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ENHANCING PHILOSOPHICAL CONCEPT ACQUISITION THROUGH THE 5E LEARNING CYCLE MODEL

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Abstract

This quasi-experimental study investigated the effectiveness of the 5E Learning Cycle Model (Engage, Explore, Explain, Elaborate, Evaluate) in enhancing philosophical concept acquisition among eleventh-grade students in the Kurdistan Region of Iraq. Seventy-two male students from Sêmêl Preparatory School for Boys participated during the 2024–2025 academic year. Two intact eleventh-grade sections were randomly assigned to conditions, with the experimental group ($n = 38$) receiving instruction structured according to the five phases of the 5E model and the control group ($n = 34$) taught using conventional, textbook-centered methods. Instructional content covered three chapters from the Grade 11 Philosophy textbook: Introduction to Philosophy, Logic and Critical Thinking, and Ethics and Moral Philosophy. A 30-item philosophical concept acquisition test assessing definition, discrimination, and application levels (Kuder-Richardson 20 reliability = .83) was administered as both pre-test and post-test. Independent samples t-test revealed statistically significant differences ($p < .05$) favoring the experimental group in post-test performance ($t = 7.214$, $df = 70$). A paired samples t-test confirmed substantial within-group improvement in the experimental group ($t = 18.936$, $df = 37$). Large effect sizes (Cohen's $d = 1.71$ and $d = 4.07$) underscore the practical significance of these findings, although the magnitude of these effects should be interpreted in light of the single-site sample, the relatively small group sizes, and the nine-week intervention duration. These results support the integration of the 5E Learning Cycle Model into secondary philosophy curricula and highlight the need for professional development programs that equip teachers with constructivist pedagogical skills. A key limitation is the single-school, all-male sample and the nine-week intervention period, which constrain generalizability and preclude assessment of long-term retention. The study's novelty lies in extending the 5E model—previously examined mainly within science and mathematics education—into philosophy instruction within a Kurdish secondary school context, an area in which empirical evidence has thus far been absent.

INTRODUCTION

The cultivation of deep conceptual understanding remains a persistent challenge in education, as a gap often exists between surface-level recall and the flexible, transferable comprehension required for authentic intellectual engagement (Bransford et al., 2000; National Research Council, 2012). Philosophy education exemplifies this tension acutely, demanding not merely familiarity with doctrines but the capacity to reason analytically, discriminate among adjacent concepts, and apply abstract principles to novel situations (Lipman, 2003; Cam, 2014).

Traditional transmission-based instruction in secondary philosophy classrooms tends to produce what cognitive scientists' term 'inert knowledge'—information recalled on examinations but rarely deployed in reasoning or transferred to new contexts (Whitehead, 1929; Bransford et al., 2000; Murris, 2016). Students may accurately name the major ethical theories yet be unable to evaluate a moral dilemma or recite the laws of syllogistic logic yet fail to detect a fallacy in everyday argumentation.

Constructivist learning theory, rooted in Piaget's (1970) developmental psychology and Vygotsky's (1978) sociocultural account, offers an alternative: learners build understanding through active engagement with content, prior knowledge, and social interaction rather than passive reception of transmitted information (Fosnot, 2005). Constructivist pedagogies position students as active knowledge-constructors, emphasize inquiry and dialogue, and require demonstration of understanding across varied contexts (Jonassen, 1991; Brooks & Brooks, 1999).

Among constructivist frameworks, the 5E Learning Cycle Model—Engage, Explore, Explain, Elaborate, Evaluate, developed by Bybee and colleagues under the Biological Sciences Curriculum Study (BSCS) project—has demonstrated consistent effectiveness across subject domains and educational levels (Bybee et al., 2006; Duran & Dökme, 2016; Trowbridge et al., 2004). Recent studies continue to confirm these gains: Mohammad ALebous (2025) reported significant improvements in scientific concept acquisition and habits of mind among Jordanian secondary students taught through an integrated 5E approach, while Kim et al. (2025) demonstrated that 5E-structured instruction enhances knowledge and confidence even in professional clinical training contexts.

Despite this accumulating evidence, the application of the 5E model to philosophy instruction remains almost entirely unexamined empirically (Minner et al., 2010; Bybee, 2015), and current 5E research remains concentrated in science, mathematics, and clinical education rather than the humanities (Mohammad ALebous, 2025; Kim et al., 2025). This gap is especially pronounced in the Kurdistan Region of Iraq, where philosophy has recently been expanded in secondary curricula to foster critical thinking and civic reasoning (Ben Messi & Khazar, 2011; Shahini et al., 2025), yet teachers report persistent reliance on textbook-centered instruction owing to large class sizes and pre-service preparation that prioritizes content over pedagogical innovation (Dzaiy & Abdullah, 2024; Sulaiman & Abdullah, 2024).

The present study addresses this gap by empirically testing the 5E Learning Cycle Model in secondary philosophy instruction, assessing concept acquisition at three progressively complex levels—definition, discrimination, and application—to provide a multidimensional portrait of learning gains. Its novelty lies in being among the first quasi-experimental investigations to extend the 5E model from the science and mathematics domains into philosophy education within a Kurdish secondary context, offering evidence-based guidance for curriculum designers, teacher educators, and policymakers in comparable settings.

RESEARCH OBJECTIVE

The research aims to investigate the effectiveness of an instructional strategy based on the 5E Learning Cycle Model in acquiring philosophical concepts among eleventh-grade secondary students.

LITERATURE REVIEW

The 5E Learning Cycle Model: Theoretical Foundations

The 5E Learning Cycle Model was developed by Bybee and colleagues at the Biological Sciences Curriculum Study (BSCS) as a structured approach to inquiry-based instruction grounded in constructivist learning theory (Bybee et al., 2006; Bybee, 2015). Its theoretical antecedents trace to Herbart's five formal steps of instruction (19th century), Dewey's (1938) emphasis on experiential learning, and Piaget's (1970) equilibration model, which conceptualizes learning as a cyclical process of cognitive disequilibrium and subsequent restructuring through assimilation and accommodation. Atkin and Karplus (1962) formalized these ideas into the original three-phase Learning Cycle (Exploration, Invention, Discovery), which Bybee et al. (1989) subsequently expanded into the five-phase 5E model.

Each of the five phases fulfils a distinct pedagogical function. The Engage phase activates prior knowledge and stimulates curiosity through provocative questions, puzzling phenomena, or contemporary dilemmas (Trowbridge et al., 2004). The Explore phase provides students with direct experiences through collaborative investigation, enabling them to construct preliminary conceptual understandings (Wilder & Shuttleworth, 2005). During the Explain phase, the teacher introduces formal concepts, vocabulary, and explanations aligned with students' exploratory findings (Bybee, 2015). The Elaborate phase extends understanding by requiring students to apply concepts to new contexts and more complex problems, thereby promoting transfer of learning (Eisenkraft, 2003). Finally, the Evaluate phase employs diverse formal and informal assessment strategies to gauge the depth and breadth of conceptual understanding achieved (Çepni, 2017).

Empirical Evidence for the 5E Model

The 5E model has accumulated substantial empirical support across science and mathematics education. Minner et al. (2010), reviewing 138 studies of inquiry-based science instruction, and Freeman et al. (2014), in a meta-analysis of 225 STEM studies, both found that active, student-centered approaches characteristic of the 5E model produce significantly greater conceptual understanding and achievement than teacher-centered didactic instruction. At the secondary level, Duran and Dökme (2016), Çepni (2017), Wilder and Shuttleworth (2005), and Trowbridge et al. (2004) report consistent gains in conceptual understanding, retention, and higher-order thinking among biology and science students. The model's benefits also generalize beyond science: Liu and Chen (2022) and Nasir et al. (2024) found that constructivist methodologies, including the 5E model, consistently outperform traditional instruction for complex conceptual material across subject areas.

Philosophy Education and Conceptual Understanding

Philosophy education presents distinctive pedagogical challenges that render active, constructivist approaches particularly appropriate, as philosophical concepts are highly abstract, require discrimination among subtly differentiated positions, and demand application across diverse contexts (Lipman, 2003; Cam, 2014). Murris (2016) argues that traditional, memorization-based instruction produces knowledge about philosophy rather than philosophical knowledge itself. The Philosophy for Children (P4C) movement (Lipman, 2003; Matthew, 1994) provides instructive evidence here: P4C implementations consistently document improvements in argument construction, conceptual discrimination, and logical reasoning (Shahini et al., 2025; Pala, 2022), suggesting that positioning students as active philosophical thinkers—the principle underlying the 5E model's exploration and explanation phases—produces more robust learning. Concept acquisition research adds further grounding: Klausmeier (1992) established that robust acquisition requires definitional knowledge, discriminative capacity, and applicative competence simultaneously, implying that effective instruction must deliberately address all three dimensions rather than definitional knowledge alone.

Adolescent Cognitive Development and Philosophical Thinking

Secondary education is a developmentally privileged period for cultivating philosophical thinking. Piaget's (1970) theory of formal operations characterizes adolescence

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as the stage at which abstract reasoning, hypothetical thinking, and systematic consideration of possibilities emerge, while Vygotsky's (1978) sociocultural framework emphasizes that such higher psychological functions develop through socially mediated dialogue. However, research indicates that the expression of formal operational capacity is highly sensitive to instructional context, requiring structured opportunities for guided discovery and metacognitive reflection (Kuhn, 2015; Young et al., 2024). The 5E model's collaborative Explore and Elaborate phases, together with its progression from concrete engagement to abstract explanation to contextual application, provide precisely this kind of scaffolded environment for developing philosophical reasoning.

Assessment, Motivation, and Transfer in Constructivist Frameworks

Assessment practices profoundly shape students' learning strategies and conceptual engagement (Young et al., 2024). Whereas traditional philosophy assessment relies on recall-based formats that present philosophical learning as fact accumulation rather than the development of thinking (Pala, 2022), the 5E model's integrated Evaluate phase embeds continuous formative assessment that supports learning refinement and metacognitive development (Le & Nguyen, 2024). Constructivist learning environments also generate higher intrinsic motivation than teacher-centered instruction (Nguyen et al., 2023), and the Elaborate and Evaluate phases specifically address transfer of learning—a persistent challenge in philosophy education—by requiring demonstration of understanding across diverse contexts (Eisenkraft, 2003; Freeman et al., 2014).

The Educational Context: Kurdistan Region of Iraq

Educational research in the Kurdistan Region of Iraq and comparable Middle Eastern contexts highlights distinctive challenges for philosophy instruction, including limited pedagogical preparation among teachers and a cultural emphasis on a transmissive rather than a constructive approach to knowledge (Ben Messi & Khazar, 2011). Active learning strategies have been shown to significantly improve educational outcomes in regional higher education (Dzaiy & Abdullah, 2024) and consistently outperform conventional approaches across Kurdish educational contexts more broadly (Sulaiman & Abdullah, 2024), supporting the expectation that the 5E model would prove beneficial in an environment where traditional, teacher-centered instruction predominates.

METHODOLOGY

Research Hypotheses and Delimitations

Two corresponding null hypotheses were tested at $\alpha = .05$: (H1) there is no statistically significant difference between the post-test mean scores of the experimental group (5E Learning Cycle Model) and the control group (conventional method) on philosophical concept acquisition; and (H2) there is no statistically significant difference between the experimental group's pre-test and post-test mean scores on philosophical concept acquisition.

The research was delimited to eleventh-grade male students enrolled in morning preparatory schools, specifically at Sêmêl Preparatory School for Boys (Sêmêl District, Duhok Governorate, Kurdistan Region, Iraq), during the first semester of the 2024–2025 academic year, and to instructional content drawn from the first three chapters of the Grade 11

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Principles of Philosophy textbook: Introduction to Philosophy, Logic and Critical Thinking, and Ethics and Moral Philosophy.

Research Design

This study employed a quasi-experimental, non-equivalent control group design with pre-test and post-test measurements—a "partially controlled" design in the sense that intact classroom sections, rather than individually randomized students, were assigned to conditions, while pre-intervention equivalence between groups was statistically verified (see Table 3). The experimental group received instruction through the 5E Learning Cycle Model, while the control group received conventional instruction—a teacher-led, textbook-centered approach in which the teacher presented definitions, theories, and examples directly from the textbook, followed by whole-class question-and-answer review and individual seatwork exercises, without the structured Engage–Explore–Explain–Elaborate–Evaluate sequence used in the experimental group. The design enabled examination of both between-group differences and within-group changes over the instructional period, consistent with established practices in educational intervention research conducted in authentic school settings (Creswell, 2014).

Table 1. Research Design Schema

Group	Pre-Test	Independent Variable	Dependent Variable (Post-Test)
Experimental (n=38)	✓	5E Learning Cycle Model	Philosophical Concept Acquisition Test
Control (n=34)	✓	Conventional Teaching Method	Philosophical Concept Acquisition Test

Participants and Setting

The research population comprised all eleventh-grade male students enrolled in secondary schools administered by Sêmêl Education Directorate in Duhok Governorate, Kurdistan Region, Iraq, during the 2024–2025 academic year, totaling 527 students distributed across 11 schools. The research site was selected through purposive sampling: Sêmêl Preparatory School for Boys was chosen based on administrative cooperation and logistical feasibility. On this site, the two available eleventh-grade sections (intact, pre-existing classes) were then randomly assigned to the experimental and control conditions a by coin toss, since random assignment of individual students across sections was not administratively feasible. Following exclusion of students with excessive absences or prior course failures, the final sample comprised 72 students: 38 in the experimental group (Section B) and 34 in the control group (Section D).

The study was conducted in accordance with institutional ethical guidelines for educational research involving minors. Approval to conduct the intervention was obtained from the Sêmêl Education Directorate and the school administration prior to data collection. Informed consent was obtained from school authorities and homeroom teachers, and parents were informed of the study's purpose and procedures through the school; students were informed that participation in the testing was voluntary, would not affect their course grades, and that their responses would be anonymized and reported only in aggregate form.

Table 2. Distribution of Research Sample by Group

Group	Teaching Method	Section	Initial Sample	Excluded	Final Sample
Experimental	5E Learning Cycle Model	B	41	3	38
Control	Conventional Method	D	38	4	34
Total			79	7	72

Prior to initiating the intervention, equivalence between groups was established across five variables that may influence philosophical concept acquisition: intelligence scores, overall academic achievement, chronological age, prior knowledge of philosophical content, and pre-test performance on the concept acquisition instrument. Independent samples t-tests revealed no statistically significant differences between groups on any equivalence variable ($p > .05$), confirming initial group comparability.

Table 3. Group Equivalence Test Results

Variable	M (Exp.)	SD (Exp.)	M (Ctrl.)	SD (Ctrl.)	t Value	df	Equivalence
Intelligence Score	17.42	2.38	17.09	2.21	0.612	70	Equivalent
Overall Academic Achievement	71.34	8.17	70.58	7.94	0.401	70	Equivalent
Chronological Age (months)	197.21	7.84	198.06	8.12	0.457	70	Equivalent
Prior Knowledge of Philosophy	11.89	2.31	11.44	2.18	0.853	70	Equivalent
Pre-Test Score	12.63	2.57	12.18	2.44	0.771	70	Equivalent

Note. *Critical t-value at $\alpha = .05$ (two-tailed) with df = 70 is 2.000.*

Instructional Materials

The instructional content encompassed the first three chapters from the Grade 11 Principles of Philosophy textbook (Ministry of Education, Kurdistan Region, 2023 edition): Introduction to Philosophy, Logic and Critical Thinking, and Ethics and Moral Philosophy. These chapters collectively address 55 philosophical concepts distributed across 13 subtopics, providing substantive content for examining the 5E model's effectiveness in promoting conceptual understanding.

Table 4. Content Analysis Results for the Three Chapters

Chapter	Concepts	Terminology	Theories	Principles	Figures	Methods	Total
Chapter One: Introduction to Philosophy	17	11	2	4	3	5	42
Chapter Two: Logic and Critical Thinking	22	14	3	3	4	2	48
Chapter Three: Ethics and Moral Philosophy	16	11	4	2	5	1	39
Total	55	36	9	9	12	8	129

Content analysis identified concept types (primary/secondary), terminology, theories, principles, historical figures, and methodological approaches within the instructional material. This analysis informed the development of 105 behavioral objectives distributed across Bloom's taxonomy levels: remembering (25), understanding (31), applying (15), analyzing (18), synthesizing (8), and evaluating (8).

Table 5. Distribution of Behavioral Objectives According to Bloom's Taxonomy

Chapter	Remember	Understand	Apply	Analyze	Synthesize	Evaluate	Total
Chapter One	7	9	4	5	2	2	29
Chapter Two	10	12	6	7	3	3	41
Chapter Three	8	10	5	6	3	3	35
Total	25	31	15	18	8	8	105
Percentage	23.81%	29.52%	14.29%	17.14%	7.62%	7.62%	100%

Subsequently, 27 lesson plans were developed for each instructional condition. Experimental group plans were structured according to the five phases of the 5E Learning Cycle, while control group plans followed conventional instructional sequences. Experimental group instruction incorporated the five 5E framework elements:

Engage: Provocative philosophical questions and contemporary dilemmas were presented to stimulate cognitive curiosity and activate prior knowledge.

Explore: Students engaged in collaborative discussions, small-group investigations, and self-directed inquiry to construct preliminary conceptual understandings.

Explain: Formal philosophical concepts, definitions, and theoretical explanations were introduced in light of students' exploratory findings.

Elaborate: Students applied philosophical principles to novel scenarios, alternative case studies, and contemporary ethical dilemmas to deepen and extend their understanding.

Evaluation: Ongoing formative assessment through questioning, exit tickets, and peer discussion monitored understanding and guided instructional adjustment.

Instrument Development

The Philosophical Concept Acquisition Test was developed specifically for this research to assess students' understanding across three cognitive levels: definition, discrimination, and application. Initial instrument development involved identifying 10 primary concepts from the 55 concepts in the instructional content, selected to represent each chapter proportionally and encompass varied philosophical domains (epistemology, logic, ethics).

Table 6. Test Specification Table for Philosophical Concept Acquisition

Chapter	Total Concepts	%	Concepts Selected	Definition Level (33.33%)	Discrimination Level (33.33%)	Application Level (33.33%)	Total Test Items
Ch. One: Intro to Philosophy	17	31%	3	3	3	3	9 (30%)
Ch. Two: Logic & Critical Thinking	22	40%	4	4	4	4	12 (40%)
Ch. Three: Ethics & Moral Philosophy	16	29%	3	3	3	3	9 (30%)
Total	55	100%	10	10 (33.33%)	10 (33.33%)	10 (33.33%)	30 (100%)

The instrument comprised 30 items distributed equally across three sections: (1) matching items assessing definitional knowledge, (2) multiple-choice items evaluating discriminative capacity to distinguish concepts from related alternatives, and (3) multiple-choice items incorporating novel scenarios to measure applicative competence. Each correct response received one point, yielding total scores ranging from 0 to 30.

Content validity was established through expert review by seven specialists in philosophy education and instructional methodology, who evaluated item clarity, content coverage, and appropriateness of cognitive level. Items receiving less than 80% of the expert agreement were revised or replaced. The instrument underwent pilot testing with 50 students from Netewe Preparatory School for Boys (excluded from the main study) on October 12, 2024. Item analysis revealed difficulty indices ranging from .36 to .72 and discrimination indices ranging from .30 to .64, all meeting acceptable psychometric standards per Ebel and Frisbie's (1991) criteria. Internal consistency reliability, calculated using Kuder-Richardson Formula 20, was .83, indicating satisfactory reliability for research purposes (Nunally & Bernstein, 1994).

Data Collection Procedures

The instructional intervention spanned nine weeks from October 17 through December 23, 2024, with three 45-minute instructional periods per week, excluding holidays and examination periods. The researcher personally delivered all instructions to both groups to control instructor effects.

Table 7. Lesson Distribution Schedule Across Nine Weeks

Week	Chapter	Topics Covered	No. of Lessons
Week 1	One	What is Philosophy? / Branches of Philosophy	3
Week 2	One	Philosophical Methods / Philosophy and Other Disciplines	3
Week 3	Two	Principles of Logic / Deductive Reasoning	3
Week 4	Two	Inductive Reasoning / Types of Arguments	3
Week 5	Two	Logical Fallacies / Critical Thinking Skills	3
Week 6	Three	Meta-ethics / Normative Ethics (Part 1)	3
Week 7	Three	Normative Ethics (Part 2) / Ethical Theories	3
Week 8	Three	Applied Ethics / Contemporary Ethical Issues	3
Week 9	Three	Moral Reasoning / General Review	3
Total			27

The Philosophical Concept Acquisition Test was administered as a pre-test on October 15, 2024, one week before intervention initiation, and as a post-test on December 26, 2024, three days following intervention completion. Testing sessions occurred in regular classrooms under standardized conditions with clear instructions emphasizing that performance would not affect course grades. Testing required approximately 40 minutes based on pilot testing results.

Data Analysis

Data analysis employed SPSS Version 27 for all statistical procedures. Independent sample tests examined post-test differences between the experimental and control groups in total and subscale scores (definition, discrimination, application). Paired samples t-tests analyzed pre-test to post-test changes within the experimental group to assess intervention effects independent of comparison group performance. Statistical significance was evaluated at α = .05 for all analyses. Effect sizes were calculated using Cohen's d to supplement significance testing with practical significance estimates, with values of .20, .50, and .80 interpreted as small, medium, and large, respectively (Cohen, 1988).

RESULTS AND DISCUSSION

RESULTS

Preliminary analyses confirmed that assumptions for parametric testing were satisfied. Kolmogorov-Smirnov tests indicated approximately normal distributions for all variables ($p > .05$), and Levene's tests confirmed homogeneity of variance between groups ($p > .05$).

Hypothesis One: Between-Group Comparison

The first null hypothesis stated: "There is no statistically significant difference at the α = .05 level between mean scores of the experimental group taught using the 5E Learning Cycle Model and the control group taught using conventional methods on the post-test of philosophical concept acquisition."

Table 8. Independent Samples t-Test Results for Post-Test Philosophical Concept Acquisition

Group	n	M	SD	t	df	p	Cohen's d
Experimental	38	23.84	2.76	7.214	70	<.001	1.71
Control	34	18.41	3.38				

Note. *Maximum possible score = 30. Critical value at α = .05 (two-tailed) with df = 70 is 2.000.*

Results indicate that the experimental group (M = 23.84, SD = 2.76) significantly outperformed the control group (M = 18.41, SD = 3.38) on post-test concept acquisition, t (70) = 7.214, $p < .001$, Cohen's d = 1.71, representing a difference of approximately 1.71 standard deviations between group means. These findings led to rejection of the null hypothesis, indicating that the post-test scores of students taught using the 5E Learning Cycle Model were significantly higher than those of students taught using conventional methods.

Hypothesis Two: Within-Group Comparison

The second null hypothesis stated: "There is no statistically significant difference at the α = .05 level between mean pre-test and post-test scores of the experimental group on philosophical concept acquisition."

Table 9. Paired Samples t-Test Results for Experimental Group Pre-Test and Post-Test

Assessment	n	M	SD	t	df	p	Cohen's d
Pre-test	38	12.63	2.57	18.936	37	<.001	4.07
Post-test	38	23.84	2.76				

Note. *Maximum possible score = 30. Critical value at α = .05 (two-tailed) with df = 37 is 2.026.*

The experimental group's post-test performance ($M = 23.84$, $SD = 2.76$) significantly exceeded pre-test performance ($M = 12.63$, $SD = 2.57$), $t(37) = 18.936$, $p < .001$, Cohen's $d = 4.07$. The increase from pre-test to post-test corresponds to a relative gain of approximately 88.8%, calculated as $[(23.84 - 12.63) / 12.63] \times 100$. The null hypothesis was rejected, indicating that students taught using the 5E model showed statistically significant growth in conceptual understanding across the nine-week instructional period. The total test score reported here aggregates performance across the definition, discrimination, and application items; level-by-level (subscale) comparisons were not analyzed separately in the present study but would be a useful addition for future reporting.

DISCUSSION

The present findings provide evidence supporting the effectiveness of the 5E Learning Cycle Model for enhancing philosophical concept acquisition among eleventh-grade students. The experimental group's superiority over the control group on the post-test assessment and its substantial pre-test to post-test improvement, both reported above, provide empirical support for implementing this pedagogical framework in secondary philosophy education. These findings contribute to growing evidence that constructivist instructional approaches produce stronger learning outcomes than traditional transmission-oriented pedagogies, particularly for complex conceptual material requiring deep understanding (Nasir et al., 2024; Liu & Chen, 2022).

Several interconnected mechanisms likely account for the 5E model's observed effectiveness. The Engage phase's deliberate activation of prior knowledge and curiosity through philosophically rich provocations created motivational conditions associated with deeper cognitive engagement, helping students process new information meaningfully and integrate it with existing knowledge structures (Nguyen et al., 2023; Bransford et al., 2000). This motivational priming effect is particularly consequential in philosophy, where the perceived relevance and intellectual vitality of content significantly influence engagement.

The Explore phase then provided collaborative, inquiry-driven opportunities for students to construct preliminary understandings through dialogue and peer interaction, consistent with Vygotsky's (1978) sociocultural account of conceptual development and with research showing that dialogue-based approaches enhance conceptual discrimination and the quality of reasoning in philosophy education (Lipman, 2003; Cam, 2014). This collaborative exploration also created conditions for identifying and challenging misconceptions before they became entrenched—a process Piaget (1970) identifies as essential for genuine conceptual change.

The sequential structure of the Explain and Elaborate phases ensured that formal conceptual introduction (Explain) was preceded by experiential grounding (Explore) and followed by contextually varied application (Elaborate), directly addressing the multilevel conception of concept acquisition articulated by Klausmeier (1992)—definitional knowledge, discriminative capacity, and applicative competence. Finally, the Evaluate phase's emphasis on formative assessment embedded throughout instruction provided continuous feedback that helped students monitor and refine their emerging understandings (Young et al., 2024; Le & Nguyen, 2024), contrasting with conventional instruction's reliance on terminal summative evaluation, which offers no opportunity for learning refinement during the instructional sequence.

The findings also illuminate the limitations of conventional philosophy instruction exemplified by the control group. Despite competent teaching and adequate instructional time, the control group's relatively modest gains suggest that traditional approaches emphasizing content presentation and textbook-centered activities produce limited conceptual understanding, echoing concerns raised throughout the philosophy education literature regarding conventional instruction's inadequacy for developing genuine philosophical competence (Murris, 2016; Pala, 2022). The effect sizes reported above substantially exceed the threshold that educational researchers generally consider educationally significant (Freeman et al., 2014); this may partly reflect the particular responsiveness of abstract philosophical content to active, meaning-making pedagogies, with concepts that have resisted comprehension under transmission-oriented instruction proving especially amenable to constructivist approaches that ground abstraction in concrete exploration and collaborative dialogue.

Several study limitations warrant acknowledgement. The exclusively male sample reflects gender-segregated schooling in the research context but limits generalizability to female students. The nine-week intervention, while sufficient for detecting effects, may not reveal long-term retention or delayed transfer effects. The researcher served as instructor for both groups, creating potential for inadvertent expectancy effects despite efforts to maintain equivalent treatment. Additionally, the study examined concept acquisition as the sole outcome measure, without assessing other valued philosophical competencies, such as argument construction quality, participation in philosophical dialogue, or the development of philosophical dispositions. Notwithstanding these limitations, the findings carry implications for theory, practice, and future research, considered in turn below.

Theoretical Contribution (What is new?). The present findings extend constructivist learning theory and Klausmeier's (1992) multilevel model of concept acquisition beyond their established disciplinary base in science and mathematics education into the domain of philosophy. By demonstrating that the 5E sequence—Engage, Explore, Explain, Elaborate, Evaluate—produces substantial gains on a test designed to span definition, discrimination, and application items, the study contributes evidence that abstract, highly conceptual humanities content responds to the same cyclical, experience-then-formalization logic that underlies inquiry-based instruction in the sciences. This suggests that the theoretical mechanisms long associated with the 5E model—activation of prior knowledge, social construction of meaning, and contextual transfer—operate as domain-general principles rather than being specific to empirically grounded subjects, thereby broadening the theoretical reach of constructivist instructional design. Future analyses disaggregating performance by cognitive level would help determine whether these gains are evenly distributed across definitional, discriminative, and applicative competence.

Practical Implications (So What?). For classroom practice, the findings indicate that philosophy teachers do not need to abandon disciplinary rigor to adopt active pedagogy: structuring a lesson sequence around an engaging provocation, collaborative exploration, formal explanation, applied elaboration, and embedded evaluation is feasible within a standard 45-minute period and an existing national curriculum. For school leaders and curriculum developers, the magnitude of the observed gains suggests that reallocating professional development time toward 5E lesson design—rather than additional content-delivery training—is likely to yield a favorable return in student learning outcomes. For policymakers in the Kurdistan Region and similar contexts, the results provide a concrete, locally generated evidence base that can support the inclusion of constructivist methods in philosophy teacher-training standards and textbook guidance, rather than relying solely on evidence imported from science education.

Recommendations and Future Actions (Now What?). Building on these findings, schools should pilot 5E-based lesson sequences for at least one full unit of the philosophy curriculum before wider rollout, accompanied by short, practice-embedded workshops that allow teachers to co-plan Engage and Elaborate activities around locally relevant ethical and logical dilemmas. Teacher-education institutions should incorporate a dedicated module on inquiry-based humanities pedagogy, using the present study's lesson plans as worked exemplars. Finally, researchers should follow this quasi-experimental study with mixed-sex samples, delayed post-tests to gauge retention, and qualitative classroom observation to identify which of the five phases contributes most to the gains documented here.

CONCLUSION

This study found that students taught the Grade 11 philosophy curriculum through the 5E Learning Cycle Model outperformed those taught through conventional, textbook-centered methods on post-test concept acquisition, and showed marked gains from pre-test to post-test, with effect sizes that were large by conventional benchmarks. Its contribution to philosophy education is twofold: it provides one of the first quasi-experimental tests of the 5E model outside the science and mathematics domains in which it was originally developed, and it offers a concrete instructional template—structured around engaging provocations, collaborative exploration, formal explanation, applied elaboration, and embedded formative assessment—that philosophy teachers can adapt within existing curricula. These results should, however, be interpreted in light of the study's limitations: the single-school, all-male sample, the nine-week intervention period, and the use of a single instructor across both conditions constrain how broadly the findings can be generalized. Future research extending this design to mixed-sex samples, multiple schools, delayed post-tests, and subscale-level analysis of definitional, discriminative, and applicative competence would help establish the robustness and boundaries of these findings. Overall, the study suggests that the 5E Learning Cycle Model is a promising, transferable framework for strengthening the acquisition of philosophical in secondary education.

RECOMMENDATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Recommendations for Educational Practice

The 5E Learning Cycle Model should be systematically incorporated into philosophy instruction at the secondary level, with particular attention to implementing all five phases as an integrated pedagogical sequence rather than selectively adopting isolated elements. Professional development programs should be designed and sustained to prepare philosophy teachers for effective constructivist pedagogy, encompassing facilitation of philosophical dialogue, design of exploratory activities, provision of formative feedback, and orchestration of collaborative learning environments. Curriculum developers should revise philosophy curricula to prioritize depth of understanding over breadth of content coverage, selecting generative topics that enable rich conceptual connections, contemporary relevance, and authentic application—characteristics central to effective 5E Engage and Elaborate phases. Educational policymakers should support evidence-based pedagogical innovation by providing adequate implementation resources, reducing class sizes to enable collaborative and dialogic instruction, and reforming assessment systems to reward conceptual understanding and higher-order thinking rather than fact recall. Teacher preparation programs should incorporate constructivist pedagogies into pre-service education, ensuring that prospective philosophy teachers experience student-centered instruction as learners and develop practical competence in implementing such approaches as teachers.

Directions for Future Research

Longitudinal studies should examine whether conceptual gains produced by the 5E model are maintained over extended periods and transfer to more advanced philosophy coursework. Replication studies including female students should be conducted to assess whether the model's effectiveness generalizes across gender in gender-segregated educational contexts. Component analysis research should investigate which specific phases of the 5E model contribute most substantially to observed conceptual gains, informing efficient implementation by identifying essential versus supplementary elements. Future studies should broaden outcome assessment beyond concept acquisition to encompass argument construction quality, philosophical dialogue participation, critical thinking skills, and dispositional outcomes including intellectual humility and openness to alternative perspectives. Comparative studies examining the 5E model alongside other constructivist frameworks (e.g., Problem-Based Learning, Socratic seminars, Philosophy for Children) would clarify the relative contributions of different pedagogical approaches to philosophical concept acquisition. Research should explore the potential for technology-enhanced implementation of the 5E model in philosophy education, examining how digital tools and online collaborative platforms might enrich each of the five phases.

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