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Research Article

Development of learning achievement in career education using demonstration-based instructional packages for upper secondary students

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Abstract

This study investigated the effectiveness of demonstration-based instructional packages in enhancing learning achievement in Career Education among upper secondary students. A quasi-experimental design using a one-group pretest–posttest model was employed. The participants consisted of 38 Grade 12 students enrolled in a Career Education course at a public secondary school in Surin Province, Thailand. The intervention was implemented over 15 weeks, with one instructional hour per week, utilizing four instructional packages covering agricultural technology, animal husbandry principles, basic agro-industry, and career experience. Research instruments included lesson plans, demonstration-based instructional packages, a 40-item multiple-choice learning achievement test, and a student satisfaction questionnaire. Instrument quality was validated by subject-matter experts using the Item–Objective Congruence (IOC) index. Data were analyzed using descriptive statistics, instructional efficiency analysis (E1/E2), paired-samples t-tests, Effectiveness Index (EI), and satisfaction analysis. The results indicated that the instructional packages achieved an efficiency level of 81.05/80.20, exceeding the established 80/80 criterion. Students' posttest achievement scores ($\bar{x}$ = 32.08, SD = 2.53) were significantly higher than pretest scores ($\bar{x}$ = 17.21, SD = 2.57), $t(37) = 22.10$, $p < .001$. The Effectiveness Index value of 0.6524 reflected substantial learning improvement. Moreover, students reported a high level of satisfaction with the instructional approach ($\bar{x}$ = 4.32, SD = 0.77). These findings suggest that demonstration-based instructional packages effectively enhance learning achievement, instructional quality, and learner engagement in Career Education. The study provides empirical evidence to support the integration of structured demonstration-based pedagogy in vocational and competency-based education contexts.

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Introduction

Contemporary education emphasizes holistic learner development, lifelong learning, and the acquisition of transferable competencies necessary for social participation and employability. In Thailand, the National Education Act B.E. 2542 (1999) and the Basic Education Core Curriculum B.E. 2551 (2008) institutionalize learner-centered pedagogy, competency-based learning, and decentralization of educational management to promote academic quality and workforce readiness (Ministry of Education, 2008; Office of the National Education Commission [ONEC], 1999). These policy directions align with international frameworks advocating active learning, experiential engagement, and authentic skill development as foundations of effective secondary and vocational education (Kolb, 2015; Prince, 2004).

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Within the secondary curriculum, Career Education integrates practical domains such as technology, food processing, basic engineering, entrepreneurship, and community-based skills, requiring instructional approaches that effectively link conceptual understanding with procedural competence (Ministry of Education, 2008). However, empirical evidence from many school contexts indicates that conventional teacher-centered instruction often limits student engagement, hands-on practice, and higher-order thinking, resulting in suboptimal learning outcomes (Prince, 2004). Local assessment data further reflect persistent achievement gaps in practical subjects, signaling the need for instructional innovation that systematically supports skill acquisition and learner motivation.

Instructional packages provide a structured framework that integrates learning objectives, content sequencing, learning activities, and formative–summative assessment into coherent learning units, enabling consistency, learner autonomy, and instructional fidelity (Boonkerd, 1999). Complementarily, demonstration-based instruction emphasizes modeling, observation, guided practice, feedback, and reflection, facilitating procedural learning and psychomotor skill development through social and experiential mechanisms (Bandura, 1986; Khammani, 2002; Kolb, 2015). Empirical studies consistently report that demonstration and hands-on approaches enhance learning achievement, engagement, and skill transfer, particularly in vocational and applied learning environments (Kolb, 2015; Prince, 2004).

Despite these theoretical and empirical advantages, limited research has systematically examined the integration of demonstration-based pedagogy with structured instructional packages in upper secondary Career Education contexts, particularly within Southeast Asian educational systems. This gap constrains evidence-based curriculum design and scalable instructional innovation. Therefore, this study investigates the effects of demonstration-based instructional packages on learning achievement among upper secondary students in Career Education. The findings are expected to contribute empirical evidence to instructional design research, support competency-based curriculum implementation, and inform pedagogical innovation in vocational and skills-oriented education.

Objectives

- Develop and evaluate the efficiency of demonstration-based instructional packages in Career Education based on the 80/80 efficiency criterion.
- Compare students' learning achievement before and after instruction using the demonstration-based instructional packages.
- Determine the effectiveness index of the demonstration-based instructional packages in Career Education.
- Examine students' satisfaction toward learning through the demonstration-based instructional packages.

Method

Scope of the Study

This study examined the development of learning achievement in Career Education using demonstration-based instructional packages among upper secondary students. The scope of the study is defined as follows:

Population and Sample: The population comprised 237 Grade 12 students enrolled in Career Education courses at a public secondary school in Thailand during the first semester of the 2025 academic year. The sample consisted of 38 students from one intact class, selected through simple random sampling

Time Frame: The intervention was implemented over a period of 15 weeks, with one instructional hour per week, yielding a total instructional time of 15 hours. A total of two additional weeks were allocated for administering the pretest and posttest and completing the data collection process.

Content Scope: The instructional content covered four learning units: agricultural technology, animal husbandry principles, introductory agro-industry, and career experience. All instructional activities were delivered through demonstration-based instructional packages.

Research Site

The study was conducted at Thatum Prachasermwithaya School, located in Thatum Subdistrict, Thatum District, Surin Province, Thailand.

Research hypotheses

The research hypotheses were formulated as follows:

H1: The demonstration-based instructional packages in Career Education achieve instructional efficiency according to the 80/80 criterion.

H2: Students who learn through the demonstration-based instructional packages demonstrate significantly higher posttest learning achievement than pretest achievement.

H3: Students who learn through the demonstration-based instructional packages exhibit a high effectiveness index, indicating significant learning improvement.

H4: Students report a high level of satisfaction toward learning through the demonstration-based instructional packages.

Research Design

This study employed a quasi-experimental one-group pretest–posttest design to examine the effects of demonstration-based instructional packages on students' learning achievement in Career Education. The population consisted of 237 Grade 12 students enrolled in Career Education courses during the first semester of the 2025 academic year. A sample of 38 students from one intact class was selected using simple random sampling. The intervention was implemented over 15 weeks (15 instructional hours) and covered four instructional units: agricultural technology, animal husbandry principles, introductory agro-industry, and career experience.

The instructional intervention comprised four demonstration-based instructional packages supported by twelve lesson plans, each emphasizing modeling, guided practice, observation, feedback, and reflection. Prior to implementation, all instructional materials were reviewed and validated by three subject-matter experts for content relevance and instructional appropriateness using the Item–Objective Congruence (IOC) index, meeting the acceptance criterion of ≥ .50. Learning achievement was measured using a 40-item multiple-choice test, which demonstrated acceptable item difficulty, discrimination indices, and internal consistency reliability (KR-20). Students' learning satisfaction was assessed using a five-point Likert-scale questionnaire, validated for content validity and reliability using Cronbach's alpha.

Data collection followed a standardized procedure consisting of pretesting, instructional intervention, and posttesting. Instructional efficiency was evaluated using the E1/E2 efficiency criterion (80/80 standard), while learning achievement gains were analyzed using paired-samples t-tests. The effectiveness of the instructional packages was further examined using the Effectiveness Index (EI). Descriptive statistics were applied to analyze students' satisfaction levels. All statistical analyses were conducted to determine the instructional impact and learning improvement attributable to the demonstration-based instructional packages.

Research Instruments

Four research instruments were employed in this study: (1) lesson plans, (2) demonstration-based instructional packages, (3) a learning achievement test, and (4) a student satisfaction questionnaire.

Lesson Plans: Twelve lesson plans were developed to support the implementation of demonstration-based instructional packages across four instructional units: agricultural technology, animal husbandry principles, introductory agro-industry, and career experience. Each lesson plan specified learning objectives, instructional procedures, learning activities, instructional media, and assessment strategies aligned with the Basic Education Core Curriculum. The lesson plans emphasized modeling, guided practice, observation, feedback, and reflective discussion. Content validity and instructional appropriateness were evaluated by three subject-matter experts using a five-level rating scale. All lesson plans achieved acceptable mean ratings above the established criterion and were approved for classroom implementation.

Demonstration-Based Instructional Packages: Four instructional packages were developed to systematically organize instructional content, learning activities, and assessment procedures. Each package consisted of teacher guidelines, student instructions, learning standards, learning objectives, pretest and posttest tasks, content cards, activity cards, and performance-based practice tasks. The instructional packages were reviewed by three experts for content

alignment, instructional coherence, and usability using the Item–Objective Congruence (IOC) index. All items achieved IOC values above the acceptable threshold of .50, indicating adequate content validity.

Learning Achievement Test: Students' learning achievement was measured using a 40-item multiple-choice test with four response options. The test covered all instructional units and was constructed based on a table of specifications aligned with learning objectives and content standards. Content validity was examined by three experts using IOC analysis, yielding IOC values ranging from .67 to 1.00. The test was piloted with a comparable student group to determine item difficulty, discrimination indices, and reliability. Internal consistency reliability was established using the Kuder–Richardson Formula 20 (KR-20), demonstrating acceptable reliability for research purposes.

4. Student Satisfaction Questionnaire: Students' satisfaction toward learning through the instructional packages was assessed using a 10-item questionnaire employing a five-point Likert scale. The instrument evaluated students' perceptions of instructional clarity, learning engagement, instructional media, activity design, and overall learning experience. Content validity was verified by three experts using IOC analysis with all items exceeding the .50 criterion. Reliability was determined using Cronbach's alpha coefficient, indicating acceptable internal consistency. Descriptive statistics were used to analyze students' satisfaction levels.

Data Collection Procedure

Data collection was conducted over a 15-week instructional period during the first semester of the 2025 academic year. Prior to the intervention, participating students completed a pretest using the learning achievement test to establish baseline performance. The pretest was administered under standardized classroom conditions and supervised by the researcher.

Following the pretest, students received instruction through demonstration-based instructional packages across four instructional units. Instructional activities emphasized modeling, guided practice, observation, feedback, and reflective discussion. Each instructional session was implemented according to the prepared lesson plans to ensure instructional consistency and fidelity.

Upon completion of the instructional intervention, students completed the posttest using the same learning achievement test, with reordered items and response options to minimize recall effects. Test administration procedures were identical to those used for the pretest.

In addition, students completed a student satisfaction questionnaire immediately after the posttest to evaluate their perceptions of the instructional approach, learning engagement, and instructional materials. Participation was voluntary, and responses were collected anonymously to ensure confidentiality and reduce response bias.

All collected data were coded and organized for statistical analysis. Learning achievement scores were used to examine instructional efficiency, effectiveness index, and pre–post learning gains, while questionnaire responses were analyzed to determine overall satisfaction levels.

Duration of the Intervention

This study was conducted during the first semester of the academic year 2025. The instructional intervention was implemented over a period of 15 weeks, with one instructional hour per week, yielding a total of 12 instructional sessions. In addition, two weeks were allocated for administering the pretest and posttest and completing the data collection process, as shown in Table 1.

Table 1. Schedule of instructional sessions and learning contents

Session	Date (2025)	Instructional Package	Content
1	June 19	Package 1	Biotechnology
2	June 26	Package 2	Crop Production System Technology
3	July 3	Package 3	Livestock Housing System Technology
4	July 10	Package 4	Fundamental Principles of Animal Husbandry
5	July 17	Package 5	Types of Animal Farming
6	July 24	Package 6	Investment in Animal Farming
7	July 31	Package 7	Meaning and Importance of Agro-Industry
8	August 7	Package 8	Components of Agro-Industry
9	August 14	Package 9	Agro-Industrial Processing
10	August 21	Package 10	Product Preservation and Storage
11	August 28	Package 11	Essential Career Skills
12	September 4	Package 12	Income and Expense Accounting

Data Analysis

Data were analyzed using both descriptive and inferential statistical methods in order to examine the quality of the instructional materials and the effects of the instructional intervention (Creswell & Creswell, 2018).

Analysis of Instructional Package Quality as follows:

First, the quality of the instructional packages was evaluated by subject-matter experts in terms of content appropriateness and suitability for students using the Item–Objective Congruence (IOC) index (Rovinelli & Hambleton, 1977).

Second, instructional efficiency was analyzed by calculating process efficiency (E1) and outcome efficiency (E2) in accordance with the 80/80 efficiency criterion (Brahmawong, 2010).

Third, students' learning achievement before and after the intervention was compared using a paired-samples t-test to determine statistically significant learning gains (Field, 2018).

Analysis of Learning Achievement Test Quality: The quality of the learning achievement test was examined through psychometric analysis. Content validity was evaluated using IOC analysis (Rovinelli & Hambleton, 1977). Item quality was analyzed by calculating the difficulty index (p) and discrimination index (r) (Ebel & Frisbie, 1991). Internal consistency reliability was determined using the Kuder–Richardson Formula 20 (KR-20) (Kuder & Richardson, 1937).

Analysis of Student Satisfaction Questionnaire: Students' satisfaction data were analyzed using item-level descriptive statistics, primarily frequency and percentage distributions, to determine overall satisfaction levels toward the instructional approach (Likert, 1932; Pallant, 2020).

Results

This section presents the empirical findings of the study examining the effectiveness of demonstration-based instructional packages in enhancing students' learning achievement in Career Education. The results include analyses of instructional efficiency, pretest–posttest comparisons, effectiveness index evaluation, and students' satisfaction. The results are presented as follows.

As presented in Table 2, the mean pretest score was 17.21 (SD = 2.57), whereas the mean posttest score increased to 32.08 (SD = 2.53). The paired-samples t-test revealed a statistically significant difference between pretest and posttest scores, $t(37) = 22.10$, $p = .001$, indicating a substantial improvement in students' learning achievement following the implementation of the demonstration-based instructional packages.

These findings demonstrate that students achieved significantly higher learning outcomes after participating in the instructional intervention.

Table 2. Instructional efficiency of the demonstration-based instructional packages (n = 38)

Measure	Maximum Score	$(\overline{x})$	SD	(%)	E1/E2
In-class Activity Performance (E1)	60	48.63	3.04	81.05	81.05 / 80.20
Posttest Achievement (E2)	40	32.08	2.53	80.20	

Note. E1 = process efficiency; E2 = outcome efficiency.

The instructional efficiency of the demonstration-based instructional packages was evaluated using the E1/E2 efficiency criterion with a sample of 38 Grade 12 students. As shown in Table 1, students achieved a mean score of 48.63 out of 60 on in-class activity performance (E1), representing 81.05% (SD = 3.04). The mean posttest score (E2) was 32.08 out of 40, equivalent to 80.20% (SD = 2.53). The overall instructional efficiency was calculated as 81.05/80.20, which exceeded the established 80/80 criterion, indicating satisfactory instructional effectiveness.

Unit-Level Learning Performance

Students demonstrated consistently positive performance across all instructional units, with mean unit scores ranging from 3.71 to 4.63 (Table 3). The highest mean score was observed in Unit 1 ($\overline{x}$ = 4.63, SD = 0.71), followed by Unit 5 ($\overline{x}$ = 4.47, SD = 0.76), indicating strong engagement and mastery of foundational and applied content. The lowest mean score occurred in Unit 7 ($\overline{x}$ = 3.71, SD = 0.61); however, this value remained within a satisfactory performance range. Overall, the average unit performance score was 4.06, reflecting stable learning continuity and consistent engagement throughout the instructional intervention.

Table 3. Unit Performance Summary Across Instructional Packages (n = 38)

Instructional Unit	Mean $(\overline{x})$	SD
Unit 1	4.63	0.71
Unit 2	4.08	0.71
Unit 3	4.00	0.77
Unit 4	3.79	0.78
Unit 5	4.47	0.76
Unit 6	4.05	0.46
Unit 7	3.71	0.61
Unit 8	4.08	0.97
Unit 9	4.03	0.82
Unit 10	3.97	0.72
Unit 11	3.84	1.00
Unit 12	3.97	0.43
Overall Mean	**4.06**	—

Note. Scores were based on a five-point rating scale reflecting students' performance in each instructional unit.

Comparison of Pretest and Posttest Learning Achievement

Students' learning achievement before and after the instructional intervention was compared using a paired-samples t-test with a sample of 38 Grade 12 students. As presented in Table 2, the mean pretest score was 17.21 (SD = 2.57), whereas the mean posttest score increased to 32.08 (SD = 2.53). The paired-samples t-test revealed a statistically significant difference between pretest and posttest scores, t(37) = 22.10, p = .001, indicating a substantial improvement in students' learning achievement following the implementation of the demonstration-based instructional packages.

These findings demonstrate that students achieved significantly higher learning outcomes after participating in the instructional intervention.

Table 4. Comparison of Pretest and Posttest Learning Achievement (n = 38)

Measure	n	$(\overline{x})$	SD	t	p
Pretest	38	17.21	2.57	22.10	.001
Posttest	38	32.08	2.53		

Note. Paired-samples t-test; df = 37; significance level = .05.

Effectiveness Index of the Instructional Packages

The effectiveness of the demonstration-based instructional packages was evaluated using the Effectiveness Index (EI) with a sample of 38 Grade 12 students.

As shown in Table 3, the total pretest score was 654, while the total posttest score increased to 1,219 out of a maximum possible score of 1,520. The calculated EI value was 0.6524, indicating that students achieved approximately 65.24% of the possible improvement beyond their initial performance.

These results demonstrate a substantial learning gain attributable to the instructional intervention.

Table 5. Effectiveness Index (EI) of the Demonstration-Based Instructional Packages (n = 38)

Test	Maximum Score	Total Score	Effectiveness Index (EI)
Pretest	40	654	0.6524
Posttest	40	1,219	

Note. EI was calculated using the formula:EI = (Posttest total score – Pretest total score)/ (Maximum possible score – Pretest total score).

Students' Satisfaction

Students' satisfaction toward the demonstration-based instructional packages was analyzed using descriptive statistics, including mean scores, standard deviations, and percentage distributions. As shown in Table 5, the overall satisfaction level was high (M = 4.32, SD = 0.77, 86.34%). The three highest-rated items were: overall satisfaction with the course (Item 10; M = 4.53, SD = 0.62), fairness and coverage of assessment (Item 8; M = 4.47, SD = 0.68), and instructional preparation and time management (Item 1; M = 4.30, SD = 0.80). All individual items were rated at either high or very high levels, indicating positive student perceptions of instructional quality, learning engagement, assessment fairness, and practical applicability. These findings suggest that students perceived the instructional approach as effective, engaging, and supportive of their learning experience.

Table 6. Students' Satisfaction Toward the Demonstration-Based Instructional Packages (n = 38)

Item	$(\bar{x})$	SD	(%)	Satisfaction Level
1. Instructional preparation and time management	4.30	0.80	86.09	High
2. Teacher personality and communication	4.00	0.93	80.00	High
3. Clarity of explanation and responsiveness	4.26	0.71	85.26	High
4. Learning activities and classroom atmosphere	4.32	0.70	86.36	High
5. Individual attention to students	4.29	0.89	85.88	High
6. Use of learning resources and media	4.33	0.78	86.67	High
7. Hands-on learning and critical thinking	4.32	0.70	86.36	High
8. Fairness and coverage of assessment	4.47	0.68	89.47	Very High
9. Applicability to daily life	4.33	0.88	86.67	High
10. Overall satisfaction	4.53	0.62	90.67	Very High
Overall	**4.32**	**0.77**	**86.34**	**High**

As summarized in Table 7, all four research hypotheses were supported. The instructional packages achieved efficiency exceeding the 80/80 criterion (H1), and students demonstrated significantly higher posttest achievement compared with pretest performance (H2). The effectiveness index indicated substantial learning improvement (H3), while student satisfaction was rated at a high level (H4). These results collectively confirm the effectiveness, instructional quality, and positive learner perceptions of the demonstration-based instructional packages.

Table 7. Summary of Hypothesis Testing Results

Hypothesis	Statistical Indicator	Key Result	Decision
H1	E1/E2	81.05 / 80.20 (>80/80)	Supported
H2	Paired t-test	t(37) = 22.10, p = .001	Supported
H3	Effectiveness Index (EI)	EI = 0.6524	Supported
H4	Satisfaction (Mean %)	M = 4.32 (86.34%)	Supported

Note. All hypotheses were tested at $\alpha = .05$.

Discussion

The findings of this study demonstrate that the demonstration-based instructional packages effectively enhanced students' learning achievement in Career Education across multiple dimensions, including instructional efficiency, academic performance, learning effectiveness, and learner satisfaction. The instructional efficiency values (E1/E2 = 81.05/80.20) exceeded the established 80/80 criterion, indicating that the instructional packages achieved high quality in both learning processes and learning outcomes. This result confirms that systematically designed instructional packages can promote consistency of instruction, structured sequencing of learning activities, and alignment between objectives, activities, and assessment, which collectively contribute to improved instructional effectiveness (Boonkerd, 1999; Wongsaphan, 2012). Similar findings have been widely reported in Thai educational research, where instructional innovations that meet the 80/80 benchmark are considered pedagogically sound and scalable within school contexts.

The significant improvement in posttest achievement compared with pretest performance further supports the effectiveness of the intervention. Students' posttest scores were significantly higher than their pretest scores, indicating substantial learning gains after exposure to the demonstration-based instructional packages. This outcome aligns with social cognitive theory, which emphasizes learning through observation, modeling, and guided practice, allowing learners to internalize procedural knowledge and skill execution more effectively (Bandura, 1986). Moreover, experiential learning theory suggests that concrete experience and active experimentation strengthen knowledge construction and skill transfer, particularly in vocational and applied learning contexts (Kolb, 2015). Consistent with international literature, active and hands-on instructional approaches generally yield higher learning outcomes than traditional lecture-based instruction, especially in subjects requiring procedural competence and practical application (Prince, 2004).

The Effectiveness Index (EI = 0.6524) further indicates that students achieved approximately 65% of the maximum possible learning improvement beyond their baseline performance. This metric provides meaningful evidence of learning growth beyond statistical significance, reflecting the magnitude of instructional impact. In Thai educational research, the Effectiveness Index is frequently used to quantify learning progression resulting from instructional innovation and has been interpreted as a robust indicator of instructional success when values exceed moderate thresholds. The relatively high EI obtained in this study suggests that demonstration-based instructional packages effectively facilitated incremental learning development across the instructional period.

Students also reported a high level of satisfaction toward the instructional approach (M = 4.32, SD = 0.77). The highest-rated aspects included overall satisfaction, fairness and coverage of assessment, and instructional preparation and time management. These perceptions reflect learners' positive engagement with structured instructional delivery, clarity of demonstrations, and transparency of evaluation procedures. Prior research indicates that student satisfaction is strongly associated with perceived instructional quality, relevance of learning activities, and opportunities for hands-on engagement (Noguera et al., 2024). The demonstration-based approach likely enhanced learner confidence, reduced ambiguity in task execution, and increased perceived usefulness of learning content for real-life application, thereby strengthening positive learning attitudes.

These findings are consistent with both Thai and international empirical studies demonstrating that demonstration-based and active learning approaches significantly improve student achievement, skill acquisition, and learning motivation in vocational and applied disciplines (Okotubu, 2024; Prince, 2004; Thissana Khammani, 2002). The integration of structured instructional packages further strengthened instructional fidelity and learning coherence, supporting sustainable instructional quality at the classroom level.

Nevertheless, the interpretation of results should consider methodological limitations. The study employed a one-group pretest–posttest quasi-experimental design, which may be susceptible to internal validity threats such as maturation, testing effects, and external influences (Luan & Saisy, 1995). Future research should incorporate control groups, randomized designs, or longitudinal follow-up assessments to enhance causal inference and examine the sustainability of learning gains. Additionally, reporting effect size indices and qualitative learning evidence may further strengthen the robustness of instructional evaluation.

From a pedagogical perspective, the findings support the adoption of demonstration-based instructional packages as a viable instructional strategy for Career Education and skill-oriented subjects. Such instructional models align well with competency-based education, experiential learning principles, and workforce-oriented curriculum frameworks. Scaling this approach may contribute to improving instructional quality, learner engagement, and practical skill development in secondary education settings.

Recommendations

Implications and Recommendations

The findings of this study provide several practical and academic implications for instructional improvement in Career Education and related vocational contexts.

- Teachers are encouraged to adopt demonstration-based instructional packages as a systematic approach to enhance students' procedural understanding, hands-on skills, and learning motivation, particularly in subjects that require practical competence and applied learning. Structured instructional packages can support instructional consistency, learning alignment, and formative assessment integration.
- School administrators should support professional development programs focusing on instructional design, demonstration pedagogy, and competency-based assessment to ensure sustainable implementation across subject areas. Institutional support, including instructional resources and collaborative curriculum development, can further enhance instructional quality and scalability.
- Curriculum developers and educational policymakers may utilize the empirical evidence from this study to support the integration of demonstration-based and experiential learning strategies into competency-based curriculum frameworks, particularly within vocational and career-oriented education systems.

Future Research Directions

Regarding future research, subsequent studies should expand sample sizes across multiple schools and educational contexts to improve generalizability. More rigorous experimental designs, including randomized control trials or comparison group studies, are recommended to strengthen causal inference. Future research should also investigate broader learning outcomes, such as skill transfer, problem-solving ability, career readiness, and long-term retention. Additionally, exploring hybrid instructional models that integrate demonstration with digital technologies or game-based learning may provide further insights into scalable instructional innovation. Cost-effectiveness and implementation feasibility studies are also recommended to support policy-level adoption.

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