

Blended Experiential Learning with e-Portfolios Learning to Enhance Creative Imagination

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Abstract

Our research developed out of concerns about whether design students currently have enough creative imagination because of COVID-19, changing design studies to online learning. This paper describes an empirical study testing the effect of Blended Experiential Learning with e-Portfolios Learning on the Creative Imagination of design students to compare the differences in the effectiveness of design students' Creative Imagination scores. It was hypothesized that first-year design students learning through blended experiential learning with e-Portfolios would have higher Creative Imagination scores when compared to those in the control group learning by not following the format. The multistage sampling method was used to select the study population, and the sample consisted of 111 participants. The test was run in two steps, including 1) the try-out, conducted with the sample group of 45 participants using the Dependent T-Test to compare the pre-test and post-test Creative Imagination scores, and 2) the trial run, conducted with the sample group of 33 participants (learning by following the format), and the control group of 33 participants (learning by not following the format) to compare the Creative Imagination scores. MANOVA was then used to test whether at least one component of the creative imagination test scores of the experimental group was higher than the control group. The Test of Creative Imagery Abilities (TCIA) assessment was used to collect the data, which was then analysed using the T-test.

Keywords:

Blended Learning;
Creative Imagination,;
Experiential Learning;
e-Portfolios Learning.

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1- Introduction

Online courses have become the primary means of teaching for higher education classes during the coronavirus (COVID-19) pandemic. However, the process of designing online courses seems ambiguous and difficult for art and design teachers [1]. Since the early 2020s, regions around the world have been in a recession. With the chaos of the COVID-19 pandemic, every aspect of life seems paralyzed to break the chains of outbreak in the world, and education is no exception [2]. Online learning is recognized as an effective teaching method and tool, widely integrated into different types of teaching and learning strategies to provide quality education at different levels. However, the field of design education does not have extensive research into online learning, delivery, and assessment [3]. The studio is the heart of design, making it difficult for design educators to embrace technology-driven changes in online teaching and learning environments. There are very few universities around the world that offer bachelor's degrees in design programs online. Although there has been a higher overall growth in online courses, brief evidence and limited research have explored the perspectives of design educators who lament the loss of direct interaction [4]. Technology offers a hands-on learning approach in the studio, often supported by face-to-face interactions between students and educators and interactions with friends, functioning as the preferred format in design studies. This traditional approach to learning and teaching design and the nature of the studio would often provide helpful and supportive interaction, proactive learning,

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and social participation [5]. In this context, it is surprising that universities, whether at the regional or perimeter level, are slow to offer online design education. For example, there are only five American online bachelor's degrees in graphic design, compared to 61 bachelor's degrees in accounting online in Australia [6]. Only four of Australia's 40 universities offer a bachelor's degree in design online, and only one offers online graphic design [7].

There are also no apparent studies exploring how online design courses can be structured and deployed or what role blended learning can play in the delivery of more flexible study options in design. While there are extensive literature reviews and large-scale student surveys in other disciplines, only a few case studies conducted in an online virtual environment have emerged over the last decade, reporting on research within individual design subjects or online projects within a design subject. However, online design courses facilitate distance collaboration at the very least and warrant further structural and pedagogical investigation. The center of design learning is an underlying method of inquiry and dialogue that cannot be objectively transferred to students through typical learning management systems. Australian universities (COFA online) argue that the "online experience", whether shopping, socializing, resourcing or teaching and learning, is different to when undertaking the same face-to-face activities [4].

1-1- Creative Imagination

Imagination is the first step in the continuation of creativity and innovation. It is characterized by several core competencies needed to succeed in the 21st century. Without a highly developed imagination, neither creativity nor innovation would flourish [8, 9]. Imagination is also as important as creativity to support an innovative economy since innovation refers to the imagination of things never seen, and not just the improvement of what we already have. Creativity is the changing of the present. Without imagination, we would be stuck within the present world. In other words, creativity helps improve things, but imagination is at the heart of developing and uncovering new things [10]. Therefore, humans use imagination to design their future [11]. Educators and most people, however, increasingly place more importance on creativity but only little and superficial attention to the imagination. These two things are related but have different scopes [12]. Imagination is an important part of creativity, leading to the creation of new things [13].

Imagination is considered the import of perception and creativity, and the blending of different aspects of experience [14]. It is the creation of pictures from experience to interconnectedness [15]. "From imagination to Creative Imagination" might not be a new phrase. To put it simply, it is the imagination of the creative category [12]. Creative Imagination is one of the most important human abilities for developing creative potential [16]. The core of creative thinking is imagination [17]. Although imagination appears for a split second, it is the product of life experience. An idea cannot appear out of thin air but from what we learned, felt, and experienced altogether [10]. Imagination produces, stores, and retrieves experiences and pictures used in activities of information and understanding and the different determination of humans. It is also a tool to synthesize feelings and understanding [18]. Therefore, learning from experience is extremely important for life skills because everything that occurs from practice is the result of experience, learning from experience, or learning from practice [19].

1-2- Experiential Learning

Creativity depends on different factors such as learning, experience, motivation, imagination, and personality. It is a dynamic relationship between learning and imagination as new experiences and learning are needed to create something new [13]. Experiential learning is the learning process through practice and its adaptation to be used in real lives [20]. It is the process of finding the special relationship between an action and its result [21]. When learners gain experience from the results of the action, past knowledge is transformed into new knowledge [22]. This is the relationship between theory and practice to help learners learn to follow objectives. The learners earn the experience necessary for learning. They then observe what happened and consider it together until a concept or assumption is derived and experimented with or applied to different situations [21].

The steps of Experiential learning consist of the following [23]:

- *Step 1:* Concrete experience – Learners focus on participating in the experience and manage specific personal situations.
- *Step 2:* Observation with experience reflection – Learners focus on understanding the meaning of ideas and situations with careful and neutral observation and explain those experiences.
- *Step 3:* The creation of abstract ideas – Learners focus on using logic and concepts to create an overview and theory about the experience.
- *Step 4:* Proactive experiment – learners focus on the influence of people and situations by testing and using concepts that are the results of the new situations.

Experiential learning is extremely important for life skills because skills result from actions and experience [24]. The experiential learning principle refers to learning supported by experience, revision, or consideration of created experience. It starts from experiencing a real or new situation, finding an interesting solution, documenting what happened, and then critically analyzing and revising to conclude as a new experience. This experience can be collected in many forms such as a portfolio [25].

1-3-e-Portfolio Learning

The e-Portfolios are digital assessment tools for enhancing the quality of student learning outcomes in higher education. Electronic works leverage the potential of digital technology to support self-monitoring, self-assessment, and student learning sharing. Therefore, e-Portfolios are reported to bring improvements in student learning [26]. Learning with an e-portfolio can enhance the nature of the learning experience by providing learners with a personal space to evaluate their learning, process their thoughts and experiences, and document their lives and learning in an authentic and meaningful way. In addition, the findings suggest that learning with an e-Portfolio can enhance the development of critical thinking skills and dispositions within a disciplinary context [27]. A portfolio is the consideration of experience and witness of one's personal growth [28]. The concept of portfolio learning is important and necessary to study art and design in most countries [29] and is also the imitation of real industrial design, where comments and feedback are always given to collaborative work [30].

This could also stimulate imagination and creatively apply imagination to find one's solutions [31]. The main categories of e-Portfolios in Higher Education include e-Portfolios for classroom learning, certification and benchmarking, employment, workplace learning, and planning. Personal development in this research is an e-Portfolio for classroom learning because it is a collection and exhibition of works from learning that learners reflect on their learning experiences and developments. Conversations with teachers and peers who provide constructive feedback on the work can motivate students through additional consulting and encouragement from teachers. Learners may also use what they learn through accumulated experience to plan the next step in their learning and vice versa. Teachers can also tailor their teaching to suit the students' current skill level, knowledge, needs, and preferences [26]. The e-Portfolios are tools to enhance the learning experience and reinforce learning approaches. The e-Portfolios have become a key factor in e-learning processes because of the ability to promote student growth, constructivism, and critical reflection in learning. It is also an ideal medium for academic and professional development [32].

Table 1. The comparisons among different e-Portfolio approaches

Source		The steps of e-Portfolio learning					
Danielson & Abrutyn (1996) [33]		Collection	Selection	Reflection	Projection	Presentation	
Hilzensauer (2006) [34]	Purpose	Collect & select		Reflect		Presentation	Assessment
Hallam et al. (2008) [35]		Collect	Select	Reflect		Publish	
Khoo et al. (2011) [36]	Plan and understand what you need to do / produce	Collect artifacts	Select & link artifacts	Review and reflect on artifacts		Share & present artifacts	
Mazlan et al. (2015) [37]	Plan and understand what you need to do / produce	Collect artifacts	Select & link artifacts	Review, evaluate and reflect on artifacts		Present & share artifacts	
Summarized	1Plan	2Collect	3Select	4Reflect		5Share	6Assessment

The steps of e-Portfolio learning are as follows [33-37]:

- *Plan*;
- *Collect*;
- *Select*;
- *Reflect*;
- *Share*;
- *Assess*.

1-4- Blended Learning

The development of Internet technology has rapidly changed teaching strategies and tools. As a result, the application of blended learning in education has attracted more attention from academics. Blended learning doesn't just combine online and traditional face-to-face learning but also transcends the limits of time and space. Blended learning combines the advantages of Internet learning with face-to-face interaction and cooperative learning. The application and development of blended learning in the domain of engineering education is quite feasible and deserves further exploration [38].

Blended Learning is the combination of different teaching methods, including regular classroom teaching, together with every form of learning and teaching technology, providing the integrated advantages of regular and online learning [39]. Blended learning would use more virtual learning to replace regular classroom learning in many cases. In the future, we may have the opportunity to work and learn with friends from all over the world in real-time [40]. Moreover, blended learning can lead to building a learning community and establishing a virtual classroom for learning [41].

Collaborative blended learning [42]:

- The integration or combination of web-based technology and traditional face-to-face classroom learning, e.g., live virtual classroom, organized based on the learners' interest, self-paced instruction, collaborative learning, and streaming video content so that the learning objectives are achieved.
- The combination of various pedagogical approaches, e.g., constructivist learning theory of behaviorism and constructivism for the best learning outcomes with and without learning and teaching technology.
- The combination of any form of instruction technology with face-to-face instruction, e.g., videos, CD-ROMs, and learning through websites blended with classroom teaching by instructors. This concept has been the most accepted and prevalently used.
- The combination of instructional technology with actual job tasks for consistency between learning and real work environment.

These concepts motivate us to develop blended experiential learning with e-Portfolios learning. Previous studies have indicated that experiential learning aims to promote the learners' awareness of the relationship between real-life experience and "learning by doing" [43]. This learning process emphasizes creating learners' experience through support or revision of created experience. It starts from real events, new experiences, and discovery to analyzing, criticizing, and finding conclusions for new knowledge or experience [24]. We blended e-portfolio learning to create the process of application through imitation of the industrial design process and real work experience, which involves collaborative work and feedback [30]. Therefore, Blended Experiential Learning with e-Portfolios Learning is a learning method focusing on creating and storing experience as a foundation for future development of Creative Imagination.

2- Method

Blended Experiential Learning with e-Portfolios Learning was developed from literature review. The format was assessed and approved by experts, followed by the examination of its efficiency and effectiveness, respectively. The population of the study included undergraduate design students from nine universities under the supervision of the government in Bangkok and peripheral areas. The multistage sampling method was used, and the sample group consisted of 111 first-year students. The test consisted of two steps, which were 1) the try-out conducted with the sample group of 45 participants using the dependent t-test to compare the pre-test and post-test scores, and 2) the trial run conducted with the sample group of 33 participants (learning by following the format) and the control group of 33 participants (learning by not following the format). The latter group completed Jankowska and Karwowski's (2015) Creative Imagination assessment [44]. T-Test statistical analysis was used to analyze the creative imagination test scores before learning in each component of both groups to confirm whether both sample groups were equivalent regarding their creative imagination scores in each component. MANOVA was then used to test whether at least one component of creative imagination test scores of the experimental group was higher than the control group. A T-Test was also used to test whether the average creative imagination scores of the experimental group were higher than those of the control group after learning. Figure 1 shows the flowchart of the research methodology.

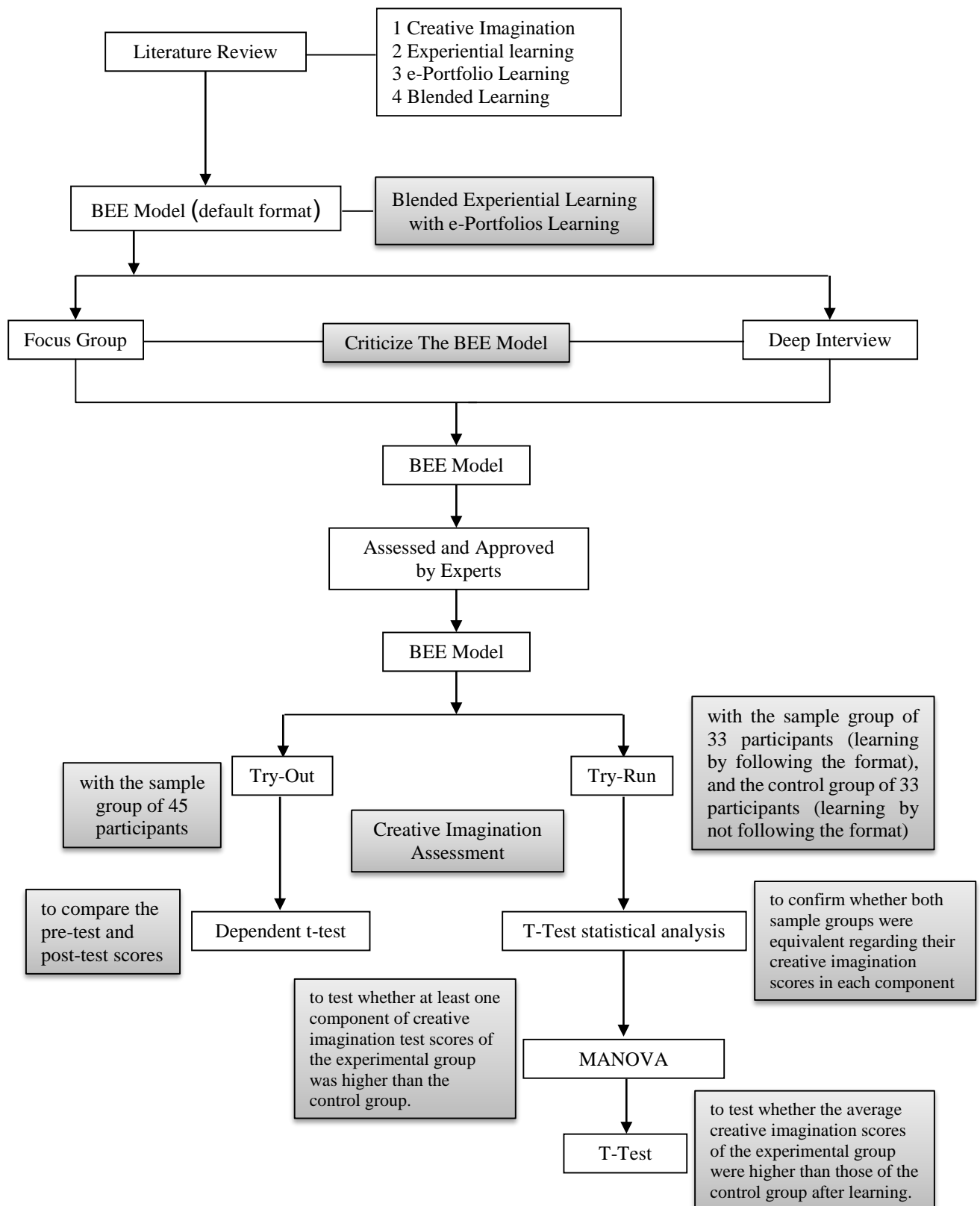


Figure 1. The flowchart to show the research methodology

2-1- Blended Experiential Learning with e-Portfolios Learning

Blended experiential learning with e-Portfolios learning method consisted of four steps, including 1) experience, 2) reflect, 3) conclude, and 4) apply. The last step comprised six detailed steps, which were 4.1) plan, 4.2) collect, 4.3) select, 4.4) reflect, 4.5) share, and 4.6) assess. In the experiment, the blended learning of online, live virtual classroom, consult, self-paced instruction, and actual job tasks were explored (Figure 2). Different platforms were selected to be appropriate for each step.

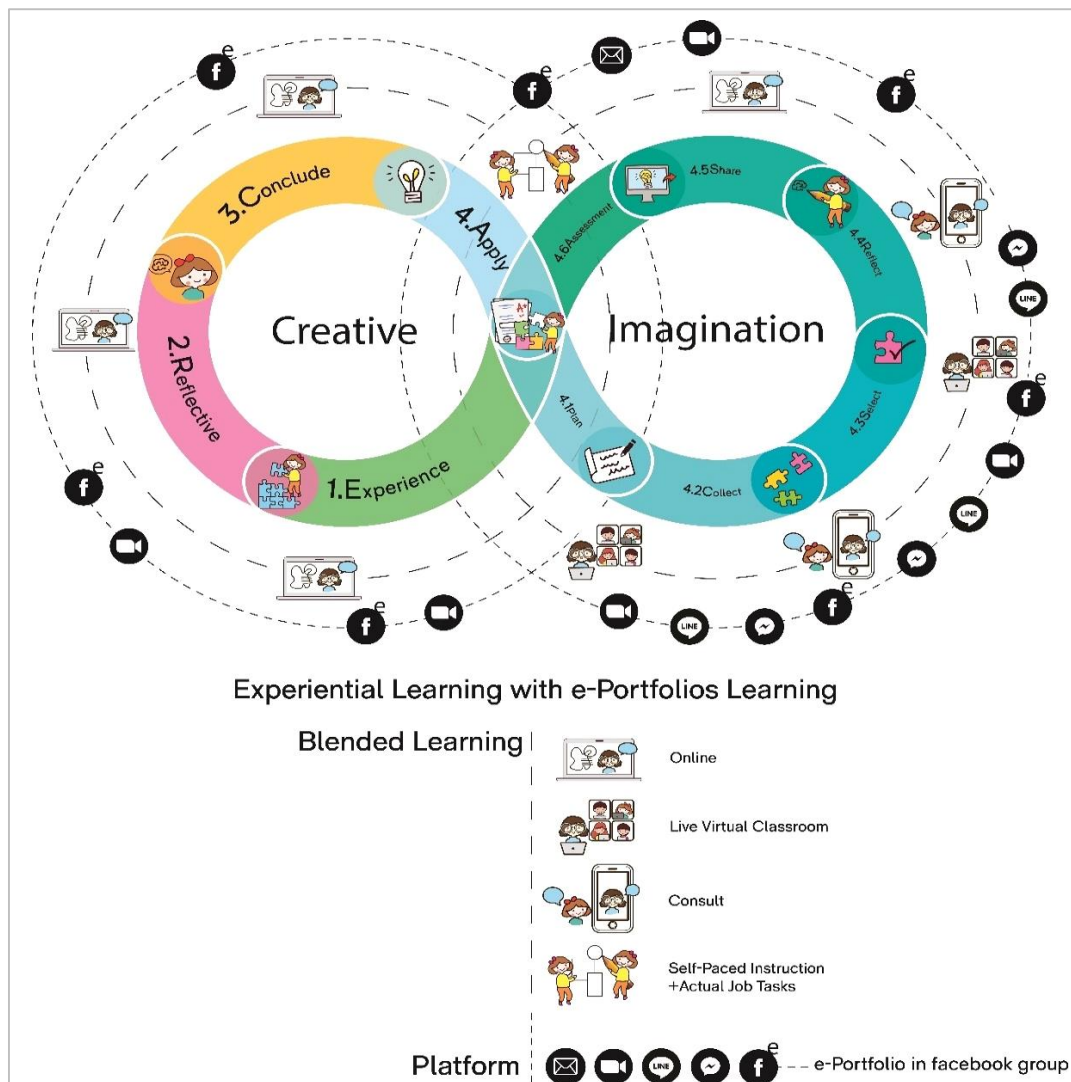


Figure 2. Blended Experiential Learning with e-Portfolios Learning

2-2-Experiment and Data Collection

Blended Experiential Learning with e-Portfolios Learning methods, approved by experts, were taken from the literature review for a preliminary efficiency test (Try Out) with a sample group of 45 participants. The details of each week were as follows:

- In week 1 or introduction, the instructor explained in detail the learning steps and instructional media of each step. The instructor assessed the learners' Creative Imagination using a Creative Imagination assessment named the Test of Creative Imagery Abilities (TCIA) and gave basic information to the learners using the lecture method.
- In week 2, basic information was provided to the learners through short lectures. The learners were then brought into experiential learning steps. In the first or experience step, the learners learned from the experiences of others through samples of related design works. In the second or reflective step, the learners learned through writing the concept of the sample works. In the third or conclude step, conclusion of everything students learned from the experience was written down. In the fourth or apply step, the direct experience was created through designing three symbolic workpieces from experience.
- In week 3, basic knowledge was provided to the learners through short lectures. The learners were brought into experiential learning steps. In the first or experience step, the learners learned from their own experiences by understanding themselves. In the second or reflective step, the learners analyzed themselves through learning methods and wrote reflections about themselves from different aspects. In the third or conclude step, the learners wrote a conclusion of everything they learned from their experience, and in the fourth or apply step, the direct experience was created through designing six symbolic self-reflection workpieces from the experience.
- In week 4, the basic knowledge was provided to the learners through short lectures. The learners were brought into experiential learning steps. In the first step, the instructor provided an experience that the learners could share to find designing concepts through brainstorming group activities. In the second or reflective step, the learners wrote

reflections of concepts they would use in their designed works. In the third or conclude step, the learners wrote conclusions of everything they learned from their experience, and in the fourth or apply step, the learners created the direct experience through designing one symbolic workpiece from knowledge gained from the experience to communicate their chosen concept.

- In week 5, basic knowledge was provided to the learners through short lectures. The learners were then brought into experiential learning steps. In the first step, the learners learned from their own experiences through their work from the previous week. In the second or reflective step, the learners verbally reflected on their own works and wrote opinions on their friends' works from each of the past weeks. In the third or conclude step, the learners wrote conclusions of everything they learned from the experience, and, in the fourth or apply step, the learners created the direct experience through designing one workpiece from the knowledge they gained from their own designed works. The e-Portfolios Learning was blended in this step and continued in week 6.
- In week 6, following week 5, the learners applied the knowledge using the e-Portfolios learning. It started with step 4.1 or plan, where the learners planned the designed workpiece. In step 4.2 or collect, the learners collected related information as planned and then presented the starting concept and other related information.
- In week 7, following week 6, the learners entered step 4.3, or select, by selecting ideas for project, which were most in line with plan and responded to the designed plan, from the gathered information. The chosen ideas were developed into concepts by extending the starting ideas through sketching
- In week 8, following week 7, the learners entered step 4.4 or reflect, and the concept chosen in week 7 was reflected on through a set of three workpieces. In step 4.5, or share, the workpiece was presented so that opinions from others could be obtained and used for the development of the finished products.
- Week 9 included step 4.6 or assessment, in which the learners completed the Creative Imagination assessment form using the Test of Creative Imagery Abilities (TCIA).

Blended Experiential Learning with e-Portfolios Learning method used the online learning platform in the lecture, experience, reflect, conclude, share, and assess steps. In the apply step, the emphasis was mainly on self-paced instruction. In the plan and select steps, live virtual classrooms were used to supplement online learning. For the collection and reflection steps, the focus was on consultation to supplement live virtual classrooms.

2-3-Differences in Learning through Formats of the Experimental Group and the Control Group

The control group learning lasted nine weeks, with content and project like the tryout of the experimental group. However, the difference was that the experimental group learned with Blended Experiential Learning with an e-Portfolios Learning model, supplemented by Live Virtual Classroom and Consult, while the control group learned through traditional online learning (Table 2).

Table 2. Differences in learning through formats of the experimental group and the control group

Week	2 group do the same	2 Group Blended learning	2 Group platform	Experimental group	Experimental group blended learning	Experimental group platform	Control group	Control group Online	Control group platform
1	Introduction Pre- Test of Creative Imagery Abilities Little Lecture	Online	Zoom Group Facebook						
2-5	Little Lecture	Online	Zoom Group Facebook	Experience Reflective Conclude	Online	Zoom Group Facebook			
	Project	Self-Paced Instruction +Actual Job Tasks	Group Facebook	Apply	e-Portfolio	Group Facebook	Experiment	Online	Group Facebook
6				Plan Collect	Live Virtual Classroom + Consult e-Portfolio	Zoom Small group Line Messenger Group Facebook	Present Idea	Online	Group Facebook
7				Select	Live Virtual Classroom + Consult e-Portfolio	Zoom Small group Line Messenger Group Facebook	Sketch	Online	Group Facebook
8		Self-Paced Instruction +Actual Job Tasks	Group Facebook	Reflect	Live Virtual Classroom + Consult e-Portfolio	Zoom Small group Line Messenger Group Facebook			
				Share	e-Portfolio	Group Facebook	Submit work	Online	Group Facebook
9	Post-Test of Creative Imagery Abilities	Online	Zoom						

2-4- Creative Imagination Assessment

The study used the Test of Creative Imagery Abilities (TCIA) assessment form developed by Jankowska and Karwowski (2015) [44] (Figure 3). The assessment was conducted by adding to the seven prototype pictures. Table 1 shows the scores given as levels 0, 1, and 2. The assessment had two forms of A and B, which were different in that the corners of the symbols were turned 270° anticlockwise from symbol A.

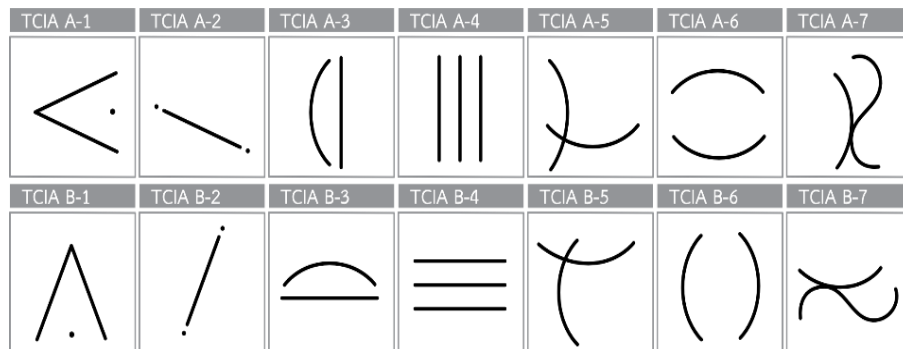


Figure 3. A form The Test of Creative Imagery Abilities (TCIA) by Jankowska and Karwowski

Three components of Creative Imagination were assessed to evaluate the remarkability of each component as follows (Table 3):

- Vividness: Assessment of the levels of ability to create clear and outstanding pictures with details.
- Originality: Assessment of the levels of ability to create outstanding and original pictures.
- Trans formativeness: Assessment of the levels of ability to transform the original pictures.

Table 3. Scoring criteria for Test of Creative Imagery Abilities (TCIA)

Scoring	Vividness	Originality	Trans Formativeness
0	Same picture with no addition but with interpretation for a new name	Presentation of common objects (things, plants, animals, places). Common shapes, functions, and characteristics are real, and status and situation process activities.	Addition to the original picture
1	Easy and often finish from an original picture	Changes of shapes, functions, and characteristics of commonly known objects (things, plants, animals, places) including common activities, status process and situations.	Entertaining, having gimmicks, Easily finished from the original drafts and addition of free objects
2	Complicated, full of completed details from the original picture	Complicated, significantly, and realistically changed. Changes of shapes, functions, and characteristics of commonly known objects (things, plants, animals, places) including common activities, status process and situations	Adjustment of complicated original work with many aspects of details

3- Result

3-1- The Results from the Preliminary Efficiency Test (Try Out)

The provided these results from the preliminary efficiency test (Try Out) conducted with the sample group of 45 participants and the comparisons of Creative Imagination scores between pre- and post-lesson of Blended Experiential Learning with e-Portfolios Learning of the sample group of 45 participants (Table 4).

Table 4. Results of analysis of dependent t-test of the sample group of 45 participants

Dependent variable	n	Mean \bar{x}	Std.	Mean \bar{d}	$S\bar{d}$	t	df	Sig. (2-tailed)
Vividness Pre	45	9.16	2.195					
Vividness Pos	45	9.96	2.430					
Originality Pre	45	4.98	3.665					
Originality Pos	45	7.58	3.829					
Trans formativeness Pre	45	4.76	3.839					
Trans formativeness Pos	45	6.11	4.168					
Creative Imagination Pre	45	18.89	9.289					
Creative Imagination Pos	45	23.64	9.817					

Table 4 shows the results of the first step. The average scores of Creative Imagination after Blended Experiential Learning with e-Portfolios Learning of a sample group of 45 participants were significantly higher than those before learning and higher in every component ($p < 0.05$). The originality before and after the first test had the greatest difference in average scores, indicating Originality Pre $\bar{x} = 4.98$ and Originality $\bar{x} = 7.58$ which differed by 2.600. The scores of Average Creative Imagination Pre $\bar{x} = 18.89$ and Section Creative Imagination Pos $\bar{x} = 23.64$ also varied by 4.756.

3-2- The Confirmation Results of Average Creative Imagination Scores

The confirmation results of average creative imagination scores before learning in each component were used to confirm that both experimental groups had similar starting creative imagination scores in each component (Table 5).

Table 5. Average creative imagination scores before learning by the experimental and control groups

Dependent variable	Levene's Test		Group	Mean \bar{x}	Std.	Mean \bar{d}	t	Sig. (2-tailed)
	F	Sig.						
Vividness	1.709	0.196	Control	7.85	1.873	-0.424	0.874	0.385
			Experiment	8.27	2.066			
Originality	1.330	0.253	Control	2.70	2.555	-1.000	1.480	0.144
			Experiment	3.70	2.921			
Trans formativeness	0.834	0.364	Control	3.12	2.891	-0.364	0.506	0.615
			Experiment	3.48	2.949			
Creative Imagination	0.547	0.462	Control	13.67	6.707	-1.788	1.114	0.270
			Experiment	15.45	6.330			

According to Table 5, average creative imagination scores before learning in each component were not significantly different between the experimental and control groups ($p > 0.05$). The difference between the mean scores of Vividness was only 0.424 for both groups before the study. The mean scores for Originality were only 1.000 before the classes and the mean scores for the Trans formativeness of the two groups were different by only 0.364. Creative imagination scores had virtually no difference before learning each component. In other words, both groups had the same or a slightly different level of creative imagination.

3-3- The Results of Assessment of Creative Imagination From the Trial Run

The results of the assessment of Creative Imagination are presented from the trial run with a sample group of the experimental group of 33 participants and the control group of 33 participants (Table 6).

Table 6. Mean values from Multivariate Tests

Intercept		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	0.950	389.745b	3.000	62.000	0.000
group	Intercept	0.050	389.745b	3.000	62.000	0.000
	Wilks' Lambda	18.859	389.745b	3.000	62.000	0.000
	Hotelling's Trace	18.859	389.745b	3.000	62.000	0.000
	Roy's Largest Root	0.155	3.790b	3.000	62.000	0.015
	Pillai's Trace	0.845	3.790b	3.000	62.000	0.015
	Wilks' Lambda	0.183	3.790b	3.000	62.000	0.015
Intercept	Hotelling's Trace	0.183	3.790b	3.000	62.000	0.015

a. Design: Intercept and group, b. Exact statistic

According to Table 6, the Wilks' Lambda statistic had a sig. = .000, which was less than α (.05), and the values of Hotelling's trace and Roy's largest root were equal (or nearly identical) to 18.859. The hypothesis would be statistically significant because there was one dependent variable that had the greatest influence or there was a relationship between the dependent variables [45]. There was at least one creative imagination element that was different from the group that was not studied in the model. The statistical significance ($p < 0.05$) was therefore to compare the creative imagination component scores between the two groups in the next step.

Table 7 shows that the average scores of Vividness of the group of Blended Experiential Learning with e-Portfolios Learning (experimental group) were significantly higher than those of the group with no blended experiential learning with e-Portfolios learning (control group) ($p < 0.05$), which assumes that groups learning through the BEE model had higher scores on at least one component of creative imagination.

Table 7. The results of MANOVA analysis of Creative Imagination scores of three components in the experimental and control groups

Dependent variable	Group	Mean \bar{x}	Std.	t	Sig.
Vividness	Control	8.09	2.213	3.019	0.004
	Experiment	9.88	2.583		
Originality	Control	3.33	3.461	2.598	0.012
	Experiment	5.76	4.093		
Trans formativeness	Control	3.70	3.396	1.860	0.067
	Experiment	5.39	3.992		

3-4- Comparison Results of Creative Imagination Scores Before and After Learning by Both Groups

Table 8 showed that the experimental and control groups had nearly the same average creative imagination scores before learning, with the average scores of 13.67 and 15.45 for the control group and the experimental group, respectively. However, when the test was completed, the creative imagination scores of the control group were not significantly different before and after learning ($\text{sig} = 0.106$, $p < 0.05$). Nevertheless, the average creative imagination scores before and after learning were significantly different for the experimental group ($\text{sig} = 0.003$, $p < 0.05$). The average creative imagination score after learning was higher for the experimental group ($\bar{x} = 21.03$) than that of the control group ($\bar{x} = 15.12$), confirming the hypothesis.




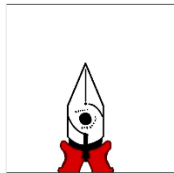

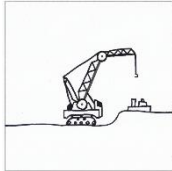

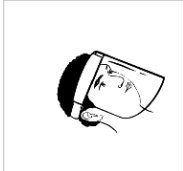


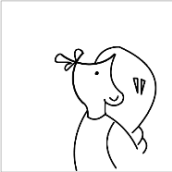
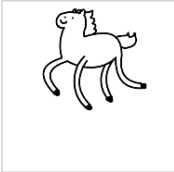
Table 8. Creative imagination scores before and after learning by the experimental and control groups

Group	Test	n	Mean \bar{x}	Std.	Mean \bar{d}	t	df	Sig. (2-tailed)
Control	Pre	33	13.67	6.707	-1.455	1.274	32	0.212
	Pos	33	15.12	8.276				
Experiment	Pre	33	15.45	6.330	-5.576	2.873	32	0.007
	Pos	33	21.03	9.926				

3-5- Comparison Results of Creative Imagination Scores Before and After Learning by Both Groups

Table 9 presents examples from Test of Creative Imagery Abilities (TCIA) in each component which received two points. The examples were collected from different students of the experimental group.

Table 9. Mean values from Multivariate Tests

Original Pictures	Vividness	Originality	Trans Formativeness
	 Picture name: Camping	 Picture name: Chopsticks Gripping Nuts	 Picture name: Sharp Wire Cutter
	 Picture name: Construction	 Picture name: A Traveler	 Picture name: Face Shield
	 Picture name: Guppies	 Picture name: Little Girl and Butterfly	 Picture name: Neighing and Galloping

4- Discussion

According to the results, Blended Experiential Learning with e-Portfolios Learning can enhance Creative Imagination because it enables learning through doing and forming experiences. Thus, experience is an important part of the imagination, such as when we see a triangle. We can only imagine that some people may think of sharks, ice cream cones, or mountains, depending on the experience of each person from the triangle. If we have no experience with anything at all, Dye is impossible to imagine when seeing it. Brown (2014) discovered that imagination was not from emptiness but lifetime experience [46], and Vendler (1984) said all imagination was imagining of experience. Hence, imagination represents the creation of experience, which is not only for creating pictures but also for perspectives embedded in experience [47]. From the observation of learners' behavior, it was found that the learners in the group with more self-experienced learning could imagine creating and designing creative works better than those in the group exposed to little experience. This shows that creative imagination has a positive relationship with experience, in the same direction as Vygotsky (2004,1995) said that imagination, creativity, and creative imagination were almost interchangeable because everything inside imagination was a primary experience. Imagination worked by combining past experiences together. The first rule of determining imagination is that creative activity is based on the completeness and diversity of one's experience because it gives materials to create fantasy products – the experience of the rich can only be imagined by the rich. A close relationship between imagination and experience and knowledge of experience in different aspects can stimulate imagination [48]. Children have more intensive but less accurate imaginations than adults because they have less experience. The content of the specifically prepared experience was collected and imaginatively applied through connection and separation of perception impression [49]. The study found that imagination, creative imagination, and creativity correlated. Some people might have thought they were the same thing, as Policastro (1999) indicated imagination as part of a creative continuum, defining it as an important part of a generative cognitive style involved in what they call “creative talent” [50]. Creative Imagination is one of the main human abilities, which can help promote creative potential. Therefore, for this type of learning, the learners need to study to expand their experience at all times [16].

The BEE Model has been blended e-Portfolio for learners to accumulate experiences they have learned. It is a record of the process throughout the learning process, which corresponds to that Kolb (1984) also indicate that Experiential learning is learning through “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience when combined with steps from the components of the e-Portfolio [51]. Costa (2015) discovered that learning a method that included a real working process was a way to promote the learning experience. Knowledge from experience was collected as a part of an operator and a part of memory that was not removable [52]. According to Ayob (2012), experiential learning was beneficial as a foundation of learning and teaching, which focused on creating innovations [53]. Dewey (1934) stated that experiential lessons included artmaking, questioning, reflection, and the use of multidisciplinary and multimedia resources. Some of these lessons purposely occurred before the experience with the work of art to help start perception, while others occurred afterward to deepen reflection. All set the stage for the possibility of what is called “an experience”, which can lead to what we call Imaginative Learning [54]. Moreover, Farrell (2019) also discovered that studying the characteristics of experiential learning through the e-Portfolio and the addition of analytical thinking development among online distance learners through the e-Portfolio could promote the development of analytical skills [55]. The important thing was that the e-Portfolio was a collection of experiences, and learners could learn from their own experiences in the e-Portfolio [16]. An e-portfolio could also be used for collaborative purposes. Participants also stated that communicating with peers enabled them to share ideas and thereby improve their academic performance and experience [32].

The process of learning according to the steps of the e-Portfolio includes 4.1) Plan, 4.2) Collect, 4.3) Select, 4.4) Reflect, 4.5) Share, and 4.6) Assess, which helps develop creative imagination because it is the accumulation of experience. Reflection of the experience includes sharing experiences in the form of an effective relationship between learners and teachers. O'Keeffe (2011) discovered that the e-Portfolio was the ideal teaching tool for enhancing creativity in learning and practicing [56], although Brown (2009) described the experiential learning portfolio in higher education for adults as a compilation of supportive, documented descriptions of learning outcomes derived from their workplace and personal experiences [57]. However, Fleischmann (2018) pointed out that the center of design learning was an underlying method of inquiry and dialogue that could not be objectively transferred to students through typical learning management systems [4]. On the other hand, Alsuwaida (2022) discovered that for the Faculty of Arts and Design, creating an online classroom required more student engagement and interaction. To attract students, online learning would allow students to collaborate with others, negotiate from multiple perspectives, share information and experiences, and engage in independent knowledge building [1]. The instructors also needed to allocate some time to learners' consultation outside of the class to help them learn from their experiences. Instructors of this type of teaching method had to have high levels of experience and the ability to communicate about it since they needed to reflect on their teaching experience of each step, realizing the importance of this part in many steps of the BEE Model. It combines virtual classroom learning to replace the advantages of face-to-face learning in the COVID-19 situation, where we cannot study face-to-face. Songkram (2015) has stated that a virtual learning environment develops creative thinking for learners in

higher education [58] because the benefit of online learning is flexibility, accessibility, and interactions allowing students to access learning materials and services from anywhere and at any time. To create an effective learning experience for design education, interactive communication and learning assessments should be included while also considering many types of interactions and communications among the learning elements (students, tutors, and content) [3].

Virtual students become more tech-savvy and gain more creativity. Another possible reason for the greater creativity of the virtual students is the better quality of the virtual course. As virtual university professors compare, there are no restrictions in terms of time and space, providing students with a wide range of educational content in terms of content and format, such as e-books, articles, educational videos, slides, pictures, etc. Students do not have time and space constraints, allowing them to handle content according to their personal learning styles. They can access content quickly and whenever they want. Virtual university teachers also use a variety of methods to assess their students. Features of digital technology that help learners to be creative include interactions; multiple data types/forms; distances; speed; and automation, which allow users to do things they can't do effectively or completely using alternative tools and keep traces of the development of ideas. Different levels of interaction and participation are available, from playing games to tracking, logging test results, archiving, converting, and visualizing. To enable student participation in higher levels of cognition, technology offers many things to the world of creative sharing, including new applications for development and content creation. Sharing video, audio, and photos in a global context and on websites allows diverse creators to share content [59]. Learning like Blended Experiential Learning with e-Portfolios Learning uses a blended learning model to enhance the positive qualities of face-to-face learning by adding, interacting, and using the Facebook platform as the main component. According to Fleischmann (2018), social media has become the key to connecting students. The use of different platforms, along with social media, in teaching and learning has made it a popular and important part of design education through technologies, such as Facebook. Informal and social interaction establishes the dynamics of teaching and learning [4], all reflecting the consistency of the results using the BEE Model and confirming the enhancement of Creative Imagination by Blended Experiential Learning with e-Portfolios Learning.

5- Conclusion

The teaching method of the Blended Experiential Learning with e-Portfolios Learning (BEE model) consists of four steps: 1) Experience, 2) Reflective, 3) Conclude, and 4) Apply, which comprised of 4.1) Plan, 4.2) Collect, 4.3) Select, 4.4) Reflect, 4.5) Share, and 4.6) Assessment. The use of blended learning consisted of 1) Online learning, 2) Live Virtual Classroom, 3) Consult, 4) Self-Paced Instruction, and 5) Actual Job Tasks to learn through various platforms such as Zoom, Group Facebook, and e-Portfolio on Group Facebook, Line, and Messenger. The research results were based on the assumption that the first-year design students learning through blended experiential learning with e-Portfolios would have higher creative imagination scores when compared to those of the group learning by not following the format. Based on the results, Creative Imagination was enhanced in those studied by the BEE model. Hence, the learners who had received such learning methods could better develop Creative Imagination than the group which did not learn through this method. The average creative imagination score of the experimental group ($\bar{x}=21.03$) was higher than that of the control group ($\bar{x}=15.12$) after learning, confirming the hypothesis. It was also found that the group of Experiential Learning with e-Portfolios Learning (experimental group) could create pictures with high levels of Vividness and were significantly higher than those of the group with no blended experiential learning with e-portfolios learning (control group) ($p<0.05$). However, with time limitations, the average scores of the Creative Imagination assessment by the group receiving Blended Experiential Learning with e-Portfolios Learning were slightly higher than those of the other group. On the other hand, although the time was short, studying with the BEE model could increase Creative Imagination, which was consistent with the assumptions set. It was shown that the education of design students with the proposed method could significantly develop Creative Imagination within a limited time. The BEE model, thus, helps to add to the missing parts of learning in non-confrontational situations. Future research should study and develop the use of technology to make teaching with the BEE model more effective, such as bringing chatbots to facilitate coaching or the establishment of a more specific form of the e-Portfolio platform. There may also be an adjustment or extension of the time in some steps, such as reflection or a summary of ideas, and finding a way to keep the knowledge alive and apply it to other subjects.

6- Declarations

6-1- Author Contributions

Conceptualization, N.S.; methodology, N.S.; software, N.S.; validation, N.S., C.V. and S.T.; formal analysis, N.S.; investigation, N.S.; resources, N.S.; data curation, N.S.; writing—original draft preparation, N.S.; writing—review and editing, N.S.; visualization, N.S.; supervision, C.V. and S.T.; project administration, N.S.; funding acquisition, N.S. All authors have read and agreed to the published version of the manuscript.

6-2- Data Availability Statement

The data presented in this study are available in the article.

6-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6-4- Institutional Review Board Statement

Not applicable.

6-5- Informed Consent Statement

Written informed consent was obtained from all subjects involved in the study.

6-6- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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