

Interactive E-LKPD Based on PjBL: Innovation Learning Adaptive for Improving Learning Outcomes Student Class X

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Abstract

The digital era demands the integration of innovative learning media to develop 21st century skills. This study aims to develop E-LKPD-based learning media combined with the Project-Based Learning (PjBL) model to improve learning outcomes, motivation, and collaboration, creativity, and problem-solving skills. The research used the ADDIE development model and was applied to class X students of SMA Negeri 2 Metro. The results showed that the use of PjBL-based E-LKPD significantly improved learning outcomes, with an average increase of 20 points and a p-value of 0.002. The N-gain value of the experimental group reached 0.78 (high category), while the control group was only 0.28 (low category). The effect size value of 1.3 indicates the large influence of the media on improving learning outcomes. 21st century skills also improved, with an average score of 4.2 in the experimental group compared to 3.1 in the control. As many as 85% of students stated that they were more enthusiastic and independent when learning. These findings indicate that the PjBL-based E-LKPD media is effective in supporting active learning, improving understanding, and shaping 21st century essential competencies. The implication of this research is the importance of integrating technology-based learning media to support independent learning curriculum, improve learning quality, and encourage active student engagement. Project-based learning and digital media can provide alternatives for teachers to be more effective in developing students' potential in an ever-evolving world.

Keywords: Interactive E-LKPD, ADDIE Model, Project-Based Learning, Learning Outcomes, 21st Century Skills

Introduction

In the 21st century, the development of digital technology has brought significant transformations in the world of education, not only on a global scale, but also in local contexts such as Indonesia (Puspa, Rahayu, and Parhan 2023), including at SMA Negeri 2 Metro. The application of this technology enables more dynamic and interactive learning, which is much needed to prepare students with 21st-century skills such as critical thinking and collaboration (Boateng, S. and Kalonde 2024; Yates, et al. 2020). However, major challenges remain, especially related to the gap between the expectations of technology and the reality of its implementation in the classroom, which is often categorized as rigid and focused on memorization (Ozmen Garibay et al. 2023).

important framework. For analyze effectiveness innovation technology in Education (Boateng, S. and Kalonde 2024). This model shows that technology can be used to increase student engagement and motivation through interactive and engaging learning experiences, making the learning process more effective (Firdaus, Hernadi, and Pratiwi 2024 ; Boateng, S. and Kalonde 2024). Although the curriculum at SMA Negeri 2 Metro is quite comprehensive, the lack of relevant and engaging technology implementation can make students lose motivation and have difficulty achieving optimal learning outcomes (Hidayat et al. 2020 ; Herwin et al. 2023).

Research shows that students who are actively engaged in learning through technology, such as Augmented Reality (AR) and Virtual Reality (VR), show significant increases in motivation and learning outcomes (Liu, Zhang, and Liu 2024 ; Aswie and Abdu 2023 ; Chang et al., 2019). For example, the use of VR in teaching not only increases learning satisfaction but also enhances interactions between teachers and students, creating a more enjoyable and meaningful learning experience (Liu et al., 2024). Collaborative and technology-based learning experiences have been shown to be important, especially in the context of secondary education facing a transition to modern learning methods (Zhou et al. 2023 ; Yates, A., Starkey, L., Egerton, B., & Flueggen 2020)

However, in SMA Negeri 2 Metro, many students are still trapped in traditional learning approaches that do not utilize technology. This contributes to low learning motivation, especially among grade X students. Research shows that low learning motivation can hinder students' ability to master material effectively (Ramadani 2024) . Therefore, it is important for educators to integrate more innovative and technology-based approaches into daily learning, not just using technological devices as aids, but as the core of the learning process itself (Firdaus et al. 2024 ; Pratiwi et al. 2024) . Thus, efforts to increase student motivation and engagement through technology are very necessary to improve the quality of education in these schools.

Traditional learning media often fail to meet the demands of 21st century skill development, which include critical thinking, collaboration, and creativity. These methods often result in minimal student engagement, causing them to simply absorb information without deep understanding and the ability to apply knowledge practically in real situations (Mustakim, et al., 2022 ; Manaff and Azahari 2024 ; Han and Ellis 2021) . Students lack the opportunity to collaborate with their peers or to develop solutions to the problems they face, thus hindering the development of skills needed in everyday life in the world of work (Nordin 2024 ; Yunus et al. 2021) . The implementation of effective technology-based learning media is important to overcome these weaknesses. E-LKPD (Electronic Student Worksheets) integrated with the Project-Based Learning (PjBL) model emerges as a relevant solution (Syukri et al. 2021 ; Novinda Putri, et al., 2022).

PjBL is a learning approach that allows students to engage in real projects, where they can create final products and solve real-world problems (Fitri et al. 2024 ; Irwan et al. 2022). Through PjBL, students not only learn theory, but also collaborate in groups to design practical solutions, which are in line with market needs and 21st century skill demands (Yunus et al. 2021 ; Anggereini, et al., 2023) . This process is further supported by the use of technology in E-LKPD, which allows learning materials to be delivered more interactively and interestingly, and encourages students to learn independently and collaboratively (Nordin And Azahari 2024 ; Cheng, et al., 2021 ; Wafik, et al., 2024)

PjBL-based E-LKPD provides students with access to a series of activities that encourage collaboration among them (Hidayati, et al. 2021 ; Nurajijah and Peniati 2024) . For example, students can collaborate in groups to develop creative and functional problem solving, combine theory with practice, and use technology to enrich their learning experiences (Tsai et al. 2020 ; Yunus et al. 2021) . Research shows that collaborative learning supported by technology can improve students' satisfaction levels and problem-solving skills, compared to traditional learning methods (Pozzi et al. 2023 ; Männistö et al. 2022 ; Hasanuddin, et al. 2021) . Overall, the integration of E-LKPD with the PjBL model reinforces the need for the transformation of conventional learning methods to be more based on collaboration and active student involvement, which ultimately supports the development of skills needed for success in the 21st century. (Yunus et al. 2021 ; Widiawati, et al. 2022 ; Irwan et al. 2022) . Through this learning media, students are empowered to become active learners who do not only rely on teaching, but face real challenges and find impactful solutions, thereby bridging the current skills gap in education (Nordin And Azahari 2024 ; Hacısalihoglu et al. 2019).

The results of this research can bridge the gap between available technology and its application in effective teaching and learning processes. Project-based learning provides opportunities for students to innovate and collaborate, improving critical thinking skills and social skills that are important for their future careers (Sari 2024 ; (Novinda Putri, et al. 2022) . In a study conducted by Syahlan, et al. (2023) , it was found that the application of a project-based learning model can improve student learning outcomes through their active involvement in the designed projects. This is in line with Firdaus' findings which highlight the importance of a structured approach such as the ADDIE model in designing effective learning media (Firdaus and Firdaus 2024). PjBL also allows students to develop practical skills that are relevant in the real world. According to research by Rehman et al. (2024), project-based learning plays a crucial role in equipping students with creative thinking skills that are important for facing future challenges (Rehman et al. 2024) . The projects carried out by students allow them to apply theory into practice and make real contributions, which ultimately contribute to the development of character and skills needed in the world professionals (Adipat et al. 2021) . Furthermore, the use of technology in learning also facilitates accessibility for students to learn outside of class hours and adjust their respective learning speeds and styles (Carstens et al. 2021 ; Habib, et al. 2020).

In the era of 21st century learning, the demand for innovative learning media design is increasingly urgent. Researchers such as Wulandari, et al. (2023) emphasize that the project-based STEM learning model can help students understand concepts more deeply. With more interactive learning media, it is hoped that students will not only become more active and creative but also more involved in the learning process. All of these elements reflect an urgent need to evaluate the effectiveness of the PjBL-based E-LKPD being developed at SMA Negeri 2 Metro, so that it can produce real solutions that are useful for improving student learning outcomes (Usparianti, et al. 2023 ; Wulandari, et al. 2023 ; Kusadi, et al. 2020) . This entire study aims to explore and evaluate the application of the PjBL-based E-LKPD model, by adapting the ADDIE design model. This process is projected not only to assess improvements in student learning outcomes, but also to explore the dynamics of their involvement in learning. Research by Kholijah et al. shows that the application of project-based learning models can help students overcome cognitive and social challenges in learning (Ni Putu and Budi Wijaya 2023) . Thus, the development of E-LKPD based on PjBL is expected to be a strategic step in facing educational challenges in the global hall.

The ADDIE (Analysis, Design, Development, Implementation, Evaluation) model is an important framework in developing learning media, because it ensures that each step is carried out systematically and focuses on student needs. Through an in-depth analysis phase, developers can identify the needs and challenges faced by students in the learning process, for example, a study by Shidiq et al. showed the importance of needs analysis in developing teaching materials (Shidiq et al. 2023). Appropriate media designs can then be developed to meet the identified needs, which are then tested and developed to be interactive and interesting, supporting student learning motivation (Zhang, et al. 2024; Cheng, et al. 2021) . Implementation of the developed media in the classroom is a crucial step to ensure its effectiveness. Research by Dikmen and Demirer shows that the use of pedagogical-technological knowledge can increase teachers' confidence in integrating technology into their teaching (Dikmen and Demirer 2022) . This is in line with Zhang's findings which emphasize that the development of pedagogical technological knowledge among teachers is essential for the successful implementation of technology in education (Liu, et al. 2024 ; Antón-Sancho, et al. 2023). In addition, evaluation of the success of media use in education must be carried out continuously to assess its impact on student motivation and learning outcomes (Dardary et al. 2020).

The urgency of this research also lies in the need for effective technology integration in the learning process. The gap in technology access and digital literacy levels among students

and teachers can be major barriers. According to research by Rahim, the combination of face-to-face learning methods and technology can provide new opportunities to improve learning (Rahim et al. 2022) . In addition, Sarker et al. emphasized the potential of digital learning environments to increase the capacity for creativity, collaboration, and student engagement (Sarker et al. 2019) . Therefore, the development of learning models that are able to optimize technology will not only be interesting but also relevant and effective in improving the quality of education (Dikmen and Demirer 2022 ; Herpratiwi, et al. 2023) .

The results of this study, the learning media produced are not only beneficial for students at SMA Negeri 2 Metro, but can be a model for other schools in facing similar challenges. Research shows that the involvement of technology in education can improve learning outcomes and provide a more enjoyable learning experience for students (Firdaus, et al. 2024 ; Rahim et al. 2022 ; Lucaberte and Sanchez 2024) This is important to consider as a step forward towards better education and responsive to the needs of today's students.

Methods

Types of Research, Research This use type study R&D (Research and Development) , which aims For develop and evaluate effectiveness of learning media based on E-LKPD which is combined with the Project-Based Learning (PjBL) model. Approach This chosen Because study This No only focus on analysis existing conditions , but also trying to produce product new that can increase quality learning at Metro 2 State Senior High School. With R&D approach, expected can created solution practical in overcome problems faced by students and teachers at school the related with use technology in learning.

Time and Place Research, Research This will implemented in the year 2025 teachings at State Senior High School 2 Metro, which is located in Metro City, Lampung Province. The research focused on class X as target main, remembering existence more problems deep related with low motivation learning and engagement students at the level class said. Research time planned in progress during six months, started from stage media development in the month First until evaluation media effectiveness in the month final.

Target/ Goal Research , Target of study This is For develop and evaluate effectiveness of learning media based on integrated E-LKPD with the Project-Based Learning (PjBL) model For increase results Study students . Target study This is student class X of Metro 2 State Senior High School who experienced difficulty in matter use technology For learning , as well as experience low motivation learning and achievement results study. Research This also involves teachers as users of the developed learning media, for get perspective about acceptance and effectiveness use of the media in the learning process.

Subject Study Subject study This consists of from two groups Students : Group Experiment , Group This consists of from 25 students class X of Metro 2 State Senior High School which will using learning media based on E-LKPD with Project-Based Learning (PjBL) approach Group experiment This aiming For test to what extent has the learning media been developed? can increase results learning and engagement student in learning based on technology . Group Control, Group This consists of from 25 students class X of Metro 2 State Senior High School which will use method learning conventional, without E-LKPD integration based on PjBL. Group control This will functioning as comparator For evaluate whether use of E-LKPD media based on PjBL truly bring change significant in results Study student compared to with method learning traditional.

Procedure Research, Procedures study This done in a number of stage the main ones that follow the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which consists of from:

1. **Analysis Needs (Analysis),** Stage This started with identification need students and teachers at Metro 2 State Senior High School, especially about related issues with use technology in learning and low motivation Study. Data collection was carried out

through interview with teachers, classroom observations , and analysis document like plan implementation learning (RPP). In addition, analysis was also carried out to material the lesson to be learned made into base For development of E-LKPD media based on PjBL.

2. **Media Design (Design)**, Based on results analysis, stage design started with designing the E-LKPD format that will used in learning based on PjBL. Design this media covers selection of relevant PjBL models with material lessons, as well as Features interactive in E-LKPD which supports collaboration and development students' problem solving skills.
3. **Media Development** , At this stage This , E-LKPD media was developed in accordance with design that has been created . Development This covers making material learning based on Customized PjBL with characteristics student class X, and making content interactive in E-LKPD which can accessed by students digitally.
4. **Implementation (Implementation)** , After the E-LKPD media is finished developed , stage implementation done with testing learning media in class X of Metro 2 State Senior High School. Group experiment will using E-LKPD based PjBL , while group control will still use method learning conventional . Implementation This done through a number of cycle learning , where students will using E-LKPD based PjBL For finish projects that have been prepared .
5. **Evaluation (Evaluation)**, Evaluation done after media implementation for evaluate effectiveness use of media in increase results Study students. Evaluation This covers evaluation to understanding materials, developing skills, and involvement student in the learning process. Evaluation data collected through test results study, observation, and interview with student and teachers.

Se way It is clear that the ADDIE development model will made into guide in study This presented in Figure 1.

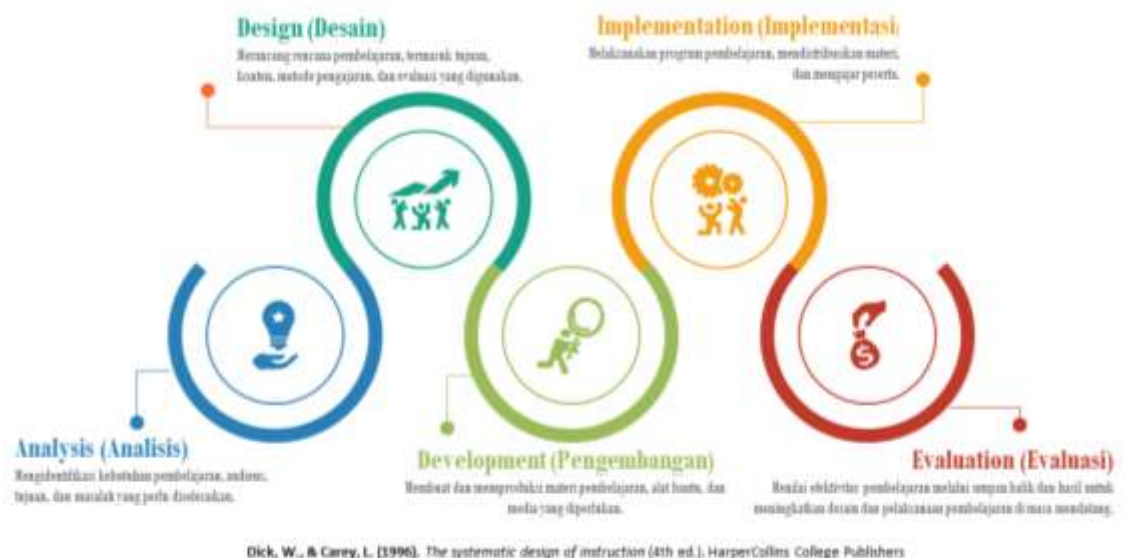


Figure 1. ADDIE Development Model

Data and Instruments Research, Data collected in study This includes quantitative and qualitative data:

1. **Quantitative Data**, Quantitative data obtained from results test Study students who are held before and after implementation of E-LKPD media based on PjBL. Test This will measure understanding student to the material taught , as well as development

skills 21st century like breakdown problems , collaboration , and creativity . The results data test will compared to between group experiments and groups control For know whether There is significant difference .

2. **Qualitative Data**, Qualitative data collected through observation class, interview with teachers and students, as well as questionnaire distributed to student For know response they towards the learning media developed. Qualitative data This will give description more deep about experience Study students , level involvement them , and teachers' perceptions of effectiveness of learning media.

Collection Techniques , Data collection techniques used in study This is:

1. **Learning Outcome Test**, Test This given to student before and after media implementation for measure improvement understanding relevant materials and skills with learning based on PjBL. Test This given to second groups (experimental and control) for compare results Study between both of them .
2. **Observation** , Observation done For evaluate How student interact with E-LKPD media and how teachers use this media in the learning process .
3. **Interview** , Interview done with teachers and some student For get outlook more carry on about perception they on E-LKPD media based on PjBL , as well as how far the media is increase motivation and results Study .
4. **Questionnaire/ Response**, Questionnaire distributed to student For evaluate experience they in using E-LKPD media based on PjBL, as well as how far the media is can increase involvement and creativity they in learning.

Data Analysis Techniques Data collected will analyzed in a way quantitative And qualitative :

1. **Analysis Quantitative**, Result data test Study student will analyzed use t-test For know whether There is significant difference between students' pre-test and post-test scores on both groups (experimental and control). This test will show whether use of learning media This effective in increase results Study students , as well as whether There is significant difference between group experiments using E- LKPD based PjBL and groups control that uses method conventional .
2. **Analysis Qualitative**, Qualitative data obtained from interviews, observations, and questionnaires will analyzed with method analysis thematic, where researchers identify themes main thing that appears from teacher and student responses . Analysis This aiming For dig perception they about media effectiveness , challenges faced , and impact use of media against engagement and motivation student in learning .

Study This aiming For show whether use of media-based technology and approaches PjBL can increase results Study student in a way significant. If the results analysis show significant increase in the group experiment , then This will prove that use of media based PjBL can more effective in increase quality learning compared to with method learning conventional . With Thus , the results study This will give contribution in designing learning media that does not only interesting , but also effective in increase quality results Study students and equip they with skills 21st century which is very much needed in an increasingly global world.

Results and Discussion

Study This aiming For develop learning media based on E-LKPD (Electronic Worksheet) Students) who are integrated with the Project-Based Learning (PjBL) model, in order to increase results learning and skills 21st century like collaboration, creativity, and problem solving problem students at Metro 2 State Senior High School. After carry out research that includes development and implementation of learning media based on E-LKPD with the

Project-Based Learning (PjBL) model in class X of SMA Negeri 2 Metro, the results obtained can dilha as in figure 1.

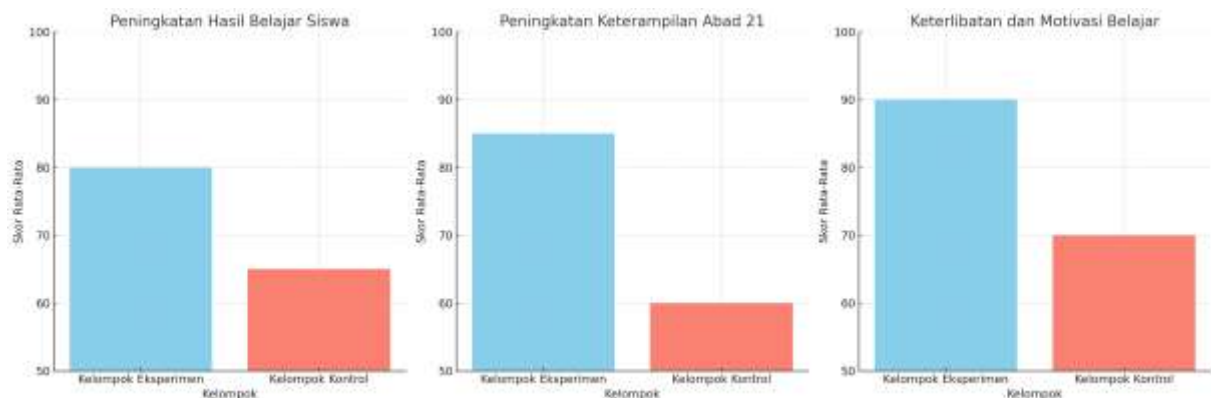


Figure 1. Research results obtained

Based on quantitative and qualitative data collection conducted on groups experiments and controls, as follows is results found:

Improving Learning Outcomes Student

Based on the results data the test taken from group experiments (students using E-LKPD media based on PjBL) and groups control (students who use method conventional), there are significant increase in the group experiment Table 1.

Table 1. Improvement in Learning Outcomes Student

Group	Pre-test Average	Post-test Average	Value Enhancement	p-value (t-test)
Experiment	65	85	20	0.002
Control	63	72	9	-

Statistical Test Results, Testing use **t-test** shows a p-value of **0.002** ($p < 0.05$), which indicates that use of E-LKPD media based on PjBL in a way significant increase results Study student compared to with method conventional.

N-gain

N-gain is used to measure how much students' learning outcomes improve after using learning media. N-gain values range from 0 to 1, with higher values indicating greater improvement. Table 2.

Table 2. N-Gain Results

Grouop	N-gain
Experiment	0,78
Control	0,24

The N-gain value of 0.78 in the experimental group shows that the increase in student learning outcomes is in the high category. This means that the learning media used (e.g. E-LKPD based on PjBL) has a significant impact on student understanding and achievement. In contrast, the control group only obtained an N-gain of 0.28, which falls into the low category, reflecting the lower effectiveness of conventional learning.

Effect Size (Cohen's d)

Effect size measures the effect of the treatment given on the results achieved. The greater the effect size value, the greater the effect of the treatment on the changes that occur. Table 3.

Table 3. Effect Size Result

Group	Effect Size (Cohen's d)
Experiment and Control	1,3

Improvement 21st Century Skills

In addition to the improvements understanding material, there is development significant in skills 21st century students, especially in matter collaboration, problem solving problems, and creativity. Table 4.

Table 4. Improvement 21st Century Skills

Rated aspect	Group Experiment	Group Control
Collaboration and work team	80% of students are very active and confident self	50% of students not enough active
Solution problem real	78% capable to design solution innovative	48% still passive and tend to follow
Creativity in task project	75% shows solution creative and unique	45% solution Still standard and repetitive
Average Score (Scale 1-5)	4.2	3.1

Based on E-LKPD media based results PjBL No only increase results learn , but also grow skills important 21st century in general significant .

Engagement and Motivation Study

Involvement students in class experiments are also more tall compared to with group control . The results of the questionnaire distributed to student show that majority students in groups experiment feel more motivated For study , especially Because they can Work with interactive and project - focused media real .

Table 5. Engagement and Motivation Study

Indicator	Group Experiment	Group Control
Enthusiasm in Study	85% feel enthusiastic and involved	55% less enthusiastic
Motivation Study	82% feel motivated	60% feel normal just
Independence and management Study	80% feel Can arrange method study it	50% depends on the teacher
Motivation & Engagement Score	4.0 (Scale 1-5)	2.8 (Scale 1-5)

Based on the data obtained, Learning based on project through E-LKPD to improve motivation intrinsic and involvement active student in the learning process. In terms of This shown that use of learning media based on E-LKPD with PjBL model give impact significant positive to improvement results Study students , development skills 21st century , and improvement motivation and engagement students . Data and statistics obtained show that

approach This more effective in support success learning compared to with method conventional used in groups control.

Study This show that implementation of learning media based on E-LKPD with approach *Project-Based Learning* (PjBL). significant increase results learning , skills 21st century , and engagement and motivation student compared to with method conventional . This result in line with various findings previously emphasized importance integration technology and approaches learning active in education 21st century .

Effectiveness of E-LKPD Based on PjBL towards Learning Outcomes

Improvement results Study students in groups experiment, indicated by the average increase score by 20 points (from 65 to 85), indicating that the E-LKPD media is based on PjBL effective in strengthen understanding conceptual and skills cognitive students. This is strengthened by the p-value of 0.002 ($p < 0.05$), which indicates existence difference significant in a way statistics between group experiments and controls . Findings This in line with opinion (Junita, et al 2023) , which states that approach *problem- and project-based learning* push student For more understand draft through a constructive , collaborative and reflective process . This is in line with study that PjBL make student as subject active in learning , as emphasized by theory *constructivism* (Sutisnawati et al. 2022 ; Fitri et al. 2024) . In addition , the E-LKPD media which is interactive allow student For access material with various style learning (visual, kinesthetic , or auditory) , as stated by Mayer in (Rahayu, et al. 2020) that theory *multimedia learning*, which states that integration text, images, and interactivity can speed up the formation process schemata in memory term long.

Use of E-LKPD as Learning Media Interactive

E-LKPD plays a role important as a learning medium that is not only serve material digitally , but also presents interactivity and flexibility in the learning process . Students can access E-LKPD when anywhere and everywhere, which supports learning independent and adaptable with speed learning each individual. Features such as exercise interactive , feed come back direct , and tasks collaborative facilitate involvement active students . According to Mayer in (Rahayu, Marmoah, and Budiharto 2020) , multimedia learning that combines text , visuals, and elements interactive strengthen processing cognitive students and improve retention information.

The existence of E-LKPD also brings together the digital world of students daily with the formal learning process . This is trigger motivation intrinsic students , because they feel more comfortable , relevant , and interested with the media used . Findings This reinforced by (Chang 2021) in *ARCS Motivation Model* , which states that Power pull learning media be one of key improvement motivation Study.

Impact to 21st Century Skills

Instructional Media based on PjBL in E-LKPD no only focus on achievement academically, but also direct develop skills 21st century, such as collaboration, creativity, problem solving problems, and thinking critical. Observation score skills student shows an average of 4.2 out of 5 for group experiment, compared to 3.1 in the control group. control, which reflects superiority approach This in to form non- cognitive competencies. In the learning process, students collaborate in team , discuss For finish challenges, as well as to design solution to relevant real world issues with Topic learning . Findings This in accordance with (Maulidia et al. 2023) , which states that learning 21st century must emphasize on ability *learning and innovation skills* that is creativity, thinking critical, communication, and collaboration. The developed E-LKPD also provides room exploration and reflection, so that student can adapt solution with need situation project.

Motivation and Engagement Student in Learning

Aspect motivation and engagement Study be one of indicator important success implementation of modern learning media . In research This , 85% of students in the group experiment state that they feel more involved in the learning process . The results of the questionnaire show that the average score involvement student reached 4.0 out of 5, while group control only reach 2.8. Motivation intrinsic increase Because student own control more big to method they learn , and because the E-LKPD media provides bait come back in a way fast and relevant . This is reinforced by the *Self-Determination* Theory by (Hamzah 2020) explain that motivation intrinsic student develop If they feel own autonomy in learn , feel competent, and have connection social . In the context of this , PjBL allow student choosing a strategy in finish project (autonomy), receive bait come back direct from E-LKPD (competence), and collaborate in group (connection social). On the other hand, the method conventionally applied to groups control tend nature One direction, limit room exploration and innovation students, so that cause low engagement.

Implications to Practice Learning

Implications from results study this is very important for the world of education , in particular in development adaptive curriculum and learning media to needs of the times. Learning No Again Enough information transfer oriented One direction, but rather must nature participatory, interactive, and development-based ability student in a way comprehensive. Integration of digital media such as E-LKPD which is designed based on project allow flexibility in learning, support curriculum independent learn, and encourage role active student in build knowledge. Teachers are expected Not only become the transmitter material, but also a facilitator who encourages exploration, collaboration, and reflection critical.

Research result This show that use of E-LKPD media based on PjBL own very positive impact to improvement results Study students at Metro 2 State Senior High School. Improvement results significant learning in groups experiment compared to group control prove that the integrated E-LKPD media with PjBL model No only enrich experience Study students , but also improve motivation , engagement , and understanding they to Learning materials (Syahlan, et al. 2023 ; Rehman et al. 2024).

Conclusion

Based on findings in study this, can concluded that use of E-LKPD learning media based on Project- Based Learning (PjBL) significant capable increase results Study students, develop skills 21st century like collaboration, creativity, and problem solving problems, and increase motivation and engagement student in the learning process. Findings This strengthen that integration technology interactive with approach learning based on project give solution effective to challenge learning less conventional contextual and less facilitate involvement active students. In general, approach This can become alternative strategic For applied in a way more wide in various levels and context education use answer need learning 21st century. For study more Furthermore , it is suggested that the development of learning media based on technology This expanded with introduce various type more projects varies , as well as develop Features interactive capable increase engagement and motivation student in a way more optimal. In addition, research next also can explore application of this media at the level more education tall or in eye another lesson for test consistency its effectiveness in various context learning.

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