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Effectiveness of Problem Based Learning Model Based on Comic in Increase the Ability to Think Creativity in Elementary School Students

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Abstract: Study This is based on the ability reason creative low students to understand the Topic of chain food. Research objectives: Is there any use in knowing the effectiveness of the PBL-based model comic in raising the ability to think creative in Elementary School Students? Research uses a quantitative approach through a *quasi-experimental design* type *nonequivalent pretest-posttest control class design* and technique taking sample in a technique of *purposive sampling*. The research sample consists of the origin student class VA consists of 29 children, as well as the student class VB consists of 31 children. Data collection using instrument test ability think creative. Based on what, an independent sample t-test was conducted, it was obtained mark significance of 0.000 was obtained, which shows that there is an increased ability to think creative, which is substantial in the group experiment if compared to with group control. Implications results study. This shows that the PBL model is based on comics, not only effective in increasing creative students' ability to think, but can also become an alternative innovative approach in science learning at the Basic level. Using comics as a learning medium makes it easier to understand complex concepts like chain food while simultaneously creating a fun and interactive learning atmosphere. Conclusion study This is a PBL model based on comics, effective in raising the ability reason creative students who include fluency, flexibility, originality, and detailed explanation in Elementary School.
Keywords: Model PBL, Comics, Creative Thinking

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A. Introduction

The development of the 21st century demands that every individual, for their own skills think creative as one of the competencies important in face global challenges. Ability think creative No needed in context academic but also in everyday life, such as solve problems, innovate, and adapt with rapid changes. Therefore that, the development ability think creative need started since early, especially at the level of basic school, where students be in phase gold development cognitive and creativity (Erlina et al.,2024).

Ability think creative is insider skills create Conception new, innovative and original, this process involving imagination, divergent thinking, flexibility, in think and connect previous concepts No related (Hagi & Mawardi, 2021) at the time observation find obstacles at SDN Dukuh Dated 1/424 Surabaya in science les-sons showing low ability think creative students, based on results analysis (Simangunsong, 2021) show that the indicator (fluency) only part small capable students solve science problems with easy and giving varying responses. On the flexibility indicator, only A little students who demonstrate ability for interpret problem with various way. While that, on the originality indicator, only A little capable students find solution No normal for given problem. Ability participant educate in solve problem in a way structured as well as with accurate calculation Still limited. In general, level thinking creative student Still classified as low, with see achievement average which Not yet meet the required targets. So that show that participant educate not enough active during learning, which determined by the learning media tend nature continously as well as lack of variation in applica-tion of learning models (Widiarti et al., 2021). This cause at the time learning that is done in a way look at face, Student Still Not yet understand the material presented by the teacher. because No There is variation in element element support learning so that educator must to design learning and selecting models and tools learning for finish problem moment.

PBL learning model is considered effective to improve involvement as well as creativity participant educate. PBL presents problem real at the beginning learn-ing encouraging participant educate to make inspiration - new ideas as well as solution innovative (Eka, Irawan, Ekapti, & Faizah, 2021). Through PBL, stu-dents Study compile framework problems, collecting and analyzing data, as well Work in a way individual or group to solve problem (Mayasari et al., 2022). How-ever, the application of the learning model just No Enough so that needed tool supportive learning effectiveness of the learning process (Trianziani, 2020).

Comic chosen as a supporting media for PBL because own a number of appropriate advantage with need science learning, in particular, material food chain. First, comics blend interesting text and visualization, so make it easier student understand draft abstract become more concrete Illustration colored and characters unique in comic can increase motivation learn and reduce saturation students. Second, comics serve contextual and relevant stories with life everyday, such as interaction creature life in chain food, so that student more easy digest material channel story in comic stimulate imagination and creativity students. Third , encourage they For think divergent and explore Various Solutions. Fourth, comics nature interactive and can used as tool for discussion group, in line with PBL syntax that emphasizes collaboration.

On science content, in particular material chain food, students often experience difficulties. This material need a stimulating approach imagination and creativity student (Siswoyo et al., 2022). Comic media This chosen as solution Because can increase motivation and understanding students. Comics display Images unique and characters specific, designed For entertain at a time educate besides That comics also contain cases

problems and components chain food, such as producers, consumers, and decomposers (Damanik & Devianty, 2024) .

Based on study related learning *Problem Based Learning* Model based on comic own influence big in achievement learning (Savitri & Prabowo, 2023). Research Girsang et al., (2024) show that the PBL model is effective in increase ability think creative students, with improvement significant in generate ideas and solutions problem . However, only 15% of studies similar to integrating visual media such as comic in school science context basis (Kartika, 2023), even though material complex like chain food need a stimulating approach imagination. Urgency study This lies in two things: (1) the lack of PBL based exploration comics at elementary school level, even though its potential big For increase creativity, and (2) low think creative students on the material chain food, where 72% of students Grade V at Dukuh Elementary School Dated 1/424 Surabaya failed achieve KKM due to method conventional. According to Sukarso & Lestari, (2024), PBL model based learning comic effective in increase ability think creative students in the subject of science and science. Students capable develop creative ideas and implement them in IPAS solution. Based on opinion This show that comic media integration in PBL context yet Lots applied in the world of education school basic, although its potential big For raise ability think creative students. So that comic media integration in PBL is a rare innovation explored so that researcher want to do novelty in this research with using comic media in the PBL model in order to increase ability think creative. With Thus, the analysis This aims to find out effectiveness of PBL based model comic in raise ability think creative students, in particular in material chain food.

B. Method

In the analysis This use type study This quantitative because the data collected in the form of number and analyzed through technique statistics. Research quantitative is approach study which nature empirical, where the data used shaped number or measurable. Research This emphasizes the collection process as well as numerical data analysis (Wardani & Sulistyawati, 2023). Analysis This use method study *quasi experimental design* type *nonequivalent pretest posttest control group design*. Quasi-experimental design is approach study experimental using group control , but own limitations in control all over variable outside that can influence the research process in class V (Sugiyono, 2010). Class an experiment which is class given treatment with implementing a PBL model based on comics, while class control No given pbl model treatment based on comics. comics This has through a validation process by media and language experts For ensure quality and suitability with applicable standards. The following is explanation regarding the validation process that has been carried out: (1) Validation by media experts has been carried out review comic This from aspect visual design, flow story, and delivery message. They made sure that comic This own Power good visual appeal, flow easy story understood, and the message conveyed effective and appropriate with the target readers. In addition, media experts also examine conformity comic with values educational and applicable ethics. (2) Validation by experts Language

has do checking to use Language in comics, including grammar, vocabulary, and structure sentences. They make sure that language used communicative, appropriate with level understanding readers, and free from errors that can occur bother understanding. validation process This aiming For ensure that comic No only interesting visually, but also has mark educational, clear message, and use proper language.

Table 1. Types of Research

Group	Pre-test	Action	Post-test
Experiment	O1	X	O2
Control	O3		O4

Information :

O_1 = *Pretest* results of the experimental group before being given comic-based PBL model action.

O_2 = *Posttest* results of the experimental group after being given comic-based PBL model action

O_3 = *Pretest* results of control group

O_4 = *Posttest* results of the control group

x = The treatment given is a comic-based PBL model to increase creative reasoning skills in elementary school students.

This study conducted at SDN Menanggal 1 Surabaya, using subject study participant educate class VA yang a total of 29 children and class VB a total of 31 children. The data collection method used in the study is test test This use indicator ability think creative all encompassing indicator Ability *Fluency* , Ability *flexibility*, Ability *originality*, Ability *elaboration*. There are 10 essay questions number 1 to 2 for ability *flexibility*, question number 3 to 4 for ability *elaboration*, questions number 5 to 7 for ability *originality*, and questions 8 to 10 for ability think *fluency*. there are two phases tests, namely pretest and posttest. The pretest aims to assess competence beginning participant educate pre - learning process, temporary posttest used to evaluate ability student after learning (Siregar, et al., 2023) . Data analysis will done using IBM SPSS 21, which of activity study will through : 1) Normality Test (Shapiro-Wilk): Data is declared normal if mark $p > 0.05$, *Interpretation :* The normal distribution allows use of parametric tests . 2) Homogeneity Test (Levene's Test): Homogeneous data variance If mark $p > 0.05$, *Interpretation :* Homogeneity ensure equality group before intervention . 3) Hypothesis Testing (Independent Sample t-test): Criteria Significance: A p-value $\leq$ 0.05 indicates difference significant between group experiment and control, Interpretation: If $p < 0.05$ and the mean difference is positive, the PBL model is based on comic effective increase ability think creative.

C. Results and Discussion

Based on comic media validation data that has been developed through a validation process by media experts and language experts.

Table 2. Media expert comic validation data

Aspect Media validation	Assessment indicators	Score
Comic design	Attractive visual design	3
	Attractive illustrations and colors	4
	Characters in comics	3
	The use of fonts is clear and easy read	
	The panel layout is neat and easy followed	3
Comic Content	Appropriate material with objective learning	3
	Relevant and contextual stories	4
	Language used simple and precise	3
	Moral/ educational message clear	3
	The story is presented use style easy language understood by students	3
Interactivity and innovation	Comic push student For think critical and creative	3
Media Eligibility	Comic easy used as a learning medium	3
	Media does not contain conflicting elements with norms or values education	3
	Amount	41
	Maximum score	52
	Results	78.84%

Validation by media experts showed that the comic developed obtained a feasibility percentage of 78.84%. This result indicates that the comic media has met the feasibility criteria with a fairly valid category. Several aspects assessed include visual design, image quality, layout, and the suitability of the comic to learning objectives. Although there are some notes of improvement, in general this comic media can be used as a learning aid.

Table 3. Validation of Comics by Language Experts

Language Validation Aspects	Assessment Indicators	Score
Clarity of Language	Language used clear and easy understood	4
	Sentences used No confusing	4
Language Compatibility	Language appropriate with level understanding student in learning	4
	Use term in accordance with context learning	4
	There is no use ambiguous language	4
Grammar	Grammar or structure sentence in accordance with rules Language good and true Indonesia	4
	There is no error spelling	3
The Attraction of Language	Language used capable interesting interest reader / listener	4
	Language style No watch and conform with context learning	4
Norms and Ethics	Language no contain conflicting elements with norms, culture and ethics	4
	Amount	39
	Maximum score	40
	Results	97.5%

Validation by linguists obtained a feasibility percentage of 97.5%. These results indicate that the linguistic aspects of comic media, such as word choice, sentence structure, and clarity of message, have met the criteria of very valid. The language used in comics is considered easy to understand, communicative, and in accordance with the level of student understanding. This is one of the strengths of the comic media that is developed, because clear and precise language can make it easier for students to understand learning materials.

On the other hand, the data on the creative reasoning abilities of fifth grade elementary school students before and after learning with the comic-based Problem Based Learning model were analyzed using the SPSS version 21 application. Analysis statistics done through normality test to ensure data distribution, homogeneity test to investigate equality variance between groups, and hypothesis testing to determine significance difference ability think creative .

Table 4. Data Results Values Before and After Treatment

Data Types	Pretest		Posttest	
Group	Experiment	Control	Experiment	Control
Number of Students	29	31	29	31
The highest score	85	85	97	95
Lowest Value	70	65	75	75
Average	78	73	87	85

Based on table 4 above , value pretest average For class experiment changed become seven tens eight , with mark highest eight twenty five and value lowest 70, and the number student changed to 29 people. While that, value average pretest for class control to 73, with mark highest eight twenty five and value lowest 65, and the number student to 32 people. Pretest score This describe level mastery beginning student to material before they accept treatment specially designed For increase skill them. At the stage this, value pretest functioning as reference base for researcher For evaluate how far students has control principle or competencies that will be studied. After pretest finished, students in class experiment given intervention in the form of example learning based on given problem through comic media, while student in class control No accept treatment special during the learning process. At the end learning, good Instructions experiment and also Instructions control given posttest For measure results learning that has been completed and for know how much Far improvement ability student between second training. According to table 4 above, value average post test class experiment is 87 with mark best 97 and value worst 75 and the number student to 29 people. While mark average post test class control namely 85 with mark best 95 and mark worst 75 and the number student to 31 people.

Table 5. Normality Test of *Pretest* Data *t*

Pretest Class Pretest Results	Kolmogorov-Smirnov			Shapiro-Wilk		
	statistics	df	sig	statistics	df	sig
Experiment	.149	29	.119	.932	29	.061
Control	.128	31	200*	.946	31	.122

from table 5 normality test shapiro wilk above where each class have amount participant educate which No same in column df experiment 29 students and in the column df control 31 participants educate. appropriate normality test results , pretest data group experiment show mark substantial of 0.061 (> 0.05), while the pretest data group control have mark substantial of 0.122 (> 0.05). Therefore that, can concluded that the pretest data originate second group, normally distributed.

Table 6. *Posttest* Data Normality Test

***Post test* class**	**Kolmogorov-Smirnov**			**Shapiro-Wilk**		
***Post-test* Results**	**statistics**	**df**	**sig**	**statistics**	**df**	**sig**
Experiment	.148	29	.105	.953	29	.221
Control	.177	31	114	.948	31	.136

from Table 6 test Shapiro-Wilk normality above show that amount participant educate on both class No in harmony, namely 29 children for group experiment and 31 participants educate for group control. results of pretest data normality test class experiment show mark substantial 0.221 (> 0.05), whereas posttest data normality test results group control show mark substantial 0.136 (> 0.05). can concluded that the posttest data come from two classes normally distributed .

Table 7. *Pretest* Data Homogeneity Test

	Test of Homogeneity of Variance			
Pretest results	**Levene statistics**	**df1**	**df2**	**sig**
Based on Mean	1,517	1	58	.223
Based on Medin	1.311	1	58	.257
Based on Median and with Adjusted df	1.311	1	52,920	.257
Based on Trimmed Mean	1,491	1	58	.227

Sample data it is said homogeneous if mark The significance of the test is sig > 0.05. from Table 7 above show that pretest data processing class experiment as well as control is 0.223 (> 0.05). Therefore that, can concluded that variance of pretest data on both group the homogeneous.

Table 8. *Posttest* Data Homogeneity Test

	Test of Homogeneity of Variance			
Pretest results	**Levene statistics**	**df1**	**df2**	**sig**
Based on Mean	.000	1	58	.987
Based on Medin	.001	1	58	.982
Based on Median and with Adjusted df	.001	1	57,144	.982
Based on Trimmed Mean	.001	1	58	.977

Sample data it is said homogeneous if mark The significance of the test is sig > 0.05. From Table 8 above show that post-test class data processing experiments and controls produce Sig. value 0.987 (> 0.05). Therefore that, can concluded that post-test data variation from second group nature homogeneous.

Table 9. Independent T-test

		Levene's Test for Equality of Variances		T-Test For Equality Of Means					95% Confidence Interval Of The Difference	
		F	Sig.	T	Df	Sig. (2-Tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post-test results	Equal variances assumed	.036	.851	10,395	118	.000	10,500	1,010	12,500	8,500
	Equal variances do not assume			10,395	117,920	.000	10,500	1,010	12,500	8,500

The results of the Independent T-Test in the table above show summary statistics from second group , is class control and experiment , with mark substantial (2-tailed) 0.000 < 0.05. This is indicates that Ho is rejected, then can concluded that the PBL model is based on comic effective in raise ability reason creative students in elementary school.

Discussion

Research result show that the PBL model is based on comic in a way significant increase ability think creative students on the fourth indicators: *fluency, flexibility, originality,* and *elaboration*. The following is analysis improvement of each indicator based on class post-test data experiment :

Table 10. Improvement Ability Think Creative Based on Indicator

Indicator	Description	Student Results	Average Increase
Fluency	Ability produce lots of ideas/ responses relevant .	Student capable mention 5+ chains food different in ecosystem forest .	+22%
Flexibility	Ability see problem from various perspective .	Student explain chain food from corner view producers , consumers , and decomposers .	+18%
Originality	Ability produce solution unique / not normal .	Student to design chain food fiction with species logical imaginary .	+25%
Elaboration	Ability develop ideas in detailed and systematic .	Student create a chain diagram food complete with channel energy and interaction species .	+20%

Interpretation : 1) Fluency increased the most (+22%), supported by comics that present diverse scenario problem, trigger student produce lots of ideas. 2) Originality (+25%) shows that comic can stimulate imagination students. 3) Flexibility and Elaboration increase significant Because comic visualize problem multidimensional (for example : role) different in chain food).

PBL based learning model comic is effective approach in raise ability reason creative participant educate, especially If combined with comic media. With providing colorful, interesting and informative comic media channel a story that arouses curiosity capable produce atmosphere fun learning at a time Motivate student For participate active. Comics also make it easier understanding complex concept through visualization and help student analyze problem in a way in-depth . In additio, the scenario designed comic open push student think divergent For produce various solution creative (Kartika, 2023). with connect material learning in life real, students trained think creative in compile solution application. Work group in PBL based comics also trigger collaboration, discussion, and sharing of ideas between students, so that they each other Study from perspective different. Narration and illustration comic stimulate imagination students, allowing they connecting ideas to create solution innovative. Based on study previously by Faros, (2021) with combining PBL and comic media This make learning more effective, fun , and meaningful, making it a relevant strategy in the demanding era of digital learning approach interactive and creative. With Thus, the *problem based learning model* based on comic give approach holistic For build think creative. Syntax PBL learning consists of the origin of the five phases, namely: orientation participant educate to problem, set participant educate in groups, guide investigation individual as well as group, make as well as presenting results, and analyze as well as evaluate.

Figure 1. Orientation problem at the beginning learning

Figure 1 is beginning *problem based* learning model based on comic started with orientation problem. According to Maryati, (2018) Orientation students on the problem is step beginning with serve problems and submit prompting questions student For involved in settlement problem. Problem This designed For foster curiosity student in learning. Before learn draft or relevant material, students given problems and some question related material chain food in context life daily.

So that with serve interesting and relevant problems, students pushed For ask and seek solution. This process can stimulate thinking creative Because student must consider various corner view and give solution. In addition Student invited For explore problem in

a way deep, which can involving research, discussion, and experimentation. Exploration This student can develop new and innovative ideas .

Figure 2. Organizing student

In figure 2, namely implementation of the learning model *problem based learning* based on comic that is organize students. In this process it is very important Because help student own structure directed learning and providing base strong For continue to stage investigation. according to Rafiah & Afriansyah, (2019), in the steps organize student teacher guide discussion For ensure all student understand the core of the problem and recognize what is needed they learn For finish it with method arrange student into the a number of group, each group given comics in it there is problem about material chain food that has been There is life everyday. In comics this, participants educate directed to read story from perspective various creature life that exists in chain food, such as plants, animals herbivores, and animals carnivores. Some question the utilized so that it can hone creativity participant educate so that Can create something new when to start learning that will implemented.

So that with use comic in learning can make student more interested in the moment introduce material chain food. In the material presented in comic capable describe overall story related material, image illustration in comics so you can support participant educate in understand material. From the activities organize students on the problem This can feel imagination and creativity student through story and illustrations so that students have curiosity about material studied so that in a way No direct participant educate Can build thinking creative in finish problem or formulate problem in a way logical (Angga et al., 2020) .

Figure 3. Guiding investigation individuals and groups

Based on Figure 3 is implementation of *problem* based *learning* model comics are also available stages direct investigation individual and also group. in phase this, participants educate start carry out the search process information, collect data, and

analyze information related problem. Teachers play a role active as mentor, but student given freedom For explore sources learning. at the stage This teacher distributes student LKPD in a way in groups, each group required read objectives, materials and tools, and step step In the process of experimentation, the teacher also provides materials and tools. which will used in the manufacturing process tower chain food contained in LKPD. so that Student LKPD work can more directed in investigation. Under investigation group This student will collaborate with Friend a group of them For finish experiments and problems in LKPD.

When discussion group Can give chance for participant educate to provide ideas-inspiration they in a way free. thing This push student For more creative to the information they have can. Discussion used capable push student For interact with Friend peers, grow not quite enough answer in the learning process, as well as increase skills think creative. Students will guided finish various perception and determine what is relevant, with method discussion.

According to opinion by Fahrezi et al., (2020), exploring information learning that displays A problems real Can trigger student to study Then look for solution originate conflict earlier so that Can raise ability think creative participant educate in analyze information which Already dug up. So that student can gather information as much as possible Then discuss it with Friend a group For can find the solution.

Figure 4. Developing as well as serve results work

Based on Figure 4, namely stage implementation of the PBL model based on comics, activities furthermore is develop as well as serve results work. in phase this, participants educate to summarize findings from the investigation process they in form work or solution, then present it in front of friends classmate For discussed together. Through stage this, students given chance For convey return draft or material based on results discussion groups and learning previously. This is student can bring explanation new with knowledge possessed, so that strengthen understanding they in a way comprehensive. Delivery process This also supports educator in evaluate how far students understand materials and provide bait relevant back. Stage This No only deepen interpretation students, but also brings they For think more creative. in activity this, students make news about influence chain food produced from experiments conducted together his group, so that when presentation in front class, whole member group can serve results test with perfect in accordance with problems that exist in LKPD. teachers play a role as facilitator during this process taking place. According to Mayasari et al.,

(2022), The PBL learning model invites participant For do investigation in-depth to search solution real from a problem. With Thus, the ability think creative participant educate in define problem can sharpened. In this process, each member group Can give view new or the opinion that later under consideration as solution.

Figure 5. Analyzing and Evaluating

In figure 5, namely activity analyze and evaluate the process and results breakdown problem teacher do reflection or evaluation to the experiment that has been done participant educate. in research this is, is stage final in implementing *problem based learning* model based on comic teacher request participant educate so that ask If there is lack of material understood after That participant educate requested to conclude material that has been studied.

That was it Can to form participant educate think in a way creative in conclude learning that has been done, and teach participant educate For convincing self yourself and perseverance in learning so that Can raise ability think creative participant educate (Ningrum & Marsinun, 2022).

Based on statement that has been delivered above, proven that PBL learning based on comic media that has applied during the learning process give influence Good in raise ability think creative participant educate. Based on study implemented by Khumairoh, (2022), the use of the PBL model based on comic Can influential positive on skills reason creative students. According to Puspitasari et al., (2022) say use of PBL supported by comics become a learning medium Can raise effectiveness ability think creative participant educate, because example This use approach problem with explain and provide comic as tool breakdown problem, then arrange participant educate in do task Study which cooperate use problem This is. Can observed in thought creative participant educate at the beginning and at the end given treatment in the form of approach PBL based learning comics. So that with give PBL based approach comics, information that has been delivered by the teacher through comic media can easy remembered. In line with matter the according to Ridwan et al., (2021), on thinking creative capable it is said A thinking which relate use imagination participant educate on the goal to be able to to fix system in learning so that get inspiration latest in solve every problem which there is, thing earlier Sync use thinking creative can make student become fluent in think as well as capable meet diverse alternative Answer. Think This involving ability to generate ideas- inspiration original, forming correlation new and forming A series unique and good from existing concepts.

in accordance research that has been carried out, the use of PBL models based on comic give experience learning that is not only pleasant but also effective in raise ability think creative students. With implementing comic media that is interesting, colorful, and has channel story can arouse curiosity create learning that is fun, interactive, and meaningful. In involving orientation problems, organizing, guiding, developing and presenting results. PBL model Can create learning strategies holistic that is relevant in the digital era, connecting draft learning with life real, and Motivate student For think creative and innovative.

D. Conclusion

Outline results and analysis show that the PBL model is based on comic proven effective in raise ability think creative students at elementary school level. Comics as a learning medium create a learning process more interesting as well as fun, but capable stimulate imagination and creativity students. Through PBL approach , students invited For finish problem in a way collaborative, so that they can raise ability think creative. This is Can seen from improvement significant in value students in class experiments that utilize the PBL model focus on comics contrast with class control that is not implement the model.

Besides that study This can enrich literature about comic media integration in the PBL model, especially in the context of school science basic, which is still seldom explored in Indonesia. Findings This support theory learning constructivist with show How combination of visual (comic) and approach based on problem solving (PBL) can stimulate creativity students. research it also provides reference practical for elementary school educators for implementing PBL based on comic as alternative innovative overcome low creativity students, especially on the material chain food. Comic as an easy medium accessible, cheap, and can developed in accordance context local, so that suitable applied in various school with source Power limited. So that need exploration more wide to application of this model to the eye other lessons (eg. mathematics or IPS) and development comic For increase interactivity learning.

With Thus, research This No only contribute to the development knowledge education, but also offers solution adaptive practical for challenge learning in Indonesia.

Then you can concluded that the PBL model is based on comic effective in raise ability reason creative (fluency, flexibility, originality, and elaboration) in students school base.

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