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The Effect Of Project- Based Learning In Enhancing Creativity And Skills Of Arts Among Kindergarten Student Teachers

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Abstract

Project-based learning (PBL) is frequently regarded as a viable alternative to traditional lecturer-led teaching. Meanwhile, creativity has been regarded as a critical skill for the twenty-first century and a crucial goal of education that should be encouraged in institutions of education. Besides, skills of arts allow for hands-on learning and creation. Nevertheless, little is known about the benefits of using PBL to enhance creativity and developing skills of arts. As a result, the goal of this research is to reveal the effect of PBL in enhancing creativity and skills of arts among kindergarten student teachers. The research was conducted to students at the department of kindergarten who were divided into two equal groups randomly. The main research instruments were a creativity scale and product evaluation card for skills of arts. The empirical results revealed that PBL had positive and significant influence on the enhancement of kindergarten student teachers' creativity, mediated by idea manipulation and generation, and analogical / metaphorical thinking. Results also showed that PBL had positive and significant influence on the development of kindergarten student teachers' skills of arts, mediated by esthetic and creative aspects.

Keywords: Project- based learning, PBL, Creativity, arts skills, kindergarten.

1. Introduction

Project refers to an act of creation over time [1] and project-based learning (PBL) is a systematic method of teaching and learning, which engages learners in complicated, real-world tasks resulting in a presentation to an audience or produce a reifiable end product, enabling their life-enhancing skills and knowledge acquisition [2-3]. It not only provides learners with knowledge, but also helps them enhance critical and creative skill, problem-solving skill, communication skill, team work, continuous learning, self-evaluation, and adaptation to changes [4-5]. Besides, it's a new approach to lifelong learning geared toward education for sustainable development [6]. Consequently, the transformation and construction of new knowledge are essential activities in PBL, which is related to constructivism [2, 7]. Meanwhile, PBL deals with a paradigm shift to student-centered from teacher-centered learning [8], with the projects at the focus of the curriculum [9]. The results of previous studies showed that PBL had a more positive effect on stimulated motivated learning and academic achievement of learners using a problem related to a specific topic in a real situation, compared to direct instruction [10-13]. Furthermore, PBL has been widely used in a variety of subjects, and studies have shown that it should be done for certain hours each week [2, 14]. The word "creativity", on the other hand is often used today interchangeably with "success" [15-16]. Overall, rearranging what we know to discover what we don't know is a big part of creativity [17]. Creativity is often defined as the process of

developing original/new as well as effective/useful products, which do not necessarily have to be a form of material; they can be performance or thoughts [15, 18]. Sometimes, creativity is known as a socio-psychological phenomenon [19-20]. Hence, it has been identified as an essential skill in the 21st century and a key educational goal that should be supported in educational institutions [21]. In the last few years, academia has placed a greater emphasis on creativity, and research in the topic has thrived, yielding a slew of intriguing findings [17-22]. Overall, our civilization survival is dependent on young people's creative ability, and one of the most essential things we can do in educational institutions is to enhance creativity [21-23]. In particular, there is no human creativity form that does not rely on social interaction, whether direct, mediated, or implicit [24]. In addition, PBL provides learners with hands-on opportunities to work with concepts from course materials, engage in social interaction in peer groups, and showcase their work [2, 25]. With this need to support student creativity, there is a need to assess the effect of PBL in enhancing creativity among kindergarten student teachers. On the opposite, art is a process for creating something (knowledge or artifacts), which refers to practices or thinking skills designers use to solve problems and create new ideas [26]. Further, some scholars use the "Arts" to refer to "Art Education" in the context of visual art, i.e. drawing, painting, sculpture, photography, design, and media arts [27]. The nature of arts skills allows for hands-on learning and creation [28]. Hence, they are merged with the educational field for the purpose of improving learner engagement, problem-solving skills, innovation, creativity, social interaction skills (e.g. communication, teamwork, adaptability), and other cognitive benefits. [27-29]. As a result, stressing arts skills in educational institutions was regarded as a realistic strategy to encourage innovation while also securing the arts' role in education [30]. Furthermore, Empirical research shows that arts skills help students learn more deeply and quickly, in both higher education and K–12 settings; and they also boost cognitive skills such as abstract thinking, spatial reasoning, creative self-efficacy, divergent thinking, curiosity, and openness to experience [31, 32]. As mentioned, arts skills aim to improve the learner's social interaction skills, while PBL provides learners with opportunities to engage in social interaction. In addition to the need to support the learner's arts skills, there is a need to assess the effect of PBL in enhancing arts skills among kindergarten student teachers. Therefore, the goal of this study is to fill that vacuum by examining the effect of project-based learning in enhancing creativity and arts skills among kindergarten student teachers. Thus, the following study questions are then raised:

RQ1: Does PBL impact enhancing creativity among kindergarten student teachers?

RQ2: Does PBL impact developing arts skills among kindergarten student teachers?

2. Theoretical background

2.1. Project-based learning (PBL)

PBL is an inquiry-based educational strategy that engages learners in knowledge construction by having them develop real-world products and accomplish meaningful projects [10]. This educational strategy also helps learners to develop their scientific process and practical thinking skills, thus enhancing their scientific problem solving, research and decision-making skills and abilities [12]. It allows learners to participate in activities that are similar to those done by professionals in the real world [33]. In PBL approach, learners are divided into groups of various sizes, and they all have equal responsibilities and roles in the project's completion [34]. Besides, PBL exercises and processes involve the use of mind or brain to make connections through learning, reflection, and articulation to see differences in views [11]. Thus, PBL is grounded in major research-based theoretical ideas active construction, situated learning, social interactions, and cognitive tools [35]. It allows students to learn by asking questions to pursue solutions, communicating with others, debating ideas, and designing plans [36]. The first purpose of PBL is to enhance learners' ability to systematically research a question based on a problem, the second purpose is to promote self-directed learning, and the third one is content acquisition [11]. In addition, PBL is expected to be a solution that learners can enjoy and support the method of creativity and interest in the process of

learning, it can also provide a creativity space in building the character of learners [36-38]. It's worth noting that some other researchers have found that PBL can develop a variety of learning outcomes. For instance, it has a significant positive impact on the academic achievement of learners compared with traditional instruction [2, 37]. Besides, it has also a significant positive impact on critical thinking of learners [4]. Similarly, adopting PBL to promote self-efficacy was more beneficial [12, 36]. Nevertheless, related literature review has not revealed a rigorous effort to using PBL in enhancing creativity and developing arts skills among kindergarten student teachers.

2.2. Creativity

Creativity is referred to as creation of an appropriate and novel response, solution, or product to an open-ended assignment [39]. It is the highest labor form, which brings social benefits and satisfies human needs [40]. Products include creativity physical manifestations (i.e. writings, inventions, works of art, processes, machines, etc.) [21]. The product to be creative should be appropriate, effective, and meaningful [41]. Nevertheless, the most common definition of creativity is a combination of originality/novelty and utility or value. Originality and novelty are often associated with arts-like processes of creative, whilst utility and value are specific for invention. [15]. In creativity active engagement, as in many other beneficial human activity areas, has a significant value in and of itself, even in the absence of recognition of success and/or achievement [42]. Furthermore, creativity takes activity or action form, and all human action occurs in a material, given symbolic, and social institutional context [24]. On the other hand, the environment of learning is a community and the community values influence the member's behaviors - lecturers and learners influence each other towards creativity constraint or support [21]. Besides, there is still a continuous growth in creativity studies applied in a variety of disciplines such as innovation and business, education, society, arts and sciences [42, 43]. While there is an increase in research of creativity in general, the major efforts to measure creativity have not focused on the environments' impact. Therefore, this research seeks to fill this gap by attempting to reveal the effect of PBL in enhancing creativity.

2.3. Arts Skills

Art is the key to the innovation needful for social progress [44]. Further, the arts are discipline, creativity, and aesthetics [45]. Arts skills in a broad sense include creation and design [46], they contribute to the economic competitiveness and innovation [47]. They can assist learners in learning not only the visual but also the performing arts [44]. Furthermore, arts skills will increase learners' future ability to deal with multidimensionality and complexity of sustainable future technologies [48]. It is noteworthy that the link between art and creativity is one of the oldest and most ubiquitous in both scientific and popular culture [27]. Meanwhile, research found significant relationships among academic achievement and arts engagement, encompassing advanced degree attainment in any field [47-49]. Besides, the arts skills can help students promote scientific concepts understanding, and improve cognitive skills [44, 50]. Research of arts education also shows that there is an intrinsic link between learning creativity and teaching through the arts [27]. While also there is an increase in research of arts skills, the major efforts to measure arts skills have not focused on the environments' impact. This research fills this gap by attempting to reveal the effect of PBL in developing arts skills.

3. Method

3.1. Sample

A total of 240 female students at the department of kindergarten made up the final research sample. They were enrolled in a course of curriculum requirement called "Art Education" while they were in their fourth academic level. All of participants were randomized into two groups of 120 students in each. The average age of participants in both groups was 18 years (SD = 2.13). The expected learning outcome of the "Art Education" course was to enhance creativity and develop arts skills of enrolled students, according to the course description [5, 51]. Before the course start, all female students were briefed about the research and completed consent papers.

Researchers provided them with the option of withdrawing or not participating without penalty. Researchers indicate that they followed all ethical guidelines when it came to involving human subjects in research.

3.2. Research Settings

This study was based on the "Art Education" course, which was delivered through the Blackboard platform. It lasted from August 15th to December 26th, 2021. The first group of participants were divided into sub groups of 6 students, as suggested of Chen and Yang [2], Olatoye and Adekoya [52] to group size for PBL, to enable more interpersonal interactions between students. Thereafter, PBL went through the following steps: First, the lecturer introduces the topic (via Collaborate Ultra Experience LTI virtual classroom, which is utilized by integrating blackboard freely) in an interesting way through short discussion to activate prior knowledge of students. Second, students in every sub group were encouraged to derive a driving question to assist them keep focused on the project's topic and to provide them with motivation to complete it. Third, assigning the tasks and roles amongst students in every sub group; each member of the group was responsible for making a contribution; thereafter, individually collecting data was associated with the driving question. Fourth, students in each sub group were to share the information they had obtained with each other (via a virtual classroom) to investigate, evaluate, and discuss it, then students could derive more sub questions for more information elaboration. Besides, the lecturer also provided constructive feedback to each sub group. Finally, the end product of each sub group (via a virtual classroom also) was collaboratively presented to the other sub-groups. On the other hand, the second group learned the course content through 14-separate lectures delivered through LTI virtual classroom that was integrated with blackboard (It is the method used for distance education at the university during the COVID-19 pandemic). In addition, the Blackboard system provided a set of interactive tools for the second group, including groups that enhance student engagement and allow them to establish virtual relationships with their peers, blogs as an open communication tool to convey their views, and discussion across forms. In the end, each female student was to submit an art project demonstrating her arts skills. Thereafter, these arts projects were evaluated using the card of product evaluation for arts skills. In addition, creativity scale was applied to all female students' products.

3.3. Instruments of data collection

3.3.1. Creativity scale

Creativity scale was developed based on a number of previous researches such as Liu [53], Kuo, Burnard [54], Kreitler and Casakin [55], Nelson and Rawlings [56], Mayfield and Mayfield [57], Rahimi, Arbabisarjou [58], Boada-Grau, Sánchez-García [59]. The scale consisted of three aspects: Manipulation of idea (8 items), Generation of idea (8 items), and Analogical /Metaphorical thinking (5 items). Each item was evaluated using a five-point Likert scale (1 = Never up to 5 = Always). The trial version of the creativity scale was presented to a panel of arbitrators who were specialists in the fields of kindergarten, psychology, methods of teaching, and educational technology to check its validity. Besides, the scale's internal consistency was further tested by implementing it to a pilot sample of ten female students of the five level at the Kindergarten Department who were not a part of the main sample in this research. The dependability coefficient of Cronbach’s Alpha was 0.88.

3.3.2. Arts Skills Product evaluation card

The product evaluation card for arts skills was also developed based on a number of previous researches such as Elfeky and Elbyaly [5], Elfeky and Elbyaly [14], Elfeky and Elbyaly [60]. It consisted of two main aspects: esthetic (5 items) and creative (5 items). Five points were assigned to each item, so the total score of the card was fifty points. Prior to employing the product evaluation card in this research, it was necessary to conduct a pilot testing to guarantee its reliability and validity. The dependability coefficient of Cronbach’s Alpha was 0.91. Furthermore, an independent professor was asked to take part in evaluating a sample of around 10% of female students' arts projects in order to assess the inter-rater reliability to foster

reliability of results. The percentage of agreement was 93 percent. At the end, all female students' arts projects were evaluated by a blind committee of three academics, and the results were used to calculate the mean score.

3.4. Data analysis

To find out whether there were notable variances induced by employing PBL, a Structural Equation Model (SEM) with IBM SPSS AMOS 24.0 was utilized to analyze the data. Consequently, confirmatory factor analysis (CFA) was applied to product evaluation card latent variables (i.e. esthetic and creative aspects), and creativity scale latent variables (i.e. manipulation of idea, generation of idea, and analogical /metaphorical thinking).

4. Results

4.1. Creativity

As indicated in Fig. 1, SEM was performed utilizing CFA to examine the influence of PBL impact to enhance creativity among kindergarten student teachers. According to the findings, the use of PBL had a favorable impact on the aspect of idea manipulation in the first group (ß = 0.90, $p < 0.05$) more than the traditional treatment in the second group (ß = 0.39, $p > 0.05$). Meanwhile, the use of PBL had also a favorable impact on the aspect of generation of idea in the first group (ß = 0.92, $p < 0.05$), more than the traditional treatment had in the second group (ß = 0.41, $p > 0.05$). In addition, the use of PBL had also a favorable impact on the aspect of analogical /metaphorical thinking in the first group (ß = 0.88, $p < 0.05$), more than the traditional treatment in the second group (ß = 0.33, $p > 0.05$).

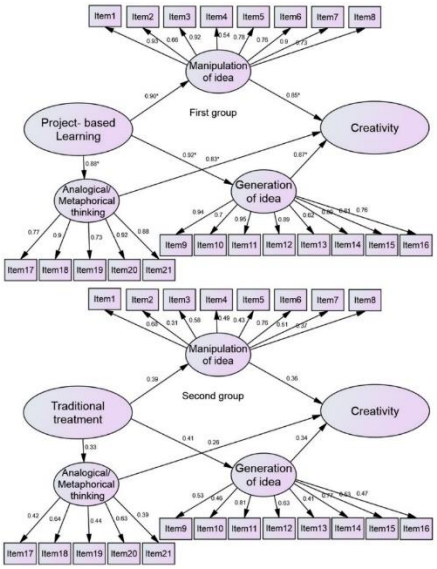

Figure 1: Creativity aspects' Multiple-group CFA model

Note. * $p \leq 0.05$; Fit indices: RMSEA = 0.022, CFI = 0.96, PRATIO = .92, IFI = 95, and CMIN ($\chi 2$)/df = .96 (CMIN = 192.7; df = 194; p = 0.74)

On the other hand, in terms of students' creativity, SEM findings revealed that the aspect of manipulation of idea had a favorable impact on the creativity of students in the first group (ß = 0.85, $p < 0.05$). But the aspect of manipulation of idea had a less impact on the creativity of students in the second group (ß = 0.36, $p > 0.05$). Meanwhile, the aspect of generation of idea had a favorable impact on the creativity of students in the first group (ß = 0.87, $p < 0.05$). Whereas, the aspect of generation of idea had a less impact on the creativity of students in the second group (ß = 0.34, $p > 0.05$). Besides, the aspect of analogical /metaphorical thinking had also a favorable impact on the creativity of students in the first group (ß = 0.83, $p < 0.05$). While, the aspect of analogical /metaphorical thinking had a less impact on the creativity of students in the second group (ß = 0.26, $p > 0.05$). Specifically, PBL had a positive and significant influence on the enhancement of kindergarten student teachers' creativity, that mediated by manipulation of idea, generation of idea, and analogical / metaphorical thinking.

4.2. Arts Skills

As indicated in Fig. 2, SEM was also performed utilizing CFA to examine the influence of PBL on developing arts skills among kindergarten student teachers. According to the findings, the use of PBL

had a favorable impact on the esthetic aspect in the first group (ß = 0.94, p < 0.05), whereas traditional treatment had a less impact on the esthetic aspect in the second group (ß = 0.35, p > 0.05). Meanwhile, the use of PBL had also a favorable impact on the creative aspect in the first group (ß = 0.89, p < 0.05), whereas, traditional treatment had a less impact on the creative aspect in the second group (ß = 0.37, p > 0.05).

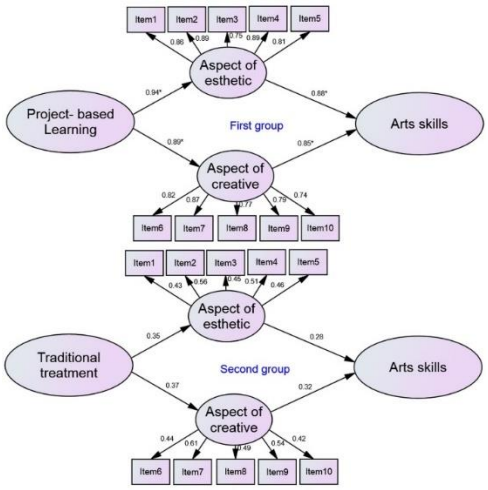

Figure 2: Arts skills aspects' Multiple-group CFA model

Note. * p ≤ 0.05; Fit indices: RMSEA = 0.043, CFI = 0.94, PRATIO = .97, IFI = 97, and CMIN (χ2)/df = .97 (CMIN = 190.9; df = 191; p = 0.92)

On the other hand, in terms of students' arts skills, SEM findings revealed also that the esthetic aspect had a favorable impact on the arts skills of students in the first group (ß = 0.88, p < 0.05). But the esthetic aspect had a less impact on the arts skills of students in the second group (ß = 0.28, p > 0.05). In addition, the creative aspect had a favorable impact on the arts skills of students in the first group (ß = 0.85, p < 0.05). Whereas, the creative aspect had a less impact on the arts skills of students in the second group (ß = 0.32, p > 0.05). Specifically, PBL had positive and significant influence on the development of kindergarten student teachers' arts skills, that mediated by esthetic and creative aspects.

5. Discussion

The goal of this research was to propose some visions for the vast potential of using PBL. It aspires to determine the impact of PBL to enhance creativity (mainly in the manipulation of idea, generation of idea, and analogical / metaphorical thinking), and develop arts skills (mainly skills in the esthetic and creative aspects) among kindergarten student teachers. The empirical results revealed that PBL had positive and significant influence on the enhancement of kindergarten student teachers' creativity mediated by: manipulation of idea, generation of idea, and analogical / metaphorical thinking. These results are in harmony to numerous earlier studies such as [4, 6, 11, 36]. Specifically, results of this research show the significant influence of PBL in enhancing student' manipulation of idea, which include "I do not reject to research my ideas", "I find the enthusiasm and energy if ideas may be interpreted in multiple ways", "putting different elements together can lead to creative ideas", "I am happy to find connections between ideas", "a solution can be found by approaching an issue from a different perspective", "it is possible to come to a new understanding by thinking about multiple ideas at the same time", "multiple ideas can be combined to create creative solutions", and "I prefer manipulating with ideas to come up with a creative idea". Results also prove that PBL was impact in enhancement student' generation of idea, which include "I feel like I have many good ideas for imagining all aspects of solving a problem", "the lecturer urges me to be creative", "I try to produce as many ideas as possible when working on a problem", "I work persistently to discovering new ideas", "I feel that I am good at generating novel ideas", "I try to look at the problem from a different angle when I am stuck of the solving", "I believe I am good at coming up with new solutions", and "I enlist the support of others to come up with possible answers when I am stuck on a problem". Besides, results prove that PBL was impact in enhancement student' analogical/ metaphorical thinking, which include "I try to apply prior solutions to the new problem when I am stuck of the solving", "working as part of a creative work group is something I appreciate", "good ideas come from combining previous solutions in novel ways", "my group is enthusiastic about trying new ideas", and "I try to find links between the new problem and other problems I have already solved when I am stuck of the solving". Results also showed that PBL had positive and significant influence on the development of kindergarten student teachers' arts

skills, mediated by: esthetic and creative aspects. These results corroborate the results of numerous earlier studies such as [61-64]. Results of this research also showed the significant influence of PBL in enhancing student' esthetic aspect, which include compatibility of used colors, keeping pace type of print with material used, the drawing method used gives a value of esthetic to the final product, student's drawing is elegant and sophisticated, and the drawing reflects the values of sense and esthetic for Student's natural environment. Results also prove that PBL was impactful in enhancing student' creative aspect, which includes: the drawing fulfills the aim of the occasion for which it was created, graphisme achieves authenticity in drawing, the drawing is quite detailed, the colors used in the drawing give it realism, and uniqueness is accomplished via drawing. As a result, it is strongly recommended that educational institutions should focus on PBL in order to achieve more success in mastering students' arts skills and creativity.

6. Conclusion

The primary purpose of this study was to determine the effect of PBL in enhancing creativity and developing arts skills among kindergarten student teachers. The empirical results revealed that PBL had positive and significant influence on the enhancement of kindergarten student teachers' creativity, mediated by: manipulation of idea, generation of idea, and analogical / metaphorical thinking. Results also showed that PBL had a positive and significant influence on the development of kindergarten student teachers' arts skills, mediated by: esthetic and creative aspects. The finding provides an important proof of PBL benefits in creativity and arts skills development.

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