

ENHANCING PAINTING SKILLS AND CREATIVITY AMONG VOCATIONAL STUDENTS THROUGH DESIGN-BASED LEARNING (DBL)*

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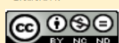
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Abstract

This quasi-experimental study examined the effects of a 12-week Design-Based Learning (DBL) art program on first-year preschool education major vocational students at Guangxi Vocational College of the Performing Arts. Twenty students participated in weekly sessions focused on line control, form proportion, light-shadow texture, color expression, composition perspective, and thematic creative practice. A painting skill assessment rubric (line control, proportion and perspective, composition, light-shadow value, color use, texture rendering, craftsmanship) and the Consensual Assessment Technique (CAT) for artistic creativity (novelty, appropriateness) reviewed by experts were used. Data were collected with a pre-test/post-test design and analyzed using paired-samples t tests; changes in score dispersion and stepwise skill mastery were also considered.

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Results showed substantial gains in painting skills (42.60 → 77.20) and artistic creativity (40.30 → 75.10), together with reduced variability across students and a progressive upward trend in phased skill assessment, indicating more consistent and step-by-step performance after the intervention. The findings support DBL as an effective student-centered, iterative, and context-oriented approach that fosters the integrated development of technical skills and creative expression in vocational painting education. Practical implications for lesson planning, skill training, and creativity cultivation in vocational art classes are discussed.

Keywords: Design-Based Learning, painting skills, artistic creativity, vocational students

Introduction

In the era of the creative economy, innovation, creativity, and visual communication skills have become essential competencies in the art and design industry. Vocational art education therefore needs to cultivate both technical painting skills and creative thinking so that students can respond to professional demands in real-world contexts. However, painting instruction in many vocational colleges still relies on traditional demonstration-and-imitation methods. Although this approach helps students develop basic technical skills such as line control, proportion, shading, and color use, it often fails to foster students' creative abilities. Many students can accurately replicate reference images but struggle to generate original ideas or solve real design problems, resulting in a gap between classroom learning and professional practice.

To address this issue, Design-Based Learning (DBL) has been proposed as an alternative instructional approach. DBL engages students in authentic design challenges and iterative processes such as defining problems, generating ideas,

creating prototypes, testing outcomes, and refining their work. Through this process, students develop both conceptual understanding and practical skills.

Although previous studies have shown that DBL can improve learning outcomes and deepen students' understanding, most research has focused on STEM education, with limited empirical studies in vocational visual art education. In the context of Chinese vocational education, where strong emphasis is placed on practical ability and industry relevance, there remains a need for effective teaching models that integrate technical training with creative application.

Therefore, this study applies a 12-week DBL teaching intervention in a vocational painting course to explore its effectiveness in improving students' painting skills and artistic creativity. The study aims to provide practical teaching guidance for vocational art education and support the development of creative talents required in the 21st century.

Objectives

1. To compare the painting skills of vocational students taught through Design-Based Learning (DBL) between pretest and posttest.
2. To examine the level of artistic creativity of vocational students taught through DBL.

Literature Review

Design-Based Learning (DBL) is a learner-centered instructional approach that emphasizes learning through authentic design challenges and iterative creative processes. In DBL environments, students develop knowledge and professional competencies by engaging in real-world design tasks and following an iterative cycle of empathizing with users, defining problems, generating ideas, prototyping solutions, testing outcomes, and refining designs (Razzouk & Shute, 2012; Gómez Puente et al., 2011). DBL is grounded in constructivism, design

thinking, and experiential learning theory, which emphasize active knowledge construction, user-centered problem solving, and reflective practice (Piaget, 1972; Kolb, 1984; Brown, 2009).

In vocational art education, painting skills involve technical execution, perceptual understanding, and expressive communication (Eisner, 2002). Core components include line control, proportion and perspective, composition, light-shadow value, color use, texture rendering, and craftsmanship (Huang, 2025). Artistic creativity refers to the ability to produce artworks that demonstrate both novelty and contextual appropriateness (Amabile, 1996), including originality, flexibility, and problem-solving ability (Kaufman & Beghetto, 2009).

DBL supports the development of both painting skills and creativity through authentic design tasks, iterative experimentation, and collaborative feedback (Oo et al., 2024; Zhang et al., 2023). However, empirical studies examining DBL in vocational painting education remain limited. Therefore, this study investigates the effectiveness of a 12-week DBL intervention in enhancing vocational students' painting skills and artistic creativity.

Methodology

Research Design

This study employed a one-group pretest–posttest quasi-experimental design to examine the effects of a Design-Based Learning (DBL) instructional program on vocational students' painting skills and artistic creativity. The intervention lasted 12 weeks, with one DBL session conducted each week. Each session lasted approximately 2–3 hours and followed a structured lesson plan based on the DBL iterative learning cycle.

The DBL process consisted of five interconnected stages: Empathize/Define, Ideate, Prototype/Make, Test/Reflect, and Iterate. Through this iterative process, students engaged in authentic design challenges, applied artistic

techniques in practical contexts, and refined their work through continuous feedback and reflection. This instructional structure encouraged experiential learning, collaborative exploration, and creative problem-solving.

The research design enabled comparison of students' performance before and after the intervention, allowing the study to evaluate the effectiveness of DBL in improving both painting skills and artistic creativity.

Setting and Participants

The research was conducted at Guangxi Vocational College of the Performing Arts, China, within the Basic Art (Painting) course for first-year students majoring in preschool education.

The population consisted of 120 first-year vocational students enrolled in the course. From this population, 20 students were selected through purposive sampling based on the following criteria:

1. No prior advanced formal training in painting
2. Ability to attend all 12 instructional sessions
3. Voluntary participation in the study with informed consent

The final sample included 20 students (10 males and 10 females) aged 18–20 years.

DBL Intervention Program

The intervention consisted of eight progressive DBL learning modules designed to integrate painting skill development with creative problem-solving in authentic design contexts.

The modules included:

1. Line and Observation – development of line control and observational accuracy through object drawing
2. Form and Proportion – exploration of spatial relationships using geometric still-life composition
3. Light and Texture – practice of tonal value and texture representation

4. Color and Emotion – application of color harmony and emotional expression

5. Composition and Perspective – development of compositional planning and perspective drawing

6. Thematic Artwork Development – campus-themed creative painting

7. Vocational Identity Expression – artwork related to preschool education contexts

8. Artwork Revision and Exhibition – final refinement and presentation of creative works

Each instructional session followed a consistent DBL lesson structure:

1. Contextual introduction and cultural hook
2. User or context exploration (Empathize)
3. Idea generation and planning (Ideate)
4. Prototype creation with teacher scaffolding (Prototype)
5. Testing and feedback (Test)
6. Reflection and iterative improvement (Reflect/Iterate)

This structure enabled students to apply artistic techniques in authentic contexts while engaging in collaborative learning and reflective practice.

Research Instruments

Painting Skill Assessment Rubric

Painting skills were assessed using an analytic rubric consisting of seven dimensions:

- line control
- proportion and perspective
- composition
- color use
- light-shadow value
- texture rendering
- craftsmanship

Each dimension was rated on a 5-point scale, resulting in a maximum score of 35 points.

Students completed a standardized still-life painting task (A3 format, 120 minutes) during both the pre-test and post-test. Two trained evaluators independently scored the artworks. Inter-rater reliability was verified using the Intraclass Correlation Coefficient ($ICC \geq 0.75$).

Artistic Creativity Assessment

Artistic creativity was evaluated using the Consensual Assessment Technique (CAT). Two domain experts independently assessed students' artworks according to two criteria:

- novelty
- appropriateness (communication effectiveness)

Each dimension was rated on a 7-point scale, producing a total score of 14 points. Inter-rater reliability was confirmed using Kendall's $W \geq 0.70$.

Expert Validation

All research instruments—including the DBL teaching plan, painting skill rubric, and creativity assessment criteria—were reviewed by three education experts and one art education specialist. Content validity was confirmed using the Index of Item-Objective Congruence (IOC), with values greater than 0.80.

Research Procedure

The research procedure consisted of four phases.

Phase 1: Program Development

A literature review and classroom observations were conducted to develop the DBL instructional framework. The initial teaching modules and lesson plans were reviewed by experts, and revisions were made based on their recommendations.

Phase 2: Pre-test

Prior to the intervention, students completed a standardized still-life painting task. Painting skills were evaluated using the analytic rubric, while artistic creativity was assessed by experts using the CAT method.

Phase 3: DBL Intervention

Students participated in the 12-week DBL instructional program, with one session conducted each week. Each session lasted approximately 2–3 hours and followed the DBL learning cycle. Students engaged in sketching, prototyping, and reflective activities while receiving guidance from the instructor and feedback from peers.

Phase 4: Post-test

After the intervention, students completed a parallel painting task under conditions equivalent to the pre-test. The artworks were evaluated using the same rubric and creativity assessment criteria. Process documentation, including sketches and reflective notes, was also collected to support interpretation of learning outcomes.

Data Analysis

Data were analyzed using SPSS statistical software. Descriptive statistics, including means and standard deviations, were calculated to examine students' painting skills and artistic creativity. Paired-samples t-tests were conducted to compare pre-test and post-test scores. Additionally, effect sizes (Cohen's d) were calculated to determine the magnitude of the intervention effects.

Results

This study investigated the effects of a Design-Based Learning (DBL) instructional intervention on vocational students' competences in the Basic Art (Painting) course. The intervention lasted 12 weeks and involved 20 first-year vocational students. Painting skills, artistic creativity, and learning literacy were

evaluated through pretest–posttest comparisons, while career adaptability was assessed after the intervention.

1. Comparison of Core Competences Before and After the DBL Intervention

Table 1 presents the comparison of students’ core competences before and after the DBL intervention. Comparison of Core Competences Before and After DBL (N = 20)

Dimension	Full Score	Pretest (M±SD)	Posttest (M±SD)	Improvement Rate
Painting Skills	100	42.6 ± 9.3	77.2 ± 7.8	81.2%
Artistic Creativity	100	40.3 ± 8.7	75.1 ± 7.6	86.4%
Learning Literacy	100	38.5 ± 10.2	72.3 ± 8.4	87.8%

The results indicate that students’ competences improved substantially after the DBL intervention. The mean score of painting skills increased from 42.6 to 77.2, while artistic creativity increased from 40.3 to 75.1. Similarly, learning literacy increased from 38.5 to 72.3. All three dimensions demonstrated improvement rates above 80%, suggesting that the DBL approach effectively supported students’ technical, creative, and learning competences.

2. Development of Painting Skills During the DBL Intervention

To examine learning progression during the DBL program, students’ performance was evaluated across eight instructional sessions.

Table 2 Skill Development Across DBL Sessions (Full Score = 10)

Session	Skill Focus	Mean (M±SD)	Pass Rate
1	Observation and Line Control	6.9 ± 1.4	75%

Session	Skill Focus	Mean (M±SD)	Pass Rate
2	Form and Proportion	6.7 ± 1.6	70%
3	Light and Texture	6.5 ± 1.5	65%
4	Color and Emotion	7.1 ± 1.3	80%
5	Composition and Perspective	6.8 ± 1.4	75%
6	Skill Integration	7.3 ± 1.2	85%
7	Vocational Expression	7.5 ± 1.1	90%
8	Artwork Refinement	8.0 ± 0.9	95%

The results reveal a progressive improvement in students' performance throughout the intervention. The mean score increased gradually across sessions, while the pass rate increased from 65% in early sessions to 95% in the final session, indicating steady development of painting skills during the DBL learning process.

3. Post-Intervention Outcomes

In addition to the pretest–posttest results, two additional competences were evaluated after the intervention: career adaptability and process-based learning performance.

Table 3 Post-Intervention Outcomes

Dimension	Full Score	Mean (M±SD)	Pass Rate
Career Adaptability	40	32.6 ± 5.3	75%
Process Performance	50	41.0 ± 5.9	85%
Portfolio Evaluation	30	24.8 ± 3.2	90%

The results indicate that most students achieved satisfactory performance in career adaptability and process-based learning outcomes. The high pass rates in process performance and portfolio evaluation suggest that students maintained consistent engagement and demonstrated progress throughout the DBL learning cycle.

Summary of Results

Overall, the findings indicate that the Design-Based Learning intervention significantly improved vocational students' painting skills, artistic creativity, and learning literacy. In addition, session-based analysis demonstrated a clear pattern of progressive skill development during the learning process. The post-intervention results further suggest that DBL supports students' career-related competences and sustained learning engagement, highlighting its potential as an effective instructional approach for vocational art education.

Discussion

The findings of this study indicate that the Design-Based Learning (DBL) intervention effectively improved students' painting skills and artistic creativity. The substantial increase in posttest scores suggests that learning through authentic design tasks enabled students to apply artistic techniques within meaningful visual communication contexts. Unlike traditional instruction that emphasizes isolated technique practice, DBL encourages students to use artistic skills to address design problems, which supports deeper conceptual understanding and skill integration (Mehalik et al., 2008).

The improvement in painting skills can also be explained by the iterative learning process embedded in DBL. The cycle of ideation, prototyping, critique, and revision allowed students to refine their artworks through continuous feedback. This iterative approach is consistent with design thinking pedagogy, which emphasizes reflection and improvement through repeated

experimentation (Razzouk & Shute, 2012). Through repeated revisions, students gradually improved their control of line, composition, color harmony, and tonal value.

Artistic creativity also showed significant improvement after the intervention. Creativity in this study was evaluated based on the combination of novelty and appropriateness, following Amabile's (1996) framework. The DBL learning environment encouraged students to explore multiple visual solutions and refine their ideas through critique and revision. This process supported the development of divergent thinking as well as the ability to communicate ideas effectively through visual forms.

In addition to artistic performance, the results suggest that DBL contributed to the development of learning literacy and career adaptability. DBL activities required students to engage in inquiry, collaboration, and reflective discussion during critique sessions. These activities strengthened students' abilities to articulate their creative ideas, respond to feedback, and improve their work through reflection. Furthermore, the use of authentic design contexts allowed students to experience how artistic skills can be applied in vocational settings, which may explain the positive outcomes related to career adaptability.

Although female students obtained slightly higher posttest scores in several dimensions, the overall improvement patterns were similar for both male and female students. The differences observed in this study should therefore be interpreted cautiously due to the small sample size. Overall, the results suggest that the DBL approach can effectively support diverse learners by providing opportunities for exploration, feedback, and iterative improvement.

Taken together, the findings support the view that DBL provides an effective instructional framework for integrating technical skill development with creative thinking in vocational art education. By combining authentic design challenges with iterative feedback processes, DBL enables students to develop both artistic competence and creative problem-solving abilities.

Recommendation

1. Policy Level Recommendations

Educational authorities and vocational education policymakers should promote the integration of Design-Based Learning (DBL) into art and vocational curricula. DBL should be formally recognized as an innovative pedagogical approach that fosters both technical painting skills and creative thinking. Curriculum frameworks should be revised to include project-based, real-world design tasks aligned with industry needs.

2. Institutional-Level Recommendations

Vocational institutions should:

- Develop flexible learning environments such as studios and creative labs that support experimentation and design processes.
- Provide adequate materials, tools, and digital technologies (e.g., graphic tablets, design software) to enhance both traditional and contemporary painting practices.
- Encourage collaboration with local artists, designers, and creative industries to expose students to authentic design experiences.

3. Instructional-Level Recommendations

Teachers should:

- Shift their role from knowledge transmitters to facilitators and mentors in the DBL process.
- Design learning activities that follow DBL stages such as problem identification, ideation, prototyping, creation, and reflection.
- Use open-ended projects that allow students to explore personal expression while solving design problems.
- Incorporate formative assessment methods, including portfolios, peer critique, and reflective journals.

4. Student-Level Recommendations

Students should be encouraged to:

- Actively engage in self-directed learning and creative exploration.
- Develop critical thinking and problem-solving skills through iterative design processes.

- Build personal artistic identity by integrating cultural context and individual experiences into their artwork.

- Collaborate with peers to enhance idea exchange and creative diversity.

5. Professional Development Recommendations

Continuous training programs should be provided for teachers to enhance their understanding of:

- DBL pedagogy and instructional design
- Contemporary art practices and digital tools
- Techniques for fostering creativity and innovation in vocational learners

6. Research Recommendations

Future research should:

- Explore the long-term impact of DBL on students' career readiness in creative industries.

- Compare DBL with other instructional approaches such as Problem-Based Learning (PBL) or Project-Based Learning in art education.

- Investigate the role of technology integration in enhancing painting creativity through DBL.

- Conduct cross-cultural studies to examine how DBL supports diverse artistic expressions.

7. Community and Industry Engagement Recommendations

- Establish partnerships with creative enterprises, galleries, and design studios to provide real-world project opportunities.

- Organize exhibitions and competitions to showcase student work developed through DBL.

- Encourage community-based art projects to strengthen students' social engagement and practical experience.

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