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DEVELOPMENT OF AN INQUIRY FLIPPED LEARNING INSTRUCTIONAL DESIGN TO IMPROVE CRITICAL THINKING AND COLLABORATION SKILLS IN PANCASILA EDUCATION FOR GRADE X SENIOR HIGH SCHOOL STUDENTS

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ABSTRACT

This research aims to develop an Inquiry Flipped Learning (IFL) instructional design to enhance the critical thinking and collaboration skills of Grade X senior high school students in Pancasila Education. The development model, which was proposed by Ellis & Levy, was adopted, but it was limited to the first three stages, including problem identification, goal identification, and design and development. The first stage, which was problem identification, was conducted through field observations and a review of previous results. The initial design was constructed on theoretical foundations such as constructivism, connectivism, information processing theory, and the TPACK framework. To ensure credibility, the conceptual model undergoes validation by three experts (media, content, and practitioners/teachers) using the Framework for Teaching evaluation instrument. The data from this evaluation were analyzed with descriptive qualitative methods, and the validity level was assessed based on the criteria established by Azwar (2016). The validation results showed that the IFL instructional design attained a "Very High" rating for both structural design and learning content. Accordingly, the model was considered conceptually and theoretically appropriate for implementation. It provided an innovative approach to 21st century learning by combining technological integration with student-centered pedagogy, thereby promoting the development of students' critical thinking and collaboration skills.

1. INTRODUCTION

Learning that guides the development of all students' natural potential is necessary in the present era. This potential is closely connected to the skills required in the 21st century. Therefore, learning should be designed to be interactive, inspiring, enjoyable, and intellectually challenging. Among the essential skills for this century, critical thinking holds a central position (Ennis, 2018). It does not involve a single dimension of thought but integrates diverse tools and perspectives (Cohen, 2015). As several studies emphasize, critical thinking is an indispensable element of effective problem-solving (Kittichai Sireerat et al., 2025; Tasgin & Dilek, 2023). The skills are best understood as a systematic process grounded in existing information. It requires activities such as questioning, analyzing, and organizing knowledge in depth to produce logical conclusions and reasoned actions, enabling individuals to form sound judgments (Alpizar et al., 2022; Deng et al., 2023; Lin et al., 2023). By developing critical thinking skills, students are better prepared to face problems they will encounter in everyday life (Kaynar & Kurnaz, 2024). For this reason, critical thinking has become a prerequisite for professional success and is highly valued by recruiters in today's workplace.

The growth of critical thinking does not occur instantly but progresses gradually toward more complex levels (Dias-Oliveira et al., 2024). A supportive learning environment is therefore essential. This environment can be fostered through the application of a specific learning model (Ananda et al., 2023; Z. B. Moghadam et al., 2023) and by designing assignments in a structured and progressive manner (Jiang, 2022). Furthermore, the community of inquiry framework plays a crucial role, as it enables students to construct and validate knowledge collaboratively (Kaczkó & Ostendorf, 2023). Collaboration is particularly significant since higher-order thinking skills (HOTS), such as critical thinking, are closely related to cooperative learning experiences (Afikah et al., 2023). Evidence further shows that strong teamwork combined with high motivation can enhance these skills (Rodríguez-Sabiote et al., 2022). Additionally, digital literacy has a direct positive effect on the development of critical thinking in contemporary education (Thamrin et al., 2025).

Accordingly, a supportive learning environment needs to be developed to provide opportunities and encouragement for students to build both critical thinking and collaboration skills. However, several studies have shown that students lack sufficient ability to interpret learning content and that learning does not effectively stimulate the development of independent opinions (Encabo-Fernández et al., 2023). Other investigations point out that students continue to show weak critical thinking (Saputra et al., 2019) and limited collaboration when solving problems (Santoso et al., 2021; Setiyaningsih & Sujarwo, 2023; Sum & Bădescu, 2023). This situation persists despite decades of evidence showing the significant benefits of engaging in collaborative activities across different contexts (Andrews-Todd et al., 2023). The rapid advancement of technology and its widespread use in fields such as cross-disciplinary research, the workplace, and daily community life further emphasize the importance of these skills (Graesser et al., 2020).

The issues mentioned above are also found in the teaching of Pancasila Education at SMA Negeri 4 Bima, a senior high school in Bima City, West Nusa Tenggara, Indonesia. Many students struggle to express critical ideas and conduct in-depth analysis of learning problems in accordance with the expected outcomes. As a result, their development of critical thinking and collaboration skills remains limited. For example, the results of several daily essay tests, including some HOTS questions, indicate that students' performance was still below the expected criteria for achieving the established learning objectives (Documentation, April 19, 2024). The Pancasila Education has primarily been taught face-to-face to date. Although online platforms were used during the COVID-19 pandemic, these did not create a learning environment that effectively promotes critical thinking and collaboration. The current learning process remains largely teacher-centered, focusing on lectures and question-and-answer sessions. Therefore, there is a need for an instructional design that can accommodate time constraints and provide opportunities for students to reason and collaborate.

The advancement of technology has introduced modern web-based learning methods that support more effective educational practices (Alyoussef, 2022). A more widely recognized method is Flipped Learning, which is both efficient and dynamic (Staddon, 2022). It enriches classroom experiences by creating more interactive sessions (Sezer & Esenay, 2022), improves the quality of learning, and encourages creativity, reflexivity, and critical thinking (Chan et al., 2023; Lantu et al., 2022; Ma, 2023; S. N. Moghadam & Razavi, 2022; Shin et al., 2022). Furthermore, Flipped Learning can be combined with other models, such as guided inquiry (Doo, 2023), which enables classroom time to be used more effectively for interactive and immersive

activities (Dutta et al., 2023). Through such integration, this model can significantly contribute to the improvement of students' critical thinking and collaboration skills.

This research aims to develop an effective Inquiry Flipped Learning (IFL) instructional design to enhance students' critical thinking and collaboration skills in Pancasila Education for Grade X at SMA Negeri 4 Bima. Its novelty lies in combining the inquiry instructional design, traditionally applied in science education, with flipped learning to support social science instruction. This integration is expected to provide a more innovative and effective means of fostering critical thinking and collaborative skills among students.

2. METHOD

2.1. Design

This research used the development model introduced by Ellis & Levy (Ellis & Levy, 2010), which consisted of a) problem identification, b) goal identification, c) design and development, d) trial, e) evaluation of trial results, and f) delivery of trial results. However, the model was limited to only the first three stages of the development model.

2.2. Procedures

The first stage, which was problem identification, was carried out through direct observation of classroom conditions as well as by reviewing earlier literature. After this, the objective identification stage focused on determining the central issue that would guide product development. Once the key problem was clear, the design and development stage began. At this point, an initial draft was prepared using insights from relevant literature. From this research,

a draft framework of the IFL model was visualized, aimed at strengthening students' reasoning and teamwork skills. Expert validation was then conducted, involving media specialists, subject experts, and practicing teachers, who evaluated the conceptual design. Their suggestions were incorporated into several revisions. As a result, a refined hypothetical design model was produced, which was considered feasible for classroom use.

2.2.1. Instruments

To test the validity of the learning plan, a questionnaire was adopted. The indicators used were adapted from The Framework for Teaching Evaluation Instrument (The Danielson Group, 2013).

2.2.2. Data Analysis Method

The analysis of internal validation data relied on qualitative descriptive methods. The level of validity of the IFL design, particularly in improving critical thinking and collaboration skills, was determined by referring to the guidelines provided by Azwar (2016).

3. RESULTS AND DISCUSSION

1. IFL instructional design is suitable for improving critical thinking and collaboration skills.

This research set out to design an instructional framework that could effectively support students' critical thinking and collaboration skills in the Pancasila Education subject for Grade X at SMA Negeri 4 Bima. The development process followed the three stages proposed by Ellis and Levy (2010). The results of the development of an appropriate IFL instructional design to improve students' critical thinking and collaboration skills in the Pancasila Education subject for Grade X of SMA are explained below.
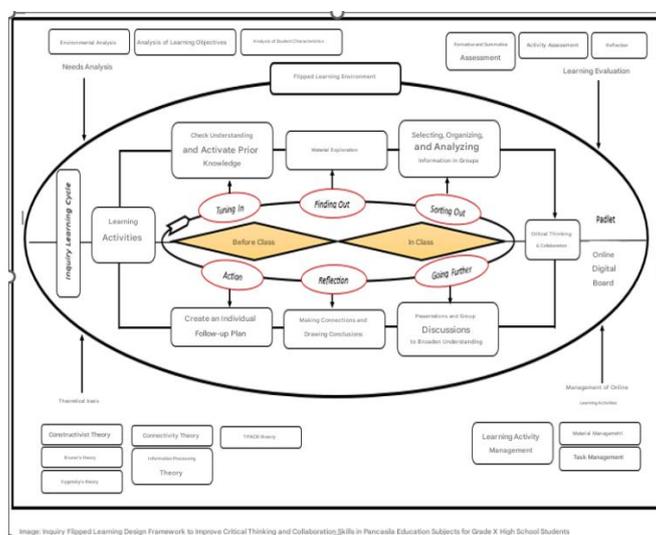

Figure 1

The IFL instructional design framework was developed to strengthen students' critical thinking and collaboration skills in Pancasila Education for Grade X of Senior High School. This model combined the flipped learning with the inquiry instructional design, which consisted of six stages, comprising Turning In, Finding Out, Sorting Out, Going Further, Reflection, and Action. The learning process was organized into two contexts, including pre-class activities and in-class activities.

In the pre-class stage, students reviewed prior knowledge, explored new material independently, and checked their level of understanding. These activities were intended to build readiness for deeper learning by offering individualized and technology-assisted experiences. Classroom activities then provided opportunities for collaboration, where students analyze and categorize information, present their ideas, and engage in discussions. Through these interactions, students were encouraged to sharpen critical thinking and develop collaboration skills.

3.1. Product Validation

The effectiveness of the IFL design for improving critical thinking and collaboration was assessed by three experts in the field of learning. Their evaluations were summarized into scores, which were then classified using Azwar's (2012) conversion guidelines. According to these standards, a score above 37 showed very high validity, while scores of 29–36, 21–28, and 13–20 corresponded to high, moderate, and low validity, respectively. Any score of 12 or below was categorized as very low, as shown below.

Table 1 Validation Results of IFL Instructional Design to Improve Critical Thinking and Collaboration Skills

No.	Component	Score		
		I	II	III
1.	Learning Objectives	8	8	8
2.	Learning Materials	11	24	11
3.	Learning Activities	10	24	11
4.	Learning Resources	6	8	8
5.	Assessment	6	8	8
	Total	**41**	**48**	**46**
	Category	Very high	Very high	Very high

The average score given by all experts was 45, placing the design within the "very high validity" category. These results showed that the instructional design was not only appropriate but also highly reliable for strengthening students' critical thinking and collaboration.

Based on the validation of the learning material, an average score of 29.9 or above showed very high validity. Scores ranging from 23.3–29.8, 16.7–23.2,

and 10.1–16.6 were categorized as high, moderate, and low, respectively, while any score of 10 or below fell into the very low category. The evaluation of the materials confirmed that they met the criteria for very high validity, further supporting the suitability of the IFL instructional design. The results of the validation of the learning material used are shown below.

Table 2 Learning Material Validation Results: IFL Instructional Design to Improve Critical Thinking and Collaboration Skills

No.	Component	Score	
		I	II
1.	Learning Objectives	4	4
2.	Information	8	8
3.	Language	8	8
4.	Student Interest and Engagement	7	6
5.	Technical Quality	4	4
6.	Guidelines	3	3
7.	Freedom from Bias	4	3
	Total	**38**	**36**
	Category	Very high	Very high

Overall, the experts' evaluation produced an average score of 37. According to the established criteria, this figure placed the IFL instructional design within the very high validity category. On this basis, the learning materials prepared for the model, aimed at enhancing students' critical thinking and collaboration in Pancasila Education, were recognized as highly valid.

Following the validation process, several revisions were introduced to improve the IFL instructional design. First, the formulation of learning objectives was refined to make them clearer and easier to understand. In the initial version, the objectives were too general. They were later restructured to become more specific, measurable, realistic, and directly aligned with the instructional targets of the IFL model. Second, more detailed technical guidelines were added regarding how to access and use the learning videos before face-to-face meetings. This ensured that the flipped learning component functioned effectively and minimized potential confusion during independent study at home. Third, adjustments were made to the time allocation for each learning activity, both at home and in class. The initial plan had unrealistic timeframes, which risked limiting students' engagement. The revised design provided a more balanced schedule, enabling critical thinking and collaboration to develop more effectively.

The IFL model is grounded in several theoretical perspectives, particularly constructivism, connectivism, and the TPACK framework, all of

which show the value of integrating technology into education. Constructivism is specifically relevant because it emphasizes the idea that students build their understanding through interaction with experiences and the environment (Kugele, 2025). Scholars such as Bhattacharjee (2015) and Golder (2018) argued that knowledge was not transferred directly from teachers to students but emerged as individuals interpreted new information and connected it with prior experiences. Learning is often described as progressing from concrete actions to symbolic representations (O'Donovan, 2021). Students continuously refine their mental model to accommodate new information, forming unique interpretations of reality (Golder, 2018). This can also pose practical challenges in the classroom, as students construct their own knowledge in various directions and at varying speeds (Sung et al., 2023). For this reason, constructivism encourages a participatory approach (Fernando & Marikar, 2017), shifting the classroom focus from teachers as the sole source of knowledge to students who construct meaning collaboratively (Alzhrani, 2022; Tsai et al., 2023). Research has found that constructivist learning successfully increases motivation (Do et al., 2023; Tsai et al., 2023; M. Yang, 2024), critical thinking skills (Le & Nguyen, 2024; Wang et al., 2024), and creativity (Jarutkamolpong & Kwangmuang, 2025).

The IFL instructional design also draws on the theory of connectivism, which emphasizes the importance of learning networks in contemporary education (Downes, 2010). In this perspective, students are not passive recipients of information but active participants who engage with digital systems to build personal knowledge and for their communities (Al-Maawali, 2022). Research has shown a strong relationship between students' active use of digital resources and their academic performance (Liu et al., 2024). Connectivism shows that individuals acquire information primarily through modern digital sources. These sources generally include: (a) online classes, particularly massive open online courses (MOOCs), (b) social networks that provide podcasts, video clips, and interactive content, as well as (c) immersive platforms such as virtual reality (Kropf, 2013). The theory integrates principles from chaos, network, and complexity theories, as well as self-organization. In this framework, learning is seen as a process that takes place in uncertain and continuously evolving environments, where not all factors are under the students' control. It is also understood as actionable knowledge, which can exist externally in organizations or databases. Therefore, the connections that link information are often more critical than the actual knowledge at any

given moment (Siemens et al., 2019). The concept of connectivism describes the relationship between human learning and the broad access to knowledge enabled by today's technological environment (Corbett & Spinello, 2020). The principles of connectivism can be applied to develop learning environments that enrich students' understanding through online interactions and access to digital knowledge resources (Dziubaniuk et al., 2023), as well as to foster digital thinking skills (Aldalalah et al., 2023).

In addition, the IFL instructional design incorporates the framework of Technological Pedagogical Content Knowledge (TPACK), which combines technological integration with pedagogical and content expertise. The growing presence of artificial intelligence (AI) in education has influenced how teachers develop professionally and adapt their practice (Tan et al., 2025). Evidence shows that effective learning is closely tied to teachers' ability to use technology to address diverse students' needs (Abubakir & Alshaboul, 2023). However, integrating technology into instruction is rarely straightforward. It requires not only technical and administrative support but also a solid level of teacher competence (Ait Ali et al., 2023). The TPACK model was introduced to capture the set of knowledge teachers need to design meaningful lessons while making effective use of technology (Santos & Castro, 2021). This framework underscores that successful integration depends not only on expertise in pedagogy, technology, and subject matter individually, but also on the way these domains interact to guide the design of teaching and learning activities (Petko et al., 2025). It provides an important perspective for understanding the challenges teachers face when implementing information and communication technology (T. Yang & Dong, 2024). Empirical literatures have confirmed that TPACK-based instruction offers clear benefits and can significantly improve the effectiveness of learning (Tseng et al., 2022).

4. CONCLUSIONS

In conclusion, the research and validation shows that the IFL instructional design have very strong validity in supporting the development of students' critical thinking and collaboration skills in Grade X Pancasila Education. The design combines the flipped learning with the inquiry instructional design, which covers six stages, including Turning In, Finding Out, Sorting Out, Going Further, Reflection, and Action. Learning is carried out in two contexts, namely before class and during class. At home, students engage in technology-supported

independent activities, while in class, they participate in active group work. Expert evaluations show the design and learning materials have an overall average score that falls in the Very High category. This result suggests the design is well-suited for use in classrooms that emphasize 21st-century skills.

Furthermore, the IFL instructional design is based on a strong theoretical foundation, namely constructivism, connectivity, information processing theory, and TPACK. These theories support a learning process that positions students as active learners, constructing knowledge independently and collaboratively, while making good use of technology. The revision process carried out based on the validation results also strengthens the quality of the design. These included refining the learning objectives to be more specific and measurable, providing clearer technical instructions for the use of learning media, and adjusting the time to support critical and collaborative thinking processes more proportionally. Therefore, the IFL design model can be used as an innovative and effective instructional design alternative to equip students with HOTS and collaboration skills.

5. SUGGESTION

Based on the results, the following recommendations are provided:

a. Implementation in Classroom Practice. Future research should apply a validated IFL design in real-life classroom settings to evaluate its practical effectiveness in enhancing critical thinking and collaboration, particularly in diverse learning environments.

b. Broader Subject Application. Since this research focused on Pancasila Education, further investigations are recommended to use the IFL model for other subjects, such as STEM, language, or social sciences, to examine its adaptability and potential cross-disciplinary benefits.

c. Integration of Digital Tools. Further exploration is needed regarding the integration of various digital platforms and tools within an IFL framework to optimize students' engagement, self-directed learning,

and collaborative activities.

d. Longitudinal and Comparative Research. Longitudinal and comparative research is needed to measure the sustained effect of IFL on students' development of 21st-century skills and to compare its effectiveness with that of other innovative learning models.

6. LIMITATIONS

The limitations of this design are as follows:

a. Scope of Development Design. This research only used the first three stages of Ellis & Levy's development model (problem identification, goal identification, and design and development), without extending it to implementation and evaluation, thereby limiting conclusions about the model's practical effectiveness.

b. Validation Process. The validation process relied solely on expert assessments (media, content, and practitioners/teachers) without involving students, making the results to show theoretical and conceptual feasibility rather than student-centered evidence.

c. Contextual Specificity. This research was conducted in the context of Pancasila Education for Grade X Senior High School students, which might limit the generalizability of the IFL design to other subjects, educational levels, or cultural settings.

6.1. Contribution of this paper to the literature

This research offers a novel contribution by applying an Inquiry Flipped Learning (IFL) model to Pancasila Education. The subject has rarely been explored through technology-enhanced and student-centered pedagogies. By integrating key theories such as constructivism, connectivism, information processing, and TPACK, the research not only advances the discussion on instructional design but also provides a validated model that emphasizes critical thinking and collaboration. These results position IFL as an innovative model for rethinking civic and values-based education in secondary schools, thereby expanding the scope of flipped learning research.

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