



# Project-Based Learning Electronic Thematic Student Worksheets (E-Book PJBL) Improving Critical Thinking Skills

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## ABSTRAK

Rendahnya keterampilan berpikir kritis disebabkan karena siswa kurang berminat dalam belajar. Tujuan penelitian ini yaitu untuk mengembangkan E-LKPD berbasis Project Based Learning. Jenis penelitian ini yaitu pengembangan dengan menggunakan model ADDIE. Uji coba dilakukan dengan menggunakan desain pre-eksperimen, one shoot case study. Uji validitas isi produk E-paket PjBL dilakukan oleh 2 validator dan 2 praktisi. Subjek uji coba produk yaitu siswa kelas IV Sekolah Dasar. Metode pengumpulan menggunakan tes berpikir kritis, observasi kualitatif, observasi kuantitatif, wawancara, angket/kuesioner dan studi dokumen. Instrumen dalam mengumpulkan data yaitu rating scale, pedoman wawancara, angket, lembar soal tes, dan lembar studi dokumen. Teknik menganalisis data yaitu analisis data uji validitas dan reliabilitas instrumen, analisis deskriptif kualitatif, analisis deskriptif kuantitatif, dan uji-t. Hasil analisis data yaitu hasil analisis validitas isi produk yaitu 1,00 (sangat tinggi). Hasil respon guru yaitu 3,85 (sangat baik) dan respon siswa yaitu 3,56 (sangat baik), sehingga layak digunakan. Hasil uji efektifitas yaitu nilai probabilitas atau Sig.(2-tailed) sebesar 0,000, nilai probabilitas ini lebih kecil dibandingkan tingkat signifikansi 0,05. Hal ini berarti terdapat perbedaan keterampilan berpikir kritis siswa kelas IV setelah belajar menggunakan E-Paket PjBL. Dengan kata lain, E-Paket PjBL dapat meningkatkan keterampilan berpikir kritis pada siswa.

## ABSTRACT

The low critical thinking skills are caused because students being less interested in learning. A lack of learning resources causes students' lack of interest in learning. This research aims to develop E-LKPD based on Project Based Learning. This type of research is developed using the ADDIE model. The trial was conducted using a pre-experimental design, one shoot case study2 validators, and 2 practitioners who carried out the content validity test of the PjBL E-package products. The subject of the product trial was fourth-grade elementary school students. The data collection method in this research uses critical thinking tests, qualitative observations, quantitative observations, interviews, questionnaires/questionnaires, and document studies. The instruments used in collecting data are rating scales, interview guidelines, questionnaires, test question sheets, and document study sheets. The techniques used to analyze the data are data analysis of the validity and reliability of the instrument, qualitative descriptive analysis, quantitative descriptive analysis, and t-test. The results of data analysis are the results of product content validity analysis, namely 1.00 (very high). The result of the teacher's response is 3.85 (very good), and the student's response is 3.56 (very good), so it is feasible to use. The result of the effectiveness test is the probability value or Sig. (2-tailed) of 0.000, this probability value is smaller than the 0.05 significance level. It means there are differences in the critical thinking skills of fourth-grade students after learning to use the PjBL E-Package. In other words, the PjBL E-Packet can improve students' critical thinking skills.

## 1. INTRODUCTION

The 21<sup>st</sup>-century education emphasizes critical thinking skills. Critical thinking is a skill that every student must have so that students can participate in learning effectively and wisely (Hart et al., 2021; Sumarni et al., 2018). Basically, critical thinking is a thinking process that aims to make a rational decision and is considered correct (Asyari et al., 2016; Marzuki & Basariah, 2015). Critical thinking skills This is a stage of higher-level thinking that must be owned by every student because it is needed in everyday life. These skills can be used to solve a case or make important decisions about life's issues (Odebiyi & Odebiyi, 2021; Purwanita et al., 2019). In developing this skill, it is necessary to think critically and logically. Students who have low critical thinking skills affect students ability to grasp difficult material it has an impact on low learning outcomes (Mutakinati & Anwari, 2018). Critical thinking skills in

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this learning are very important. This is because through these skills students will be able to make decisions or solutions to the problems they are facing (Alghafri & Ismail, 2014; Arisoy & Aybek, 2021). This skill will equip students in dealing with every problem and is used to provide solutions to problems. This is why this skill needs to be developed early on, especially at the elementary school level. Learning activities require students to be able to think critically so teachers must design activities that can stimulate students' thinking skills (Indah, 2020; Mulyanto et al., 2020). If students have critical thinking skills, then learning will run smoothly and students will participate in learning activities. Students who actively participate in learning activities will certainly create a conducive learning environment and create a pleasant learning atmosphere (Syahril et al., 2020; Yonanda et al., 2019). Critical thinking skills have a very significant role that is why this skills must be instilled, honed and developed since elementary school.

However, in reality, there are still some problems regarding students' critical thinking skills. Previous research revealed that students' critical thinking skills, especially in elementary schools, were still very low (Changwong et al., 2018; Hamdu et al., 2020). Other research revealed that students' low critical thinking skills are caused by students being less active in learning so students are less able to think critically (Darmaji et al., 2021; Syawaludin et al., 2019). Other research revealed that students' non-participation in learning makes students only accept the material presented by the teacher, this is why they are unable to develop thinking skills effectively (Changwong et al., 2018; Syawaludin et al., 2019). This problem causes learning activities to be less than optimal thus it has an impact on low learning outcomes. The problem of low critical thinking skills is caused by students' lack of interest in learning. Students' lack of interest in learning is caused by monotonous learning activities (Juita et al., 2019; Rahmawati et al., 2019). Teachers are also less able to develop media related to learning themes so that students have difficulty learning (Illahi et al., 2018; Marshel & Ratnawulan, 2020).). If this problem is not addressed, it will certainly have a negative impact (Afandi et al., 2019; Rizaldi et al., 2020). First, students experience difficulties in analyzing information due to a lack of learning resources. Second, students have a character that is easy to accept and difficult to make decisions. Third, learning is not implemented properly because students are unable to solve problems on their own.

The problem found at SD Negeri Antiga, in grade IV, is also the low ability of students to think critically. This occurs due to several reasons such as limited facilities and infrastructure, lack of teacher competency development activities related to the use of appropriate learning models, limited learning media, and limitations of teachers in developing media technology. During the learning activities, the students looked very bored in participating in the lesson, causing students to get sleepy easily. If this problem continues and the teacher does not solve the problem then the learning activities will not be able to achieve the goals that have been set before. Efforts that can be made in improving students' critical thinking skills are by using worksheets that are suitable for students. LKPD is a collection of material that is presented systematically so that it can create appropriate learning activities for students (Fitriyah & Wardana, 2019; Marshel & Ratnawulan, 2020). One of the LKPD that can be used to improve students' critical thinking skills is the electronic student worksheet (E-LKPD). E-LKPD is a systematic work guide that students can use in learning (Pribadi et al., 2021; Puspita & Dewi, 2021). E-LKPD makes it easier for students to understand the material. In addition, the material presented in the E-LKPD is very complete. E-LKPD can also be accessed via a cellphone or computer, making it very practical (Octaviana et al., 2022; Rochman, 2021). The developed E-LKPD contains a complete summary of the material, questions, and instructions for use so that it makes it easier for teachers to apply it.

Previous research findings revealed that this E-LKPD is very practical to use in learning (Puspita & Dewi, 2021; Putra & Agustiana, 2021). Other studies also reveal that E-LKPD can stimulate students in learning because it presents the material in an interesting and complete way (Ernawati et al., 2018; Kinanti et al., 2021). By using the E-LKPD will improve student learning outcomes because students can study independently (Pribadi et al., 2021; Wahyuni et al., 2021a). This causes E-LKPD to be needed to improve students' critical thinking skills. However, there is no study on Project Based Learning-based E-LKPD that can improve students' critical thinking skills. The advantage of E-LKPD is that development refers to thematic learning based on Project Based Learning (PjBL). This is because thematic learning will provide direct experience to students so that this learning is related to the PjBL model. In addition, the E-LKPD presents the material in a complete and detailed systematic manner so that it will help students study independently. The purpose of this research is to develop PjBL-based E-LKPD. It is hoped that the PjBL-based E-LKPD can improve students' critical thinking skills.

## 2. METHOD

This research was developed using the ADDIE model which includes analysis, design, development, implementation and evaluation (Cahyadi, 2019). In the analysis phase, analyze the

competencies to be achieved, analyze student characteristics, and analyze needs. The design stage is carried out by compiling the media design. The development stage was a product development and judges testing. The implementation phase is the trial of the *E-Paket PjBL*. The trial was carried out using a pre-experimental design, one shoot case study. The evaluation phase was carried out at each stage of development for product improvement. The research location is SD N 3 Antiga. The *E-Paket PjBL* product content validity test was carried out by 2 validators. The response test was carried out by 2 practitioners and 3 students with high, medium, and low achievement levels. The method of collecting data in this study was using critical thinking tests, qualitative observations, quantitative observations, interviews, questionnaires, and document studies. The instruments used in collecting data were rating scales, interview guidelines, questionnaires, test question sheets, and document study sheets. The instrument grid is presented in [Table 1](#) and [Table 2](#).

**Table 1.** The Grid of Expert and Practitioner Validation Instruments

No	Assessment aspect	Indicator
1	Content suitability	Suitability of content with thematic learning Suitability of activity content with learning competencies Suitability of content with learning indicators Suitability of activity content with learning objectives
2	Language	Simplicity the language used in the <i>E-Paket PjBL</i> Ease in understanding sentences and not having multiple discoveries
5	Appearance	Appearance of the Cover Illustration of the <i>E-Paket PjBL</i> Attractiveness illustrations of the contents presented in the <i>E-Paket PjBL</i>
6	Attractiveness	The use of color combinations in the <i>E-Paket PjBL</i> The attractiveness of the presentation of the <i>E-Paket PjBL</i>

(Modifikasi dari [Sholehah, 2021](#))

**Table 2.** The Grid Instruments for Students

No	Assessment aspect	Indikator
1	Content suitability	Suitability of content with thematic learning Suitability content with critical thinking skills
2	Appearance	Attractiveness of the illustrations presented in the <i>E-Paket PjBL</i>
3	Language	Simplicity of the language used in the <i>E-Paket PjBL</i> Ease in understanding sentences presented

(Modification from [Sholehah, 2021](#))

Methods and stages of data analysis were as follows. First, analysis of the validity test data of the rating scale instrument using the Gregory formula. The results of the validity test showed a validity score of 1.00 so that the instrument was declared to have very high validity. The instrument reliability test used alpha Cronbach which was analyzed using the SPSS 22 software application. The reliability test results obtained a reliability coefficient value of 0.832. This value was in the range of  $0.80 < r \leq 1.00$ , this indicates very high instrument reliability. Analysis of the data analysis phase using a qualitative descriptive analysis. Development stage, using quantitative descriptive analysis techniques. The implementation phase uses the t-test. In proving the hypothesis, prerequisite tests are used, namely the normality test of data distribution and the homogeneity of variance test. Then, t-test analysis was performed. The trial results were compared with the t table with a significance level of 0.05 (5%).  $H_0$  was rejected if the value is  $\text{sig.} < 0.05$ . Calculations were assisted with the SPSS program. Qualitative descriptive analysis in development research was related to sentence processing in the form of responses, criticisms, suggestions, input, and also reviews from experts resulting from research objects ([Lestari et al., 2016](#)). The results of the analysis was used as an improvement for the PjBL E-Package. Data analysis was performed on observation and interview data. Quantitative descriptive analysis technique was a technique used to process data obtained from questionnaires in the form of percentages (average) so that general conclusions can be obtained ([Arywiantari et al., 2015](#), [Widiana, 2016](#)).

### 3. RESULT AND DISCUSSION

#### Result

This study developed the PjBL E-package to improve students' critical thinking skills using the ADDIE model. The results of the needs analysis are that the position of teachers is 42.9% for low-class teachers and 42.9% for high-class teachers. The problems experienced are related to efforts to improve critical thinking skills, namely in making work guides in the learning process by 62.5%. Teacher skills in using the live worksheet application are 93.8% unskilled. Students have completeness to study online 87.5%. Students never use the application to learn about worksheets 86.7%. 100% of students need the PjBL E-Package for the learning process, as well as the *E-Paket* PjBL needed, namely the *E-Paket* PjBL which contains 43.8% of projects, the PjBL E-Package which contains a picture 25%, the *E-Paket* PjBL which contains video 18.8% and *E-Paket* PjBL containing animation 6.3%.

At the design stage, three activities were carried out, designing products, consulting products, and preparing instruments. The first stage was designing the product. This product design was used to facilitate product development. The design of the product starts from designing the cover, KD, instructions for use, observing activities, making schedules, reviewing literature and presenting speakers. After the draft was completed, it is then consulted with the supervisor in order to get input for improvement. The final stage was the preparation of the instrument which consists of 4 instruments, namely expert validation instruments, practitioner responses, student responses, and tests of critical thinking skills. The product design is presented in Figure 1.

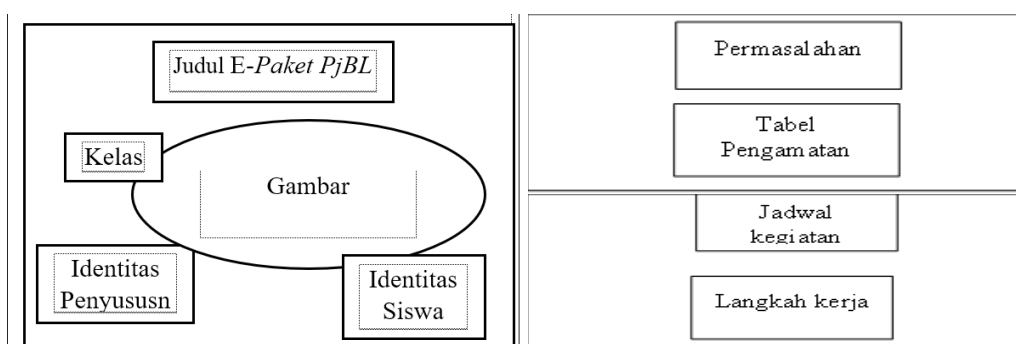


Figure 1. E-paket PjBL Plan

The development stage is the development of the *E-paket* PjBL product. Product development is adjusted to designs that have been previously developed. The initial appearance of the *E-Paket* PjBL contains the Undiksha logo, title, class, developer profile, product serial number, student identity column, and an image as a background. Product display used contains content in the form of attractive color combinations, combinations of several images, basic competencies, competency achievement indicators, learning objectives, instructions for use, observation activities, observation tables, making schedules, work steps, literature review, learning reference videos, presenting sources, and exhibition results. In developing products using attractive colors and a combination of several images so that the appearance becomes more attractive. The *E-Paket* PjBL development results are presented in Figure 2.

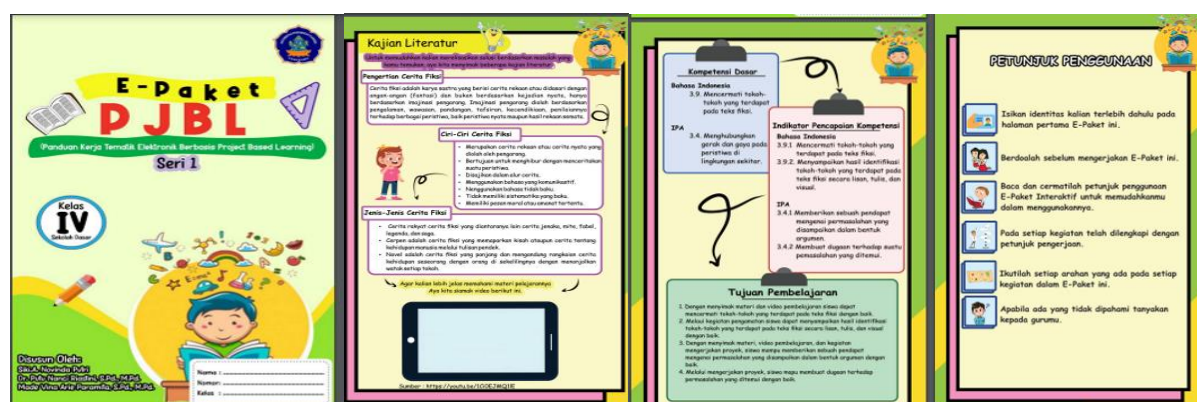


Figure 2. E-paket PjBL Development Result

The *E-paket* PjBL was then tested for validity. The *E-paket* PjBL product content validity test was carried out by 2 validators. The result of product content validity analysis is 1.00. These values are in the

range  $\geq 0.80$ . This product is declared valid with a very high level of validity. The results of the teacher's response showed that the average teacher's response to the PjBL E-Package was 3.85. This value is categorized as very good because it is in the range  $3.25 < X \leq 4.00$ , so it shows very good validity. The results of student responses to the PjBL E-package were 3.56. This value is categorized as very good because it is in the range of  $3.25 < X \leq 4.00$ . These results indicate that the student's responses are declared valid with a very good level of validity. The results of the validity test are presented in Table 3.

**Table 3. Validity Test Results of E-paket PjBL**

No	Subject	Average	Qualification
1	Expert of Product Content	1.00	Excellent
2	Teacher Response	3.85	Excellent
3	Student Response	3.50	Excellent

At the implementation stage, the E-paket PjBL product was implemented for students. After implementing the product implementation, the data obtained is then tested for its effectiveness using the t-test. The results of the normality test using the Shapiro-Wilk test obtained a probability value or Sig for the data before and after the administration of the PjBL E-Package, respectively 0.408 and 0.149, so the data is normal. The results of the homogeneity test are the probability value or Sig. of 0.069, so the data has a homogeneous variance. The result of the hypothesis test is the probability value or Sig.(2-tailed) of 0.000, this probability value is smaller than the 0.05 significance level. This means H0 is rejected. Thus, there are differences in the critical thinking skills of grade IV students after learning to use the E-paket PjBL. The summary results of the t-test are presented in Table 4.

**Table 4. Summary t-test results of Paired Differences**

Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
			Lower	Upper			
41.250	11.474	2.868	35.135	47.364	14.380	15	0.000

At the evaluation stage, the evaluation carried out was formative evaluation and summative evaluation. Formative evaluation is carried out at each stage of product development. The results of the formative evaluation were the evaluation analysis stage carried out from the results of data collection and the needs analysis stage. The results of the evaluation at the design stage were adding a problem to be solved, adding a literature review, adding presenting speakers, adding an exhibition of results, and adding color to the product. The results of the evaluation of the development stage, namely tidying up and improving typing in the instructions for use, improving typing in the observation activity section, and adding product descriptions to the initial appearance. The evaluation results are presented in Figure 3.



**Figure 3. Evaluation Results of E-paket PjBL**

**Discussion**

The results of the data analysis found that there were differences in the critical thinking skills of grade IV students after learning to use the PjBL E-Package. This is because, first, the PjBL E-package

improves critical thinking skills. The PjBL e-Package is very effective because it combines thematic learning with the Project Based Learning learning model. This will help students in learning activities so that they can improve students thinking skills (Syafrijal & Desyandri, 2019; Winatha & Abubakar, 2018). In addition, learning also occurs interactively so that learning is student-centered (Hidayat et al., 2019; Pratiwi et al., 2018). E-Paket PjBL can create a pleasant learning atmosphere because it presents a problem that must be solved by themselves and students are also required to produce a project. PjBL can build concepts on students because students can create a project so as to improve student level abilities (Hadiyanti et al., 2021; Wu & Wu, 2020). This learning model also emphasizes collaborative cooperation. The application of project-based learning makes students more active and encourages students to think according to their abilities (Gunawan et al., 2017; Susilawati et al., 2017). Students were also required to be able to work in teams to complete a project related to the material being studied so that students are able to produce a product or work in groups.

Second, the *E-Paket* PjBL can train students' critical thinking skills through a problem that will be worked on by students. The problems presented in the PjBL E-Package can train students to solve a problem they encounter using their own way. This is because the product uses the Project Based Learning model so that learning activities are student-centered in completing a project (Handayani et al., 2021; Laili et al., 2019). This project-based learning is a learning model that can construct students' knowledge and skills so that they can increase creativity and motivation (Duran et al., 2015; Pérez-Escolar et al., 2021). This learning model also provides opportunities for teachers to process interactive learning.

Third, the *E-Paket* PjBL provides direct experience to students. In learning activities, students are required to participate directly so that learning activities take place actively (Ismuwardani et al., 2019; Sakliressy et al., 2021). In addition, the PjBL E-Package stimulates students' thinking skills because the problems presented are related to phenomena that occur in the student's environment. Through these critical thinking skills later it will help students in making a decision or action on a problem (Kumar & Refaei, 2017; Shaw et al., 2020). This skill equips students in dealing with every problem related to life.

Fourth, the *E-Paket* PjBL can be used as a student guide in facilitating the understanding of learning material. The PjBL E-Package can be applied via computers, smartphones, or other electronic devices so that students can study anywhere and anytime which makes learning activities practical (Rochman JK, 2021; Wahyuni et al., 2021b). The *E-Paket* PjBL can be used in printout form so that it can directly assist students in studying the material and train students' critical thinking skills. The PjBL E-Package has a great influence on critical thinking skills because its use will have an impact on more enjoyable student learning activities. If students have good critical thinking skills, learning activities will run smoothly and students will have broad thoughts in solving a problem (Heidari, 2020; F. P. Lestari et al., 2021).

Fifth, the *E-Paket* PjBL has interesting features that motivate students. The development of the PjBL E-Package pays attention to message design with appropriate color combinations, images and language so that students can understand it well and students' motivation arises in participating in learning activities. High student learning motivation makes learning activities fun so students don't feel bored when participating in learning activities in class (Awe & Benge, 2017; Ibrahim & Suardiman, 2014). The use of the *E-Paket* PjBL assists students in understanding and growing students self-confidence in dealing with all problems through critical thinking. Previous research also revealed that E-LKPD can be used because it can help students understand the material (Puspita & Dewi, 2021; Putra et al., 2021).

Previous research also revealed that E-LKPD is appropriate for use as teaching material because it can increase students' courage in learning (Augustha et al., 2021; Ernawati et al., 2018). Other studies have also revealed that digital student worksheets can motivate students to study anywhere so that learning activities become more practical (Manalu et al., 2022; Pribadi et al., 2021). Other research also reveals that Project Based Learning can improve students' critical thinking skills because students are required to solve a problem (Hidayat et al., 2019; Winatha & Abubakar, 2018). Based on this, it can be concluded that the *E-Paket* PjBL can assist students in learning. The implication of this research is that the PjBL E-Package that has been developed can increase students' motivation and thinking skills so as to improve student's critical thinking skills.

#### 4. CONCLUSION

The results of data analysis show that the *E-Paket* PjBL has received an excellent qualifications from experts and students, therefore it is suitable for use in learning. The results of the effectiveness test found that there were differences in the critical thinking skills of grade IV students after learning to use the PjBL E-Package. It was concluded that the PjBL E-package can improve the critical thinking skills of fourth-grade elementary school students.

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