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Construction of a Creative Instructional Design Model Using Blended, Project-Based Learning for College Students

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The purpose of this study was to construct a blended, project-based learning creative instructional design model for university students that responds to the demands of the digital age, enhances student learning achievements in creativity, and cultivates student creative ability in independent thinking and innovation. This study organizes and analyzes blended learning, project-based learning, and the literature on creativity to summarize creative instructional design indicators for blended project-based learning, and it uses the fuzzy Delphi method for expert questionnaire analysis to filter the indicators most suited to university students. This study proposes that the four dimensions of creative instructional design are the following: 1) creative character traits; 2) ability in the creative process; 3) innovative product design, and 4) an instructional environment for creativity, with a total of 23 design indicators. Based on the results of the expert questionnaire analysis and evaluation mechanisms, the levels of importance and primary consideration indicators of the design indicators are established. The results show that incorporation of creative instructional design in blended, project-based learning can sufficiently cover the content of the four dimensions of creativity and that this approach gains the approval of most experts. This instructional design model can be used as an indicator for creativity learning effect assessment of university students, as a basis for creative instructional design by teachers, and as a reference for creativity curricular planning in university engineering colleges. This model can effectively enhance student creativity learning effects and, in turn, achieve the objective of an overall elevation of national competitiveness.

Keywords: Creative Instructional Design; Blended Learning; Project-Based Learning; Fuzzy Delphi Method

Research Background

Creativity is one of the key items for the elevation of international competitiveness (Labuske & Streb, 2008). In the "2010-2011 Global Competitiveness Report," the World Economic Forum (WEF) ranked Taiwan's competitiveness as 13th in the world in 2010 (Sala-i-Martin, Blanke, Hanouz, Geiger, & Mia, 2010). This ranking shows that economic development in Taiwan has advanced to an innovation-centered period, causing Taiwan to receive higher assessment in the innovative factors indicator. Thus, the education and promotion of creativity in university technological education is a significant issue. However, Wu (2002) found that, when schools arrange for the transmission of knowledge about creativity, they generally convey such course content as "knowledge", and generally do not allow students to personally experience the creative process and discovery (Wu, 2002). If students can actually experience and sense creativity, it would provide a key to inspiring personal creativity. Treffinger et al. (1980) argued that creativity could be enhanced through actual activities of creative thinking and actions (Treffinger, County, Gifted, & Talented, 1980); if creative thinking capabilities could be incorporated into courses, students could form and develop creative ideas and increase their imagination, allowing them to see problems from other perspectives and to cultivate problem-solving ability (Maisuria, 2005). Project-based learning (PBL) advocates for the creation of a learning context in which students can actively participate and discuss, and it suggests the use of these contexts to inspire student learning interests (Polman, 1998), using driving questions to elicit various learning activities. The problems posed by the projects are challenging, and in the learning process, students must propose and define questions, collect data, cooperate in learning, and create concrete achievements, all of which inspire their creative thinking abilities. In addition, using diverse instructional strategies has been proven to cultivate student creativity (Michaela, 2001). With the development of digital technology, instructional strategies and tools have changed, and creativity instruction must evolve with them. Among these strategies, the instructional application of blended learning has received more attention. Because blended learning combines online and face-to-face learning, it breaks through the constraints of time and space, covering both face-to-face and

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collaborative learning and effectively realizing the advantages of online learning (Akkoyunlu & Yılmaz-Soylu, 2008). If it can be applied to creativity instruction, it should be quite feasible and worthy of exploration.

To summarize, the importance of creativity and creativity instruction are known. This study hopes to incorporate the advantages of digital technology into blended, project-based learning in creative instructional design to effectively enhance student learning effects in creativity. Accordingly, this study has four research purposes:

1) Develop the dimensions and indicators for creativity assessment;

2) Explore the integration of blended, project-based learning and creative instruction;

3) Establish the design indicators for blended, project-based learning and creative instruction;

4) Construct a design model for blended, project-based learning and creative instruction.

Literature Review

The purpose of this study is to construct a blended project-based learning creative instructional design model (henceforth BPBLCID); thus, the literature on creativity assessment, blended learning, project-based learning, and creativity instruction are organized and summarized as follows:

Creativity Assessment

Early creativity research tended to explore the correlation between personal factors and creative behavior (Barron & Harringtion, 1981). After Rhodes (1961) summarized the literature defining creativity, he proposed the "4 'P's of creativity," which are: 1) Person; 2) Process; 3) Products; and 4) the Place or Press (Rhodes, 1961). This set of criteria means that the development of creativity should occur within a supportive environment, using educational processes and methods to cultivate student character traits, and in turn it should produce creative products. In the 1980s, creativity research turned to the exploration of external factors, such as using social influence processes to understand the expression of creativity (Amabile, 1996). Simonton (1988) proposed the "6 'P's" theory, which proposes that creativity is the interaction between the psychological processes of the creator's character traits and the product environment for creativity, occurring under an appropriate degree of pressure to produce persuasive creative expressions (Simonton, 1988). Gowan (1972) indicated that creativity is a continuous process from cognition and rationality to the illusory and irrational and should be viewed with an integrative attitude (Gowan, 1972).

This study uses the 6 Ps as the primary framework. However, because the subjects of creative instructional design are university students, "press" is thought to originate in the imposition of the instructional environment, so both parameters are classified as the same time. In addition, it is thought that students' creative products should emphasize expression of their creative abilities and should not be judged as merchandise. The BPBLCID includes 1) creativity character traits; 2) ability in the creative process; 3) innovative design of products, and 4) instructional environment for creativity. We will henceforth refer to this framework for creativity as "the 4 Ps". Based on this framework, complete BPBLCID design indicators are summarized to enhance student learning effects in creativity. These indicators are explained below.

Creativity Character Trait

Creativeness is an inclination of self-actualization and potential development (Rogers, 1959). The character inclinations of creative behavior include adventurousness, accepting of challenge, curiosity, imagination, and independent autonomy. Barron and Harrington (1981) suggested that the traits of a creator include autonomy, self-confidence, and tolerance of differences between oneself and others (Barron & Harringtion, 1981). Lubart and Sternberg (1995) argued that people with high creativity show perseverance when encountering obstacles, are willing to take reasonable risks, are willing to grow, can tolerate unclear situations, can accept new experiences, and have self-confidence (Lubart & Sternberg, 1995).

This study suggests that human values play an important role. When an individual emphasizes new concepts, he would express better creativity. Furthermore, creators must be adventurous and possess independent determination, their own views, a personal style, high confidence, and perseverance. Thus, this study summarizes the indicators of creativity character traits as follows: 1) accepting of independent challenge; 2) proactivity; 3) originality; 4) high capability; 5) imagination; 6) seeking knowledge; 7) adaptability; and 8) associative ability. We used these indicators to develop the questionnaire to investigate the concrete actions to be taken to cultivate the creativity character trait in students.

Abilities in the Creative Process

Creation is the process of using creative thinking to solve problems (Dewey, 1906). Wallas (1926) suggested that the psychological process of creativity is divided into the preparation stage, the incubation stage, the clarification stage, and the verification stage (Wallas, 1926). Thus, creative thinking is a series of processes, including perceiving the problem, making guesses and hypotheses about the problem, seeking answers, proposing proof, and finally reporting the results. Treffinger, Isaksen and Stead-Dorvad (2005) proposed that, to resolve creative problems, one must first create opportunities, explore facts, construct questions, develop resolutions, and establish acceptance (Treffinger, Isaksen, & Stead-Dorval, 2005).

This study proposes that creation consists of the formation of new hypotheses, followed by the modification or re-evaluation of these hypotheses to solve problems. The ability to resolve unknown questions is creativity. Thus, this study summarizes the creative process indicators as follows: 1) the preparation stage; 2) the incubation stage; 3) the clarification stage; and 4) the verification stage. We used these indicators to develop the questionnaire to investigate the concrete actions to be taken to enhance student abilities in the creative process.

Innovative Design of Products

The results of creation must have uniqueness, quality, and value (Gilchrist, 1972). Mayer (1999) suggested that there are two characteristics in creative works: originality and usefulness (Mayer, 1999). Thus, the created products should have originality and clear objectives, while complementing and not causing conflict with the objectives and needs of others (Gruber, 1988).

This study suggests that the innovative design of products by students must conform to the demands of the topic, have value, and apply new concepts to design unique products. Thus, this

study summarizes the indicators of innovative design of products as follows: 1) originality; 2) adaptability; and 3) efficacy. These indicators are used to develop a questionnaire to ascertain concrete directions for innovative product design by students.

Instructional Environment for Creativity

Csikszentmihalyi (1975) claimed that environment has a determining effect on creativity (Csikszentmihalyi & Csikszentmihalyi, 1975). Many studies have also noted that it is beneficial to encourage an environment that focuses on creativity (Amabile, 1996; Sternberg & Lubart, 1995). Cropley and Fleith proposed that it is beneficial to the cultivation of creative thinking by students to encourage creative thought and exploration in a learning environment (Cropley, 1997; Fleith, 2000).

This study focuses on the academic learning environment for students, including the instructional methods provided by teachers, the learning atmosphere created, and cooperative learning among peers. In light of this focus, the study refers to the views and literature by Cropley, summarizing the indicators for instructional environment for creativity as follows: 1) independence; 2) cooperative discussion; 3) asking questions; 4) flexible and open; 5) reward support; 6) assessment; 7) reflection on challenges; and 8) interest and motivation. These indicators are used to develop a questionnaire to elicit the key points for the creation of an instructional environment for creativity for students.

Blended Learning

Blended learning refers to the mixing of two or more types of learning method or media tool. Blended learning combines face-to-face instruction and online learning systems to seek the optimal effects between the two as well as the most balanced combination (Osguthorpe & Graham, 2003). Thus, blended learning can effectively integrate different conveyance models, instructional models, and learning methods (Procter, 2003). Osguthorpe and Graham (2003) argued that blended learning environments can enrich education, store knowledge, act as a personal proxy, save costs, and be easily modified (Osguthorpe & Graham, 2003). Mortera-Gutierrez (2006) suggested that, in the blended learning context, the combination of traditional instruction with information technology can create infinite possibilities in education and reflect the richness of education (Mortera-Gutiérrez, 2006).

This study uses blended learning to integrate different instructional methods and media, combining online learning and face-to-face instruction to cope with individual differences among students. The goal of this application is to create the most suitable instructional strategies, learning environments, and tools to conduct creativity instruction, so that students can engage in efficient learning, in hopes of elevating student learning effects in creativity.

Project-Based Learning

The primary purposes of project-based learning (PBL) are to enable students to use what they have learned and to integrate the theory and practices learned by students. They can then realize their imagination and creativity, converting their knowledge into abilities to cope with the challenges of life and work (Hsiao, 1997). In PBL, students face a challenging task, and their designs, problem-solving, decision-making, and research allow them to autonomously conduct work related to the topic during a period of time, completing a real product (Thomas, 2000). Boaler (2002) noted that, in project-based learning, students are more responsible for autonomous learning and learn more than from other instructional models (Boaler, 2002).

Thus, in the design of this study, students are the guides of their own learning. They divide work and cooperate in tasks ranging from data collection, reading, analysis and discussion to the production of actual innovative products. They discuss creative ideas and use project activities to learn creativity and enhance student learning effects in creativity.

Creativity Instruction and Platform Integration

Creativity is extrinsically constructed and is a process unique to human beings in its continued construction, deconstruction, and reconstruction of thought (Gagne, Yekovich, & Yekovich, 1997); many studies have noted that personal potential for creativity can be used to construct and develop creativity through practice (Zimmerman, 2006). By using diverse adaptable strategies, it is possible to cultivate student creativity (Michaela, 2001); these strategies include the following: 1) give students time to think creatively; 2) reward creative ideas; 3) encourage adventure; 4) give permission make mistakes; 5) encourage different opinions and diversity of ideas; 6) encourage exploration of the environment; 7) doubt assumptions; 8) do not criticize student creativity; 9) provide an environment for cooperation; 10) provide a free and open environment.

This study uses the blended creative learning platform proposed by Lou et al., (Lou, Chung, Chao, Tseng, & Shih, 2012), engaging in overall consideration of the four dimensions of this platform to establish effective connections between creativity learning and blended learning platform functions: developmental purpose, system design, system mechanisms, and system support, We then use the advantages of information technology and diverse and flexible instructional strategies to enhance student learning in creativity.

To summarize the literature review, this study finds that most of the literature still focuses on the individual exploration and assessment of the 4 Ps, carrying out creativity instruction based on those principles; however, it is insufficient to use the 4 Ps to conduct a complete instructional design. This study suggests that there would be interactive effects between the actual instructional environment, personal traits, creative processes, and innovative design of products, resulting in complex cross-influences. To truly understand creativity and in turn design a model for creativity instruction, these factors should not be considered singly. Thus, the construction of a model for creativity instruction that conforms to the demands of the digital age and that can comprehensively consider creative content's potential to enhance student creative ability is a very important issue and is the purpose this study.

Research Methods

The methodology and implementation flow of this study are explained as follows:

1) Carry out literature review of blended learning, creativity assessment, creativity instruction, and project-based learning, to establish the dimensions and indicators of creativity assessment;

2) Explore the correlation between blended learning method

and creativity instruction, conduct initial planning for the design of indicators in BPBLCID, and use this to develop an expert questionnaire on BPBLCID;

3) Use the fuzzy Delphi method for the expert questionnaire survey;

4) Analyze and organize the results and suggestions of the expert questionnaire surveys to ascertain BPBLCID indicators;

5) Conduct assessment of BPBLCID indicators;

6) Construct BPBLCID.

Fuzzy Delphi Method

The Fuzzy Delphi method evolved from the traditional Delphi method, an expert prediction method and type of group decision-making (Noorderhaven, 1995). The traditional Delphi method reveals the consensus value of expert opinions and is based upon mean values. In fact, in expert consensus, there is an unknown functional relationship. Klir and Folger (1988) proposed the introduction of a normalized mean model into the Delphi method, using the minimal value (a) and maximal value (b) of the normalized means from the expert questionnaire as the two end points of an expert consensus triangular fuzzy function. A geometric function (m) represents the consensus of expert groups on the influential factor. Finally, the researcher determines the threshold value based on the research purpose to select suitable evaluation factors. A diagrammatic representation of the method is shown in **Figure 1**. On the whole, compared to the fuzzy Delphi method, the traditional Delphi method has the following advantages: 1) it can save the time and costs for investigation; 2) the individual opinions of experts can be clearly shown without distortion; 3) the semantic structure of the prediction items can be clearly expressed; 4) it considers the unavoidable fuzziness in the interview process; 5) it possesses a facile computational process that can process multi-level, multi-attribute, and multi-solution decision problems. Thus, this study uses the fuzzy Delphi method to create a collection of opinions and ideas and individual expert opinions, integrating these data to obtain analytical results that conform to the trends of the times and are close to the theme, forming the main basis for the study in constructing a model for blended creativity instruction.

Expert Questionnaire Content

This study uses a semi-closed questionnaire to collect expert-opinion. Experts are asked to evaluate the constructed indicators of BPBLCID from their research on and experiences with creativity and to offer their subjective value judgments in the form of scores. In addition, the experts and scholars are permitted to add indicators to address insufficiencies in the original indicators. The evaluation scale definition of the model construction indicators in the questionnaire have 0 ~ 1 as the fuzzy number range, which is given three values, representing the triangular fuzzy number of a certain linguistic variable. For instance, (.4, .5, .6) can be used to represent the semantic value of "slightly," in which 0.5 is the value of maximum satisfaction and .4 and .6 represent ranges acceptable to experts. No personal data are elicited in the questionnaire to conform to the fuzzy Delphi method's principle of anonymity.

Research Subjects

The planning dimensions of BPBLCID in this study are broad, and would produce different views from different angles, so when the subjects are selected, the consideration for selecting experts is based on their professional ability, their familiarity with the research topic, and their level of authority. Regarding expert selection, Dalkey and Helmer (1963) indicated that the error for a population of at least 10 can be lowered to the minimum and has the highest reliability. This study invites 10 experts for questionnaire surveys; the expert data are shown in **Table 1**. Their fields of expertise are creativity assessment, creativity instruction, innovative design of products, and blended learning, fully covering the range to be explored by this study. Each has at least 7 years of instructional experience; consequently, it can provide the most comprehensive and professional suggestions for this study.

Results and Discussion

To understand the level of importance of the indicators for evaluation and modification of design indicators for blended project-based learning creative instruction, the 23 indicator results further use quartiles Q1, Q3 (which are .6657 and .7443, respectively) to serve as the basis for delineating the level of importance of creativity indicators. When Mean > Q3, it means that the experts believe the indicator is "highly important"; when Q3 > Mean > Q1, it means that the experts believe the indicator is "important". These two levels are considered primary indicators. When Q1 > Mean, it means that the experts believe the indicator has "secondary importance", and it is considered an indicator of secondary consideration.

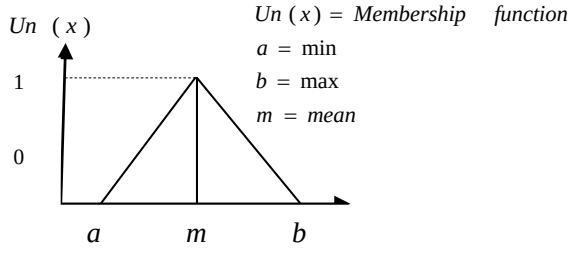

Figure 1.
Triangular fuzzy number diagram.

Table 1.
Background data of experts and scholars.

Item	Gender		Professional field				Number of years in instruction				Occupation			Education		Age	
Type	Male	Female	Creativity assessment	Creativity instruction	Innovative design of products	Blended learning	26 - 30 years	16 - 20 years	11 - 15 years	6 - 10 years	Professor	Associate professor	Assistant professor	Doctorate	Masters	50 - 59 years old	40 - 49 years old
Number	6	4	7	5	4	4	1	5	3	1	3	5	2	9	1	3	7

Analysis of Results of Fuzzy Delphi Method Expert Questionnaire

This study uses the fuzzy Delphi method to compute and construct the item scores (m) and indicator means (M) for the BPBLCID indicator items. The 4 Ps analysis results are explained below.

Analysis of the indicators for creativity character traits

Table 2 shows that for creativity character traits, the "highly important" rank indicators include five items: seeking knowledge, associative, proactive, adaptable, and imaginative, with scores of .8088, .7902, .7663, .7505 and .7476, respectively. The "important" rank indicator is originality, with a score of 0.6829. Independent challenge and high capability are listed at the rank of "secondary importance", also with scores as high as .6644 and .5537. This result suggests that most experts identify with the creativity character trait indicators summarized by this study. The main points for integration into instructional design include the following:

1) Encourage students to be flexible rather than rigid so that they can flexibly cope with various situations. They should have a high degree of tolerance for fuzzy and uncertain matters, to break through the constraints of their thinking. Train students to have unique insight and imagination, think from multiple dimensions, and use new concepts to solve problems. Cultivate students' opinions, personal styles, and original ideas to enhance student ability in proposing unique and logical views. 2) Enhance student curiosity and learning motivation, encouraging them to actively pursue their interests to enhance acceptance for new matters and experiences. Cultivate student ability in integrating different ideas, making new connections among superficially unrelated things or concepts. Guide students to set goals for themselves in pursuit of self-affirmation and enthusiastic, proactive attitudes, to encourage them to work hard at seeking innovation and discoveries.

In summary, this study integrates expert opinions to ascertain that the BPBLCID must be able to cultivate the following character traits among university students: seeking knowledge, associative ability, proactivity, adaptability, imagination, originality, accepting of independent challenge, and high capability. Through the cultivation of creativity character traits, the BPBLCID should enhance learning effects in creativity of university students.

Analysis of indicators for ability in the creative process

Table 3 shows that, among indicators of ability in the creative process, indicators with "important" include the verification stage and the clarification stage, with scores of .7930 and .7260, respectively. Indicators with "secondary importance" include the incubation stage and the preparation stage,

Table 2.
Analysis of creativity character traits.

Indicator	Item	Fuzzy score (m)	mean (M)	Level of importance Q1 = .6657 Q3 = .7443	Analytical results
1. Seeking knowledge	Is highly curious, with strong learning motivation.	.7986	.8088	highly important	primary indicators
	Can actively explore matters of interest, high acceptance for new matters.	.8190			
2. Associative ability	Can make new connections among superficially unrelated ideas or concepts.	.8012	.7902	highly important	primary indicators
	Has the ability to integrate different ideas.	.7792			
3. Proactivity	Has a high degree of enthusiasm, strong motivation, and active attitudes for advancement.	.8190	.7663	highly important	primary indicators
	Can set one's own objectives and pursue self-affirmation.	.7007			
	Have the motivation to create and work hard to seek innovative discoveries.	.7792			
4. Adaptability	Can be flexible rather than rigid, can flexibly react to various situations.	.7986	.7505	highly important	primary indicators
	Have a high degree of tolerance for fuzzy and uncertain matters.	.6895			
	Can break through the constraints of their thinking and use new concepts to solve problems.	.7634			
5. Imagination	Thinks broadly and observes from different perspectives, has a high degree of sensitivity.	.7318	.7476	highly important	primary indicators
	Is able to produce unique insights, can propose multiple opinions.	.7634			
6. Originality	Has individual views and personal style, does not follow precedents.	.6746	.6829	important	primary indicators
	Uses individual values and standards to evaluate matters, has original thoughts.	.6281			
	Can pose unique and logical views toward dealing with problems.	.7460			
7. Accepting of independent challenge	Can independently complete work and overcome obstacles.	.6281	.6644	secondary importance	secondary indicators
	Can bravely accept new challenges.	.7007			
8. High capability	Has professional knowledge, good at thinking, can address complex issues.	.5973	.5537	secondary importance	secondary indicators
	Has a high degree of faith and pride in personal ability.	.5101			

Table 3.
Analysis of ability in the creative process.

Indicator	Item	Fuzzy score (m)	Mean (M)	Level of importance Q1 = .6657 Q3 = .7443	Analytical results
4. Verification stage	Can implement new ideas.	.7986	.7930	Important	Primary indicators
	Can conduct verification of the problem-solving method.	.7818			
	Can concretely execute ideas, produce creative achievements.	.7986			
3. Clarification stage	Can provide solutions.	.7986	.7260	Important	Primary indicators
	Can evaluate effective solutions.	.6863			
	Can continuously modify possible solutions of a problem to solve it.	.7792			
	Can find the optimal solution.	.6398			
2. Incubation stage	Can think about and discover the needs of a problem.	.6012	.6553	Secondary importance	Listed as primary indicator after analysis
	Can consider possible solutions to problems.	.6378			
	Can seek suitable and feasible solutions to a problem.	.7270			
1. Preparation stage	Can collect related data.	.6520	.6360	Secondary importance	Listed as primary indicator after analysis
	Can integrate related new and old knowledge.	.7294			
	Can understand the facts of a problem.	.5735			
	Can have spontaneous inspirations and ideas.	.5889			

with scores of .6553 and .6360, respectively. The scores are all over .6360. This shows that most experts agree with the importance of indicators of ability in the creative process. The levels of importance clearly show that experts believe that the elevation of student abilities in the verification and clarification stages is more important than elevation of abilities in the incubation and preparation stages. The main points in the design of creative process instruction include:

1) Provide diverse channels so that students can collect data, blending old and new knowledge as they analyze the facts of the problem. Through platform group discussions, they can consider possible solutions to arrive at the most suitable and feasible ones.

2) Design practical activities for creativity, so that when students face problems, they can propose solutions and evaluate and modify them to find the optimal solution. They can then implement concrete verification of solutions and execute their ideas to create new works.

To summarize, this study integrates expert opinions to ascertain that BPBLCID indicators must proceed from the initial preparation stage, through the incubation and clarification stages, to the verification stage with full consideration. There should also be comprehensive design of curricular activities that can cultivate abilities throughout the creative process based on the indicators to enhance the creativity learning effects of university students.

Analysis of indicators for innovative design of products

Table 4 shows that, among indicators for innovative design of products, all have the rank of "important," including effectiveness, originality, and adaptability, with scores of .7029, .7016 and .6697, respectively. This shows that most experts agree with the importance of indicators for innovative design of products in this study. The main points of instructional design include:

1) To ensure that students can consider and apply new concepts from various perspectives to break through the constraints of their thinking and can use different materials to complete projects, expressing unique ideas and imaginative insights.

2) To guide student projects toward value and usability, as well as conformity to topical demands, to effectively execute tasks and solve problems.

In sum, this study integrates expert opinions to ascertain that the BPBLCID must clearly plan the main points for innovative design of products. This implementation allows students to clearly understand that innovative product design must be effective, original, and adaptable. The model is designed to produce clear objectives to enhance the learning effects of creativity in university students.

Indicator analysis for instructional environment for creativity

Table 5 shows that, among indicators for instructional environment for creativity, the indicator ranked "highly important" is asking questions, with a score of .7460. Indicators with the rank of "important" include six items: interest and motivation, reward support, reflection on challenges, flexible opening, assessment, and independence, with scores of .7426, .7236, .7072, .6878, .6826 and .6669, respectively. Cooperative discussion is an indicator with "secondary importance," scoring as high as .6166. This result shows that most experts affirm the instructional environment indicators selected by this study. The main points of instructional design include the following:

1) At the platform discussion area, use diverse techniques and methods in asking questions to guide student thinking, encouraging students to express diverse opinions and views, while paying attention to student problems and suggestions. This approach creates a diverse and variable learning environment. Furthermore, identify student strengths, abilities, and interests in the learning process and accept their thoughts and

Table 4.
Analysis of innovative design of products.

Indicator	Item	Fuzzy score (m)	Mean (M)	Level of importance Q1 = .6657 Q3 = .7443	Analytical results
1. Effectiveness	Can meet the topical requirements.	.8190	.7029	Important	Primary indicators
	Can effectively execute tasks or solve problems.	.6520			
	Has value.	.6520			
	Has usability.	.6885			
2. Originality	Can demonstrate unique imagination.	.7159	.7016	Important	Primary indicators
	Is unique and logical.	.7609			
	Can reconnect and recombine concepts or ideas that others cannot think of.	.6281			
3. Adaptability	Obtains results after multidimensional thinking.	.7294	.6697	Important	Primary indicators
	Can apply new concepts.	.6499			
	Can demonstrate one's own abilities in analysis, comparison, and determination.	.6499			
	Can be flexible and use different materials for completion.	.7460			
	Can break through the constraints of thinking.	.5735			

Table 5.
Analysis of instructional environment for creativity.

Indicator	Item	Fuzzy score (m)	Mean (M)	Level of importance Q1 = .6657 Q3 = .7443	Analytical results
1. Asking questions	Emphasize student questions and suggestions.	.7460	.7460	Highly important	Primary indicators
	Encourage students to express opinions and diverse viewpoints.	.7460			
	Use diverse techniques and methods for asking questions to lead student thinking.	.7460			
2. Interest and motivation	Identify student strengths, abilities, and interests in the process of instruction.	.7792	.7426	Important	Primary indicators
	Encourage students to keep trying to discover their own interests.	.7294			
	Use diverse and variable methods to form the learning environment.	.7634			
	Use various strategies and methods to elicit student learning motivation.	.6984			
3. Reward support	Give praise and affirmation for students' creative products and behaviors.	.6281	.7236	Important	Primary indicators
	Respect and accept student views and feelings.	.7634			
	When students encounter difficulties, offer support and encouragement.	.7792			
4. Reflection on challenges	Give students challenging problems and tasks.	.7135	.7072	Important	primary indicators
	Encourage students to take reasonable risks in the creative process.	.7135			
	Encourage students to reflect and perceive that they are also creative in instruction.	.7294			
	Enhance student abilities and use this for continuous improvement and growth in instruction.	.6724			
5. Flexibility and openness	Form a free and open learning atmosphere.	.7634	.6878	Important	Primary indicators
	Guide students in thinking from diverse perspectives.	.7318			
	Encourage students to freely ask questions, respect students' individual differences.	.6281			
	Give students the opportunity to choose and encourage them to accept new experiences.	.6281			
6. Assessment	Conduct assessment using diverse evaluation methods.	.6863	.6826	Important	Primary indicators
	Do not jump to conclusions about student ideas.	.7435			
	Expect that students will evaluate themselves, and let them understand the evaluation standards before evaluation.	.5871			
	Incorporate creativity into homework assessment.	.7135			
7. Independence	Encourage students to learn independently and seek answers to problems or difficulties on their own.	.6895	.6669	Important	Primary indicators
	Encourage students to be autonomous when thinking about questions and not rely on others.	.6626			
	Encourage students to be freed from social constraints and to not follow others blindly.	.6485			
8. Cooperative discussion	Allow students to cooperate, discuss, and share in their learning in groups.	.6378	.6166	Secondary importance	Secondary indicators
	Permit students to cooperate and jointly discuss in learning to solve problems.	.5954			

feelings. When students encounter problems, the teacher should give timely encouragement and support, offering praise and affirmation for the creative products and behaviors of students.

2) Give students challenging problems and tasks so that students can reflect and perceive that they are also creative. In the creative process, students should be encouraged to take reasonable risks. Additionally, guide them to think from a number of different perspectives and encourage them to ask questions freely in an open learning atmosphere. Assessment should be conducted through diverse evaluation methods, incorporating creativity into work assessment. Before assessment, students should understand the standards for evaluation and they are also expected to evaluate themselves. Encourage students to solve problems by cooperating, discussing, and learning together.

In sum, this study integrates the opinions of experts and ascertains that BPBLCID must create an environment in which the following are encouraged: asking questions, developing interest and motivation, rewarding support, reflecting on challenges, being flexible and open, assessing, acting independently, and discussing cooperatively. Such an environment should enhance the learning effects of university students in creativity.

Holistic Analysis of BPBLCID Indicators

In this study, a five-member evaluation team was formed (3 professors and 2 doctoral students) to evaluate and modify the analytical results in 4.1 to ascertain the primary indicators and secondary indicators. **Table 6** shows that, after evaluating the indicators for creativity character traits, 6 primary indicators and 2 secondary indicators were established. Among the indicators for the creative process, there are no indicators at the "highly important" rank, while there are 2 at the "important" and "secondary importance" ranks. After the analysis and discussion of this study, the indicators of ability in the creative process appear to have temporal sequence relationships that are continuous, with scores close to the Q1 value. Thus, after evaluation, these 4 indicators are listed as primary indicators. After evaluating the indicators of innovative design of products, there are 3 primary indicators. For indicators of an instructional environment for creativity, after evaluation, 7 are listed as primary indicators and 1 is listed as a secondary indicator.

After evaluation, the mean for the primary indicators for creativity character trait was found to be the highest, at .7577, followed by instructional environment for creativity, innovative design of products, and ability in the creative process, with means of .7081, .6914, and .6894, respectively. This result shows that most experts believe that creativity is still produced by the influence of character traits. Thus, experts believe that the cultivation of creativity character traits should be the top consideration. The second highest score was assigned to an instructional environment for creativity, which shows that most experts agree with the purpose of this study in constructing BPBLCID, believing that purposeful instructional methods, instructional atmosphere, and instructional environment can enhance student creativity. Although the innovative design of products and ability in the creative process received the lowest scores, their means are still greater than .6894, which shows that most experts agree that the process of innovative design and production of actual products can enhance the creative ability of students.

In sum, the BPBLCID indicators include 20 primary indicators and 3 secondary indicators. The results of the mean calculations do not affect the original rankings, but they can increase the differences among dimensions, indicating that BPBLCID can restore expert assessment of the importance of the four dimensions, accentuating the priority ranking among dimensions. This assessment is done to ascertain the views of experts to make the most appropriate distribution and usage of limited instructional resources to enhance the effects of student learning on creativity. Analysis of the mean values shows that creative instructional design requires holistic consideration and indicates that experts approve the instructional strategy of incorporating the 4 Ps into blended project-based learning as the indicators for considering creative instructional design.

Blended Project-Based Learning Creativity Instructional Design (BPBLCIDD) Model

As shown in **Figure 2**, the learning effects of creativity can arise from 1) cultivation of creativity character traits; 2) abilities in the creative process; 3) actual work on innovative design of products; and 4) cultivation of an instructional environment for creativity. Through expert questionnaire analyses in the fuzzy Delphi method, BPBLCID indicators include 20 primary indicators and 3 secondary indicators to fully cover the BPBLCID indicators and integrate the advantages of blended learning and project-based learning in the design of creativity instruction. With diverse blended learning, it is possible to effectively integrate different instructional models and learning methods to evince the richness of education and social interactivity, which benefits the formation of an instructional environment for creativity. In turn, this integration cultivates creativity character traits in students and elevates abilities in the creative process. Through systematic design of question contexts in project-based learning, it is possible to form an open instructional environment for problem solving and decision making, giving students opportunities for autonomous learning and the creation of innovative product design to strengthen their abilities in the creative process. Through the innovative design and manufacture of products, instruction can actively cultivate good characteristics in the creative character of students, enhancing the effects of creativity instruction.

Table 6.
Chart of BPBLCID indicator analysis.

Dimensions of BPBLCID indicators	Distribution of indicators before evaluation				Results of primary indicators after evaluation		
	Highly important	Important	Secondary importance	Overall mean	Number	Mean and ranking	
The creativity character trait	5	1	2	.7206	6	.7577	1
Ability in the creative process	0	2	2	.6895	4	.6895	4
Innovative design of products	0	3	0	.6914	3	.6914	3
Instructional environment for creativity	1	6	1	.6967	7	.7081	2

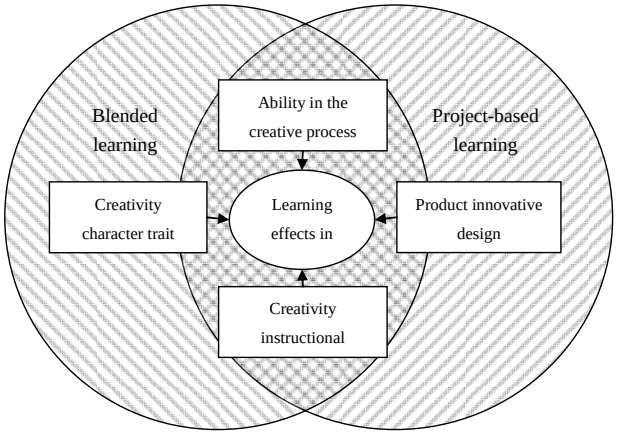

Figure 2.
Blended project-based creative learning instructional design model.

Conclusion and Suggestions

The construction of blended project-based learning creative instructional design model should conform to the demands of the digital age. Based on the results of this study, the following conclusions and suggestions are indicated:

Conclusion

1) *BPBLCID indicators received the approval and agreement of most experts*

Most experts agree that BPBLCID must be able to cultivate student characteristics—such as seeking knowledge, associative ability, proactivity, adaptability, imagination, originality, accepting of independent challenge, and high capability—to construct an environment for creativity instruction that allows students to ask questions, find interest and motivation, reward support, reflect on challenges, be flexible and open, assess themselves, and participate in independent and cooperative discussion. From the preparation stage to the incubation stage, clarification stage, and final verification stage, there is full consideration and design of course activities to cultivate the abilities students need for the creative process. These abilities allow them to clearly understand that innovative design of products must achieve effectiveness, originality, and adaptability and be designed toward clear objectives to enhance the learning effects of creativity in university students. In addition, these analytical results can be used to understand the level of importance of the indicators to serve as a reference for creative instructional design.

2) *Evaluation mechanisms for creative instructional design can help to ascertain primary indicators and secondary indicators*

The evaluation mechanisms effectively compile expert opinions and address the research topic. The evaluation mechanisms further ascertain the views of the experts. The BPBLCID indicators are divided into four dimensions, which include 20 primary indicators and 3 secondary indicators, allowing this study to make the most suitable distribution of limited instructional resources and serve as the primary basis for reference in instructional design.

3) *Most experts express approval for the incorporation of blended project-based learning into creativity instruction*

The overall analysis of the 4 Ps of creativity shows that creativity character traits received the highest scores, followed by an instructional environment for creativity, innovative design of products, and ability in the creative process. Further analysis shows that, even though the four dimensions received different scores, they are very close, which shows that most experts believe that all four dimensions are highly important to creativity. Thus, in this study, the incorporation of the 4 Ps of creativity into blended learning and project-based learning as a consideration indicator and instructional strategy of creative instructional design is feasible and necessary.

4) *BPBLCID sufficiently covers the 4 Ps of creativity*

Use of the diverse instructional strategies of blended learning and actual work activities of project-based learning can cover all of the indicators of the 4 Ps of creativity, including 1) cultivation of creativity character traits; 2) elevation of abilities in the creative process; 3) practical work in innovative product design; and 4) the formation of an instructional environment for creativity. Effective integration of the advantages of blended learning and project-based learning in the design of creativity instruction can result in construction of a blended project-based learning creative instructional design model with the 4 Ps of creativity as the main framework.

Suggestions

1) *Using BPBLCID indicators in student self-evaluation and elevation of creativity*

BPBLCID indicators received agreement from most experts and scholars, completing the classification of important ranks. This result demonstrates that the instructional design indicators summarized by this study can help to cultivate student creativity. Thus, students can use the BPBLCID indicators compiled in this study as a basis for self-assessment to understand the current condition, strengths, and weaknesses of their own creativity learning; they can serve as an important reference for developing self-creativity and elevating creativity learning effects.

2) *Implementing BPBLCID indicators in course instructional design relating to creativity*

BPBLCID indicators can be divided into primary indicators and secondary indicators to ascertain the priority level of instructional design indicators. Teachers can use the priority ranking of instructional design indicators to implement instructional design, to make the most appropriate distribution of limited instructional resources and to serve as the primary consideration when designing courses relating to creativity.

3) *Promote BPBLCID in curricula relating to creativity*

Using the perspective of the 4 Ps of creativity in blended project-based learning in creative instructional design is feasible and necessary. This study shows that BPBLCID can fully cover the four dimensions of creativity. Therefore, schools can promote BPBLCID to develop courses relating to creativity that fully consider the 4 Ps of creativity, providing a comprehensive curriculum on creativity to be selected and taken by students.

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