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Article

The Effectiveness of the Socio-Scientific Based CIRC (Cooperative, Integrated, Reading and Composition) Model on Students' Curiosity

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ABSTRACT

One of the characters that must be developed in students is curiosity, namely the desire to know more deeply and broadly about something that is learned, seen or heard. This research aims to determine the effectiveness of the socio-scientific based CIRC model on Students' Curiosity. The CIRC model is cooperative learning that integrates reading and writing activities using a socio-scientific approach which is new to research. This research uses a quasi-experimental quantitative method. The sample consisted of 25 students as the experimental class and 25 students as the control class. Data collection techniques use tests and observation sheets which are analyzed descriptively quantitatively and inferential statistics. The results of the independent sample t-test produce a P-Value of 0.000, if the P-Value <α = 5% (0.05), then H0 is rejected, meaning there is a significant difference between the curiosity of experimental class and control class students. The results of the one tailed t-test produced a P-Value of 0.000 so that H0 was rejected and the estimated value for difference was 10.80, so the curiosity of experimental class students was better than that of the control class. The ANCOVA test shows a significance of 0.000<α=(0.05), meaning that the socio-scientific based CIRC model is declared effective in increasing curiosity. It can be concluded that the curiosity of students who use the socio-scientific based CIRC model is more effective than those who use the socio-scientific based non CIRC model.

INTRODUCTION

The position of education is very important in life because education acts as a bridge to obtain knowledge and insight that will make human resources a high-quality resource in the future. According to Wood in Astalini et al. (2019), Education has the meaning of a process of acquiring and instilling skills carried out by students in order to create quality human beings. The level of education in Indonesia is still in a developing stage. This means that the government continues to strive to update the curriculum, which previously still had many shortcomings compared to the previous curriculum.

The realization of quality and qualified humans is not far from the role of character education. Character education is an important indicator in making a student have good

behavior and noble character. Children's character is formed by the connection between people in a sphere such as family, environment or school. The various kinds of characters inherent in a child become an assessment of the child's family background and environment. The character that a student is born with will later describe the child's attitude in the future. Previously, character education emphasized citizenship and religion subjects. In reality, character education is not enough to obtain from just two subjects. However, character education needs to be emphasized in all subjects. In accordance with the aim of Indonesian education, namely to form a generation that is intelligent and has character (Ainia, 2020).

The task of an educator is not only to teach in class to convey material that has never been learned. The teacher's role is also to educate students to become good individuals. A teacher is someone who has an important role in the progress of learning activities. Especially in forming the character of students, this means being able to develop the potential of students. Creating people with character can be done by integrating character education in every lesson. One of the characteristics that needs to be brought out in students to develop their potential well is the character value of curiosity (Arnone, M. P., Small, R. V, Chauncey, S. A., & Mckenna, 2011). According to Oktavioni (2017), curiosity is an attitude or action that leads to a person's desire to know more deeply and extensively about something they have learned, seen or heard. Someone who is curious usually devotes their attention to certain activities, processes information more deeply, remembers information well, and usually works on tasks until they are finished. (Artinta & Fauziah, 2021).

Students' curious character can be obtained through formal and non-formal education, both in the school environment and the family environment (Weible & Zimmerman, 2016). The way parents can stimulate children's curiosity can be through the experiences they gain so that they can encourage children to ask questions and explain new experiences (Baram-Tsabari, 2015). Apart from that, it is also very important to develop knowledge from educational institutions. According to Rohmawati (2018), the character of curiosity needs to be cultivated in students because this makes it easier for students to understand learning material. If curiosity is not developed in students, then students tend to be passive and do not dare to ask questions or express opinions during the learning process. In contrast to students who are curious, they become critical individuals, daring to express something that they think needs to be expressed. Apart from that, students who are curious tend to seek out their own knowledge from various sources to answer problems that are bothering them. So students who have high curiosity will have more knowledge than students who just wait for an explanation from the teacher.

One way to integrate the values of curiosity can be through learning Natural Sciences. Natural Sciences is one of the mandatory subjects at school level. In accordance with government regulation No. 22 of 2005, "Science education is expected to be used as a vehicle for students to learn about themselves and the natural surroundings, as well as prospects for further development in applying it in everyday life." Science learning has the aim of providing students with the ability to recognize, respond to, and appreciate science and technology as well as instilling habits of thinking and showing scientific attitudes such as curiosity, criticality, honesty, logic, and discipline through learning." So that science itself is used as one of the formal education subjects leading to the 21st century which includes affective, cognitive and social culture (Kang, M. hee, Heo, H., Jo, I. H., Shin, J. & J, 2010).

It should be noted that there is a lot of previous research that discusses the importance of curiosity in science learning, such as research conducted by Shonstrom in Tessa J. P. van Schijndel (2018), namely that curiosity is a person's strength or motivation behind the discovery, exploration, adventure and learning that they do. Another research conducted by Girod and Wong in David et al., (David et al., 2020) said in their research that curiosity plays an important role in science learning as it motivates students to engage with scientific ideas,

increases motivation to learn, and improve the progress of students' thinking power. Curiosity makes students active learners and continues to improve their potential. In line with the opinion of Herwin & Nurhayati (2021) who say that curiosity causes a person to engage in higher level cognitive abilities such as evaluating or creating.

According to Nasution in Suhirman et al. (2021), indicators of curiosity consist of enthusiasm in seeking answers to every question that is not well understood, paying attention to the object being observed, enthusiasm for the science process, and also enthusiasm in carrying out every step of science activities. Another opinion by Raharja et al in Sari et al (2021), to measure curiosity, which is used as an assessment indicator includes information exploration, adventuring with information that has been presented by the teacher, exploring information, and asking questions to the teacher about things that not yet understood. Meanwhile, according to Artinta & Fauziah (2021), curiosity consists of 4 indicators including explorer, discover, adventurous, and questening. However, in research conducted by Fatkul Jannah et al. (2021), there was the addition of one curiosity indicator from research conducted by Sindy Vega Artinta, et al, namely the absorption indicator. So there are 5 indicators of curiosity, namely explorer, discover, adventurous, questening, and absorption.

The problems found from the results of the preliminary study through the curiosity test obtained an average score of 73.6 and there was no equal score obtained for each indicator. Apart from that, facts in the field show that there is a gap in the value of curiosity in science learning, where during the learning process many people do not want to ask questions regarding material they do not yet understand. Apart from that, when the teacher asks questions directly to students, many of the students cannot answer, it seems that students also do not try to read and look for material related to the questions asked by the teacher. So students don't want to ask questions and are interested in answering. It can be seen that students are bored and many of them are not paying attention while learning is taking place. This is one of the factors causing low student curiosity due to the lack of variety in learning models which results in a lack of student activity. In accordance with the opinion of Arianto & Fauziyah (Arianto & Fauziyah, 2020) stated that the lack of variety of learning models used makes students' responses to the learning process less good.

Based on the description above, it is necessary to have an appropriate learning model to increase students' curiosity. If the teacher's attitude in delivering the material is appropriate, then the character of curiosity can also emerge and be formed (Dinkha, 2008). One of the learning models offered to increase curiosity is the socio-scientific based CIRC learning model. The choice of a socio-scientific based CIRC learning model is very suitable for increasing students' curiosity. Because the CIRC model is a cooperative model where learning activities are carried out in groups that integrate reading and writing activities. In other words, this model provides opportunities for students to interact and discuss in groups so that it can increase students' motivation in reading. So that students build their desires through group discussions that emphasize reading and writing activities (Gupta & Ahuja, 2014; Jatmiko et al., 2013). So by discussing it, of course, gives birth to differences of opinion according to each person's point of view. And to solve problems by proving the truth can be done through reading. In accordance with the opinion which states that the CIRC model involves discussion activities as a problem solving effort(Fadhillah, 2018).

The socio-scientific approach is an approach that examines facts, phenomena or events that occur in society that are related to science. Socio-scientific based learning contains important parts, namely building learning around interesting issues, presenting problems first, providing scaffolding for high-level practice (for example argumentation, reasoning, and decision making), and providing high-level experiences to students (Presley et al., 2013). The use of a socio-scientific approach is able to support the CIRC learning model because this approach is open, meaning that each student is given the freedom to argue (Stephen P. Day,

2010; Zeidler et al., 2019). So that group discussion activities can be said to be successful, that is, they can solve problems. So students are trained to be open and ready to accept the opinions of friends who have different views. Its implementation is also very easy and very effective, because it utilizes the environment around students so that it can improve high-level thinking processes, and can increase scientific literacy (Herman et al., 2018; Özden, 2015; Wiyarsi & Çalik, 2019). According to research results that prove scientific literacy can shape students' curiosity (Citra Ningrum et al., 2019). So when making decisions, other ethical and scientific aspects must be considered, namely investigation. Therefore, this approach is very suitable for studying science (Higgins & Moeed, 2017; Kolstø et al., 2006).

METHODS

The method used in this research is a quantitative experiment with a quasi-experimental design where there is a control class but it cannot be used completely to control external variables that influence the experiment (Payadnya & Jayantika, 2018). The location of this research is at MTsN 6 Ponorogo. The sample used was class VIII students consisting of one class as the experimental class and one class as the control class with a total of 25 students in each class selected using cluster sampling. The experimental class was given special treatment, namely using a socio-scientific based CIRC learning model, while the control class used a non-CIRC socio-scientific based learning model. The design used in this research can be seen in Table 1.

Table 1. Research Design Pretest-Posttest Only Control Group Design

Class	Pretest	Treatment	Posttest
Experimen	T_1	X_1	T_2
Control	T_1	X_2	T_2

(Payadnya & Jayantika, 2018)

Description:
X_1 = Treatment with the socioscientific-based CIRC Model
X_2 = Treatment with the Non CIRC Model is socioscientific based
T_1 = P*retest*
T_2 = P*osttest*

Data collection techniques use tests and observation sheets. The observation sheet consists of observations of learning implementation and student activity observation sheets. Meanwhile, the test consists of pretest and posttest questions based on open ended questions with a total of 5 questions in the form of descriptions that are adjusted to the curiosity indicators, namely explorer, discover, adventurous, questioning, and absorption.

Table 2. Indicator of Curiosity

Indicator	Explanations
Explorer	Have enthusiasm in finding answers
Discover	Students focus on the object being studied
Adventurous	Have high enthusiasm for the science process
Questening	Dare to ask the teacher or colleagues about material that students do not understand
Absorbtion	The students have listening, speaking, reading and writing skills

(Jannah et al., 2021)

Giving test questions aims to determine the extent of students' curiosity about the material being taught. The test was given before (pretest) and after (posttest) the socio-scientific based CIRC model treatment. After obtaining the data, it was then analyzed using the t-test, namely independent sample t-test and one tailed. Then continued with the ANCOVA test to determine the effect of using the socio-scientific based CIRC model on students' curiosity. In other words, to see whether there are other variables that influence the variable being tested. Next, an N-Gain test was carried out to find out how much curiosity

increased in the indicators after being given treatment in the form of a socio-scientific based CIRC model.

RESULTS AND DISCUSSION

Based on the data from research that has been carried out, it can be seen that the average value of curiosity for experimental class students is higher than the curiosity of control class students.

Tabel 3. Descriptive Results of Curiosity Data

Test Results	N	Minimum Score	Maximum Score	Mean	Standard Deviation
Experiment Pretest	25	25	60	45	10.4083
Experiment Posttest	25	60	95	75,4	10.198
Control Pretest	25	25	60	37,2	9.58297
Control Posttest	25	50	80	64,6	9.11958

Table 3 shows that the pretest score before using the socio-scientific based CIRC learning model had the lowest score of 25 and the highest score of 60 with an average of 45 and a standard deviation of 10.4083. Meanwhile, the posttest results had the lowest score of 60 and the highest of 95 with an average of 75.4 and a standard deviation of 10.198. In the control class which did not use the socio-scientific based CIRC learning model, the lowest pretest score was 25 and the highest was 60 with an average of 37.2 and a standard deviation of 9.58297. Meanwhile, the posttest results had the lowest score of 50 and the highest of 80 with an average of 64.6 and a standard deviation of 9.11958. The results of the descriptive data can be seen on average pretest, posttest and N-Gain in Figure 1.

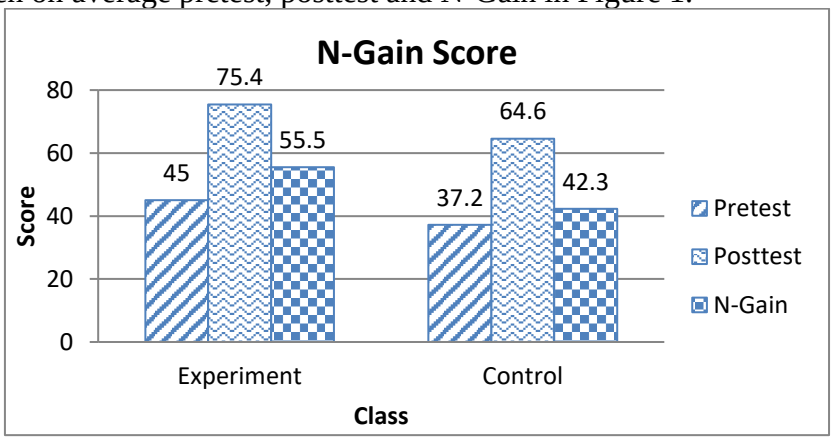

Figure 1. Average Value of Pretest, Posttest, and N-Gain for Experimental and Control Classes

Figure 1 shows that students' curiosity in the experimental class which used the socio-scientific based CIRC model experienced a greater increase compared to students' curiosity in the control class. To find out how much each indicator of student curiosity has increased, consisting of the explorer, discover, adventurous, questioning and absorption indicators after applying the socio-scientific based CIRC model. N-Gain test was carried out on each curiosity indicator. The results of the N-Gain calculation for each curiosity indicator can be seen in Figure 2.

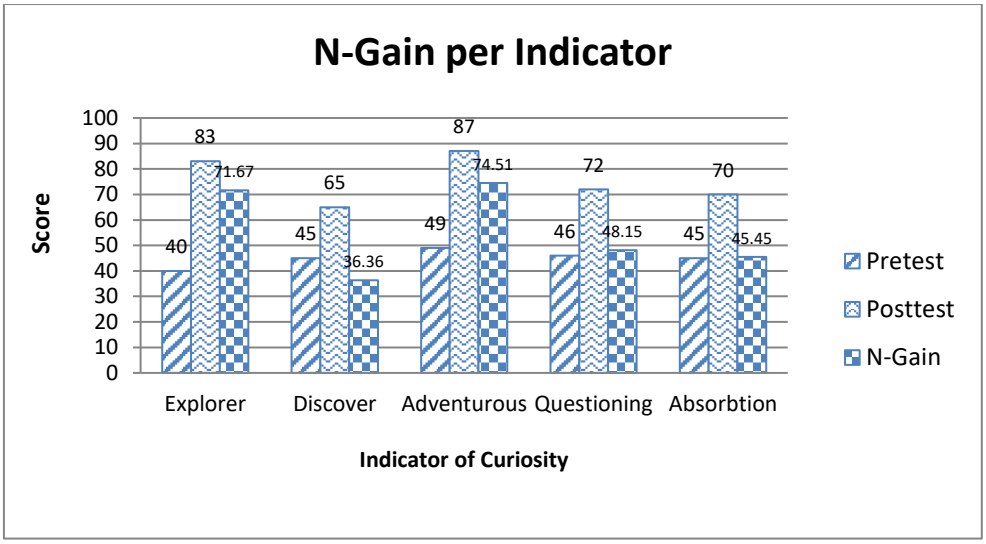

Figure 2. Average Score of Pretest, Posttest, and N-Gain for Experiment Class Students' Curiosity

Curiosity in classes that use the socio-scientific based CIRC model on the explorer indicator is 71.67, the discover indicator is 36.36, the adventurous indicator is 74.51, the questioning indicator is 48.15, and the N-Gain value absorption indicator is obtained is 45.45. The indicator with the highest N-Gain value is the adventurous indicator. In accordance with research conducted by Jannah et al. (2021) which found that the indicator of curiosity that had the highest value was the adventurous indicator. Meanwhile, the lowest N-Gain value is found in the discover indicator. Based on the results obtained from the N-Gain test for each indicator, it can be concluded that students' curiosity increased after implementing the socio-scientific based CIRC model.

Based on the results, the average value of students' curiosity attitude in the experimental class was 75.4 and the control class was 64.6, indicating that the average value of the experimental class was higher than the average value of the control class so that the curiosity of students who used the model socio-scientific based CIRC learning and socio-scientific based non CIRC learning models have differences. From the results of the independent sample t-test, it shows that the significance value is 0.000 <0.05, so H0 is rejected. This shows that there is a difference between students' curiosity in the experimental class and students' curiosity in the control class. After it was discovered that the data from the independent sample t-test results had a significant difference between the experimental and control classes, then a one-tailed t-test was carried out to confirm that there was an influence of the socio-scientific based CIRC model on curiosity. The significance value obtained from the one tailed test was 0.000 < 0.05, so it was proven that students' curiosity in the experimental class using the socio-scientific based CIRC model was better than the control class which used the socio-scientific based non CIRC model. Next, an ANCOVA test was carried out to determine the effect of using the socio-scientific based CIRC model on the curiosity of class VIII students at MTsN 6 Ponorogo. In other words, the ANCOVA test is used to see whether there are other variables that influence it or not. The results obtained show a significance value of 0.000 < 0.05 so that there is an influence of differences in the curiosity scores of students who use the socio-scientific based CIRC learning model and those who do not use the socio-scientific based CIRC learning model. Apart from that, to find out which class has better curiosity, it can be seen from the estimated value for difference of 10.80, which shows that the curiosity of the experimental class is better than the control class.

During the application of the socio-scientific based CIRC learning model, student activities reflect curiosity in the explorer indicator, namely students are enthusiastic about working together to find answers by reading and finding the main ideas from the reading. So that by working together and discussing, groups can find answers or find out what they don't

know so they can learn about the challenges of the outside world. This is related to the socio-scientific approach because it discusses social events or problems that occur in society and are discussed by the wider community and are related to science. Because explorer itself is an indicator of curiosity which is shown by the attitude of students who have high enthusiasm in searching for answers. In accordance with the opinion which states that high curiosity makes students more enthusiastic about learning in order to be fulfilled with new knowledge. Apart from that, curiosity can stimulate students to carry out various activities to find answers to the problems they are facing and arise due to information gaps so that they intend to straighten out these gaps (Artinta & Fauziah, 2021; Fauzi et al., 2017; Tessa J. P. van Schijndel, 2018). Apart from that, implementing the CIRC model carried out in groups certainly creates collaboration between members. This is supported by research which shows a positive relationship between collaboration and students' curiosity, namely through discussion (Skarstein & Skarstein, 2020).

Then the discover indicator is shown by the student's focus on the object that is the problem. It can be seen that students' attention to their friends who are presenting and asking questions or rebuttals is not optimal. So it can be said that it is difficult for students to be conditioned to focus on what is being said by their friends who are presenting. This causes the discover indicator to get the lowest value compared to the others. Curiosity arises as a result of his seriousness in observing an object or event that occurs around him and can occur anywhere as a result of an event that occurs in the school environment or in the general community (Stephen P. Day, 2010). This motivates students to learn more about something they want to know. Thus, the learning process is not only limited to theory, but students can implement theory with the surrounding environment (Topcu et al., 2010). Apart from that, students' curiosity can be demonstrated through exploring more in-depth information so that the information obtained can answer the problems that occur. The more information you obtain, the broader and deeper your knowledge will be. So when students' focus is lacking, information exploration does not go well. Because students don't know what the topic of the problem being discussed is, so the information they get is reduced and students don't understand the material being taught. In accordance with Shonstrom's opinion, curiosity is related to students' motivation behind discovery, exploration, adventure, and also the learning model used, namely the CIRC model (Gottfried et al., 2016).

The adventurous indicator is shown by things that are investigative in nature. In accordance with the opinion that curiosity is a person's strength or motivation behind discovery, exploration, adventure and learning (Nasution, D., Harahap, P. S., & Harahap, 2018). The adventurous indicator is the indicator that has the highest value compared to other indicators in this research. The socio-scientific approach makes the investigation process not too difficult because the object of the problem is real based on events that occurred in the surrounding environment (Borgerding & Dagistan, 2018). A person is motivated to solve a problem when he or she feels that their knowledge is lacking or experiences gaps in the information obtained (Tessa J. P. van Schijndel, 2018). nformation gaps are caused because each individual's thoughts are different and have their own views. This difference is what causes curiosity to arise to seek understanding that is felt to be true and a resolution is needed so that the gap can be straightened out. So the CIRC model is suitable for increasing curiosity because the CIRC model involves discussion activities as a problem solving effort (Fadhillah, 2018; Tor & Gordon, 2020).

The questioning indicator relates to students' courage to ask teachers or friends when there is something they do not understand. Students who have curiosity skills will ask questions at a higher level or level than before in order to solve problems that require logical answers and can solve gaps in their minds. The more weighty the questions asked, shows how deeply they understand the material. Apart from that, students can also be said to have

curiosity when they are actively involved, such as asking questions, providing rebuttals, or criticizing so that students are involved in problem solving (Handoyo, S. S., Iriani, T., & Septiandini, 2019). S Students who have high curiosity will always be actively involved during the learning process to increase their knowledge (Almulla, 2018; Haryanti et al., 2020; Herwin & Nurhayati, 2021). This is different from students who have low curiosity, who tend to be passive in class. The CIRC model can increase student activity in class because in the learning process all students take part in group discussions. In accordance with the advantages of the CIRC model, namely that it can increase student activity in the learning process (Budiani, 2019; Hendi Ristanto et al., 2018). Apart from that, the socio-scientific approach is open, where every student is given the freedom to argue, so students are not afraid when their arguments are wrong (Gresch et al., 2013; Zeidler et al., 2019). Meanwhile, the absorption indicator is curiosity which includes the ability to read, write, listen and express opinions well. Students can be seen working together to read and find the main idea then write the answers on sheets of paper. Meanwhile, the ability to listen and express opinions can be seen when demonstrating the results of group work, students give their opinions to each other in the form of questions, rebuttals, or open criticism, which is an application of the socio-scientific approach, which means that each student is given the same opportunity to argue.

During the learning process, curiosity is shown by students' enthusiasm in searching for and collecting information related to problems. They seemed to be trying to find answers from various sources, including textbooks, worksheet books, and textbooks prepared by researchers. In the learning process, students are given a social problem (socio-scientific issue) that is real and occurs in the community according to the learning material. Thus, it makes students interested in learning more. In accordance with the opinion of Fatkul Jannah et al.(2021) which states that curiosity increases when someone sees a situation or environment that is unique and attracts their attention.

The choice of a socio-scientific based CIRC learning model is very suitable for increasing students' curiosity. Because the CIRC model is a cooperative model where learning activities are carried out in groups that integrate reading and writing activities (Behice, 2016). So by discussing it, of course, gives birth to differences of opinion according to each person's point of view. And to solve problems by proving the truth can be done through reading. In accordance with the opinion of Fadhillah's research (2018) which states that the CIRC model involves discussion activities as a problem solving effort. Meanwhile, the use of a socio-scientific approach examines facts, phenomena or events that occur in society that are related to science. So students are familiar with the issues used in socio-scientific issues because these issues are raised from events that occur in their environment.

Students' curiosity increased after implementing the socio-scientific based CIRC learning model due to several factors. The first factor, the implementation of the CIRC learning model causes students to be enthusiastic in discovering the material themselves. The CIRC model integrates group discussion activities with a focus on reading and writing activities. So as to foster interaction and cooperation between students. Through interaction and collaboration between students during group discussions, individual and group needs can be met that cannot be met alone without interaction between students. The formation of an interaction creates motivation for students to learn from something they don't know yet. Supported by the opinion that the higher the interaction created, the more students' learning motivation will increase (Damayanti et al., 2021). Apart from that, learning using the class discussion method is very effective for transferring knowledge, this is because students are given the freedom to express ideas, ask questions, or provide feedback on the opinions expressed (Cross et al., 2008).

From the description above, it can be seen that there are differences between experimental class and control class students. It can be concluded that classes that use the socio-scientific based CIRC learning model are more effective in increasing the curiosity of class VIII students at MTsN 6 Ponorogo compared to classes that do not use the socio-scientific based CIRC learning model. So it is proven that the use of a socio-scientific based CIRC model can increase curiosity.

CONCLUSION

Based on the results of the research that has been carried out, it can be obtained from the independent sample t-test that there is a significant difference in curiosity between classes that use the socio-scientific based CIRC learning model and those that do not use the socio-scientific based CIRC model. The decision of the one tailed t test can be stated that the curiosity of students in classes that use the socio-scientific based CIRC learning model is better than the curiosity of students in classes that use the socio-scientific based non CIRC model. The ANCOVA test shows that the socio-scientific based CIRC model is considered more effective in increasing curiosity. So it can be concluded that the socio-scientific based CIRC model is able to increase curiosity. The application of this model is able to make students active in the classroom, such as actively asking questions, carrying out the process of investigating a problem. Even though this research can be said to be successful in increasing students' curiosity, the preparation process is not far from shortcomings and errors in the preparation process. So there is great hope for future researchers to optimize their research and make this research a reference source.

REFERENCES

Abudulbouh, M. A. (2016). The Relationship Between The Forms of Family Upbringing and Curiosity: A Study on Primary School Students in Zarqa First Directorate of Education in Jordan. *International Journal of Education and Research*, *4*(1).

Ainia, D. K. (2020). Merdeka Belajar dalam Pandangan Ki Hadjar Dewantara dan Relevansinya bagi Pengembangan Pendidikan Karakter. *Jurnal Filsafat Indonesia*, *3*(3), 95–101.

Almulla, M. (2018). Investigating teachers' perceptions of their own practices to improve students' critical thinking in secondary schools in Saudi Arabia. *International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE)*, *6*(3), 15–27.

Arianto, H., & Fauziyah, H. N. (2020). Students' Response To the Implementation of Case Based Learning (Cbl) Based Hots in Junior High School. *INSECTA: Integrative Science Education and Teaching Activity Journal*, *1*(1), 45. https://doi.org/10.21154/insecta.v1i1.2058

Arnone, M. P., Small, R. V, Chauncey, S. A., & Mckenna, H. P. (2011). Curiosity, Interest and Engagement in Technology-pervasive Learning Environments: A New Research Agenda Marilyn. *Education Tech Research Dev*, 181–198.

Artinta, S. V., & Fauziah, H. N. (2021). Faktor yang Mempengaruhi Rasa Ingin Tahu dan Kemampuan Memecahkan Masalah Siswa pada Mata Pelajaran IPA SMP. *Jurnal Tadris IPA Indonesia*, *1*(2), 210–218. https://doi.org/10.21154/jtii.v1i2.153

Astalini, Kurniawan, D. A., Perdana, R., & Pathoni, H. (2019). Identifikasi Sikap Peserta Didik terhadap Mata Pelajaran Fisika di Sekolah Menengah Atas Negeri 5 Kota Jambi. *Unnes Physics Education Journal*, *8*(1).

Baram-Tsabari, A. (2015). Promoting information seeking and questioning in science. In K. A. Renninger, M. Nieswandt, & S. Hidi (Eds.). *Interest in Mathematics and Science Learning, pp. 15-152*.

Behice, V. (2016). Influence of cooperative integrated reading and composition technique on

foreign students reading and writing skills in Turkish. *Educational Research and Reviews*, *11*(12), 1168–1179. https://doi.org/10.5897/err2016.2744

Borgerding, L. A., & Dagistan, M. (2018). Preservice science teachers' concerns and approaches for teaching socioscientific and controversial issues. *Journal of Science Teacher Education*, *29*(4), 283–306. https://doi.org/10.1080/1046560X.2018.1440860

Brown, B. A., Reveles, J. M., & Kelly, G. J. (2005). Scientific literacy and discursive identity: A theor- etical framework for understanding science learning. *Science Education*, *89*, 779–802. https://doi.org/10. 1002/sce.20069

Budiani, N. A. (2019). Penerapan Model Pembelajaran CIRC (Cooperative Integrated Reading and Composition) untuk Meningkatkan Hasil Belajar PPKn. *Journal of Education Action Research*, *3*(3), 299. https://doi.org/10.23887/jear.v3i3.19475

Cross, D., Taasoobshirazib, G., Hendricksc, S., & Hickey, D. T. (2008). Argumentation: A Strategy for Improving Achievement and Revealing Scientific Identities. *In Tern Atio Nat ,Journ Al of Science Education*, *30*(6), 837—861.

Damayanti, A. P., Yuliejantiningsih, Y., & Maulia, D. (2021). Interaksi Sosial Teman Sebaya Terhadap Motivasi Belajar Siswa. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *5*(2), 163–167.

David, M., Susanti, D., & Kurniasih, R. (2020). Pedagogical Use of Dramatic Performance Through Science Subject for Peace Education in Paraguay. *INSECTA: Integrative Science Education and Teaching Activity Journal*, *1*(2), 110–120. https://doi.org/10.21154/insecta.v1i2.2182

Dinkha, J. (2008). Effects of Character Education on the Self-esteem of Intellectually Able and Less Able Elementary students in Kuwait. *International Journal of Special Education*, *5*(4), 47–59.

Fadhillah, N. (2018). *Penerapan Cooperative Integrated Reading and Compisition (CIRC) dengan Media Gambar terhadap Sikap Ilmiah dan Hasil Belajar Siswa kelas IV MIN 3 Aceh Besar*. Universitas Islam Negeri Ar-Raniry Darussalam-Banda Aceh.

Fauzi, A. R., Zainuddin, Z., & Atok, R. Al. (2017). Penguatan Karakter Rasa Ingin Tahu dan Peduli Sosial melalui Discovery Learning. *Jurnal Teori Dan Praksis Pembelajaran IPS*, *2*(2), 79–88. https://doi.org/10.17977/um022v2i22017p079

Gottfried, A. E., Preston, K. S. J., Gottfried, A. W., Oliver, P. H., Delany, D. E., & Ibrahim, S. M. (2016). Pathways from parental stimulation of children's curiosity to high school science course accomplishments and science career interest and skill. *International Journal of Science Education*, *38*(12), 1972–1995. https://doi.org/10.1080/09500693.2016.1220690

Gresch, H., Hasselhorn, M., & Bögeholz, S. (2013). Training in Decision-making Strategies: An approach to enhance students' competence to deal with socio-scientific issues. *International Journal of Science Education*, *35*(15), 2587–2607. https://doi.org/10.1080/09500693.2011.617789

Gupta, M., & Ahuja, J. (2014). Cooperative Integrated Reading Composition (CIRC): Impact on Reading Comprehension Achievement in English among Seventh Graders. International Journal of Research on Humanities, Arts and Literature (Impact: IJRHAL), ISSN (E): 2321-4564 & ISSN (P): 2347-45. *International Journal of Research on Humanities, Arts and Literature (Impact: IJRHAL), ISSN (E): 2321-4564 & ISSN (P): 2347-4564, Impact Factor (JCC) 1.3648. Google Scholar Citations-06 (Hi-Index)*, *2*, 37–46.

Handoyo, S. S., Iriani, T., & Septiandini, E. (2019). Study of the Analysis on the Characteristics of Learning Style of the Students of the Vocational Education of Building Construction study program, Faculty of Engineering, Jakarta State University. 3rd UNJ. *International Conference on Technical and Vocational Education and*

Training, 339– 348.

Haryanti, N., Wilujeng, I., & Sundari, S. (2020). Problem based learning instruction assisted by e-book to improve mathematical representation ability and curiosity attitudes on optical devices. *Journal of Physics: Conference Series*, *1440*(1). https://doi.org/10.1088/1742-6596/1440/1/012045

Hendi Ristanto, R., Zubaidah, S., Amin, M., & Rohman, F. (2018). The Potential of Cooperative Integrated Reading and Composition in Biology Learning at Higher Education. *International Journal of Educational Research Review*, *3*(2), 50–56. https://doi.org/10.24331/ijere.376727

Herman, B. C., Sadler, T. D., Zeidler, D. L., & Newton, M. H. (2018). *A Socioscientific Issues Approach to Environmental Education*. 145–161. https://doi.org/10.1007/978-3-319-67732-3_11

Herwin, & Nurhayati, R. (2021). Measuring students' curiosity character using confirmatory factor analysis. *European Journal of Educational Research*, *10*(2), 773–783. https://doi.org/10.12973/EU-JER.10.2.773

Higgins, J., & Moeed, A. (2017). Fostering Curiosity in Science Classrooms: Inquiring into Practice Using Cogenerative Dialoguing. *Science Education International*, *28*(3), 190–198.

Jannah, F., Fadly, W., & Aristiawan, A. (2021). Analisis Karakter Rasa Ingin Tahu Siswa pada Tema Struktur dan Fungsi Tumbuhan. *Jurnal Tadris IPA Indonesia*, *1*(1), 1–16.

Jatmiko, A., Maridi, & Ariyanto, J. (2013). Penerapan Model Pembelajaran Kooperatif Tipe Circ (Cooperative Integrated Reading And Composition) Disertai Media Komik Biologi Untuk Meningkatan Minat Belajar Siswa Dalam Pelajaran Biologi Pada Siswa Kelas VII-A SMP Negeri 1 Surakarta Tahun Pelajaran 2. *Pendidikan Biologi*, *5*(1), 15–25.

Kang, M. hee, Heo, H., Jo, I. H., Shin, J., & S., & J. (2010). Developing an Educational Performance Indicator for New Millennium Learners. *Journal of Research on Technology in Education*, *43*(2), 157– 170.

Kolstø, S. D., Bungum, B., Arnesen, E., Isnes, A., Kristensen, T., Mathiassen, K., Mestad, I., Quale, ATonning, A. S. V, & Ulvik, M. (2006). Science Students' Critical Examination of Scientific Information Related to Socioscientific Issues. Science Education. *Science Education*, *90*(4), 632–655.

Nasution, D., Harahap, P. S., & Harahap, M. (2018). Development Instrument's Learning of Physics Through Scientific Inquiry Model Based Batak Culture to Improve Science Process Skill and Student's Curiosity. *Journal of Physics : Conference Series*, *970*(1).

Oktavioni, W. (2017). *Meningkatkan Rasa Ingin Tahu Siswa pada Pembelajaran IPA Melalui Model Discovery Learning di Kelas V SD Negeri 186 / 1 Sridadi*. Universitas Jambi.

Özden, M. (2015). Rospective Elementary School Teachers' Views about Socioscientific Issues: A Concurrent Parallel Design Sstudy. *International Electronic Journal of Elementary Education*, *7*(3), 333–354.

Payadnya, I. P. A. A., & Jayantika, I. G. A. N. T. (2018). *Panduan Penelitian Eksperimen Beserta Analisis Statistik dengan SPSS*. Deepublish.

Presley, M. L., Sickel, A. J., Muslu, N., Merle-Johnson, D., Witzig, S. B., Izci, K., & Sadler, T. D. (2013). A Framework for Socio-scientific Issues Based Education. *Science Educator*, *22*(1), 26–32.

Rohmawati, E. (2018). Hubungan Motivasi Belajar Dan Rasa Ingin Tahu dengan Prestasi Belajar IPS Siswa Kelas V. *Jurnal Pendidikan Guru Sekolah Dasar*, *7*(1).

Sari, E. N., Fauziah, H. N., Muna, I. A., & Anwar, M. K. (2021). Efektivitas Model Pembelajaran Scramble dengan Pendekatan Socio-Scientific terhadap Rasa Ingin Tahu

Peserta Didik. *Jurnal Tadris IPA Indonesia*, *1*(3), 354–363. https://doi.org/10.21154/jtii.v1i3.177

Skarstein, T. H., & Skarstein, F. (2020). Curious children and knowledgeable adults–early childhood student-teachers' species identification skills and their views on the importance of species knowledge. *International Journal of Science Education*, *42*(2), 310–328. https://doi.org/10.1080/09500693.2019.1710782

Stephen P. Day, T. G. K. B. (2010). Does the discussion of socio-scientific issues require a paradigm shift in science teachers' thinking? *International Journal of Science Education*, *pp,1*.

Suhirman, S., Prayogi, S., & Asy'ari, M. (2021). Problem-Based Learning with Character-Emphasis and Naturalist Intelligence: Examining Students Critical Thinking and Curiosity. *International Journal of Instruction*, *14*(2), 217–232. https://doi.org/10.29333/iji.2021.14213a

Tessa J. P. van Schijndel, B. R. J. J. & M. E. J. R. (2018). Do individual differences in children's curiosity relate to their inquiry-based learning? *International Journal of Science Education*, *40*(9), 996–1015. https://doi.org/10.1016/j.dr.2012.04.002

Topcu, M. S., Sadler, T. D., & Yilmaz-Tuzun, O. (2010). Preservice Science Teachers' Informal Reasoning About Socioscientific Issues: The Influence of Issue Context. *IJSE: International Journal of Science Education*, *32*(18), 2475–2495. https://doi.org/10.1080/09500690903524779

Tor, N., & Gordon, G. (2020). Digital interactive quantitative curiosity assessment tool: Questions worlds. *International Journal of Information and Education Technology*, *10*(8), 614–621. https://doi.org/10.18178/ijiet.2020.10.8.1433

Weible, J. ., & Zimmerman, H. . (2016). Science Curiosity in Learning Environments: Developing an Attitudinal Scale for Research in Schools, Homes, Museums, and the Community. *International Journal of Science Education*, *38*(8), 1235–1255.

Wiyarsi, A., & Çalik, M. (2019). Revisiting the Scientific Habits of Mind cale for Socio-scientific Issues in the Indonesian Context. *International Journal of Science Education*, *41*(17), 2430–2447.

Zeidler, D. L., Herman, B. C., & Sadler, T. D. (2019). New directions in socioscientific issues research. *Disciplinary and Interdisciplinary Science Education Research*, *1*(1), 1–9. https://doi.org/10.1186/s43031-019-0008-7