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Canva-assisted project-based learning for collaborative competence and learning outcomes in civic education

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ABSTRACT

This study aimed to examine the effects of Project-Based Learning (PjBL) assisted by Canva on students' collaborative competence and learning outcomes in Civic Education. A quantitative approach employing a quasi-experimental nonequivalent control group pretest-posttest design was used. The participants consisted of 52 Grade X students at Muhammadiyah Private Vocational High School Batam, Indonesia, divided into an experimental group ($n = 26$) and a control group ($n = 26$). Data were collected through a collaborative competence observation sheet and a 25-item multiple-choice test. The findings revealed that the experimental group achieved significantly higher improvements in collaborative competence and learning outcomes than the control group ($p < .001$). The MANOVA results also demonstrated a significant simultaneous effect with a large effect size. Therefore, Canva-assisted PjBL is an effective instructional approach for improving collaborative competence and academic achievement in Civic Education.



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Introduction

The continuous advancement of digital technology has significantly reshaped educational practices and redefined the competencies required for learners in today's educational environment. (Fatimah & bin Mohamed Faudzi, 2025; Ramli & Serip Mohamad, 2025). Contemporary education emphasizes not only knowledge acquisition but also higher-order thinking, collaboration, communication, creativity, and digital literacy to prepare students for increasingly complex social and professional environments. Consequently, educational institutions are encouraged to implement student-centered learning supported by digital technologies (Ladjamudi et al., 2025; Satria et al., 2024). However, Civic Education in many schools remains dominated by teacher-centered instruction that emphasizes content mastery rather than active participation, limiting opportunities for students to develop collaborative competence alongside academic achievement.

Collaborative competence is widely recognized as an essential educational outcome because it enables learners to exchange ideas, solve problems collectively, negotiate different perspectives, and accomplish shared goals. Previous studies have shown that collaborative learning positively influences academic achievement, communication skills, and social interaction (Megawati, 2025; Wolfe, 2026). Nevertheless, many classrooms still provide limited opportunities for authentic collaboration, resulting in inadequate development of these competencies. This issue is particularly relevant in Civic Education, whose primary objective is to cultivate

democratic values, social responsibility, and active citizenship through participatory learning rather than passive knowledge acquisition (Cotulbea, 2025; Ilahy et al., 2025; Jordão & Karimi, 2023).

Project-Based Learning (PjBL) has been widely acknowledged as an effective student-centered approach for addressing these challenges by engaging learners in authentic projects that require inquiry, teamwork, and problem-solving. Previous studies consistently report that PjBL enhances critical thinking, communication, collaborative competence, and academic performance across various educational contexts (Giordano et al., n.d.; Laela & Badarudin, 2026; Zahran et al., 2026). Grounded in constructivist learning theory, PjBL promotes knowledge construction through social interaction and experiential learning. However, most previous studies have primarily emphasized academic achievement or general twenty-first-century skills, while collaborative competence as a distinct learning outcome in Civic Education has received comparatively limited attention.

Project-Based Learning can be further strengthened through the integration of digital technologies that facilitate communication, collaboration, and knowledge construction. One platform that has gained considerable attention is Canva, a cloud-based visual design application that enables students to collaboratively create presentations, posters, infographics, videos, and other digital products. Previous studies have demonstrated that Canva enhances student engagement, creativity, and digital literacy by providing interactive learning experiences (Ambarwati, 2024; Asmi et al., 2025; Kusuma et al., 2025). Nevertheless, most studies have examined Canva primarily as a learning medium rather than as a collaborative platform integrated into Project-Based Learning, particularly in Civic Education.

Despite the growing body of research on PjBL and Canva, several important gaps remain. Existing studies have largely focused on improving academic achievement, creativity, learning motivation, or digital literacy, whereas collaborative competence has received relatively limited attention as a specific educational outcome. Moreover, empirical studies investigating the combined use of Canva-assisted PjBL to simultaneously improve collaborative competence and learning outcomes in Civic Education are still scarce, especially within Indonesian vocational education settings (Harahap et al., 2025; Hidayati et al., 2025). These gaps indicate the need for further empirical evidence regarding the effectiveness of integrating digital collaborative platforms into project-based pedagogy.

Therefore, this study aims to examine the effects of Canva-assisted Project-Based Learning on students' collaborative competence and learning outcomes in Civic Education at Muhammadiyah Private Vocational High School Batam, Indonesia. The novelty of this study lies in three aspects: integrating Canva as a collaborative digital platform within Project-Based Learning, simultaneously evaluating collaborative competence and learning outcomes as indicators of instructional effectiveness, and providing empirical evidence from Indonesian vocational education, where research on technology-enhanced Civic Education remains limited. The findings are expected to enrich the literature on technology-enhanced Project-Based Learning and provide practical guidance for designing Civic Education that promotes both academic achievement and essential twenty-first-century competencies (Hallgren & Österlind, 2019; Sanjaya et al., 2022).

Method

This study employed a quantitative approach using a quasi-experimental nonequivalent control group pretest-posttest design to examine the effects of Canva-assisted Project-Based Learning (PjBL) on students' collaborative competence and learning outcomes in Civic Education. The research was conducted at Muhammadiyah Private Vocational High School Batam, Indonesia. The population comprised 164 Grade X students enrolled in eight vocational programs. A purposive sampling technique was employed to select two intact classes with comparable academic characteristics, class size, and learning conditions. Class X TEI 1 ($n = 26$) was assigned as the experimental group, while Class X TEI 2 ($n = 26$) served as the control group. Both classes were taught by the same teacher using identical learning objectives and assessment criteria to minimize instructional bias. In addition, pretest results indicated comparable initial levels of collaborative competence and learning outcomes, supporting the equivalence of the two groups before the intervention.

The experimental group received Canva-assisted Project-Based Learning for six instructional meetings following six sequential phases: (1) formulating essential questions, (2) designing project plans, (3) developing project schedules, (4) monitoring project implementation, (5) assessing project outcomes, and (6) conducting reflection and evaluation. Throughout these phases, students worked collaboratively to design digital learning products, including presentations, posters, infographics, videos, and podcasts using Canva. The platform facilitated communication, task distribution, collaborative editing, and peer feedback during project completion. In contrast, the control group received conventional teacher-centered instruction consisting of explanation, guided discussion, individual assignments, presentation, and reflection. Collaborative competence was measured using an observation sheet based on the indicators proposed by Kamawarni (2020), including mutual

assistance, collaborative problem-solving, appreciation of group contributions, task sharing, and active participation. Two trained observers independently assessed students' collaborative performance using the same observation rubric, and the final score represented the average of both assessments to improve rating objectivity. Learning outcomes were measured using a 25-item multiple-choice test covering higher-order cognitive levels of analysis (C4), evaluation (C5), and creation (C6).

Prior to implementation, all research instruments underwent psychometric evaluation. The learning outcome test demonstrated satisfactory validity, with corrected item-total correlation coefficients ranging from 0.553 to 0.870, and excellent internal consistency (Cronbach's $\alpha = 0.958$). All items also satisfied acceptable discrimination and difficulty indices. Before hypothesis testing, the data were examined using the Kolmogorov-Smirnov test for normality, Levene's test for homogeneity of variance, and Box's M test to verify the homogeneity of covariance matrices required for MANOVA. Paired-sample t-tests were used to analyze within-group improvements, while independent-sample t-tests compared posttest differences between groups. The effectiveness of the intervention was further evaluated using N-Gain analysis and Cohen's d effect size to determine the magnitude of learning improvement. Finally, Multivariate Analysis of Variance (MANOVA) was performed to examine the simultaneous effects of Canva-assisted PjBL on collaborative competence and learning outcomes, followed by Tests of Between-Subjects Effects to identify the contribution of the intervention to each dependent variable individually.

Results and Discussions

The findings are presented in five sections, including assumption testing, changes in collaborative competence, changes in learning outcomes, learning gains, and multivariate effects of Project-Based Learning (PjBL) assisted by Canva.

Table 1. Assumption Tests of Collaborative Competence and Learning Outcomes

Variable	Test	Experimental Pretest	Experimental Posttest	Control Pretest	Control Posttest	Interpretation
Collaborative Competence	Kolmogorov-Smirnov (Sig.)	0.111	0.124	0.124	0.197	Normal distribution
Learning Outcomes	Kolmogorov-Smirnov (Sig.)	0.110	0.200	0.200	0.200	Normal distribution
Collaborative Competence	Levene's Test (Sig.)	colspan=4: 0.426		Homogeneous variance		
Learning Outcomes	Levene's Test (Sig.)	colspan=4: 0.945		Homogeneous variance		

The assumption tests demonstrated that all datasets fulfilled the requirements for parametric analysis. The Kolmogorov-Smirnov significance values ranged from 0.110 to 0.200, all exceeding the threshold of 0.05, indicating normal distributions of collaborative competence and learning outcome scores in both groups. Similarly, the Levene's test results yielded significance values of 0.426 for collaborative competence and 0.945 for learning outcomes, confirming homogeneity of variance across groups. Therefore, the data met the assumptions necessary for subsequent inferential analyses.

Table 2. Changes in Collaborative Competence

Analysis	Experimental Group	Control Group
Mean Difference	54.308	15.231
t-value	45.123	10.174
Sig. (2-tailed)	0.000	0.000
Posttest Mean Difference Between Groups	36.769	
Independent t-value	24.428	
Sig. (2-tailed)	0.000	

The paired-sample t-test revealed significant improvements in collaborative competence in both groups ($p < .001$). However, the experimental group achieved a substantially larger mean increase (54.308 points) than the control group (15.231 points). The independent-sample t-test further demonstrated a significant posttest difference between groups ($t = 24.428$, $p < .001$), with a mean difference of 36.769 points. These findings indicate

that Project-Based Learning assisted by Canva significantly enhanced students' collaborative competence compared with conventional instruction.

Table 3. Changes in Learning Outcomes

Analysis	Experimental Group	Control Group
Mean Difference	32.231	26.038
t-value	19.280	13.366
Sig. (2-tailed)	0.000	0.000
Posttest Mean Difference Between Groups	7.423	
Independent t-value	4.239	
Sig. (2-tailed)	0.000	

Table 3 indicates that both groups experienced significant improvements in learning outcomes following instruction ($p < .001$). Nevertheless, the experimental group demonstrated a greater increase in achievement scores than the control group. The independent-sample t-test further confirmed a significant difference between groups, with the experimental class outperforming the control class by 7.423 points. These results suggest that integrating PjBL with Canva contributed positively to students' academic achievement in Civic Education.

Table 4. N-Gain Analysis

Variable	Experimental Mean (%)	Category	Control Mean (%)	Category
Collaborative Competence	81.98	High	23.41	Low
Learning Outcomes	67.24	Moderate	51.94	Moderate

The N-Gain analysis demonstrated greater learning gains in the experimental group across both dependent variables. Collaborative competence achieved a high gain score of 81.98% in the experimental class compared with only 23.41% in the control class. Similarly, learning outcomes showed a higher gain score in the experimental group (67.24%) than in the control group (51.94%). These findings indicate that PjBL assisted by Canva was more effective in improving both collaborative competence and learning outcomes.

To facilitate visual interpretation of the intervention effects, Figure 1 illustrates the changes in mean pretest and posttest scores of collaborative competence and learning outcomes across the experimental and control groups. The figure demonstrates steeper increases in both variables among students who received Project-Based Learning assisted by Canva compared with those who received conventional instruction.

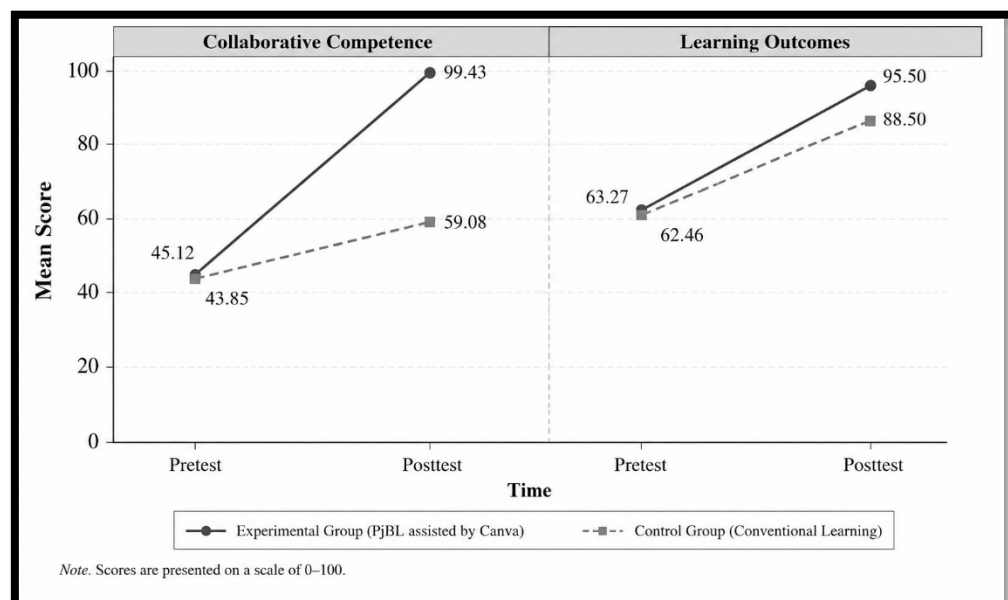


Figure 1. Mean Pretest-Posttest Scores of Collaborative Competence and Learning Outcomes

The MANOVA results revealed a significant simultaneous effect of PjBL assisted by Canva on collaborative competence and learning outcomes ($F = 325.493$, $p < .001$). The Tests of Between-Subjects Effects further demonstrated significant partial effects on collaborative competence ($F = 596.751$, $\eta^2 = 0.923$) and learning outcomes ($F = 17.970$, $\eta^2 = 0.264$). According to the criteria for effect size interpretation, all Partial Eta Squared

values exceeded 0.14 and were therefore categorized as large effects. Overall, these findings provide strong empirical evidence that Project-Based Learning assisted by Canva substantially improved both students' collaborative competence and academic achievement.

Table 5. Multivariate and Effect Size Analyses

Analysis	Collaborative Competence	Learning Outcomes	Simultaneous Effect
F-value	596.751	17.970	325.493
Sig.	0.000	0.000	0.000
Partial Eta Squared	0.923	0.264	0.930
Effect Category	Large	Large	Large

The findings indicate that Canva-assisted Project-Based Learning (PjBL) significantly improved students' collaborative competence and learning outcomes in Civic Education. Because all datasets satisfied the assumptions of normality and homogeneity, the differences observed between the experimental and control groups can be attributed to the instructional intervention rather than to initial group disparities (Amansyah & Nurhayati, 2025; Jannah & Kamil, 2021; Santosa & Yul, 2026). These results reinforce constructivist learning theory, which argues that meaningful learning occurs when students actively construct knowledge through authentic experiences, social interaction, and collaborative problem-solving.

The most substantial improvement occurred in collaborative competence, indicating that the integration of PjBL and Canva created meaningful opportunities for students to communicate, share responsibilities, solve problems collaboratively, and provide peer feedback throughout project completion. Canva strengthened this process by facilitating collaborative editing, visual communication, and continuous interaction, making collaboration an integral component of learning rather than a complementary activity. The high N-Gain score further confirms that digital project-based learning effectively promotes essential twenty-first-century collaborative skills. These findings are consistent with previous studies showing that project-based learning enhances teamwork, communication, and interpersonal competence through authentic collaborative experiences (Khafit Rohani, 2024; Mulatiningsih & Rindrayani, 2025; Owens & Hite, 2022; Alifah et al., 2025; Astaño, 2025; Habibah et al., 2025; Liem & Chua, 2013; Parker-Gwin & Mabry, 1998; Wong et al., 2022).

Canva-assisted PjBL also produced higher learning outcomes than conventional instruction. Authentic project activities encouraged students to investigate problems, evaluate information, organize ideas visually, and construct knowledge collaboratively, resulting in deeper conceptual understanding. Although the improvement in learning outcomes was smaller than that of collaborative competence, this difference is reasonable because cognitive achievement is influenced not only by instructional strategies but also by prior knowledge and individual learning readiness. Nevertheless, the findings support constructivist principles and align with previous studies reporting that technology-enhanced Project-Based Learning improves conceptual understanding, critical thinking, and academic achievement through active inquiry and meaningful learning experiences (Chaleoychanya & Thammetar, 2023; Jalaludin et al., 2026; Rifai, 2026; Irawati et al., 2026; Pujawati & Hasanudin, 2026; Redmond, 2023; Utami et al., 2026).

The multivariate analysis further confirmed the effectiveness of Canva-assisted PjBL by demonstrating significant simultaneous effects on collaborative competence and learning outcomes with large effect sizes. These findings indicate that integrating Canva into Project-Based Learning produces meaningful educational benefits beyond statistical significance, particularly in strengthening collaborative competence while improving academic achievement. The larger effect on collaborative competence suggests that continuous interaction throughout the project contributed more directly to social skill development, whereas cognitive achievement was also influenced by individual factors such as prior knowledge and learning readiness. These findings are consistent with previous studies highlighting that technology-enhanced Project-Based Learning promotes both academic performance and essential twenty-first-century competencies through authentic and student-centered learning (Dias & Soares, 2018; Irawati et al., 2026; Laela & Badarudin, 2026; Utami et al., 2026).

From a practical perspective, the findings suggest that Canva should be integrated as a collaborative learning platform rather than merely a presentation tool in Civic Education. Its use throughout the Project-Based Learning process enables students to communicate, share responsibilities, exchange feedback, and co-construct digital learning products, thereby strengthening both collaborative competence and academic achievement. Nevertheless, this study was limited to a single vocational school with a relatively small sample and a quasi-experimental design. Future research should involve more diverse educational settings, larger samples, and comparisons with other digital collaboration platforms to examine the long-term effects of technology-assisted Project-Based Learning on broader twenty-first-century competencies.

Conclusions

This study concludes that Project-Based Learning (PjBL) assisted by Canva significantly improves students' collaborative competence and learning outcomes in Civic Education. Students who participated in the Canva-assisted PjBL activities demonstrated substantially higher gains in collaborative competence and achieved better academic performance than those who received conventional instruction. Furthermore, the multivariate analysis confirmed that the instructional model exerted a significant and large simultaneous effect on both dependent variables. Therefore, integrating Project-Based Learning with Canva constitutes an effective pedagogical approach for promoting meaningful learning experiences while simultaneously fostering collaborative competence and academic achievement as essential twenty-first-century skills in vocational education contexts.

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