the website to a mobile app. (25%)

**Table 4: Website Design and Development Completion Percentage**

	Completion percentage	Description
1	15%	Completed requirement #1
3	20%	Completed requirements #1&3
2	25%	Completed requirements #1&2
4	30%	Completed requirements #1, 2 &3
5	40%	Completed requirements #1, 2, 3 &4
6	50%	Completed requirements #1, 2, 3, 4 & 5
7	75%	Completed requirements #1, 2, 3, 4, 5 & 6
8	100%	Completed all requirements

## RESULTS AND DISCUSSIONS

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### *DESCRIPTIVE STATISTICS*

Demographic variables of gender, age, and company industry are reported as follows (n=38). Only 13.2% of the CEOs were female. The age of the CEOs ranges from 18 to 67. Over 68% of CEOs are between the ages of 31 and 60. A wide variety of industries that the CEOs are currently working in were represented in the responses, as shown in Table 5.

**Table 5: Demographic information of the Participants**

Demographics	Percentage of participants
Gender	
Female	13.2% (n=5)
Male	86.8% (n=33)
Age	
18-30 years old	18.4% (n=7)
31-45 years old	42.1% (n=16)
46-60 years old	26.3% (n=10)
over 60	13.2% (n=5)
Industry	
Manufacturing	7.9% (n=3)
Hospitality	15.8% (n=6)
Retail	18.4% (n=7)
Health Services	21.1% (n=8)
Insurance	26.3% (n=10)
Food and Restaurant	10.5% (n=4)
<b>Total</b>	<b>100% (n=38)</b>

### *COMPARISON OF TWO GROUPS*

To identify the differences between the two training groups, we conducted Independent-Samples *t*-Test. The first criterion we used in the study was the total hours each CEO spent on their website learning and development. This time includes two parts. The first part is the time each CEO spent on their website design training:

- for CEOs in Group A, this is the total time they spent on the virtual workshop (some of the CEOs did not spend 78 hours in the workshop because they had other events that conflicted with the workshop);
- for CEOs in Group B, this includes a half-day virtual workshop and the total time they spent in the training game

The second part is the time each CEO spent on their business website design and development other than the training time. Table 6 shows the average hours each CEO spent in the training (Workshop training for group A and gamified training for group B). The time spent on the training workshop in Group A ranged from 36 hours to 78 hours, indicating that some CEOs in Group A did not complete the entire training workshop hours. The numbers in Group B have a minimum of 60 hours and a maximum of 110 hours, which is definitely higher than the numbers in Group A. After adding the extra time each CEO spent on their actual business website design and development, we got the total time for CEOs working on their business website design and development. According to Table 7, CEOs from Group A averagely spent 78.9 hours total for this learning process. Obviously, CEOs from Group B averagely spent more time (100 hours) learning website design and development. The *t*-test results (Table 8) show a significant difference in the total hours spent on website design and development learning between Group A with virtual training workshop and Group B with gamified training ( $t=-3.30$ ,  $df=36$ ,  $p=0.002$ ).

**Table 6: Total time attending the training workshop or in the gamified training**

	Number of Participants	Min. Hours	Max. Hours	Range (hours)	Mean (hours)	Std. Error (hours)	Std. Deviation (hours)	Variance
Total hours studied in the training workshop (group A)	19	36	78	42	64.26	2.96	12.92	166.87
Total hours spent in the game (group B)	19	60	110	50	89.37	3.32	14.47	209.24

**Table 7: Total time working on the website design & development**

	Group A or B	Number of Participants	Mean (hours)	Std. Deviation (hours)	Std. Error Mean (hours)
Total_hours	A	19	78.89	20.50	4.70
	B	19	100.16	18.77	4.31

**Table 8: Independent Samples Test of the total hours spent by Group A and B**

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	
Total hours	Equal variances assumed	.210	.649	-3.334	36	
	Equal variances not assumed			-3.334	35.724	
		t-test for Equality of Means				
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Total hours	Equal variances assumed	.002	-21.26316	6.37711	-34.19655	-8.32977
	Equal variances not assumed	.002	-21.26316	6.37711	-34.20002	-8.32630

*P is significant at the 0.05 level.*

The most important criterion we used to evaluate the CEOs' learning outcomes from the training programs is the completion percentage of the business websites they built right after their training. We believe that the purpose of learning website development is to actually develop the website. Therefore, this completion percentage variable will appropriately represent the CEOs' learning outcomes from the training programs we offered. According to Table 9, on average, the CEOs in Group A only completed 36.84% of their websites, whereas the CEOs in Group B completed 55.26% of their business websites. The results of a *t*-test between the two groups (Table 10) show a statistical significance for the average website completion percentage between the two groups ( $t=-2.330$ ,  $df=36$ ,  $p=0.026$ ).

**Table 9: Average Completion Percentage of both groups**

	Group A or B	Number of Participants	Mean	Std. Deviation	Std. Error Mean
Completion	A	19	36.84%	21.680%	4.97%
	B	19	55.26%	26.795%	6.15%

**Table 10: Independent Samples Test for average completion percentage between groups A and B**

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	
Completion	Equal variances assumed	1.203	.280	-2.330	36	
	Equal variances not assumed			-2.330	34.497	
		t-test for Equality of Means				
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Completion	Equal variances assumed	.026	-.18421	.07907	-.34458	-.02384
	Equal variances not assumed	.026	-.18421	.07907	-.34482	-.02360

*P is significant at the 0.05 level.*

**ADDITIONAL SURVEY RESULTS**

Additionally, at the end of our training program, we distributed a short survey asking about the CEOs' experience with this training program. We asked three questions regarding their satisfaction with the training program, their enjoyment during the training, and their perceived usefulness of the training program. We used a 7-Point Likert Scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The results in Table 11 show that the average evaluation from group B was at least 2 Likert Scale levels higher than the average evaluation from group A. According to the results in Tables 12 to 14, all results from three survey questions show significant differences between the two groups, which indicates that CEOs from group B were more satisfied with the training ( $t=-4.029$ ,  $df=36$ ,  $p=0.000$ ), enjoyed more with the training ( $t=-4.933$ ,  $df=36$ ,  $p=0.000$ ), and they believed the training is useful ( $t=-5.737$ ,  $df=36$ ,  $p=0.000$ ).

**Table 11: Results Statistics of three survey questions**

	Group A or B	Participants	Mean	Std. Deviation	Std. Error Mean
Are you satisfied with the training effectiveness and efficiency?	A	19	3.79	2.043	.469
	B	19	5.95	1.129	.259
Do you enjoy the training?	A	19	3.53	1.837	.421
	B	19	6.05	1.268	.291
Please evaluate the usefulness of this training	A	19	3.68	1.916	.440
	B	19	6.47	.905	.208

**Table 12: Independent Samples Test for the satisfaction with the training effectiveness and efficiency between groups A and B**

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	
Satisfaction	Equal variances assumed	13.913	.001	-4.029	36	
	Equal variances not assumed			-4.029	28.054	
		t-test for Equality of Means				
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Satisfaction	Equal variances assumed	.000	-2.158	.536	-3.244	-1.072
	Equal variances not assumed	.000	-2.158	.536	-3.255	-1.061

*P is significant at the 0.05 level.*

**Table 13: Independent Samples Test for the enjoyment of the training between groups A and B**

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Enjoyment	Equal variances assumed	6.595	.015	-4.933	36
	Equal variances not assumed			-4.933	31.982

  

		t-test for Equality of Means				
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Enjoyment	Equal variances assumed	.000	-2.526	.512	-3.565	-1.488
	Equal variances not assumed	.000	-2.526	.512	-3.569	-1.483

*P is significant at the 0.05 level.*

**Table 14: Independent Samples Test for the usefulness of the training between group A and B**

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Usefulness	Equal variances assumed	20.525	.000	-5.737	36
	Equal variances not assumed			-5.737	25.646

  

		t-test for Equality of Means				
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Usefulness	Equal variances assumed	.000	-2.789	.486	-3.776	-1.803
	Equal variances not assumed	.000	-2.789	.486	-3.790	-1.789

*P is significant at the 0.05 level.*

The following summarizes the results of this study:

- The training time of the CEOs in Group A ranged from 36 hours to 78 hours, whereas numbers in Group B ranged from 60 hours to 110 hours;
- The average time the CEOs in Group A spent on their business website design and development was 78.9 hours, whereas the average time in Group B was 100.16 hours. The t-test results show a significant difference between the two groups;
- On average, the CEOs in Group A only completed 36.84% of their websites, whereas the CEOs in Group B completed 55.26% of their business websites. The t-test results show a significant difference between the two groups;
- The t-test results show significant differences in all three survey questions from the CEOs, including satisfaction, enjoyment, and usefulness of the training, between the two groups.

**DISCUSSION**

In line with the literature reviewed, it is reasonable to design and develop a desired gamified training system to support small business owners in developing a commercial website by themselves for their businesses (King, 2018). Traditional web design and development training programs challenged learners' patience, listen-to-understand reaction, and time consumption (Lareki et al., 2010). Therefore, many small business owners were afraid of website design and development (Chinomona, 2013). This study compared a gamified training program with traditional in-class training. The learning outcomes and survey results from two groups of small business CEOs showed statistically significant differences. The results support our proposed assumption that gamified web design learning environment improves small business owners' learning outcomes.

First, although the traditional training in our study was virtual, the average time the CEOs attended the training was 64 hours out of the complete 78 hours of the training (Table 6). However, the CEOs who participated in the gamified training program spent an average of 89 hours in their training. Because we arranged and scheduled this training program with all 38 CEOs two months before the actual training time, we believe that the reasons for the CEOs to leave the in-class training mostly are not because of their business or preplanned personal events. To identify the actual causes, we did a short follow-up interview with each CEO recently. 81% of the CEOs, who spent less than 78 hours for training in Group A, admitted their absence from the training was mainly because it was hard to learn so much information about website development, and their interest in the training dramatically decreased when they faced the program bugs. Only 32% of the CEOs in Group B gave similar reasons for their absence from the training. In addition, the CEOs gave relatively low evaluations of the traditional training programs on their perception of satisfaction, enjoyment, and usefulness in the survey. In light of the results from the survey and the follow-up interviews, we argue that the main reason the CEOs in group A, on average, spent much less time on the training is that the in-class training itself is not attractive. On the contrary, the CEOs in group B showed more enthusiasm in attending the gamified training and gave very positive evaluations on the three survey questions. From a theoretical perspective, according to the cognitive load theory, cognitive load negatively influences self-regulated learning (Dong et al., 2020; Hughes et al., 2018). In this study, the high cognitive load of web development knowledge decreased the CEOs' self-regulated learning in group A. In contrast, the gamified training for group B enhanced the CEOs' cognitive load, and this group could tolerate and accept more information from the training. This could explain the differences between the two groups. Therefore, we believe that the gamified training program attracts more users spending a relatively long time.

Second, besides the training program, we also asked all CEOs to spend extra time developing their business website based on their training content. We calculated the total hours (we named it Total Hours of Learning) each CEO spent on training and business website development. We believe that the number of total hours of learning reveals the CEOs' efforts in learning website design and development. Therefore, we used linear regression to analyze the relationship between the completion of the website (dependent variable) and the total hours of learning (independent variable). The results align with our expectations that the relationship is statistically significant,  $p < .000$ , with an  $R^2$  of 0.48 (Table 15). This finding concurs with the common argument that the more time applied to website development, the higher the completion percentage the CEOs would get at the end of the training.

**Table 15: Relationship between total hours of learning and website completion percentage**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.704 <sup>a</sup>	.496	.482	.18563	.496	35.411	1	36	.000

a. Predictors: (Constant), Total\_hours

Third, from a business perspective, website completion is the aim of website design and development. Therefore, we used the website completion percentage to evaluate the CEOs' final training outcomes after the training program. The statistical results (Tables 9 & 10) supported our hypothesis that gamified web design learning environment improves the small business owners' learning outcomes compared to traditional web design learning paths, such as in-class lectures/training.

Fourth, we noticed significant differences in learning satisfaction, enjoyment, and usefulness through our short survey results between the two training groups (Tables 12 to 14). These results suggest that our gamified training system surpasses the traditional lecture training method from a learner's perspective. This result is also in line with the argument from Markopoulos et al. (2015) that gamification enhances learners' engagement.

Additionally, we asked the CEOs to explain why none of them showed any interest in the self-learning path at the beginning of this study. Their reasons are listed in Table 16.

87% of the CEOs were not encouraged to learn by themselves because of the difficulty of web development. 18 CEOs (47% of the total) tried to learn and stopped eventually, which indicates that almost half of the CEOs believed this web development knowledge was necessary to the workplace. However, they quit due to the difficulty of learning. Therefore, we can argue that, in self-learning, one of the work-based learning methods, learners lack motivation with a perceived learning difficulty.

**Table 16: Reasons not to attend the self-training**

Number of CEOs	Reason not to do self-learning	Percentage
33	Too difficult to learn (18 of them tried before but failed)	87%
2	No time	5%
3	Don't know how to start	8%

The following information summarizes our findings:

- Gamified training program improves small business owners' learning outcomes;
- Gamified training program attracts more users spending a relatively long time in the training;
- Gamified training program provides better support to users in learning website design and development;
- Gamified training program enhances learners' engagement;
- Self-learners lack motivation with a perceived learning difficulty.

## CONCLUSIONS

Work-based learning has the potential to help employees develop their desired skills and gain knowledge in their workplace (Brook & Corbridge, 2016). However, with several key issues, such as cognitive overload, scheduling, and training quality, work-based learning may not be an appropriate method to support small business owners in learning. As Cardador et al. (2017) indicates, gamification is a promising training method, which shifts in-class or mentored training to self-direct training with a motivation mechanism adopted from game features.

This study compares two website design and development training methods, work-based in-class training and gamification training, in the specific context of small business owners' perspectives. To our best knowledge, this is the first study in the field that developed a research model regarding gamification to help business owners develop their own websites effectively. We designed a gamified training program for small business owners to help them easily understand how to design and develop their business websites. We scheduled a one-month training for 38 small business owners using the traditional lecture training method and our gamified training system. The results confirm that our gamified training program gains higher learning outcomes and better learning satisfaction. The results of this study help advance the understanding of training program design and provide insights to support small business owners in learning new technologies.

This research has made considerable contributions to, and implications for, research. First, this study developed a new gamified training system to help researchers study the differences between traditional in-class training and gamified programs. This system covers the essential training activities of learning website design and development. Researchers can use this system to test more research models and theories. Second, this study empirically compared traditional work-based lecture training and gamified training methods. The results highlight the significant differences between the two training methods. For any work-based training and education programs, researchers should take the gamified system into consideration. Lastly, most researchers investigate either website design and development learning or business activities of small business owners. Few studies have investigated



the need for website knowledge training and education of small business owners. The outcomes of this study suggests areas for future research by combining technology education and small business owners' needs in their workplace.

Our study offers several implications for practice. First, the gamified training program provides better user support in learning website design and development compared to traditional training methods. Software developers in training and education can offer easier and more efficient tools for various training and education programs using gamified systems. Second, with the growth of technologies, small business owners are challenged when they are trying to efficiently absorb new technologies or up-to-date IT-related knowledge (Leonard-Barton & Kraus, 1985). The results of this study show the advantages of gamified training programs. For their future training program selections, small business owners should pay more attention to and explore the benefits of gamified training and education systems in the market.

Moreover, our results may have broader educational implications. Appropriate training design would improve employees' work-based skills and training involvement, thereby arousing their desire to study (Chung et al., 2019). Therefore, the results of this study can provide substantial help for instructional designers to understand the efficiency and effectiveness of the gamified training method, which could assist them in designing more appropriate and accessible training programs. Additionally, current educational work-based training has often been copied from university education programs, although the programs seem to simulate the settings close to the working environment (Tell & Gabrielsson, 2013). More and more researchers argue that educators should understand the small business circumstances and integrate business learning culture into the work-based training pedagogy (Greenbank, 2000). Therefore, special structured educational programs, such as the gamified training program in this study, should be adopted for small businesses to enhance business management education under their learning culture, especially for managers who have never had a traditional university education.

There are some inherent limitations in our study. First, none of these 38 CEOs paid any interest in the self-learning path. Therefore, this study only compares in-class and gamified training for web programming education. We do not know the effects of the self-learning path, though we discussed the direct reasons and potential causes above. We suggest that further research should compare all these three learning methods.

Second, all the CEOs who participated in this study are from one city in the USA. Analytical results presented may therefore have limited generalizability. We plan to expand this study to several metropolitan cities, such as New York, Los Angeles, and Chicago. The results would be more acceptable from a generalization perspective.

Additionally, the generalizability of the results to other countries might be limited due to cultural differences. Cultural differences could raise obstacles and problems during work-based learning (Doherty & Stephens, 2020). Hofstede (1997) defines culture as a system of patterns that differentiates people into groups with five dimensions: power distance, uncertainty avoidance, individualism versus collectivism, masculinity versus femininity, and long-term versus short-term. In gamification training, individual cultural differences may cause learning barriers to the learners while using the training program without customized cultural settings. From an organizational perspective, learners may be confused or even resistant to the training if the gamification training is incompatible with the organizational culture to support its accepted values, ideas, and beliefs (Ferrara, 2013). Therefore, further investigations can be carried out to identify the culture construct in the context of gamification applications in small business work-based training programs.

Future research should also be conducted to explore to what extent gamification can improve work-based learning and what are the primary factors in the gamification design.



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