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Trilogy of Philosophy of Science Thinking as a Stimulation of Collaboration Skills in Asian Community Education courses

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Abstract. The Collaborative abilities are essential for student achievement in the educational environment of the twenty-first century. Nonetheless, both international and domestic evaluations have shown that college students frequently struggle to collaborate well with others, interact critically, and co-create knowledge. In order to foster collaborative abilities, this study intends to investigate the effects of incorporating the Trilogy of Scientific Philosophy Thinking ontology, epistemology, and axiology into the Asian Community Education course. The study used a posttest-only control group and a quasi-experimental design. Two courses were used: the control group got case studies with no philosophical integration, whereas the experimental group was instructed using case studies enhanced with philosophical trilogy materials. Purposive sampling was used to choose the sample, which included 60 college students. A collaborative skills questionnaire was used to gather data, and both descriptive and inferential statistics were used for analysis. According to the results, the experimental group outperformed the control group on all four aspects of collaboration: respect for variety, communication, accountability, and interdependence ($p < 0.05$). These findings demonstrate how philosophical reasoning might improve students' ability to work together in a meaningful way. Building future-ready students and transformational community educators requires introspective, ethical, and integrative thinking, all of which are fostered by incorporating philosophical frameworks into learning modules.

Keywords: Collaborative, Skills, Scientific, Philosophy, Trilogy.

1 Introduction

Collaborative competency has become a critical skill set in academic and professional fields worldwide in the twenty-first century [1]. The capacity to collaborate is becoming essential rather than elective as the globe grows more linked and transdisciplinary issues take center stage in the socioeconomic environment. International standards like the World Economic Forum's Future of Jobs report and the OECD's Programme for International Student Assessment (PISA) continuously emphasize teamwork as one of the essential skills needed for success in the future [2], [3]. The low collaborative ability of students is a real issue in Indonesian higher education, in line with the challenges of 21st century education at the national level. Despite this worldwide focus, a worrying pattern continues: university students' collaboration skills, especially in Asia, continue to fall short of expectations. Research and educational assessments conducted nationally in Indonesian higher education have shown that students frequently struggle with co-constructive problem-solving, active listening, and respect for different points of view all of which are essential components of cooperation [4], [5], [6]. Courses that address sociocultural aspects, like Asian Community Education, where interdependence and communal consciousness are major themes, exacerbate these difficulties even more.

From a global standpoint, collaboration has emerged as a critical competency in the 21st-century workforce and education systems. The OECD's Programme for International Student Assessment (PISA) has explicitly assessed students' collaborative problem-solving skills since 2015, revealing that many learners struggle to engage effectively in teamwork, particularly in diverse and digital contexts. Countries like Indonesia have consistently ranked below the OECD average in collaborative performance, indicating a gap in both instructional strategies and skill acquisition among students.

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The apparent discrepancy between the curriculum's requirements for encouraging teamwork and the real results in terms of student conduct and involvement is what spurred this study [7], [8], [9]. In higher education, traditional teaching methods usually place an emphasis on rote learning, individual accomplishment, and hierarchical teacher-student relationships. As a result, students seldom ever get the chance to participate in philosophical, introspective discussions that call for group reasoning and reciprocal investigation [10], [11]. The current study suggests using the Trilogy of Scientific Philosophy Thinking, which consists of ontology, epistemology, and axiology, as a fresh and intellectually sound way to foster collaborative thinking in order to close this educational gap.

With its well-organized philosophical framework, the trilogy encourages students to consider the nature of reality (ontology), the extent and reliability of knowledge (epistemology), and the aspects of human action that are motivated by values (axiology) [12], [13]. By interacting with these aspects, students are able to develop critical thinking skills as well as an awareness of the limitations of their own viewpoints, which creates an atmosphere in which teamwork naturally follows from inquiry [14], [15]. Since the course material naturally addresses pluralism, cultural empathy, and shared identity themes that are both intellectually stimulating and socially necessary the incorporation of this philosophical approach into the Asian Community Education course is especially pertinent [16], [17], [18], [19].

Philosophical inquiry in education encourages critical thinking, ethical reflection, and the examination of assumptions. In higher education, integrating philosophical frameworks such as ontology, epistemology, and axiology can deepen students' understanding of knowledge, values, and existence. These elements align well with collaborative learning by fostering open dialogue, intellectual humility, and co-construction of meaning. Inquiry-based philosophical models, such as the Community of Inquiry, have been shown to enhance cognitive presence and social engagement.

Collaborative learning has gained increasing prominence in contemporary pedagogy as a key strategy for fostering 21st-century competencies. It emphasizes shared responsibility, interdependence, and mutual goal-setting among students. In higher education, it is particularly relevant for developing teamwork, problem-solving, and intercultural competence. Studies indicate that well-structured collaborative learning environments enhance both cognitive and social outcomes. However, effective collaboration requires intentional scaffolding, especially in multicultural or diverse classrooms.

It is clear that there is a practical gap in the educational techniques used today: whereas collaborative learning is frequently recommended, strategies for fostering authentic collaborative participation are still lacking. Innovative teaching approaches that combine the development of soft skills like communication, openness, and consensus-building with in-depth philosophical inquiry are conspicuously lacking [20]. Furthermore, the ways in which philosophical thinking especially when viewed through the prism of scientific philosophy can function as a cognitive framework for cooperative action are seldom examined in the literature. By developing and putting into practice a methodology that uses the three pillars of philosophy to reframe students' thought processes, communication styles, and collaborative knowledge creation in group learning environments, this study aims to close that gap.

Soft skills such as communication, adaptability, empathy, leadership, and conflict resolution are critical for personal and professional success. Educational institutions are now under pressure to equip graduates not only with hard knowledge but also with emotional intelligence and teamwork capabilities. Collaborative learning provides a natural platform for soft skill development, as it involves negotiation, accountability, and responsiveness to diverse perspectives. Recent research emphasizes the role of experiential and inquiry-based learning in embedding soft skills into the learning process.

In addition to enhancing academic performance, this study is urgently needed to prepare students for real-world problems where teamwork is essential. Innovative pedagogical interventions become a crucial goal as higher education institutions are expected to generate graduates who are not only informed but also socially intelligent and team-oriented. The suggested approach is a useful tactic for resolving one of the most enduring skill gaps in higher education, in addition to providing a theoretical contribution to educational philosophy and pedagogy. Recent interdisciplinary research highlights the synergy between collaborative learning, soft skill acquisition, and philosophical thinking. When students engage in philosophical discussions within a collaborative structure, they develop metacognitive awareness, emotional regulation, and civic responsibility. This integration has shown promise in teacher education, community-based learning, and global citizenship education, particularly in Asian contexts where collective values are deeply rooted.

The convergence of collaborative learning, soft skills development, and philosophical inquiry presents a robust pedagogical foundation for preparing future-ready learners. It not only addresses the cognitive demands of academic learning but also nurtures the affective and ethical dimensions of education. This holistic approach is especially pertinent in higher education settings aiming to foster global competence and socially responsible graduates.

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In summary, this study is crucial because it offers a well-founded, multidisciplinary answer to a national and worldwide educational issue. This study hopes to provide a revolutionary approach to community-based learning by using the trilogy of scientific philosophy to encourage collaborative thinking. In the end, it hopes to develop a generation of students who are not only academically proficient but also mindful of collaboration.

2 Methods

This study offers a significant and timely contribution to the field of philosophy of education by demonstrating how philosophical thinking particularly the Trilogy of Scientific Philosophy (ontology, epistemology, and axiology) can serve as a powerful framework to bridge the often fragmented gap between educational theory and pedagogical practice in collaborative learning. In order to assess the impact of using the Trilogy of Scientific Philosophy Thinking on students' collaborative abilities in the Asian Community Education course, this study used a quasi-experimental research methodology with a posttest-only control group design. Participants in this design are split into two groups, the experimental group, which is treated using case-based learning enhanced with resources based on the ontology, epistemology, and axiology of scientific philosophy, and the control group, which is exposed to the same case-based learning approach but does not incorporate the philosophical content based on the trilogy. By comparing posttest results across the two groups, this method enables the researcher to isolate the influence of the philosophical intervention.

Traditionally, educational philosophy has been viewed as a domain reserved for abstract thought, while collaborative learning has been explored primarily through psychological, cognitive, or sociocultural lenses. This study challenges that separation by integrating philosophical inquiry directly into the learning process. By embedding ontological reflection (the nature of being), epistemological critique (the nature and source of knowledge), and axiological awareness (the nature of values and ethics) into collaborative case-based learning, students are not only engaging in academic content but also questioning, justifying, and constructing shared meanings with their peers.

This approach allows students to move beyond surface-level teamwork into deeper metacognitive, ethical, and critical engagement, positioning philosophy as a practical and transformative tool within classroom collaboration. It also empowers learners to reflect on their roles, assumptions, and responsibilities as members of a learning community. Thus, this study reframes philosophical education as not merely theoretical, but as an active pedagogical force a means to cultivate reflective, ethical, and dialogical collaboration. In doing so, it strengthens the alignment between educational ideals and classroom realities, contributing a unique model for future-ready, value-based higher education in both Asian and global contexts.

Incorporate elements of ontological, epistemological, and axiological reflection into collaborative learning activities. Encourage students to question their assumptions, explore diverse perspectives, and evaluate the ethical implications of their decisions. This deepens the quality of collaboration and supports critical, reflective dialogue. Use case studies that require students to work interdependently. Assign clear roles within groups to promote accountability, and ensure that the learning outcomes emphasize mutual achievement rather than individual performance. Real-world, community-oriented cases are especially effective in promoting authentic engagement. Develop assessment rubrics that explicitly measure soft skills such as communication, leadership, adaptability, and empathy. Provide students with regular formative feedback on their collaborative behaviors to build self-awareness and social responsibility. In multicultural contexts such as Indonesia and Asia more broadly, honor local cultural values like gotong royong (mutual cooperation) by integrating them into collaborative norms and practices. Acknowledge and leverage collectivist traditions as assets in designing group learning activities.

Undergraduate students enrolling in the Asian Community Education course at a certain university during the academic year in which the research is done make up the study's population. Two complete classes are purposefully selected from this demographic based on how comparable the course material and academic level are. To guarantee that the groups are similar in terms of background traits like age, gender distribution, and past academic performance, one class is designated as the experimental group and the other as the control group.

Table 1. Collaborative Skills Questionnaire Integrated with the Trilogy of Scientific Philosophy

Indicator	Statement
1. Active Participation	1. I actively contribute my ideas during group discussions related to community issues in Asia. 2. I engage in collective decision-making with group members when solving problems. 3. I share responsibilities fairly in group tasks. 4. I remain involved in discussions, even when my opinion differs

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	from others. 5. I consistently encourage others to participate in our group activities.
2. Respect for Diverse Perspectives	6. I show appreciation for the different cultural perspectives expressed in the group. 7. I listen carefully to others' viewpoints before responding. 8. I avoid dominating conversations and give space for others to speak. 9. I respect ideas that challenge my own assumptions, particularly on philosophical topics like the nature of reality (ontology). 10. I consider both individual and communal perspectives when analyzing Asian societal issues.
3. Joint Problem Solving	11. I contribute to identifying community problems from multiple viewpoints, including philosophical perspectives. 12. I work collaboratively to analyze evidence before proposing solutions. 13. I am willing to revise my solutions after receiving input from peers. 14. I apply knowledge critically and reflectively when solving real-world issues, such as in community education. 15. I recognize the importance of aligning solutions with shared values (axiology) in group decision-making.
4. Shared Reflection and Knowledge Construction	16. I reflect on the reasoning process used by my team when drawing conclusions. 17. I help construct group understanding based on philosophical questioning (epistemology). 18. I integrate various sources of knowledge in collaborative projects, including traditional, empirical, and philosophical knowledge. 19. I value the process of co-creating meaning through dialogue with peers. 20. I engage in reflective dialogue to evaluate the impact of our actions in the community based on ethical and philosophical values.

Both descriptive and inferential statistical approaches are used for the data analysis strategies. Measures of central tendency and variability are among the descriptive statistics used to characterize and summarize the students' degrees of collaborative skill. To ascertain if the posttest results of the experimental and control groups differ significantly, inferential statistics like the independent samples t-test are used. In the end, this combination of analytical techniques validates the function of philosophical stimulation in improving students' collaborative ability by providing a thorough knowledge of both the trends and the statistical significance of the observed effects.

Table 2. Research Hypotheses Table

No.	Type of Hypothesis	Hypothesis Statement (English)	Explanation
1	Null Hypothesis (H_0)	There is no significant difference in collaborative skills between students who receive trilogy-based philosophical instruction and those who do not.	This hypothesis assumes that the trilogy of scientific philosophy does not influence the students' level of collaboration in the course.
2	Alternative Hypothesis (H_1)	There is a significant difference in collaborative skills between students who receive trilogy-based philosophical instruction and those who do not.	This hypothesis suggests that the instructional integration of ontology, epistemology, and axiology improves collaborative abilities among students.

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The findings of the posttest data analysis, particularly utilizing inferential statistical techniques like the independent samples t-test, will be analyzed in order to decide if the null hypothesis (H_0) should be accepted or rejected. This exam compares the experimental group's (students exposed to the Trilogy of Scientific Philosophy Thinking) and control group's (students getting traditional teaching) mean scores on collaborative abilities.

The following standards are used in the decision-making process: 1) There is no statistically significant difference between the two groups if the t-test's p-value (significance threshold) is higher than 0.05. As a result, the null hypothesis (H_0) is accepted, and it is determined that students' collaboration skills are not greatly impacted by trilogy-based philosophical training, 2) On the other hand, a statistically significant difference in the experimental and control groups' collaboration abilities is indicated if the p-value is less than or equal to 0.05. The integration of the Trilogy of Scientific Philosophy Thinking has a positive effect on improving students' collaborative abilities in the Asian Community Education course, as evidenced by the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_1).

This finding reaffirms the value of incorporating in-depth, reflective thought into collaborative learning models in addition to validating the efficacy of the philosophical approach in educational practice.

3 Result and Discussion

Descriptive statistics were computed for the experimental and control groups in order to assess the pupils' collaboration abilities. A questionnaire with 20 items assessed on a 5-point Likert scale was used to collect the data. The table below displays the findings:

Table 3. Descriptive Statistics of Collaborative Skills Questionnaire

Group	Mean	Standard Deviation	Minimum Score	Maximum Score	Mode
Control Group	68.40	5.75	60	78	67
Experimental Group	79.25	4.60	72	88	80

An overview of the distribution of collaborative skills scores in the experimental and control groups is provided by the descriptive statistics. The findings show notable distinctions between the two groups, particularly with regard to response variability and mean scores.

With a mean score of 68.40, the control group's performance was comparatively lower than that of the experimental group, even if some students demonstrated a modest degree of collaborative competence. There was significant variety in the way students in the control group reacted to the collaborative activities, as seen by the somewhat high standard deviation of 5.75 for this group. With some students performing at a significantly lower level than others, this variability may indicate that pupils have varying capacities for participating in group projects.

The experimental group, on the other hand, obtained a mean score of 79.25 after receiving education that included the Trilogy of Scientific Philosophy Thinking. This implies that pupils in this group generally showed better teamwork abilities. The experimental group's pupils demonstrated higher consistency in their collaboration skills, as seen by the lower standard deviation of 4.60 compared to the control group. This can be explained by the methodical philosophical framework that was offered, which might have encouraged a more concentrated and unified method of teamwork.

Furthermore, the experimental group's superior overall performance is reflected in both the minimum and maximum ratings. With a minimum score of 60 and a maximum score of 78, the control group appeared to have a more limited range of performance, with some students scoring far lower than others. The experimental group, on the other hand, had a greater baseline level of collaborative competence and fewer students who struggled at the lower end, with a minimum score of 72 and a maximum score of 88.

The experimental group's mode, which denotes the most common score, was 80, whereas the control group's was 67. This demonstrates the beneficial effect of the philosophical framework on the experimental group's engagement and performance in collaborative activities, further corroborated by the finding that they were more likely to score at higher levels of cooperation than the control group. In conclusion, the descriptive statistics show that, in comparison to the control group, students in the experimental group who were taught philosophy based on the Trilogy performed better overall and exhibited more consistent and advanced levels of collaborative abilities.

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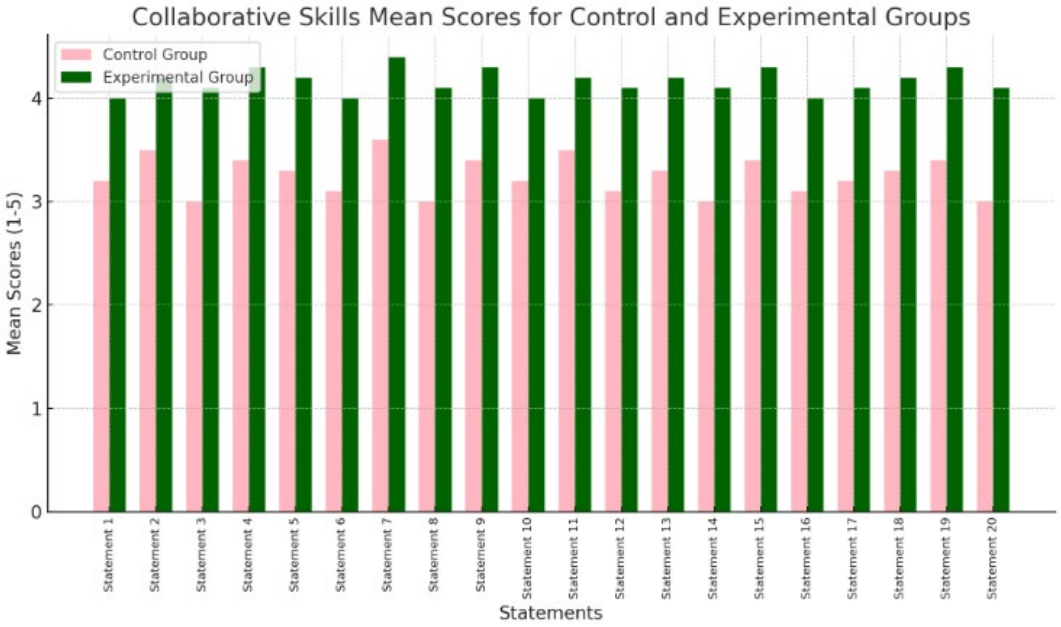

Figure 1. The Chart Depicting the Mean Scores of Collaborative Skills for Both the Control Group (in Pink) and the Experimental Group (in Dark Green)

To test the hypothesis, an independent samples t-test was conducted to determine whether the observed difference in collaborative skill scores between the two groups was statistically significant.

Table 4. Independent Samples t-test Results

Group Comparison	t-value	df	p-value (Sig. 2-tailed)
Experimental vs Control	6.143	58	0.000

Students in the experimental group and those in the control group scored significantly differently on collaborative skills, according to the t-test result ($t(58) = 6.143$, $p < 0.05$). Consequently, the alternative hypothesis (H_1) is accepted and the null hypothesis (H_0) is rejected. According to this research, students' ability to work together is much improved when the Trilogy of Scientific Philosophy Thinking ontology, epistemology, and axiology is incorporated into the Asian Community Education curriculum. Higher-order thinking, ethical reasoning, and dialogical engagement all crucial elements of collaborative learning seem to be stimulated by the philosophical framework.

The findings are consistent with other research supporting the incorporation of philosophical and reflective techniques in active learning settings. The scientific philosophy trilogy was used in this setting not just as subject matter but also as a cognitive tool to encourage students working in groups to engage in critical discourse, perspective-taking, and ethical debate. Educators should receive professional development in facilitative teaching methods that promote inquiry, discussion, and co-construction of knowledge. Rather than directing group work, instructors should guide and scaffold collaboration, helping students resolve conflicts and reflect on group dynamics. Curricula should be revised to emphasize collaboration as a core learning outcome across disciplines. This includes embedding teamwork into program-level goals, and ensuring alignment with national education standards and global frameworks such as those outlined by PISA and the World Economic Forum. By implementing these strategies, institutions can cultivate not only collaborative skills but also philosophically grounded, socially aware learners who are better prepared for complex, interconnected challenges in the modern world.

Future research should adopt a longitudinal design to examine the sustained impact of integrating the Trilogy of Scientific Philosophy into collaborative learning over time. This would allow researchers to track changes in students' collaborative competencies, critical thinking, and ethical reasoning throughout multiple semesters or academic years. Such studies could also explore whether these gains transfer to professional or real-world contexts after graduation.

Expanding the scope of empirical testing across various academic disciplines such as engineering, social sciences, and health education would offer insights into how the philosophical-collaborative model performs in different learning cultures and content areas. Larger sample sizes across institutions and regions would enhance

the generalizability and reliability of the findings. It is important to conduct comparative studies between this approach and other collaborative learning frameworks, such as Project-Based Learning (PjBL), Cooperative Learning, or Problem-Based Learning (PBL). Such analyses would clarify the unique contributions and limitations of a philosophy-integrated model, particularly in fostering deeper reflection, value-based reasoning, and interdisciplinary dialogue.

Incorporating qualitative methods, such as focus group interviews, reflective journals, and discourse analysis, alongside quantitative measures could offer a more nuanced understanding of how students experience collaborative learning when philosophical thinking is embedded. This would also shed light on group dynamics, identity formation, and ethical tensions in collaborative settings. Exploring the use of digital platforms or AI-assisted tools to facilitate philosophical collaboration and reflection may offer innovative paths forward, especially in blended or online learning environments. This aligns with global educational trends toward digital transformation and scalable pedagogical innovation.

4 Conclusion

By analyzing 20 important statements, this study was able to successfully assess respondents' collaborative competency and found that the sample as a whole had a typically high degree of cooperation abilities. According to the mean scores, most respondents regularly exhibit productive teamwork behaviors, such as cooperative problem-solving, active listening, idea sharing, and mutual respect. High mean values for the majority of the questions indicate a strong culture of cooperation among participants. The results demonstrate how important it is to have access to digital collaboration tools, organized learning environments, and previous experience working on team projects in order to develop these abilities. Additionally, the findings support the efficacy of contemporary organizational or educational strategies in fostering the development of important 21st-century abilities, including teamwork, which is essential for success in both the classroom and the workplace. In summary, this study demonstrates that the participants have strong collaboration skills that not only meet but even above the anticipated standards in several domains. In addition to suggesting focused treatments for areas where collaborative behavior might be further enhanced, our results highlight the significance of maintaining and improving collaborative learning practices.

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