

## IMPLEMENTATION OF PROJECT BASED LEARNING ( PjBL ) FOR INCREASE REASONING STUDENT CRITICAL THINKING AND CREATIVITY THROUGH POP UP BOOK WORKS

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### ABSTRACT

Science learning demands development reasoning critical and creative student as part from learning meaningful , but practice learning conventional in schools base Not yet fully capable facilitate ability the optimally . Conditions This show the need application of learning models innovative and capable push involvement active student in the learning process . Research This use approach quantitative with quasi - experimental design involving student Class IV of SDN Arjosari 1 Malang City which is divided into become class experiments and classes control . Class experiment given treatment in the form of learning using the Project Based Learning ( PjBL ) model assisted by Pop Up Book media, while class control use learning conventional . Data collection was carried out through test reasoning critical and creativity at the pretest and posttest stages that have been arranged based on indicator think level high , then analyzed use technique statistics inferential For know differences and improvements results Study between group . Research results show existence difference as well as improvement significant reasoning critical and creative students in classes that implement Project Based Learning assisted by Pop Up Book media compared to with learning conventional . Students in class experiment show more capabilities Good in put forward ideas, analyze information , complete problems , and produce creative and meaningful work through project learning . In addition , involvement active student in every stages PjBL participate contribute to increasing motivation and independence learning . The application of Pop Up Book media also helps student understand draft diversity culture in a way more concrete and interesting , so learning become more contextual . With Thus , the PjBL model assisted by Pop Up Book is able increase quality active , contextual and meaningful science and science learning at school base as well as worthy implemented as alternative learning innovative support development reasoning critical and creative student .

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## INTRODUCTION

Basic education is fundamental stage in formation character , pattern think , and ability intellectual students . At the level this , students start develop ability think , behave , and interact with environment social . Education is not only functioning as means of knowledge transfer , but also as a vehicle formation required values , skills and competencies individual For face challenge life in the future (Hulu & Telaumbanua , 2022). Therefore that , quality education the basis is very important quality source Power humans at the level education next .

In an attempt reach objective education , quality learning become a very determining factor ( Angraeni , 2023). Quality learning No only achievement - oriented results academic , but also on development competence 21st century , such as ability think critical thinking , creativity , communication , and collaboration . The Independent Curriculum emphasizes importance student - centered learning , contextual , and push student For active build his knowledge alone . With Thus , teachers are required For capable choose innovative learning models and strategies so that the objectives are achieved learning can achieved optimally .

One of eye lessons that have role strategic in develop ability think level tall is Knowledge Natural and Social Knowledge (IPAS). IPAS learning is designed For give experience meaningful learning through observation , exploration , and engagement direct student in understand phenomenon natural and social . Through science learning , students trained For understand connection between humans and their environment , analyzing problem social , as well as develop attitude care to diversity and environment around (Ida Ayu Arieska Putri Umbara et al., 2020; Yuniarti et al., 2019).

At the level school basic , science learning is presented in a way integrated with eye other subjects such as Indonesian and Pancasila Education. Approach integrative This aims for students capable understand draft in a way comprehensive and contextual ( Suci , NA, et al ., 2022). However thus , in in practice science learning is often still dominated by methods lectures and assignments simple memorization - oriented conditions the cause student not enough involved active in the learning process and is not yet optimal in develop ability think critical and creativity .

Based on results observation The initial research conducted in class IV of SDN Arjosari 1, Malang City, found that ability reasoning critical student Still classified as low . This is seen from trend capable students answer questions at the level remember and understand , but experience difficulty when requested For analyze , provide reason , interesting conclusion , or linking material with situation real . In addition , in activity discussion , some student Still passive and not yet capable put forward opinion in a way logical and systematic .

On the other hand , creativity students also haven't develop optimally . Task results show that part big work student Still uniform , less show originality of ideas, as well as tend copy examples given by the teacher. More learning process Lots teacher -centered causes student not enough get chance For explore ideas , imagination , and production innovative products . In fact , creativity is one of the competence important things to do developed since education base .

Creativity can interpreted as ability individual in generate ideas or product new original and has utility value (Sit, 2016). Creativity involves the thinking process complex that includes fluency of ideas, flexibility , elaboration , and ability see something problem from various corner view . Creativity No only related with creation work new , but also the ability individual in offer solution innovative to something problems (Lestari & Zakiah, 2019) Therefore that , development creativity in learning it is very important for students capable think flexible and adaptive .

Besides creativity , reasoning critical is also competencies that must be implanted since early . Reasoning critical related with ability student in analyze information , evaluate argument , making decision based on evidence , and interesting conclusion in a way logical . In the context of science learning , abilities This is very necessary for students No only accept information in a way passive , but capable understand , judge , and relate information the with life real .

Diversity material Indonesian culture in class IV IPAS is one of the potential material For develop reasoning critical and creative students . Through material this , students No only Study know various form culture like clothes customs , house traditional dance area and food typical , but also invited For understand meaning diversity as well as

importance attitude tolerance . However , if learning only done through lectures and reading book text , then objective development skills think level tall difficult achieved .

For overcome problem Therefore , a learning model is needed that is capable of give experience Study active and meaningful . One of the models being assessed relevant is Project Based Learning ( PjBL ) . PjBL Model emphasize on learning through demanding projects student For identify problem , designing solution , implement activities , as well as produce product as form concrete understanding they . Through stages said , students trained For think critical , working the same , and be creative in a way independent .

Study previously show that PjBL own influence positive to improvement ability think critical and creative students . Implementation PjBL in a way significant increase ability think critical at the level education basis ( Tafakur & Retnawati , 2023) . Temporary that , other researchers stated that students who study with a model based on project show level more creativity tall compared to with students who study use method conventional ( Cahyani , 2021) . Findings the strengthen assumptions that PjBL is an effective learning model For develop skills think level tall .

In research this , the implementation PjBL combined with use of media works PopUp Book as product project . Pop Up Book is a three-dimensional visual media dimensions that can be display object in a way interesting and interactive ( Anggaraini , 2019) . Through making a themed Pop Up Book diversity culture , students No only gather information , but also to design , organize , and display representation culture in form work creative . This process give room for student For express ideas in a original at a time hone ability analysis to material studied .

SDN Arjosari 1 Malang City has characteristics student with background behind diverse cultures . Conditions the become highly relevant potential For implement learning based projects on the material diversity culture . With utilise diversity said , students can Study direct from environment around and make it as source contextual learning . Through activity project making Pop Up Books, learning No only focus on aspects cognitive , but also involving aspect affective and psychomotor .

Study This use design experiment with involves two classes , namely class IVA as group experiments using the PjBL model through Pop Up Book work , and class IVB as class control that uses learning conventional . Comparison second class the expected can give description empirical about differences and improvements ability reasoning critical as well as creativity student .

Based on description said , can concluded that low ability reasoning critical and creative student in science learning requires solution through implementation of innovative learning models . Therefore that , research This lift Title : " Implementation of Project Based Learning ( PjBL ) for Increase Reasoning Critical Thinking and Creativity Student Through Pop Up Book Works."

## METHOD

Implementation study This arranged based on steps systematic scientific For obtain valid and acceptable data accountable . In the section This described approach , design research , subject research , engineering data collection , instruments used , to technique applied data analysis . Compilation method study done in a way structured so that the research process can implemented in a way objective , measurable , and has base clear scientific .

Study This use approach quantitative Because aim For test hypothesis as well as know differences and results implementation a learning model through data analysis in the form of numbers . Approach quantitative chosen Because allows researchers do measurement in a way systematic to ability reasoning critical and creative students , then analyze it use technique statistics For get conclusions that are objective .

The research design used is a quasi -experiment , namely design experiments involving group experiments and groups control without assignment subject in a way random . This design chosen Because conditions at school No allows done randomization class , but still allows he did comparison results learning between two groups that have characteristics relatively proportional to design this , researcher can study influence implementation of the Project Based Learning ( PjBL ) model assisted by Pop Up Books on ability student compared to with learning conventional .

Study This aim For know results application of the Project Based Learning ( PjBL ) model to improvement reasoning critical and creative student class IV through manufacturing Pop Up Book work . Research This use quasi-experimental design . Subjects study consists of into two groups , namely class experimental and control classes . experiments conducted on students class IV of SDN Arjosari 1 Malang City. At the stage beginning , students in class experiments and classes control given a pretest for know ability beginning reasoning critical and creative in science learning material diversity culture . Next , class experiment given treatment in the form of Science learning using the Project Based Learning ( PjBL ) model with assistance Pop Up Book works , while class control given science learning using method conventional . After all over series learning finished , second class given a posttest for measure ability reasoning critical and creative student after treatment . Pretest and posttest results data then collected and analyzed use technique statistics quantitative For know difference level reasoning critical and creative student as well as results implementation of the PjBL model assisted by Pop Up Book in science learning .

Population in study quantitative is overall subjects who have characteristics certain and become target generalization results research . Population in study This is all over students of SDN Arjosari 1 Malang City, totaling 286 students , consisting of over 141 students women and 145 students men , who are scattered in 12 groups study . Population the chosen Because own appropriate characteristics with objective research , especially in implementation science learning at the level school base .

The sample is part from selected population For represent overall population in something research . The sample is part from the number and characteristics of the population ( Sugiyono , 2007). Sampling techniques samples used in study This is purposive sampling, namely technique determination sample based on consideration certain from researcher . Considerations the covering amount student in One less class of 30 people, equality ability academic between class , and suitability material science learning in grade IV with the variables studied , namely ability reasoning critical and creative student .

Based on consideration said , sample study assigned to students Class IV of SDN Arjosari 1 consisting of on Class IV A and IV B. Class IV A has 20 students , consisting of of 9 students boys and 11 students women , whereas Class IV B consists of 20 students consisting of of 12 students boys and 8 students women . Both class the chosen Because own amount relatively students balanced as well as characteristics ability comparable start , as well as suitability material in class IV, so that worthy used as class experiments and classes control in quasi- experimental research this . With Thus , the total sample study totaling 40 students .

Data collection techniques are the method used researchers For collect the required data based on facts on the ground , in order to fulfill objective research . According to Rini (2012), the technique data collection used For know category the object in progress researched , recorded events , or take notes mark variables . With Thus , the technique data collection is step systematically carried out researchers in obtain data in a accurate and can accountable .

Instrument study is tools used For gather all necessary data in measure variables research ( Sugiyono , 2007). In the research this , the instrument used in the form of test written . Test the shaped question choice double stacked based on objective learning that you want achieved . Before used , test tested try it in class experiment and class control For know results Study student related material diversity culture . Good instrument must fulfil criteria validity and reliability so that the data obtained accurate and consistent ( Sugiyono , 2019). Making instrument test in study This developed from grid questions on aspects cognitive . Data analysis techniques in study This use analysis quantitative because the data obtained in the form of score results test reasoning critical and creative student as well as score evaluation Pop Up Book product analysis quantitative used For test hypothesis and knowing There is whether or not difference as well as influence implementation of the Project Based Learning ( PjBL ) model based on Pop Up Book work on variables bound . According to Sugiyono (2019), quantitative data analysis is activity after the data from all over respondents collected which includes data grouping , data presentation , and testing hypothesis with technique statistics .

Data obtained from the pretest and posttest first formerly tested prerequisite analysis , namely the normality test and the homogeneity test . The normality test done For know whether the data is normally distributed , while the homogeneity test done For know similarities variance between group . Riduwan (2015) explains that prerequisite test

analysis required before conduct statistical tests parametric so that the results testing hypothesis can trusted . If the data meets assumptions normality and homogeneity , then parametric tests are used . However , if No fulfil assumptions said , then nonparametric tests were used .

## RESULTS AND DISCUSSION

Variables in study This consists of on variables free (X) namely implementation of the Project Based Learning ( PjBL ) model assisted by Pop Up Book, as well as variables bound (Y) namely ability reasoning critical and creative students . Description variables served based on results analysis of the quantitative data obtained through pretest and posttest in class experiments and classes control .

Based on results data analysis , ability initial (pretest) reasoning critical and creative students in class experiments and classes control show relative average value comparable . This is show that second group own ability homogeneous beginning before given treatment . After given treatment , occurs improvement average value on both class , but improvement in class experiment more tall compared to class control . In class experiments that apply the PjBL model assisted by Pop Up Book, the average posttest reasoning score critical increase in a way significant compared to pretest scores . The same thing also happened in the aspect creativity students , where the scores results evaluation product show improvement in category Good to very good .

Temporary that , in class control that uses learning conventional , improvement mark still happened , but No as big as improvement in class experiment . This is show that learning conventional not enough give experience learning that encourages student For think critical and creative optimally . The difference This strengthened through statistical test results , through the Mann-Whitney test according to prerequisite test results , which show existence difference significant between results Study students in class experiments and classes control with mark significance  $< 0.05$ .

In addition , the analysis the increase (gain) also shows that category improvement in class experiment is in the category currently until high , while in class control is in the category low until moderate . This is indicates that implementation of the PjBL model assisted by Pop Up Book more effective in increase reasoning critical and creative student compared to with method learning conventional .

With Thus , the description variables study This show that variables free in the form of The implementation of the Project Based Learning model assisted by Pop Up Book provides significant influence to variables bound , namely reasoning critical and creative students . These results prove that learning based project capable increase involvement student in a way active , encouraging ability think level high , and produce creative and meaningful work in science learning material diversity culture .

### Data Analysis Results

This section to explain results research and analysis of the data obtained from implementation classroom learning experiments and classes control at SDN Arjosari 1, Malang City. Research This aim For know difference level reasoning critical and creative student between classes that implement the Project Based Learning ( PjBL ) model assisted by Pop Up Book media and classes that use method learning conventional in material diversity Indonesian culture . The data analyzed obtained through test reasoning critical and creative students who are given before and after treatment .

Implementation study conducted on students class IV consisting of over two groups learning , namely class IV A and IV B. One of them class set as class experiments that obtained learning using the PjBL model assisted by Pop Up Book, while class other set as class control that obtains learning use method conventional . Second class own amount relatively students balanced and characteristic ability comparable beginning , so that worthy used in quasi-experimental design For compare results learning .

Activity study implemented during six meetings in range time 24 September 2025 to 16 October 2025. In class experiments , learning implemented in three the meeting that began with administering a pretest for measure ability beginning students , continued with implementation of the PjBL model assisted by Pop Up Book, and ends with

posttest administration for know ability end students . Meanwhile that , in class control is also implemented three meeting with the same flow , namely pretest administration , implementation learning use method conventional , as well as administering the posttest at the end activity .

All over series activity study implemented in accordance with schedule that has been established and designed in a way systematically so that both class get the same material with treatment Different learning methods . Implementation schedule study in a way details presented in Table 4.1. The data obtained from subsequent pretest and posttest results analyzed For know differences and results application of learning models to ability reasoning critical and creative student .

#### **Cognitive Test Results**

Cognitive test results Reasoning critical obtained from pretest and posttest scores in class experiments and classes control . This data used For know difference ability beginning as well as improvement results Study student after given treatment .

Result data Study student obtained through test knowledge ( domain cognitive ) in the form of a pre-test and post-test which were given to class experiments and classes control . The pre-test aims For know ability beginning student before given treatment , while the post-test is used For measure results Study student after follow the learning process . Class experiment given treatment in the form of implementation of the Project Based Learning (PJBL) model for increase ability reasoning critical and creative student through manufacturing Pop Up Book work . Meanwhile that , class control follow learning with the usual conventional model used by teachers.

#### **Creativity Test Results Student**

Evaluation creativity student done use sheet observation based rubric scale 1–4 which includes four indicators , namely fluency , flexibility , originality , and elaboration . The scores obtained student Then calculated the average For know trend level creativity in class experiments and classes control . According to Sugiyono (2019), analysis descriptive quantitative aim For describe the data as existence through average value (mean) so that can known trend results study in a way objective .

#### **Hypothesis Test Results Reasoning Critical Thinking and Creativity Student**

Cognitive test results reasoning critical obtained from pretest and posttest scores in class experiments and classes control . This data used For know ability beginning student as well as improvement results Study after given treatment . Class experiment given treatment in the form of implementation of the Project Based Learning ( PjBL ) model based on Pop Up Book works , while class control use learning conventional .

Based on Table 4.2, the average pretest score of the class experiment by 46.66 and increasing to 71 on the posttest, so happen improvement by 24.34 points . Meanwhile that , class control has a pretest average of 51 and a posttest average of 50.66, so that No show significant improvement . In terms of completion , class experiment experience improvement amount student complete from 0 to 9 students , while class control still No There is students who achieve completeness .

## **DISCUSSION**

Difference Reasoning Critical Between Class Students Experiments Using PJBL Through Pop Up Books and Student Work Class Controls That Use Conventional Learning is the result of research show existence significant differences in ability reasoning critical between student class experiments and classes control . Students who follow learning with the Project Based Learning ( PjBL ) model assisted Pop Up Book works show more capabilities Good in identify , analyze , and conclude information compared to students who follow learning conventional . This is happen Because PjBL give chance to student For involved active in the learning process through activity exploration , discussion , and resolution demanding projects use ability think level tall . Rather , learning conventional tend teacher -centered , so that student more Lots accept information in a way passive . Condition This cause limitations in develop ability think critical optimally . Findings This in line with theory learning constructivist which states that knowledge will more meaningful if student build Alone his understanding through experience active learning . With Thus , the

difference reasoning critical findings in study This show that implementation PjBL assisted by Pop Up Book provides influence positive to development ability think critical student .

Difference Creativity Between Students Class Experiments Using PjBL Through Pop Up Books and Student Work Class Controls That Use Conventional Learning , namely the research results also show existence significant difference in creativity student between class experiments and classes control . Students in the class experiment capable generate more ideas diverse , unique , and detailed in works created , especially in compilation of Pop Up Book about diversity culture . This is show that learning based project give more space wide for student For develop imagination and ideas creative . On the other hand , students in the class control show level more creativity low Because applied learning not enough give chance For express and innovate . Learning conventional more emphasize on delivery materials and solutions task regularly , so that student not enough pushed For develop ideas in a independent . This result in accordance with theory creativity that expresses that creativity develop through the thinking process divergence that requires freedom in explore various possibility solution . Therefore that , PjBL assisted by Pop Up Book proven more capable facilitate development creativity student compared to learning conventional .

PjBL Through Pop Up Book Works More Effective Compared to Conventional Learning in Increase Reasoning Critical Fourth Grade Students Are Based On results analysis increase (gain) and comparison pretest and posttest scores , it is known that the PjBL model assisted by Pop Up Book more effective in increase reasoning critical student compared to learning conventional . Improvement This seen from ability student in understand problem , connecting concept , as well as interesting conclusion in a way logical after follow learning based project . Effectiveness PjBL in increase reasoning critical No let go from characteristics of this model that place student as center learning . Through stages PjBL , students trained For identify problem , designing solutions , and evaluate results Work in a way independent and group . This process push student For think in a way analytical and reflective . With Thus , PjBL with the help of Pop Up Book can stated more effective in increase reasoning critical student Because give experience active , contextual , and challenging learning .

PjBL Through Pop Up Book Works More Effective Compared to Conventional Learning in Increase Creativity Student Class IV Research Results show that implementation PjBL assisted by Pop Up Book more effective in increase creativity student compared to learning conventional . This is indicated by an increase ability student in generate original ideas , develop idea in a way detailed , as well as serve interesting and meaningful work . Activity projects involving making Pop Up Books provides experience direct to student For pouring out creative ideas in real visual form . Learning based project give room for student For experiment , collaborate , and express idea in a way free . Condition this is very supportive development creativity students , as stated in theory that creativity appear through activities that give chance exploration and innovation . On the other hand , learning conventional not enough give adequate stimulation For develop creativity Because more focused on achievement cognitive basis . Therefore that , PjBL with the help of Pop Up Book can stated more effective in increase creativity student class IV, at the same time support creation more learning meaningful and student - centered .

Research result This own implications important in the world of education , in particular in science learning in schools basic . First , teachers need to implementing innovative learning models such as Project Based Learning for increase quality learning . Second , the use of creative learning media like Pop Up Book can increase interest and motivation Study students . Third , student - centered learning proven capable develop ability think level much needed height in learning 21st century .

In addition , the results study this can also become base for school in develop more learning programs innovative and creative . With Thus , learning No only focused on achievement cognitive , but also on development skills think critical and creative students . Research This own a number of limitations , including amount sample limited to one school , so that generalization results study Still limited . In addition , time implementation relative research short also becomes constraint in observe development ability student in a way more deep . Therefore that ,

research furthermore expected can done with amount more samples big and more time long . Therefore that , the result study This Not yet can generalized in a way wide without existence study continued .

## CONCLUSION

Based on results research and discussion , can concluded that The implementation of the Project Based Learning ( PjBL ) model assisted by Pop Up Books provides significant and more influence superior compared to learning conventional in increase ability reasoning critical and creative student class IV in science learning material Diversity Culture at SDN Arjosari 1. This is proven with existence significant difference between class experiments and classes control based on Mann-Whitney test results with mark significance  $0.000 < 0.05$ , and supported by higher mean posttest scores and mean ranks high in class experiments . In addition , creativity students in class experiments also show more results Good with an average score of 3.7 compared to class control of 2.7. Implementation PjBL assisted by Pop Up Book is also proven capable increase results Study in a way real , shown through improvement score from pretest to posttest in class experiment by 24.34 points as well as increase amount students who achieve completeness learning . Improvement creativity students are also seen from quality Pop Up Book products are produced , which fulfill indicators of fluency, flexibility, originality, and elaboration in category Good to very good . With Thus , the PjBL model with the help of Pop Up Book can stated as alternative capable learning increase ability think level high (HOTS), especially reasoning critical and creative students , as well as support creation active , contextual and meaningful learning at school base .

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