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The effect of group investigation model assisted by interactive media Lectora Inspire on high school students' critical thinking skills

Aulia Nindy Fadila Gastama*, Fatiya Rosyida, Budi Handoyo, Djoko Soelistijo
Universitas Negeri Malang, Indonesia.
* Corresponding Author. E-mail: aulia.nindy.1907216@students.um.ac.id

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ABSTRACT

Geography learning teaches students to be able to think critically. Critical thinking is one of the thinking skills that students must have in 21st-century learning. However, the critical thinking skills of high school students in Indonesia are proven to be lacking. The study aimed to determine the effect of the Group Investigation (GI) model assisted by interactive media Lectora Inspire on high school students' geography critical thinking skills. The research design used a quasi-experimental design with a posttest-only control group design. The location of the research was carried out at the Laboratory Senior High School Universitas Negeri Malang. The research subjects were XI IPS 3 students as the experimental group and XI IPS 1 as the control group. Data on students' critical thinking skills were obtained from six essay test questions arranged according to indicators of critical thinking skills. Data analysis techniques for critical thinking skills using the Mann-Whitney test show that the GI model assisted by interactive media Lector Inspire affects high school students' critical thinking skills. Comparison of the post-test scores of the experimental group is much better than the control group. The steps of the GI model and interactive media Lectora Inspire during learning to make students productive in critical thinking.

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INTRODUCTION

In learning geography, students are confronted with geosphere phenomena in their surroundings, which encourages them to think critically. Every student must have critical thinking in the 21st century. The ability to think critically is the process of rational thinking when studying a problem and conducting an investigation (Mellita & Rosita, 2019). Students will learn to be responsible for their opinions, be rational, and have the best alternative available through this way of thinking (Firdaus et al., 2019). Students understand a real-life problem given by the teacher and think critically to find solutions to these problems.

However, several studies have shown that the critical thinking of high school students in Indonesia is still lacking. Inappropriate teacher strategies are a factor causing high school students' lack of critical thinking (Suwarna et al., 2022). In addition, students have not been accustomed to dealing with questions with cognitive ability levels evaluated to create (Wayudi et al., 2020). The lack of students' critical thinking was also seen by researchers when teaching through the Teaching

Assistance program at Laboratory Senior High School Universitas Negeri Malang. Students tend not to be enthusiastic when allowed to give arguments, answer, or ask questions. Therefore, appropriate learning models and media are needed to improve the quality of learning by encouraging students to engage in critical thinking activities (Herlina et al., 2019; Wulandari et al., 2023). One of these learning models and media is the Group Investigation (GI) model assisted by interactive media Lectora Inspire.

The GI model is a cooperative model involving students collaborating to investigate a problem (Sharan, 2017). The advantages obtained from using the GI model are that students are more intensive in solving a problem, developing students' skills in obtaining information to solve problems, developing a leadership spirit, the teacher pays much attention to student learning needs, students learn more easily cooperatively, and develop mutual respect among students. Students (Slavin, 2015; Sumarmi, 2012). In addition, students will like learning by discussing and conveying their ideas because the GI model makes students more confident and increases social interaction between students. Students will encourage and help each other complete group topics (Halimah, 2017). Students also become wise individuals in living community life, such as collaborating on various activities and planning activities to be carried out (Artini et al., 2015). Some of these advantages can be seen that the GI model can positively influence students during the learning process.

In addition, the GI model also has a weakness: the sitting position between one group and another adjacent group allows for a disturbing classroom atmosphere (Sumarmi, 2012; Widyanto, 2017). The "free rider" effect, or the act of piggybacking students, can be triggered by the GI model (Slavin, 2015). This effect means that only a few students in one group do their work. Another drawback is that students cannot use the GI model properly if they do not understand the material (Shoimin, 2014). The disadvantages of the GI model indicate that there is a need for media to minimize the deficiencies of the GI model, such as the interactive media Lectora Inspire.

Lectora Inspire is software for creating interactive learning media developed by Trivantis Corporation to provide an exciting learning experience (Wibawa, 2017). Lectora was Inspired to be an AICC-certified authoring system. This achievement has provided the credibility needed to gain acceptance in the e-learning industry. Learning media developed through Lectora Inspire can be published so students can learn independently (Shalikhah, 2016; Shalikhah et al., 2017). Teachers can also apply Lectora Inspire to help students learn online and offline material. The material in the Lectora Inspire media can be presented in writing, pictures, or videos so that learning is interactive. The GI model assisted by interactive media Lectora Inspire is a suitable combination because the attractive display of interactive media Lectora Inspire has the potential to arouse student enthusiasm for learning, seriously answer teacher questions, and increase understanding of the material (Dewi et al., 2020; Rahmadani, 2019). This potential makes it easy for students to apply the GI model assisted by interactive media Lectora Inspire in geography learning, especially when facing a problem so that students' critical thinking processes will emerge.

The GI model assisted by interactive media Lectora Inspire is suitable for use in geography material. The selection of geographic material that can be used indicates essential competencies 3.5 competency achievement, namely analyzing problems caused by environmental population dynamics. The reason for using this material is because there are still many population problems in Indonesia. Using media-assisted models will encourage students' thinking processes and their awareness and concern for population issues, so it is hoped that this will become their provision in the future.

The explanation of the background above shows that the researcher found a suitable combination of models and learning media that needed to be tested for its effect on critical thinking, namely the combination of the GI model with interactive media Lectora Inspire. The novelty of the research is the use of instructional media, teaching materials, and research subjects. Thus, the study aimed to determine the effect of the GI model assisted by interactive media Lectora on high school students' critical thinking skills. The Group Investigation model, assisted by Lectora Inspire media, improves high school students' critical thinking skills.

METHOD

Research design, namely the strategy chosen by researchers to thoroughly integrate research components logically and systematically to discuss and analyze the research's focus. The research design used a quasi-experimental design with a posttest-only control group design. This quasi-experimental research design, posttest only control design, emphasizes the comparison of treatment between the two groups, namely the control group and the experimental group, where the experimental group is the group that was given special treatment and carried out on January 31 - February 10, 2023. The research sample was selected based on the geographic average end-of-semester assessment scores. The following is the average value for class XI IPS at Laboratory Senior High School Universitas Negeri Malang in 2022/2023.

Table 1. Average End of Semester Assessment Geography

No.	Class	Average
1	XI IPS 1	81
2	XI IPS 2	80
3	XI IPS 3	81.5

Based on Table 1, the study population was obtained: students XI IPS 1 with an average of 81 and XI IPS 3 with an average of 81.5. The experimental and control groups were selected through a random sampling technique with a lottery type. The lottery results showed that XI IPS 3 was the experimental group, and XI IPS 1 was the control group. The experimental group was given the treatment of the GI model assisted by interactive media Lectora Inspire. Media use is used to minimize the shortcomings of the GI model. It is used to deepen the material students study before carrying out investigative activities. At the same time, the control group uses conventional learning. The mean of this conventional learning is usually carried out by Laboratory Senior High School Universitas Negeri Malang, which uses a scientific approach. The research design (Sugiyono, 2022) is shown in Table 2.

Table 2. Research Design

No.	Group	Treatment	Post Test
1	Experimental Group	X	O
2	Control Group	-	O

Information:
X: Learning with the GI Model assisted by interactive media Lectora Inspire
O: Post Test in the group after being given treatment

The data collection technique is the posttest with instruments in the form of six essay questions based on indicators of critical thinking according to Ennis (Bustami et al., 2016), including 1) formulating problems, 2) giving arguments, 3) deduction, 4) induction, 5) evaluation, and 6) decide and implement. The question is used to obtain a score of students' critical thinking skills. The questions were first given to XII IPS 3 before being distributed to the experimental and control groups and then tested for validity and reliability. The basis for deciding on the validity test includes: 1) the item is declared valid if the significance is $0.00 < 0.05$, and 2) the questions are declared invalid if the significance is $0.00 > 0.05$. Meanwhile, the basis for making decisions on the reliability test includes: 1) the item is declared reliable if the significance is $0.00 > 0.60$, and 2) the item is not declared reliable if the significance is $0.00 < 0.60$.

Data analysis techniques assisted by SPSS 22 for Windows, namely the normality test, homogeneity test, and hypothesis testing with a significance level of 5%. The provisions of the Kolmogorov-Smirnov normality test are that if the significance is $0.00 > 0.05$, the data is usually distributed. The homogeneity test uses the condition that if the significance is $0.00 > 0.05$, then the data is homogeneous. Testing the hypothesis with the Mann-Whitney Test, which has the following conditions: 1) if the significance is $0.00 > 0.05$, then H_0 is accepted, and H_1 is rejected; 2) if the significance is $0.00 < 0.05$, then H_0 is rejected; and H_1 is accepted.

RESULTS AND DISCUSSION

Results

The initial implementation step was conducting instrument trials on XII IPS 3 students who had previously studied essential competencies 3.5. The second step was treating the GI model assisted by interactive media Lectora Inspired by the experimental group. At the last meeting, the posttest was given to both the experimental and control groups. The posttest results received are data on critical thinking skills. The data is presented and divided into five classifications, as shown in Diagram 1.

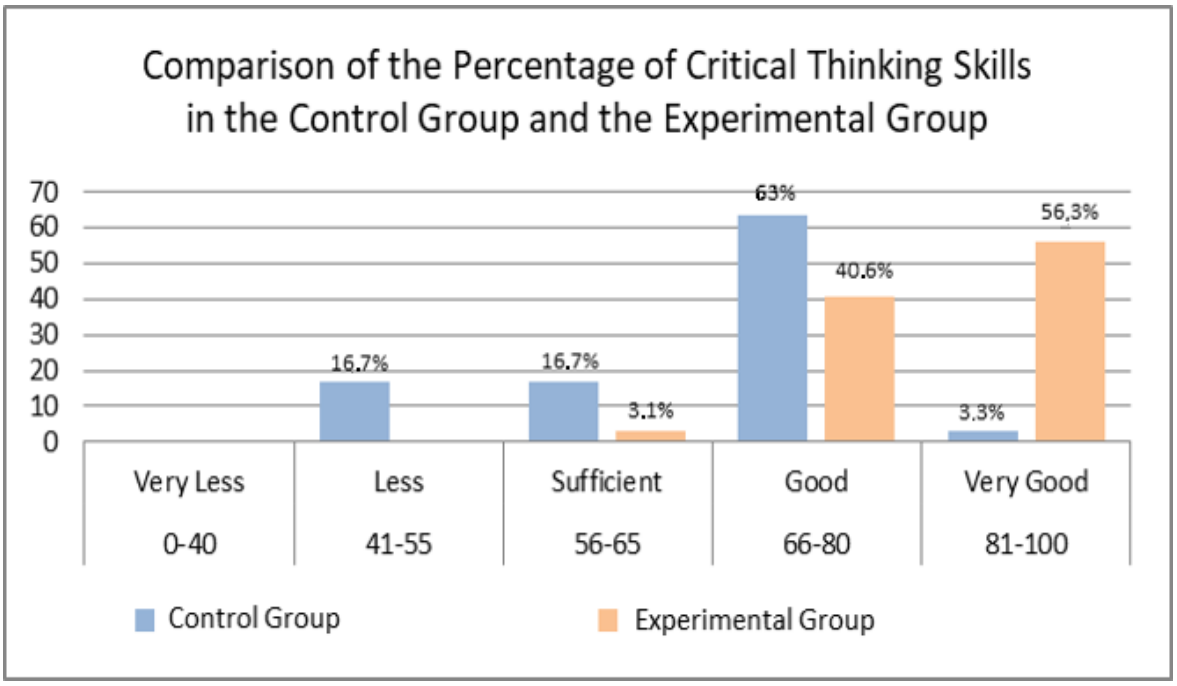

Diagram 1. Comparison of the Percentage of Critical Thinking Skills in the Control Group and the Experimental Group

Diagram 1 shows the percentage of students' critical thinking in the control group who are classified as less and sufficient at 16.7%. 63% of students have a good classification, and only 3.3% have a perfect classification in critical thinking. Meanwhile, in the experimental group, 3.1% of students had a sufficient classification. 40.6% of students are classified as good, and 56.3% are classified as good. From the results obtained, it is said that fewer students in the control group have excellent critical thinking skills. This is because the control group was not given the GI model assisted by the interactive media Lectora Inspire during learning. In addition, the teacher determined the problems that the control group students must solve. Meanwhile, the experimental group used the GI model with the help of interactive media based on Lectora Inspire, and students determined their problems.

Table 3. The Average Value of Critical Thinking Ability for Each Indicator

No.	Indicator	Average Value		Difference
		Control	Experimental	
1	Formulating Problems	3.0	4.4	1.4
2	Giving Arguments	3.6	4.3	0.7
3	Deduction	3.4	3.8	0.4
4	Induction	3.3	4.1	0.8
5	Evaluation	3.0	3.9	0.9
6	Decide and implement	3.9	4.2	0.3

Table 3 proves that indicators of critical thinking skills, namely formulating problems, have the most significant difference with a difference of 1.4. The reason is that the experimental group students are taught to find and formulate problems. The ability to formulate the main issues and explain answers to the questions given, students can learn to think critically to become one of critical activities (Budiarsih & Supeni, 2019; Hidayati & Indriana, 2022).

The decide and implement indicator has a difference of 0.3 and is an indicator of critical thinking with the lowest average difference. This is because the experimental and control groups have a similar learning process assigned to find solutions to existing problems. In addition, students are already accustomed to providing solutions to problems that arise around them, so there is little difference in average between them. The experience that a person has experienced exceptionally influences his ability to think because he has previously experienced and done it (Sudrajat et al., 2021; Sutriyanti & Mulyadi, 2019).

Data analysis on critical thinking skills used prerequisite tests, namely the homogeneity test and the Kolmogorov-Smirnov normality test. Meanwhile, the Mann-Whitney Test is used for hypothesis testing. The following are the provisions for deciding the research hypothesis.

H_0: The GI model assisted by interactive media Lectora Inspire does not affect the geography critical thinking skills of high school students

H_1: The GI model assisted by interactive media Lectora Inspire affects the geography critical thinking skills of high school students

Table 4. Results of Data Analysis

Prerequisite Test	**Significance**	**Information**
Kolmogorov-Smirnov Normality Test		
Experimental Group	0.000	Not Normal Distributed
Control Group	0.016	Not Normal Distributed
Homogeneity Test	0.450	Homogeneous
Hypothesis Test	Significance	Information
Mann Whitney test	0.000	H_0 is rejected, and H_1 is accepted

The normality test results in Table 4 show that the experimental group has a significance of 0.000 < 0.05, while the control group has a significance of 0.016 < 0.05, which shows that both data are not normally distributed. Meanwhile, the homogeneity test produces a significance of 0.450 > 0.05, meaning the data is homogeneous. Nonparametric statistical tests are used to test the hypothesis because the prerequisite test results do not meet the parametric statistical test analysis requirements.

The use of nonparametric statistical tests in research, namely the Mann-Whitney Test. The test results show a significance of 0.000 < 0.05, so H0 is rejected, and H1 is accepted. That way, it can be said that the GI model, assisted by the interactive media Lectora Inspire, influences the critical thinking skills of high school students.

The GI model assisted by the interactive media Lectora Inspire used in the experimental group is a learning that allows students to study independently in groups, starting from identifying topics to presenting project results. Therefore, the GI model assisted by the interactive media Lectora Inspire is based on a student-centered approach. The role of the teacher during the learning process is as a facilitator, assisting in learning experiences, assisting with environmental changes, and assisting in a learning process that is in harmony with needs and desires and helping groups when experiencing difficulties or offering assistance to each group (Sharan, 2017).

The material arranged in interactive media Lectora Inspire is the material students will learn about population problems. The media provides several cases of population problems in Indonesia, both open and dark, so the lessons learned are more concrete and contextual. The material is made in text, images, and videos to make it easier for students to learn and understand it from a visual and audio-visual perspective. To attract more visual attention but also concentration. The appearance of the material in interactive media Lectora Inspire is shown in the following Figure 1 and Figure 2.

Figure 1. Display of Visual Aspect Material

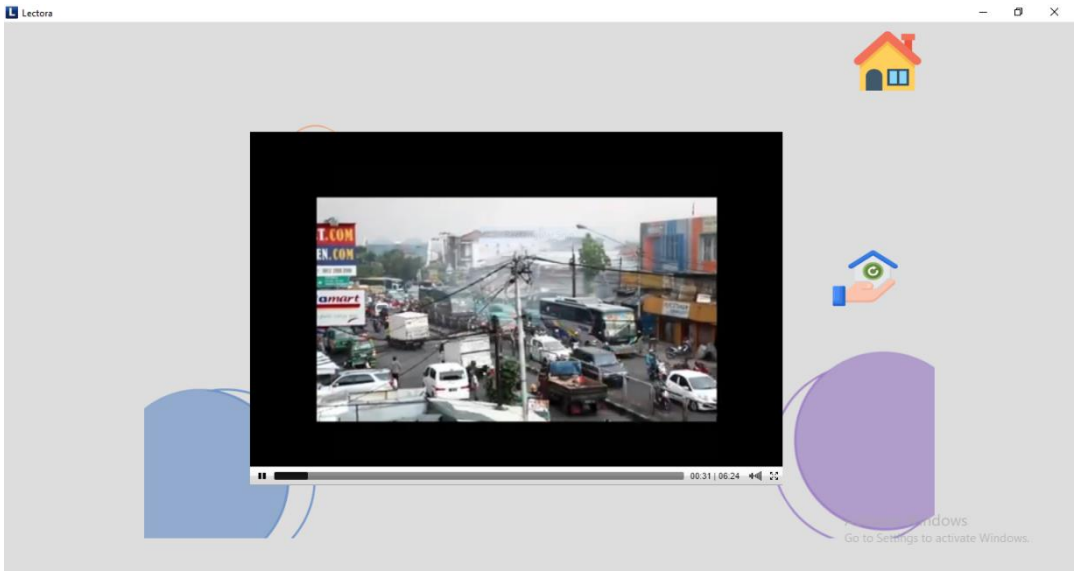

Figure 2. Display of Audio-Visual Aspect Material

The explanation of material in interactive media Lectora Inspire is carried out with the aim that students can understand the material first before carrying out investigative activities. This is also related to the shortcomings of the GI model. Namely, students cannot do the GI model learning correctly if they cannot understand the material. Next, we will discuss further the influence of the GI model, assisted by interactive media Lectora, on critical thinking skills.

Discussion

There are findings in this study, namely that students have been able to identify and provide solutions to problems that are still unclear regarding the population in Indonesia with the GI model assisted by the interactive media Lectora Inspire. These findings arise because, during the learning process, students are given an overview of population problems that are still relatively dark, and students in groups can determine other dark problems and analyze these problems. Therefore, it can be said that the stages of the GI model assisted by interactive media Lectora Inspire are the cause of the findings of this study. Further explanation regarding the research findings is described as follows.

Interactive media assist the GI model Lectora Inspire learning to make students active in facing a problem. The steps of the GI model assisted by the Lectora Inspire media in learning are 1) identifying topics and forming students into groups, 2) planning investigations, 3) investigations, 4) analyzing data and preparing final reports, 5) presenting reports, and 6) evaluating (Slavin, 2015). Media Lectora Inspire in learning is used in the first and second steps. The step of the GI model assisted by Lectora Inspire media can influence students' critical thinking, which consists of six indicators: formulating problems, giving arguments, deduction, induction, evaluation, and deciding and implementing (Bustami et al., 2016).

The first step is identifying the topic and forming students into groups. Students are presented with text, pictures, and videos of several open-ended population problems in Indonesia in the Lectora Inspire media, as shown in Figure 1 and Figure 2. The residents' problems in this video are slum settlements, crime, and poverty caused by population movements. The purpose of this presentation is so that students can know examples of open population problems in advance. Then, students are presented with pictures of examples of dark population problems through interactive media Lectora Inspire. In this activity, students are asked to compare open and dark problems. Topic problems that later need to be investigated by students are dark so that students can feel challenged (Sharan, 2017). Dark problem topics displayed in the media encourage students' desire to respond and provide appropriate solutions (Gaol & Darmana, 2022; Suwarna et al., 2022). The first stage shows that students can answer the teacher's questions so that it can be interpreted that students have recognized the problems displayed. Students' ability to recognize a problem is a characteristic of critical thinking skills (Nisa, 2022; Tumanggor, 2021). Students were formed into five heterogeneous groups using a paper lottery at this step. Groups formed heterogeneously influence high-ability students to help students under them during the project (Amin, 2019; Widyanto, 2017). Each group received an investigation sheet as a tool to make it easier to investigate the problem. Students in groups discuss determining the topic of population problems that are still unclear and explaining the reasons for choosing the problem. Each group has a different problem topic, so they can share the information they find. Achievement of critical thinking skills indicators in the first step, namely formulating problems, because students can define problems before formulating questions.

The second step is the planning of the investigation. In investigation planning, students plan activities, create strategies, and divide tasks to deal with problems (Sudiasih & Margunayasa, 2020). At this step, the teacher explains the procedure for planning the investigation properly through the interactive media Lectora Inspire. The procedures described are formulating problems, determining objectives, data, location and time, data collection techniques, and instruments. Students are also shown videos of conducting investigations on the media so they can understand the process of carrying out investigations that will be carried out. After that, students discuss determining their investigative plan by formulating the investigation's problem and purpose. The determination of the location and time between groups is the same, namely in the area around Laboratory Senior High School Universitas Negeri Malang on Thursday, February 2, 2023.

In addition, each group also determines the data along with the method of collection and the instruments written on the investigation sheet. The purpose of this investigative planning process is so that the data collection process carried out by students becomes more structured and directed (Mushoddik et al., 2016). The group that had prepared its investigation plan was asked to make an instrument in the form of an interview sheet. The questions made cover 5W1H. The group was also asked to assign tasks to each member, such as the interview section and documentation, and to record respondents' answers so as not to trigger a "free rider" effect. However, the division of tasks must be adjusted to students' abilities (Rokayah, 2014). Group discussions are seen at this step because students need to be active and think critically in planning their investigations to prevent future mistakes. Thus, the planning step becomes one of the success of a group's project. Critical thinking indicators at this stage are formulating problems and giving arguments.

The third step is the implementation of the investigation. This step is the core of the group investigation model assisted by interactive media Lectora Inspire. Before carrying out the investigation, each group was asked to collect literature reviews according to the topic of the problem. They can find this literature review through textbooks and sources from the internet. The

literature review will later be written in the investigation report. After collecting the literature review, each group can investigate the classroom. The investigation was carried out during study hours with limited time, and the location was not far from the school, so the sources obtained by each group did not vary. This is due to the limitations of the school. At the investigative step, students gain new learning experiences by collecting data through interviews with specified sources. Collecting data or information about this problem is a stage of critical thinking (Lismaya, 2019; Saloom, 2022). The data they found was then written on the investigation sheet. The process of achieving indicators of critical thinking skills at the investigative stage is induction because students can collect problem data through interviews.

The fourth step is analyzing the data and preparing an investigative report. This step is a follow-up activity from the implementation of the investigation. Each group reviews the interview data they get. Then, they discussed analyzing the data with the 5W1H aspects to obtain answers from the formulated problems. Through this data analysis, each group has developed problem information that is still unclear, starting from the factors that influence the problem and the impact of the problem. Therefore, data analysis activities allow students to think critically (Lismaya, 2019; Nuraini et al., 2020). Groups are also asked to determine and evaluate appropriate problem solutions to increase student development in solving problems. Students' insight increases by studying the problems around them (Marlina et al., 2017; Taher et al., 2019). The indicators seen in the learning model of GI assisted by the Lectora Inspire media in the fourth stage include deduction, induction, evaluation, and deciding and implementing. In the fourth step, each group prepares an investigative report. The investigation report is in the form of a paper and is prepared by the writing systematics listed on the investigation sheet.

The fifth step is the presentation of the investigation report. Each group presented their investigative report in front of the class. At the time of the presentation, the presenter group seemed confident in conveying their findings. The group that is the audience is allowed to ask questions or respond to the results of the investigation of the group presenting. Questions to the group of presenters are limited to 1-2 questions due to time constraints. This process raises group discussions, making students' courage to express their arguments visible. Expressing arguments plays an essential role in developing critical thinking (Roviati & Widodo, 2019). Therefore, implementing this stage raises critical thinking indicators, namely, giving arguments.

The sixth step is evaluation. The evaluation step is a question-and-answer activity between the teacher and students about the learning process that has been carried out (Aulia et al., 2020). Representatives of students were asked to express their opinions on the learning process using the GI model assisted by the interactive media Lectora Inspire and what they got during the lesson. Students revealed that implementing learning by investigating a problem became a new learning experience and felt more enjoyable because the investigation was implemented outside the classroom. In addition, students also stated that learning with the GI model assisted by interactive media Lectora Inspire had helped them understand population problems in Indonesia, how to investigate problems correctly and train them to think. At this step, students bring up students to think critically because they dare to express their opinions (Sukmawati & Putra, 2019).

One example of a dark problem topic taken by Group 1 is the Impact of the Perception of Women Not Allowing Higher Education on the Level of Education—implementing investigations or activities to collect data from Group 1, namely interviews with informants. The results of the investigation show that 1) the emergence of the notion that women should not have higher education is due to the thinking of the people who do not understand education, 2) the impact of this assumption can encourage women not to pursue higher education and can reduce education for women and the next generation, and 3) problems can be overcome by providing outreach to the community about the importance of education or by using social media to create content on the importance of education for women. The investigation carried out by group 1 shows that group members have found an answer to one of the dark problems regarding population and its solution.

The step of the GI model assisted by interactive media Lectora Inspires during learning, showing that using models and media influences students' critical thinking. However, the stages of the GI model have a more significant influence on encouraging students to think critically. This is because all stages of the GI model include critical thinking activities according to the indicators. The

first step of the six majorly influencing students' critical thinking is identifying topics. This stage provides experience for students because students in groups are required to think and discuss to determine and decide on dark population problems. Therefore, students become aware that there are still many population problems whose causes and impacts have not been answered. Thus, identifying topics makes students think actively and productive (Mushoddik et al., 2016).

During the learning process, the experimental group differs from the control group. The control group only uses the steps of the scientific approach. In observing, the teacher presents news on population problems through infographic media. The role of students at this stage is to observe the problems that occur in the news. At the questioning step, the teacher divides students into groups and asks each to compose questions related to news on population problems through the student worksheets. At the try and reason step, each group discussed looking for information to answer questions through books or internet sources. The information they find is written on the student worksheets. At the last stage, each group presented the results of their discussion. The activities were almost the same as those of the experimental group, but the actions taken differed—this difference in action resulted in different critical thinking.

The use of the GI learning model assisted by the interactive media Lectora Inspire went well. It was proven to encourage students to think critically, but researchers also faced problems. Problems are encountered when students in groups prepare investigative reports. Some students tend to be more engrossed in chatting, which can affect the concentration of students from other groups because the sitting positions between groups are too close. This is caused by the condition of the experimental group class is not so broad when compared to the control group class. In addition, this problem corresponds to one of the weaknesses of the GI model; namely, the sitting position between one group and another adjacent group allows for a disturbing classroom atmosphere. Thus, the action taken by the teacher is to condition the student to focus on working in the group.

CONCLUSION

The findings in this study are that students have been able to identify and provide solutions to problems that are still unclear regarding the population in Indonesia with the GI model assisted by the interactive media Lectora Inspire. This influence arises because students can recognize the phenomenon of population problems presented in the media, and students in groups can seek information through interviews and analyze population problems that are still relatively dark. The activities carried out during learning make students experience an increase in critical thinking. The comparison of the posttest scores of the experimental group students was also better than that of the control group students. In other words, the GI model assisted by interactive media Lectora Inspire is perfect for use in geography learning to influence students' critical thinking. As an implication, teachers can use this research as a reference for learning using the GI model assisted by interactive media Lectora Inspire to improve critical thinking skills. For future researchers, it can be used as a reference for researching the GI model assisted by interactive media Lectora Inspire with different dependent variables. In addition, the researcher recommends that investigative activities with interviews be carried out with various sources. This makes students gain more diverse insights or knowledge, and the results of investigative analysis become more leveraged.

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