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Exploration of the use of PBL and interactive videos in developing student critical thinking

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Abstract: The 21st century is marked by rapid technological advancement that demands a transformation in learning approaches, including the development of students' critical thinking skills. In Citizenship Education, critical thinking is a key competency for examining social and civic issues reflectively and rationally. However, the continued dominance of conventional learning methods often leads to boredom and low student engagement. This study is a qualitative descriptive research study that aims to explore the use of the PBL model integrated with interactive video to enhance students' critical thinking skills. Data were collected through in-depth interviews with ten students and analysed through stages of data reduction, data display and conclusion drawing. The findings indicate that the combined use of PBL and interactive video fosters a more active, contextual, and reflective learning process. Students showed improvement in four aspects of critical thinking: analysing issues using visual support, formulating collaborative solutions, drawing logical conclusions based on theory and social realities & evaluating arguments ethically and contextually. These results suggest that integrating PBL and interactive video significantly enhances the comprehensive development of students' critical thinking skills.

Keywords: PBL; interactive video; critical thinking

Introduction

The rapid development of science and technology in the 21st century demands a change in the approach to education, especially in preparing students who have high-level thinking skills, including critical thinking (Almazroa & Alotaibi, 2023). Critical thinking skills are among the main competencies for addressing global challenges, including in the lives of society, the nation, and the state. Higher education is expected to produce graduates who not only have knowledge but also can think critically when making decisions and solving social problems (Mastuti et al., 2022). In the context of Civics Education courses, critical thinking skills are essential because students are expected to examine civic issues in depth and objectively.

However, the field shows that students' critical thinking skills remain suboptimal. Based on observations during the Civic Education lecture, most students experienced boredom due to the conventional delivery of the material. This has an impact on low student active participation and decreased motivation to learn. Several students look sleepy and passive, and do not even show interest in material that should be contextual and close to daily life. Previous studies also indicate that conventional lecture methods are less effective than active learning approaches in improving students' critical thinking abilities and social attitudes (Fatriani & Sukidjo, 2018). This phenomenon aligns with research by Kim et al. (2019), which found that traditional lecturer-centric teaching methods tend to hinder the development of 21st-century skills, including critical thinking.

One innovative solution to address these challenges is the application of the Problem-Based Learning (PBL) model combined with interactive video media. PBL encourages students to actively solve authentic problems, which ultimately stimulates critical and collaborative thinking skills (Wiggins et al., 2016). In PBL, students not only receive knowledge but also engage in reflective thinking, decision-making, and in-depth exploration of important issues. By starting with problems, students are challenged to develop higher analytical and synthesis skills.

The use of interactive videos as a supporting medium in PBL learning is believed to create a more interesting and meaningful learning experience. Interactive videos allow students to actively engage with learning content, visualising abstract concepts and presenting real-world situations in a more concrete way (Zaneldin et al., 2019). Previous studies also indicate that integrating visual and interactive learning media can enhance student engagement, conceptual understanding, and meaningful participation in the learning process (Aulia et al., 2025). Thus, the combination of PBL models and interactive videos is believed to be an effective learning strategy for improving students' critical thinking skills, especially in Civic Education courses that require critical and ethical analysis of socio-political issues.

Based on the description above, it is important to conduct in-depth research to explore the effectiveness of collaboration between the PBL model and interactive videos in improving students' critical thinking skills. This research is expected to make a real contribution to the development of innovative learning models in higher education and to address challenges in learning Civic Education in the digital era (Japar et al., 2024).

Method

This research is a qualitative descriptive study that aims to understand in depth how collaboration between the Problem-Based Learning (PBL) model and interactive video media can improve students' critical thinking skills in the Civic Education course. Qualitative descriptive research aims to describe phenomena in a naturalistic manner, that is, based on the reality observed in the field without manipulating variables (Creswell & Poth, 2016). In this study, the main focus is on students' learning experiences and perceptions of the effectiveness of the applied learning strategies, making qualitative approaches particularly relevant for capturing narrative and contextual data.

Data collection was conducted through in-depth interviews with 10 students who

had participated in Civic Education lectures using an interactive, video-assisted PBL approach. Interviews were conducted face-to-face to gather broader information while still focusing on the issues being studied. The data obtained were then analysed using qualitative data analysis techniques, which included three stages:

1. Data reduction, the process of filtering and simplifying data to align with the research focus.
2. Data display, which is done in the form of a narrative or thematic table to facilitate the drawing of conclusions; and
3. Verification, which is the drawing of conclusions based on consistent patterns and findings.

In addition, this study was specifically designed to capture the implementation of the PBL model in learning by examining how each PBL syntax was applied during the lecture process. Thus, the data presented not only reflect students' perceptions but also portray the actual practice of implementing PBL assisted by interactive video in the Civic Education course.

Finding and Discussion

Findings

Overall, the study's results show that applying the Problem-Based Learning (PBL) model, combined with interactive video media, effectively improves students' critical thinking skills in the Civic Education course. This approach creates an active, contextual learning environment, where students are not only recipients of information but also directly involved in solving real problems relevant to the life of society and the state. Interactive videos strengthen students' understanding of problems by presenting interesting and representative visualisations.

Students feel more motivated and challenged to dig deeper into the issues presented. PBL encourages group discussions, reflective thinking, and evidence-based decision-making. This whole process enriches the learning experience and encourages students to develop critical thinking skills on an ongoing basis (Liu et al., 2023). This combination of methods also succeeded in overcoming the saturation of conventional learning that had previously made students passive, as evidenced by their enthusiasm in expressing opinions and actively participating in group discussions.

In particular, the results of this study can also be described in terms of the indicators of critical thinking skills proposed by Susanto (2016).

1. *Analyses*

The ability to analyse is one of the most prominent aspects of critical thinking in this study. Students can dissect problems into smaller elements to understand them thoroughly. GI explained that he and his group divided the problem into small parts to find the most appropriate solution. Likewise, KH emphasised the importance of using video data as a basis for analysis. The two speakers not only accepted the problem for granted but also sought to identify the root cause and the key aspects requiring deeper examination.

Interactive videos are very helpful in the analysis process because they visualise the flow of events, making it easier for students to understand the relationships between facts. FR said that the animation in the video really supports understanding the problem's cause-and-effect process. Other students, such as IR, added that the video's narration supports their visual learning style. This shows that video media is not only a visual sweetener but also a tool that encourages the development of analytical thinking skills in concrete ways.

2. *Recognising and Solving Problems*

Students' ability to recognise and understand problems develops using interactive videos that present real-world contexts. DN admitted that he was confused at first but was interested because the problems presented were very close to daily life. The video not only depicts the problem but also shows supporting elements, such as the background, the characters involved, and the problem's impact. This makes it easier for students to understand the essence of the problem that needs to be solved.

In the problem-solving process, students demonstrate strong collaborative skills by dividing tasks, seeking additional data, and formulating solutions through group discussions. AR explained that his group used simple discussions to outline issues, while DA sought additional literature online for reference. These steps show that the problem-solving process is carried out systematically and in a structured manner and is based on relevant data.

3. *Conclude*

Students demonstrate the ability to infer by combining information from discussions, theories, and field realities. The US said that the solution considered reasonable is in accordance with the theory studied and logical in the context of the problem. The same thing was conveyed by KH, who assessed solutions based on short- and long-term impacts. This process shows that students are not in a hurry to draw conclusions; rather, they proceed with careful consideration.

Furthermore, the concluding process also shows a reflective understanding of the social context being studied. RA and IR, for example, state that solutions must be relevant to the facts on the ground and have ongoing benefits. The two not only convey personal opinions but also consider whether the solution is realistic if applied in society. This indicates that students' inference ability has developed towards a high level of critical thinking.

4. *Evaluating and Assessing*

In the aspect of evaluation and assessment, students showed the courage to criticise their friends' opinions and test the arguments that emerged in the discussions. They admitted that they often questioned their friends' opinions in group discussions to find the best solution. AI also explains that disagreements are frequent, but they make discussions livelier and more perspective-rich. Evaluation is carried out not emotionally but based on logical data and arguments.

Evaluation also considers the benefits and risks of the solutions offered. AR and RA explain that they assess ideas based on relevant facts and data. This evaluative process shows that students not only assess practical aspects but also consider ethical and sustainability factors. This reinforces the indication that interactive video-assisted PBL models are very effective in shaping overall critical thinking skills.

It should be noted that the assessment of students' critical thinking development in this study was not based on quantitative test instruments. Instead, the development was captured qualitatively through in-depth interviews and classroom observations, which revealed how students engaged with each PBL syntax. The evidence of improvement emerged from students' ability to analyse issues, propose collaborative solutions, formulate logical conclusions, and evaluate arguments during the learning process. Thus, the findings presented here should be understood as qualitative portraits of critical thinking development, rather than statistical test results.

Discussions

Based on the results of this study, it can be concluded that the application of Problem-Based Learning (PBL) assisted by interactive videos is effective in improving students' critical thinking skills, including the ability to analyse, recognise, and solve problems; to conclude, and to evaluate and assess. Students are more actively involved in discussions, able to systematically analyse problems, formulate data-based solutions, and assess arguments logically. This finding supports previous research demonstrating that problem-based learning significantly contributes to the development of students'

critical thinking abilities (Suparmi et al., 2025). In addition, this aligns with Ennis's (2015) view that critical thinking includes the ability to evaluate information rationally for appropriate decision-making.

1. *Analyze*

The ability to analyse is an important critical thinking skill in the learning process, especially in the context of Civic Education, which is full of social, political, and legal issues. Based on the study's results, students showed a significant increase in analysis after participating in problem-based learning (PBL) enriched with interactive video media. Students not only identify problems in general but also break them down into specific parts for further study. This process demonstrates its ability to understand the structure of the problem in greater depth, as explained by Arini et al. (2023), including the ability to identify main ideas, assess the relationships among information, and distinguish between facts and opinions in an argument.

The application of interactive video in PBL has been shown to help students deepen their understanding of the problem's context. The visualisation and narrative flow in the video clarify the key elements of the problem under discussion, enabling students to build a more accurate analytical framework (Chen et al., 2023). For example, in interviews, some students mentioned that animations and visual explanations in videos help them understand the root of the problem and see the connections between concepts. This aligns with research by Alshehri et al. (2021), who found that interactive videos can increase cognitive engagement and facilitate conceptual learning through meaningful visual reinforcement.

Group discussions are also an important means of developing analytical skills (Murphy et al., 2016). Students do not work individually; instead, they collaboratively divide problems into sub-topics, then discuss and compare different points of view. This creates a critical and open space for thought. According to Wiggins et al. (2016), PBL allows learners to develop in-depth analytical skills through social interaction and collective exploration, leading to a more comprehensive understanding of complex issues. In this context, students are trained not only to analyse data literally but also to interpret the meaning behind events in videos and teaching materials.

Increased analytical skills can also be characterised by students' willingness to seek additional information to strengthen arguments (Anthonysamy et al., 2024). For example, by using other literature sources and comparing them with the cases in the video, one can then synthesise the information to understand the situation. This strategy reflects an advanced stage of critical thinking, including inference and information validation. In line with this, Susilawati (2020) emphasised that good analytical skills include the ability to trace information sources, assess data validity, and logically integrate evidence to form arguments.

Overall, the application of the problem-based learning (PBL) model, enriched with interactive video media, has proven effective in improving students' analytical skills, especially in the context of Civic Education. Students not only show improvements in systematically identifying and deciphering problems but also build an in-depth critical thinking framework through visualisation, group discussions, and the search for additional information. The combination of interactive video presentations that facilitate conceptual understanding and a collaborative approach in PBL has created a learning environment that encourages meaningful exploration, interpretation, and synthesis of information (Pluta et al., 2013). Thus, this strategy can be a relevant pedagogical alternative to hone students' critical thinking skills, especially in dealing with the complexity of social and civic issues.

2. *Recognising and Solving Problems*

The ability to recognise problems is the initial stage in critical thinking that determines the direction of the next solution. In this study, students responded positively to the presentation of problems through interactive videos, as they found it easier to understand the problem's context, as the videos visually and narratively presented social issues. This reinforces the idea that contextual representation through

digital media can facilitate problem identification (Srikan et al., 2021). According to Clark and Mayer (2023), multimedia learning supports more optimal information processing by activating both verbal and visual channels simultaneously, enabling learners to understand the structure of the problem more quickly and thoroughly.

After recognising the problem, students show progress in solving it. This process is shown through group discussions, task divisions, search for additional data, and the formulation of alternative solutions. In many cases, students adapt solutions to real-world conditions and consider the social impact of their decisions (Ahmar et al., 2023). This aligns with Birgili's (2015) view that problem-solving in higher education should be linked to data-based decision-making and real-world contexts, rather than theoretical simulations. The PBL approach that places students as problem solvers provides a more open and independent thinking space.

In the process of solving problems, interactive videos serve not only as an entertainment medium or a conduit of information, but also as a trigger for reflective and critical thinking (Mete, 2020). Students said that the visual parts, such as graphs, impact illustrations, and case studies, presented in the videos helped them see the problem from various perspectives. According to Atapattu & Falkner (2018), interactive learning videos have high potential for building deep understanding because they allow learners to interact directly with the content, choose a flow, and repeat important parts as needed. This has an impact on students' ability to develop a directed, argumentative solution approach.

Interestingly, the problem-solving process does not stop at the formulation of solutions but continues with the evaluation of alternatives and consideration of implications (Mohaghegh & Furlan, 2020). Students engage in healthy debates to test the validity of solutions, compare them with theories studied, and assess their effectiveness in implementation. This shows the emergence of a critical awareness in assessing solutions, not just as a result, but as part of the thought process. As noted by Asfar and Nur (2018), problem-solving skills are not only about finding answers but also about building a systematic, flexible, and reflective decision-making process.

Overall, this study shows that the use of interactive video in the problem-based learning (PBL) approach significantly supports students' ability to recognise and solve problems critically. Visualising social issues in videos helps students understand the problem's context more quickly and thoroughly, making it easier to identify problems (Zhang & Chan, 2023). The solution process, carried out through group work, the search for additional data, and the evaluation of solutions, shows the development of deep reflective and argumentative thinking skills (Voon et al., 2022). Students not only focus on finding answers but also consider the validity and impact of the solutions proposed in context. Thus, learning through interactive videos is not only a means of conveying information but also a catalyst for building a systematic, meaningful critical thinking process.

3. Conclude

The ability to conclude is an important stage in critical thinking because it indicates that a person has thoroughly understood, analysed, and interpreted information (Raj et al., 2022). In this study, students showed increased ability to draw conclusions from data, theory, and group discussions. In this context, students not only give final answers, but also explain the thought process behind them. This reflects mature intellectual skills. According to van Gelder (2015), critical inference involves integrating arguments, evaluating information, and constructing generalisations that can be logically accounted for.

In the context of interactive video-assisted PBL learning, the inference process becomes stronger because students gain a thorough understanding of the various sources and visualisations provided (Navarrete et al., 2025). Interactive videos not only convey material but also present real-life situations that stimulate students' reflective thinking. Through direct observation of the case, students can construct arguments based on evidence and contextual experience. This aligns with Clark & Mayer's (2023)

view that visual learning media, such as interactive videos, encourage learners to organise and synthesise information into a structured, logical understanding.

The concluding process is also influenced by the dynamics of the group discussion (Galatsopoulou et al., 2022). Students not only absorb information passively but also actively consider ideas from their peers, clarify them, and test the logic of arguments before reaching a common conclusion. These dynamics create space for divergent thinking before eventually leading to mutually agreed convergent conclusions. Based on a study by Saujani et al (2025), collaboration in problem-based learning allows students to test conclusions in critical forums, so that the decisions taken are more mature and can be accounted for academically and ethically.

Furthermore, students can relate their conclusions to relevant social realities, showing that their conclusions are not based solely on texts or theories but also consider their impact and implementation in society. Some students stated that they assessed the solution's sustainability and its compatibility with real conditions before reaching a conclusion. This shows that the process of inferring in this learning is reflective and applicable. As stated by Battersby and Bailin (2018), a strong conclusion in critical thinking is not only about logic but also about sensitivity to the problem's context and the social values associated with it.

Overall, problem-based learning (PBL) enriched with interactive videos has been proven effective in improving students' ability to draw conclusions critically and reflectively. Students are not only able to formulate logical, evidence-based conclusions but also to demonstrate a mature thought process by integrating data, theory, group discussions, and relevant social contexts. Interactive videos play an important role in strengthening understanding and presenting real-life situations that encourage students to think deeper, while the dynamics of group discussions enrich perspectives and test arguments collaboratively (Rajaram, 2021). As a result, the conclusions produced are not only academic but also applicable and contextual, reflecting a comprehensive, ethically and intellectually responsible critical understanding.

4. *Evaluating and Assessing*

The ability to evaluate and assess is the pinnacle of the critical thinking process because it requires students to consider the feasibility, accuracy, and relevance of the information and solutions developed (Shanta & Wells, 2022). In this study, students showed improvement in evaluating their own ideas and those of their peers. They question arguments, criticise opinions, and compare ideas with existing theories and data before agreeing on a decision. According to Moon (2019), evaluation is a form of advanced reflection that demands an understanding of the decision's context, standards, and impact.

Group discussions are the main medium for students to train their evaluation skills (Daou et al., 2022). Students give each other feedback on the arguments proposed, and it is not uncommon for healthy debates to arise to test the strengths and weaknesses of the solutions formulated. Interactions like this create an active, dynamic space for critical thinking. According to Lipman (2015), a learning environment that encourages open dialogue and joint reflection can strengthen students' capacity to assess the validity and rationality of an argument in depth. In this context, students not only accept opinions for granted but also learn to be active assessors in the collective thinking process.

Interactive video media also play an important role in shaping evaluative abilities (Desai & Kulkarni, 2022). Videos featuring case studies, social impact illustrations, and conflict narratives help students distinguish between assumptions, facts, and opinions. They can assess the validity of the information and select the most relevant data to support the solution. As stated by Fiorella and Mayer (2016), well-designed interactive multimedia can enhance critical judgment by facilitating the integration of conceptual knowledge with practical applications. In this case, students are more confident in evaluating information because they have a strong context from the video.

In addition to evaluating information, students demonstrate the ability to assess the

sustainability and feasibility of the solutions they develop. They consider the effectiveness of implementation, social impact, and the values contained in each decision. This ability reflects ethical awareness and responsibility in the thought process. This is reinforced by Forawi (2020), who argues that evaluation in the context of education must be directed not only to scientific truth but also to human values, sustainability, and social justice. Therefore, the PBL model enriched with interactive video media provides a holistic and meaningful evaluative experience for students.

Implementation of PBL Syntax in Learning

The findings of this study also provide a more detailed picture of how the implementation of PBL unfolded through its main syntaxes during the Civic Education lectures:

1. *Orienting students to the problem*
   Students were introduced to authentic social issues through interactive videos. These videos served as a trigger for problem identification, enabling students to engage with contextual issues closely related to their daily lives (Wu et al., 2022).
2. *Organising students for learning*
   The lecturer divided the students into groups and guided them in assigning roles. Within these groups, students collaboratively identified issues, planned steps, and assigned responsibilities, fostering active engagement and teamwork (Zitha et al., 2023).
3. *Guiding individual and group investigations*
   Students conducted an in-depth exploration by discussing in groups, seeking additional online references, and critically questioning the arguments presented. The lecturer acted as a facilitator, ensuring that students remained focused and systematic in their investigation (Battista et al., 2023).
4. *Developing and presenting solutions*
   Each group formulated alternative solutions and presented their findings in classroom discussions. The interactive nature of the videos strengthened their arguments by providing concrete evidence, while peer groups served as evaluators to test the validity of each solution (Utomo, 2025).
5. *Analysing and evaluating the process*
   At the final stage, students reflected on the solutions produced and evaluated the strengths and weaknesses of each argument (Zhu et al., 2020). They considered both short- and long-term impacts as well as ethical aspects, thus completing the cycle of critical reflection as intended in PBL.

This description shows that the learning process not only encouraged critical thinking skills but also captured the implementation of each PBL syntax in practice. The synergy of interactive video and PBL ensured that all phases of the model, from problem orientation to reflection, took place effectively and contextually in the classroom setting (Hazmi & Helsa, 2025).

Overall, students' ability to evaluate and assess has increased significantly through the application of problem-based learning (PBL) enriched by interactive video media. Students not only demonstrate proficiency in assessing the accuracy and relevance of information but also exhibit a reflective, critical attitude when testing arguments, both individually and collectively, in group discussions. Interactive videos provide real-world context that helps students distinguish between facts, opinions, and assumptions, thereby strengthening their evaluative foundation for decision-making (Ali et al., 2024). In addition, students consider sustainability, social impact, and ethical values when assessing the feasibility of solutions, demonstrating that the evaluation process is not only logical but also humanistic. Thus, this learning not only develops advanced critical thinking skills but also equips students with a holistic, responsible perspective for dealing with the complexity of real-world problems.

Conclusion

This study concludes that the application of the Problem-Based Learning (PBL) model, combined with interactive video media, effectively improves students' critical thinking skills in the Civic Education course. The increase is evident in four key indicators of critical thinking, namely:

1. Analytical skills: Students can dissect problems into smaller elements, identify the root cause, and interpret the relationships among facts in depth. The visualisation of interactive videos is very helpful to them in building a logical, structured framework for analysis.
2. Ability to recognise and solve problems: Students demonstrate a contextual understanding of social issues thanks to the visual presentation of videos. They can formulate solutions collaboratively through discussions, task sharing, and additional data searches. The proposed solutions also consider the real conditions and their social impact.
3. Ability to conclude: Students not only give a final conclusion, but also explain the thought process behind it. The conclusions made are reflective, logical, and contextual, reflecting the integration between theory, data, and social reality.
4. Ability to evaluate and assess: Students actively critique opinions, test arguments based on data, and assess the sustainability and ethical values of the proposed solutions. The evaluation is carried out not only from a practical perspective but also with consideration for social justice and humanity.

Thus, the synergy between the PBL approach and interactive video media not only creates an engaging, context-rich learning experience but also encourages students to develop critical thinking skills across the board.

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