

PHENOMENOLOGICAL STUDY OF ENHANCING STUDENTS' LEARNING INTEREST THROUGH PROJECT-BASED LEARNING MODELS IN CHEMISTRY SUBJECT AT HIGH SCHOOLS IN SUKABUMI CITY

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ABSTRACT

Chemistry lessons in high schools are still perceived as less popular, hence requiring educational management that can optimize students' interest in learning. This poses a unique challenge for teachers to enhance learning, one of which is project-based learning. This research aims to describe and analyze the optimization of students' interest through project-based learning in the chemistry subject. The study is qualitative, employing a phenomenological approach, and is also examined through the PDCA quality management theory by Edward Deming. Specifically, the research describes and analyzes planning, implementation, supervision, and follow-up on the optimization of PjBL in chemistry. The research is conducted at SMAN 1 Sukabumi and SMAN 2 Sukabumi. Data collection involves observation, interviews, and documentary studies. Data processing is assisted by the ATLAS.ti application, interpreted by researchers based on relevant supporting theories. The results indicate that in planning, teachers strategize topic selection, motivational planning, and create strategies to keep students engaged. For implementation, teachers play a guiding role, organizing groups to ensure smooth project-based learning. In the evaluation or supervision stage, teachers design assessments covering cognitive, psychomotor, and affective domains. As a follow-up effort for improvement, comprehensive evaluation and adjustments are made from planning to implementation and evaluation, focusing on refining planning and topic formulation. In conclusion, this study demonstrates that the optimization of teaching efforts is evident in teachers' management, executing each step of the learning process thoroughly. The key to enhancing student interest lies in the teacher's ability to organize project-based learning effectively.

Keywords: Optimization, learning interest, Project-based learning, Chemistry

INTRODUCTION

Education is the main pillar in shaping the future generation; however, the development of the education world faces various challenges. One of the challenges that continues to be the focus of attention is students' learning interest. Students' learning interest not only determines the level of academic achievement but also influences the overall learning process. In this context, attention

needs to be focused on innovative learning models to enhance students' learning interest. Teachers need to create students' learning interest so that they can enthusiastically receive lesson materials, motivate students to actively engage in the learning process, make learning an enjoyable experience, and use a variety of methods, strategies, techniques, and approaches that are engaging (Simbolon, 2014).

In recent years, there has been a phenomenon where the education world has undergone a significant paradigm shift. Traditional linear learning models centered on the teacher are facing challenges in meeting the increasingly diverse needs of students. The phenomenon of the Merdeka curriculum provides an alternative innovative and creative learning model, thus becoming the key to adapting to the changing times. Among the learning models suspected of being able to increase students' learning interest is project-based learning

To achieve this, according to Komara, Endang (2020), in the learning process educators or teachers should use a scientific approach that begins with observing, questioning, experimenting, associating, and communicating, which can be realized in various models, methods, and learning approaches.

21st-century skills have become increasingly important in facing the demands and changes in the education and job world. Skills such as creativity, problem-solving, critical thinking, collaboration, communication, digital literacy, and leadership are increasingly dominating future needs, becoming the key to success in an ever-changing environment. Students equipped with these 21st-century skills are better able to adapt to technological advancements, solve complex problems, and work collaboratively in teams, creating individuals ready to face future challenges (Mardiyah, R.H, 2021).

These competencies are not only limited to the job world but also play a crucial role in shaping global citizens who are open-minded and responsive to differences. These skills enable individuals to understand global realities, contribute to society, and address global challenges such as climate change, social inequality, and sustainable innovation. Therefore, education that prioritizes the development of 21st-century skills opens the door to shaping a generation that is not only academically intelligent but also ready to face the complexities of the modern world.

21st-century skills create new challenges and opportunities in the education world. Curricula and methods need to be adjusted to ensure that students not only acquire academic knowledge but also can apply and develop the necessary skills. Education should encourage students to think creatively, create space for collaboration, and provide practical learning experiences. The integration of technology in learning strengthens the creation of a learning environment that is relevant and responsive to rapid developments in various sectors of life today. By prioritizing 21st-century skills, education can become a driving force for positive change, preparing future generations for success in careers, personal lives, and positive contributions to global society.

According to Rafik, M, et al. (2022), Project-Based Learning (PjBL) has become a highly effective tool in integrating 21st-century skills into today's education world. Through PjBL, students not only gain theoretical knowledge but also develop critical thinking, creativity, and

collaboration skills directly in the context of real-world projects. These projects enable students to face real challenges, create innovative solutions, and practice the skills needed in the modern workplace.

PjBL also creates a learning environment that encourages autonomy and student responsibility for their own learning. In this regard, students play an active role in designing, implementing, and evaluating the projects they create. Thus, they not only sharpen their knowledge but also build leadership, problem-solving, and effective communication skills. PjBL, in the current education context, serves as a bridge that combines the needs of future skills with innovative and relevant learning approaches. PjBL has also been proven effective in increasing student engagement (Bartz, D. (2023)).

Students' learning interest is considered a crucial factor in determining the success of learning. According to Qomariah, N (2023), students with high learning interest tend to be more active and actively participate in the learning process. Conversely, low learning interest can be a significant barrier. Therefore, efforts to optimize students' learning interest become an urgent need. According to Figueroa Maldonado, O. J., & Vera González, K. S. (2023), with this project-based learning method, students are motivated to improve their speaking skills and in other subjects, thus making them actively participate in learning.

Although important, enhancing students' learning interest through traditional learning models often encounters obstacles. Lack of student engagement, a tendency to memorize without deep understanding, and the lack of practical application of acquired knowledge are some of the main obstacles. Therefore, exploration of learning models that can overcome these obstacles is needed.

In the pursuit of solutions to enhance students' learning interest, Project-Based Learning (PjBL) becomes an attractive choice. PjBL offers a contextual learning approach, linking learning to real-world situations (Lestari N, A, 2023). According to Undari, M (2023), Project-Based Learning (PjBL) has proven to be an effective and beneficial learning approach in improving students' understanding and developing skills relevant to the needs of the 21st century. One of the successes of PjBL lies in its ability to bring learning concepts into the real-world context through practical projects that touch on daily life. Students engaged in PjBL tend to understand concepts more deeply because they are given the opportunity to apply their knowledge in concrete situations

Project-Based Learning (PjBL) in Chemistry plays a crucial role in enhancing students' understanding of chemistry concepts and linking them to real-world applications. One unique aspect of PjBL in Chemistry is its ability to make theoretical materials more relevant and meaningful through project-based learning. For example, PjBL projects can be designed to enable students to investigate the environmental impact of a chemical compound or design experimental methods to understand specific chemical reactions. According to Hemayanti et al. (2020), interest in learning chemistry is influenced by internal factors such as curiosity, aspirations, motivation,

and intelligence level, while external factors involved include family environment, teaching methods of teachers, interaction with peers, and learning materials.

In this regard, students not only understand chemistry concepts theoretically but also directly engage in observing, analyzing, and synthesizing chemical substances. Projects related to real-world applications provide deeper and more significant contexts for chemistry learning. Additionally, PjBL can build 21st-century skills such as creativity, collaboration, and problem-solving, which are crucial aspects in preparing students for careers in science and technology.

PjBL can also be used to explore ethical and sustainability issues in chemistry, allowing students to understand the social and environmental impacts of certain chemical particles. Thus, students not only become competent in understanding chemistry concepts but also develop critical thinking towards ethical implications and safeguarding the environment from the harmful effects of chemicals. Overall, PjBL in Chemistry provides a comprehensive and applied learning approach, creating deep and relevant learning experiences for students.

However, in the implementation of Project-Based Learning (PjBL), there are several potential gaps that can affect the effectiveness of learning. One factor may lie in the lack of connection between the project themes and individual students' interests. If the project fails to captivate their interest or lacks relevance to students' lives, their interest in learning is likely to diminish. Additionally, the role of the teacher is crucial; lack of involvement or difficulty for teachers in linking learning materials with projects can be a barrier. Other factors to consider include resource limitations, both in terms of time and equipment, as well as the clarity of learning objectives. Gaps can also arise from differences in students' learning styles and ambiguity in evaluation methods. Therefore, to address these gaps, it is necessary to design projects that consider students' interests, actively involve them, provide adequate support, and establish clear evaluations to motivate students and ensure the successful implementation of PjBL.

This research brings novelty in methodology by applying a phenomenological study approach, which provides an in-depth understanding of the experiences and perceptions of subjects related to Project-Based Learning (PjBL) in the context of Chemistry subjects. This methodology allows the research to explore the essence and meaning of students' and teachers' experiences in implementing PjBL, providing rich and contextual insights.

Furthermore, this research also contributes novelty in terms of outcomes, where the research findings will yield a hypothetical PjBL model that can be applied in various Chemistry topics and based on a value system. This model not only offers innovative solutions in the context of Chemistry learning but also introduces variations in teaching methods that may rarely be used by teachers. This model is expected to provide interesting and effective alternatives in facilitating students' understanding of Chemistry concepts, thus building significant motivation for learning in the classroom

THEORETICAL REVIEW

1. Learning Interest

Every student surely has an interest in every subject taught in their school. Learning interest is an important factor for them to be willing to participate in the learning process. Learning interest itself consists of two syllables, namely "interest" and "learning." According to Djaali (2013), interest refers to feelings of curiosity, desire to learn, admire, or possess something. A student should ideally have an interest that arises from within themselves for the learning process. Learning is defined as a natural process to acquire knowledge or skills through teaching and learning activities (Pritchard, 2014).

There are two types of interests explained by Rosyidah (2013), namely:

- a. Interest Stemming from Nature
- b. Interest Influenced by the Environment

These interests develop along with the individual's developmental process influenced by the surrounding environment. Factors such as encouragement from parents, habits, or customs around the individual can play a significant role in shaping interests. The learning environment, both at home and at school, also influences the development of a person's learning interest.

Based on the explanation from Hurlock (2013, p. 115), here is an elaboration on the characteristics of interest:

- a. Interest Grows Alongside Physical and Mental Development
- b. Interest Depends on Learning Activities and Learning Readiness
- c. Interest Depends on Learning Opportunities
- d. Interest Development May Be Limited
- e. Cultural Influence on Interest
- f. Emotionally Weighted Interest
- g. Economically Weighted Interest².

2. Project-Based Learning

The Project-Based Learning model is an enhancement of the Problem-Based Learning method. Project-Based Learning is one of the training strategies that focus on Contextual Learning (CTL), which helps educators link learning materials to real-world situations. This CTL concept encourages learners to apply their knowledge in daily life as members of society (Jones, Rasmussen, and Moffit, 1997).

Project-Based Learning emphasizes solving real-life problems through practical learning experiences in the community. This method is also known by several other names, such as project-based teaching, experiential education, authentic learning, or rooted instruction. Project-Based Learning can be defined as learning that focuses on projects, experiential education, and authentic learning rooted in real-life issues (Gijbels, 2005:29).

The steps of learning with the Project-Based Learning method, according to Delise (1997:27-35), can be explained as follows:

- a. Connecting with the Problem
- b. Visiting the Problem
- c. Revisiting the Problem

- d. Producing a Product/Performance
- e. Evaluating Performance and the Problem

3. PDCA Cycle

In the context of Project-Based Learning (PjBL), the Plan-Do-Check-Act (PDCA) concept by Deming can be integrated as a systematic approach to ensure sustainability and continuous improvement in the implementation of PjBL. PDCA is a management cycle involving Plan (P), Do (D), Check (C), and Act (A).

RESEARCH METHOD

This research was conducted at SMA Negeri 1 Sukabumi City and SMA Negeri 2 Sukabumi City. The reason for selecting these schools is that they represent favorite public schools in Sukabumi City with distant geographic locations, and both schools have implemented PjBL learning models.

This study used a phenomenological approach, which is a qualitative research approach used to understand and explain individuals' subjective experiences related to a phenomenon or event. Qualitative method describes and analyzes phenomena, events, beliefs, attitudes, and social activities, both individually and in groups.

According to What and Berg in Komara, Endang (2022:78), "Phenomenologists,...are not at all in the business of trying to explain why people do what they do, rather, they are interested in explaining how people do what they do; according to constructs they manage to organize their daily lives, especially their communication between each other."

Primary data sources refer to information obtained directly from the primary source through data collection methods such as interviews and observations. In qualitative research, the number of data sources or respondents is not predetermined, because the main emphasis is on achieving maximum information to fulfill the research objectives. The concept of sampling in this study is more related to the selection of respondents and specific social situations that can provide credible and solid information related to the research focus. To ensure data relevance to the research problem, the researcher visited the research location and obtained information from various parties, including school principals, chemistry teachers, students, school committee chairs, school supervisors, and the Head of the Branch Office of Education (KCD).

Various techniques were used for data collection in this study, including interviews, observations, and documentation. These three techniques were used to obtain supporting data and information. Data analysis includes data reduction, data display, conclusion, and using the ATLAS.ti application. Researchers need to perform triangulation, which is checking data from various sources; the results of observations are confirmed through interviews with informants, and then verified with documents available at the research site

RESULTS AND DISCUSSION

Students' learning interest, as a driver of intrinsic motivation, plays a key role in designing engaging and relevant learning experiences. When students have a high interest in a topic, they are more likely to be active, participate in discussions, and have a strong inner motivation to learn. PjBL, as a learning approach that emphasizes real-world projects, provides an ideal platform for integrating students' interests into the learning context.

At the same time, the implementation of the PDCA cycle ensures that learning is not only engaging but also sustainable and continuously improving. The planning stage of PDCA aligns with the "Starting with Essential Questions" step in PjBL, where project goals and plans are made considering students' interests. The execution stage of PDCA, or "Do," aligns with the "Creating Project Plans" and "Scheduling" phases in PjBL, where these plans are carried out in the form of real projects. PjBL can be considered as the implementation of the PDCA concept in action. After the project is completed, the "Check" stage of PDCA is manifested in the "Testing and Assessing Results" step, where the project results are evaluated and compared with the initial objectives. The "Act" stage of PDCA, which emphasizes continuous improvement actions, is reflected in the "Evaluating Experience" step in PjBL.

Students and teachers together reflect on the learning outcomes, identify obstacles, and take action for future improvements. Quality management analysis based on Deming's quality management theory known as the PDCA cycle, Plan (P), Do (D), Check (C), and Act (A). Here are the research results processed using the ATLAS.ti application.

A. Plan

Planning includes lesson planning, student motivation planning, planning in formulating chemistry topics, planning goal setting/PjBL motivation, and student organization planning. In planning Project-Based Learning (PjBL), there are several planning aspects to consider. Firstly, we need to establish clear learning objectives, which encompass the development of students' skills, knowledge, and attitudes through projects. The chosen topics should be challenging and relevant, serving as the primary focus in the learning process.

Research findings on planning are consistent with what Edmuns (2017) conveyed, "The principles of project design involve a context that engages students in authentic extended inquiry through essential questions, collaborative work that enables students to articulate their ideas, learning technology to discover and convey solutions, and the creation of products that demonstrate student understanding and serve as the basis for discussion, feedback, and revision."

Lesson planning is formulated in the operational curriculum of the school and translated by teachers into the form of Lesson Implementation Plans (RPP), while topic formulation planning is done either individually or collaboratively formulated by Subject Teacher Groups. Meanwhile, the teacher's goal planning for conducting learning with the Project-Based Learning model must be clear, so that the teacher does not lose direction in implementing learning in the classroom. Organizing the implementation of learning is a crucial aspect that must be done so that the project

can be conducted properly, both in terms of learning time and the achievement of predetermined learning objectives.

The importance of having detailed assessment rubrics cannot be ignored. These rubrics help in evaluating student performance based on criteria relevant to the learning objectives and the projects undertaken. Additionally, dividing students into teams with clear roles and responsibilities can enhance collaboration effectiveness.

B. Do

The implementation of optimizing students' learning interest through PjBL in Chemistry subjects at high schools is depicted from the informant's responses collected by the researcher. This implementation is divided into several categories: Implementation Steps, Teacher's Role, Steps of Differentiated Approach, and Involvement of External Elements. The implementation of optimizing students' learning interest through PjBL in Chemistry subjects at high schools is depicted in the form of a diagram, using the ATLAS.ti application.

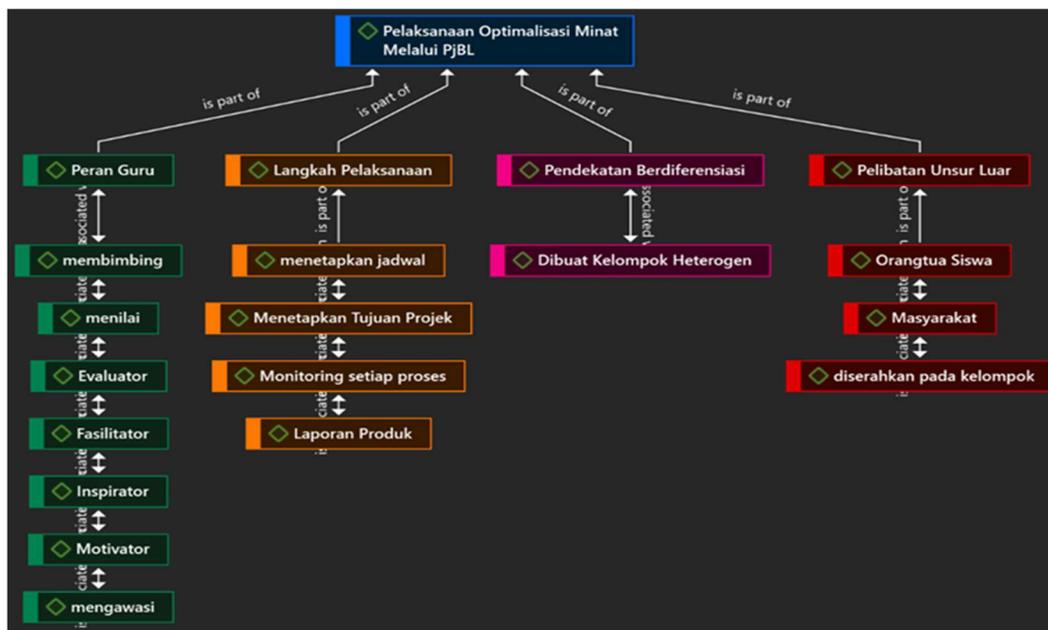


Figure 1. Data Processing Results with ATLAS.ti Implementation of Student Interest Optimization through Project-Based Learning Model

Clear implementation steps based on the syntax of Project-Based Learning are crucial. The most fundamental steps include scheduling the project, setting project objectives, monitoring each step, and creating and presenting the product report. The role of the teacher in implementing project-based learning includes being a guide, an assessor, a facilitator, an inspirer, and a motivator.

The trend of differentiated learning in education today is already reflected in the formation and collaboration of groups. Heterogeneous group formation, in terms of competencies,

backgrounds, and genders, can be achieved in learning using the project-based learning model. Implementing the optimization of student interest through Project-Based Learning (PjBL) in chemistry subjects at high school is an engaging and effective approach to stimulate student engagement. In this context, PjBL is designed to create meaningful and relevant learning experiences, while also tapping into students' interest in chemistry subjects. Creatively designed projects can arouse students' curiosity and provide them with opportunities to delve into chemical concepts practically.

The importance of PjBL lies in the development of collaborative skills and problem-solving abilities among students. By involving them in real projects, students learn to work together in teams, share ideas, and complete tasks that reflect real-world challenges. Additionally, PjBL can be integrated with technological advancements, allowing students to use digital tools and resources in exploring and presenting their project outcomes. Besides skill-building aspects, PjBL also considers the meaningfulness of learning. Students not only understand chemical concepts theoretically but also see how these concepts are applied in projects relevant to everyday life. This adds depth and significance to their learning experience, creating more memorable learning experiences belajar yang lebih berkesan.

C. Check

Assessment encompasses planning assessment, implementation assessment, and assessment of outcomes/products. All three assessments are crucial requirements for the successful optimization of student interest through project-based learning. Typically, assessment focuses solely on assessing outcomes, so overall evaluation cannot be conducted. Assessment of skills and attitudes during project implementation is neglected and oriented towards outcomes. In the outcomes, all assessments will reflect not only knowledge but also attitudes and 21st-century skills can be identified and formed, such as teamwork, communication, responsibility, happiness, creativity, and independence.

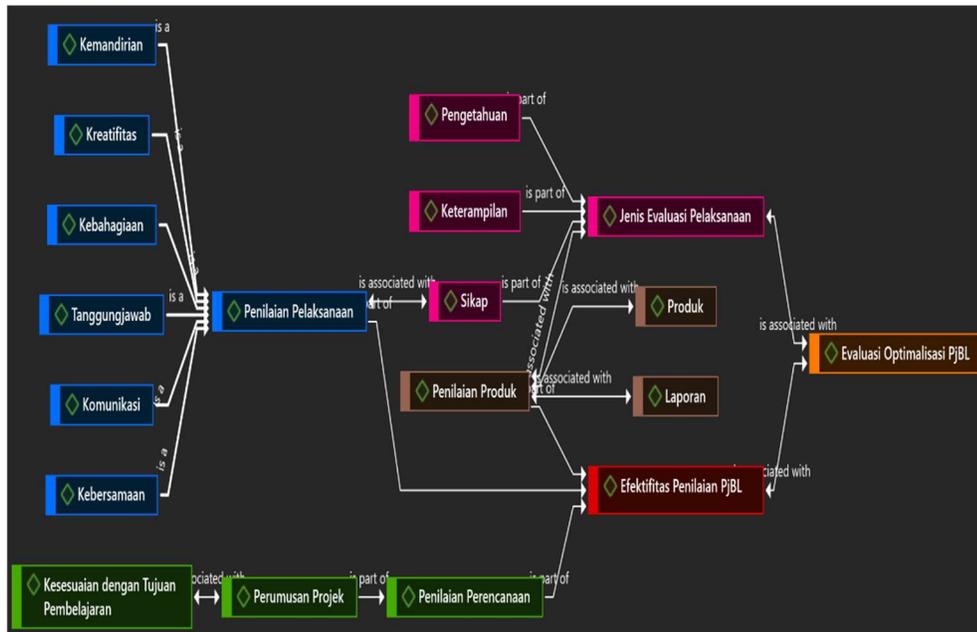


Figure 2. Data processing results with ATLAS.ti Evaluation of student interest optimization through project-based learning model.

The integration of these three evaluation aspects allows teachers to gain a more comprehensive and in-depth understanding of students' achievements in project-based learning. The interview results reflect the commitment of teachers in both schools to see students not only as information recipients but as individuals with cognitive intelligence, psychomotor skills, and affective aspects that need attention.

Evaluating the optimization of student learning interest through Project-Based Learning (PjBL) in Chemistry subjects at high school requires a holistic approach involving various indicators to effectively measure its impact. Firstly, evaluation needs to consider changes in the level of student participation in learning activities. With PjBL, it is expected that students actively engage in projects, group discussions, and exploration activities, which can be measured through their level of involvement and contribution to the learning process.

D. Act

The follow-up of optimizing students' learning interest through Project-Based Learning (PjBL) in Chemistry subjects at high school involves a series of steps to ensure sustainability and continuous improvement in the learning process. This follow-up is evidenced by the interview results with informants, including follow-up planning and student reflection engagement. Here are the results of processing interview data for PjBL follow-up using the ATLAS.ti application:

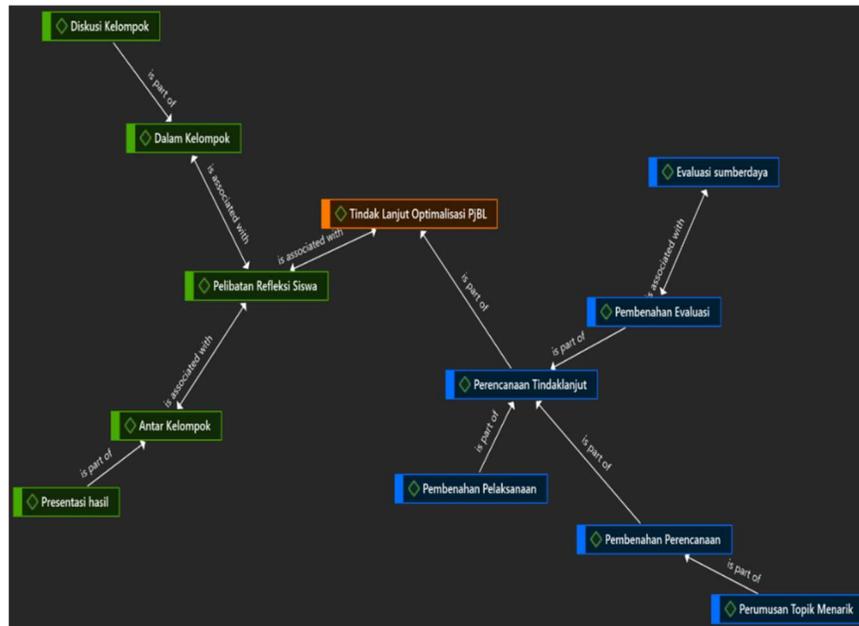


Figure 3. Data Processing Results with ATLAS.ti Follow-up Improvement of Student Interest Optimization through Project-Based Learning Model

Follow-up evaluations can be conducted by both students and teachers. Teachers guide students to provide feedback to each other, both within groups and between groups. Follow-up actions must also be well-planned and based on the analysis of each step in the planning, implementation, evaluation, and improvement process.

The PDCA cycle in Project-Based Learning is not only a tool for teachers to improve their teaching, but it is also utilized by students to enhance their learning experiences. The correlation between the PDCA Cycle, Project-based Learning (PjBL), and Student Interest can be illustrated as follows:

a. Planning (Plan)

Goal Identification: Determine specific and measurable learning objectives. Example: Set goal = "Students can generate creative solutions to a specific problem in the project."

Project Design: Develop project details, including scope, resources, and schedule. Example: Design project = "Create a project plan that includes action steps, student roles, and evaluation."

b. Implementation (Do)

Plan Implementation: Execute the project plan according to the designed stages. Example: Implement project plan = "Engage students in project activities according to the established schedule."

Team Collaboration: Encourage cooperation and collaboration among students within the team. Example: Facilitate team collaboration = "Facilitate team discussions and meetings to enhance collaboration."

c. Evaluation (Check)

Outcome Evaluation:

Assess project outcomes to determine the extent to which learning objectives are achieved.

Example: Evaluate project outcomes = "Analyze project results to assess the achievement of learning objectives."

Feedback and Correction: Provide feedback to students and offer corrections or guidance as needed. Example: Provide feedback = "Provide constructive feedback to students and guide them for improvement."

d. Reflection and Improvement (Act)

Learning Identification: Specify what has been learned during the project. Example: Identify learning = "Analyze what students have learned during the project implementation."

Plan Revision: Adjust the learning plan based on identified learning. Example: Revise plan = "Modify the learning plan based on reflection findings."

If viewed from the syntax of Project-based learning, the improvement of project-based learning based on Deming's quality theory can be illustrated as shown in the table below:

Table 1. Relationship between PjBL Stages and PDCA Cycle

No	Step of PjBL	PDCA Cycle
1	Starting with Essential Questions	Plan
2	Designing the Project Plan	Plan
3	Scheduling	Plan
4	Monitoring Students and Progress	Do
5	Testing and Evaluating Results	Check
6	Reflecting on the Experience	Act

CONCLUSION AND RECOMMENDATIONS

Optimizing student interest through project-based learning in chemistry illustrates the phenomenon that every learning process must be conducted earnestly; teachers must possess competency in teaching. Mastery of content material and proficiency in approaches and learning models are essential to create a conducive learning atmosphere. In chemistry learning through project-based learning, it may not directly optimize students' interest in learning, but continuous

improvement strategies are necessary for each step of the learning process, starting from planning, implementation, evaluation, and follow-up/improvement.

A phenomenon that emerges is that teachers tend to conduct assessments dominantly at the end of the project, namely in assessing outcomes, reports, and presentations. Meanwhile, the process leading to outcomes is less maximally conducted through observation and assessment.

Based on the findings of this research, it is recommended that project-based learning in chemistry subjects be carried out thoroughly and earnestly at each step based on the syntax of the project-based learning model. Conducting evaluation and improvement with the PDCA cycle is something that can assist teachers in improving this project-based learning process.

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