EXPLORATION OF THE CHARACTER OF COOPERATION IN PHYSICS

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Abstract :
This study aims to be able to identify how the character of student cooperation through indicators of good listeners and respect for others. This type of research is a mix method type of explanatory approach, while the research instrument uses questionnaires and interviews, data analysis uses descriptive tests and descriptions. The sampling technique used purposive sampling. The results of the study showed students on the mutually encouraging aspect of the cooperation character indicator Junior High School 16 Muaro Jambi with a percentage of 70% in the good category, Junior High School 18 Kerinci with a percentage of 66% in the good category, Valmiera Secondary School with a percentage of 45% in the very good category, and Valmiera Viesturs secondary school percentage is 54% very good category. Furthermore, students in the aspect of helping each other from the indicator of the character of cooperation Junior High School 16 Muaro Jambi with a percentage of 46% in the very good category, Junior High School 18 Kerinci with a percentage of 75.5% in the good category, Valmiera Secondary School with a percentage of 79.1% in the good category, and Valmiera viesturs secondary school percentage of 54% very good category.

Keywords: Argumentation; Character; Help each other

INTRODUCTION

The 22nd century physics education is an educational approach that focuses on mastering the concepts and applications of physics that are relevant to modern times. The 22nd century physics education integrates technological developments and new discoveries in physics (Ansori et al., 2023; Dabukke et al., 2021; Kurniawan, Putri, et al., 2023). The 22nd century physics education aims to equip students with the required knowledge, skills and understanding (Aziz, 2021; Halimah et al., 2023; Nissa et al., 2023; Ridwan et al., 2020). This is also to face the challenges of physics and technology in the future, as well as to encourage awareness of the social, environmental and ethical impacts in the use of physics knowledge.

Science education in Indonesia refers to education that focuses on learning science and mathematics (Astalini et al., 2023; Kamid et al., 2022). Science education in Indonesia focuses on

developing students' knowledge and skills in natural sciences (Sinaga, 2022; Qoidah et al., 2021). At the intermediate level, students study more in-depth concepts in physics, chemistry, biology (Anggraini & Perdana, 2019), and other natural sciences. students also develop practical skills in observing, measuring, and conducting scientific experiments.

Science education in Latvia refers to an education system that emphasizes natural sciences, mathematics and technology (Lamanauskas et al., 2017). Secondary education in Latvia consists of two stages: general secondary education and professional secondary education (Lavonen et al., 2008). In general secondary education, students can choose courses that focus on natural sciences, mathematics, or the humanities. Students interested in science subjects can choose courses with an emphasis on the natural sciences and mathematics.

Science learning in rural areas can be more related to the environment around students. Teachers can take advantage of natural resources around the village (Agustini, 2020; Putri et al., 2022). Schools in rural areas may face limited resources, such as limited laboratory or library facilities (Mutia et al., 2018; Putri, 2021). This can affect the presentation of material and practicum in science learning. Teachers need to use student creativity in finding alternative solutions, such as using simple materials that are easily found around students (Handayani* & Jumadi, 2021).

Cooperation is one of the most important things in education on temperature and heat. By working together, students can help each other and share their understanding of temperature and heat (Yolanda & Andriani, 2011). Collaboration allows students to learn collaboratively (Dewi & Trikusumaadi, 2017; Rukiyati et al., 2015). Therefore in order to achieve successful learning of temperature and heat material, it is important to encourage and support cooperation between students.

Based on the explanation that has been explained above, the researcher is interested in conducting research on junior high school students with the title "Description of the character of cooperation through indicators of good listening and respect for others". learning science material temperature and heat.

RESEARCH METHOD

This type of research uses mixed method research, where mixed method research is a research method that involves collecting quantitative and qualitative data (Hadju et al., 2022; Masrizal, 2011). This study uses the Explanatory type of approach, this type uses a quantitative approach as an initial stage to examine the relationship between certain variables broadly, and then uses qualitative data to explain the results found. (Sari et al., 2022). Qualitative data is used to gain a deeper understanding of the context and mechanisms underlying the relationships found.

Sampling is a technique used by researchers to systematically select a relatively smaller number of items or individuals from a predetermined population (Hasyim Ali Imran, 2017). The sampling technique is using purposive sampling, purposive sampling technique is one of the sampling methods used in research (Maharani & Bernard, 2018). The main purpose of this technique is to select samples that specifically represent certain characteristics or objectives to be studied in research (Etikan, 2016). The criteria for this research sample are students at Junior High School who have or are currently studying physics or science regarding temperature and heat. so that the research sample was obtained as in table 1 below.

Table 1. Research Sample

No	School Many	students
1	Valmiera Secondary School	48 students
2	Valmiera viesturs secondary school	50 students
3	Junior High School 16 Muaro Jambi	50 students
4	Junior High School 18 Kerinci	45 students

The data collection instrument for this researcher's quantitative data used a cooperation character questionnaire sheet. This instrument uses a Likert scale, a scale consisting of 5 points with a score range of 5 very good, 4 good, 3 good enough, 2 not good, and 1 very bad. Each statement

represents each indicator of the character of cooperation, the questionnaire sheet instrument grid used in this study can be seen in table 2.

Table 2. Indicators of the character of cooperation

No	Indicator	Aspect	No. Statement
1	Dare to excel in front of the class	Give	
2	Dare to argue, ask/answer questions	encouragement	
3	Opinion / do activities without hesitation	to others	
4	Say thank you after receiving the help of others		1-15
5	Use polite language when arguing		
6	Use polite language when criticizing friends		
7	Show gratitude		
8	Help others in need	Helping each	
9	Don't cheat on assignments	other	
10	Report information as it is		1-15
11	Admit mistake		
	Number of statements		30

After students fill out all the statements in the collaboration character questionnaire, then the data will be arranged in the form of categories. The categories of cooperation characters can be seen in Table 3.

Table 3. Categories of cooperation characters

Intervals	Category
15 – 27	Not Very Good
28 – 40	Not Good
41 – 53	Enough
54 – 65	Good
66 – 77	Very Good

Research can be carried out using a collaboration character questionnaire sheet and interviews with students. After the data is obtained and collected, data analysis is carried out to obtain results and draw conclusions. The procedure in this study follows the diagram in Figure 1.
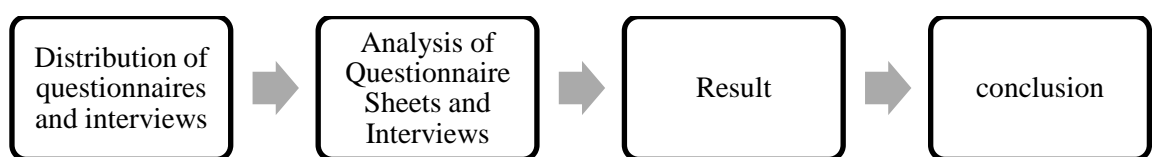

Figure 1. Research procedure

In this study, quantitative data were obtained from student questionnaires and multiple-choice questionnaires, then qualitative data were obtained from student interviews. Then for quantitative data analysis using descriptive statistics (Nasution, 2017). Descriptive statistics are statistics that have the task of organizing and analyzing data, numbers, in order to provide an orderly, concise, and clear description of a phenomenon, event or situation, so that certain meanings or meanings can be drawn. (Sholikhah, 2016).

The descriptive statistics used include the mean which is the average of a data set (Martias, 2021). In descriptive also calculates the median value, the median is the middle value in a data set that has been sorted ascending or descending (Candra et al., 2015). Furthermore, there is also a percentage, a percentage is a number that shows the portion or ratio of a value to the total (Sholikhah, 2016). Percentages are often used to present frequency in a more understandable context, where frequency is the number of observations or a particular occurrence in a data set.

RESULTS AND DISCUSSION

The research results that have been obtained and have been analyzed using statistical science. Data analysis using descriptive statistics. The results of descriptive statistics for the aspect of giving encouragement from the variable indicator of cooperation at Junior High School 16 Muaro Jambi and Junior High School 18 Kerinci can be seen in table 4.

Table 4. The descriptive results of the aspect of giving encouragement to students from the cooperation indicator at Junior High School 16 Muaro Jambi and Junior High School 18 Kerinci

School	Characteristics of Intervals	Category	F	mean	median	Min	maks	%
Junior High School 16 Muaro Jambi	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	0					0%
	41 – 53	Enough	5	61.61	60.0	41.0	75.0	10%
	54 – 65	Good	35					70%
	66 – 77	Very Good	10					20%
Junior High School 18 Kerinci	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	4					8.8%
	41 – 53	Enough	3	63.33	62.0	30.0	75.0	6.6%
	54 – 65	Good	30					66%
	66 – 77	Very Good	8					17%

Table 4 shows that students in the aspect of giving encouragement from the dominant cooperation indicator are in the good category with a percentage of 70% at Junior High School 16 Muaro Jambi, and in the good category with a percentage of 66% at Junior High School 18 Kerinci. Furthermore, the descriptive aspects of giving encouragement from the cooperation indicators at Valmiera Secondary School and Valmiera Viesturs Secondary School can be seen in table 5.

Table 5. Descriptive results of aspects of giving encouragement from indicators of cooperation at Valmiera Secondary School and Valmiera Viesturs Secondary School

School	Characteristics of Intervals	Category	F	mean	median	min	maks	%
Valmiera Secondary School	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	2					4.1%
	41 – 53	Enough	4	67.38	66.5	35.0	75.0	8.3%
	54 – 65	Good	13					27%
	66 – 77	Very Good	22					45.8%
Valmiera viesturs secondary school	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	0					0%
	41 – 53	Enough	6	69.2	68.0	42.0	75.0	12%
	54 – 65	Good	17					34%
	66 – 77	Very Good	27					54%

Table 5 shows that students in the aspect of giving encouragement from the dominant cooperation indicator are in the very good category with a percentage of 45.8% at Valmiera Secondary School, and in the very good category with a percentage of 54% at Valmiera Viesturs Secondary School. Furthermore, the results of the descriptive analysis for the mutual assistance aspect of the cooperation indicator at Junior High School 16 Muaro Jambi and Junior High School 18 Kerinci can be seen in table 6.

Table 6. Descriptive results for the mutual assistance aspect of cooperation indicators at Junior High School 16 Muaro Jambi and Junior High School 18 Kerinci

School	Characteristics of Intervals	Category	F	mean	median	min	maks	%
Junior High School 16 Muaro Jambi	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	0					0%
	41 – 53	Enough	9	66.79	65.5	41.0	75.0	18%
	54 – 65	Good	18					36%
	66 – 77	Very Good	23					46%
Junior High School 18 Kerinci	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	0					0%
	41 – 53	Enough	0	63.58	62.0	54.0	75.0	0%
	54 – 65	Good	34					75.5%
	66 – 77	Very Good	11					24.5%

Table 6 shows that students on the mutual assistance aspect of the cooperation indicator are dominant in the very good category with a percentage of 46% at Junior High School 16 Muaro Jambi, and at Junior High School 18 Kerinci dominant in the good category with a percentage of 75%. Furthermore, the descriptive aspects of mutual assistance from the cooperation indicators at Valmiera Secondary School and Valmiera Viesturs Secondary School can be seen in table 7.

Table 7. Descriptive results of aspects of mutual assistance from cooperation indicators at Valmiera Secondary School and Valmiera Viesturs Secondary School

School	Characteristics of Intervals	Category	F	mean	median	min	maks	%
Valmiera Secondary School	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	0					0%
	41 – 53	Enough	0	69.17	68.5	54.0	75.0	0%
	54 – 65	Good	38					79.1%
	66 – 77	Very Good	10					20.8%
Valmiera viesturs secondary school	15 – 27	Not Very Good	0					0%
	28 – 40	Not Good	0					0%
	41 – 53	Enough	3	66.72	65.0	43.0	75.0	6%
	54 – 65	Good	20					40%
	66 – 77	Very Good	27					54%

Table 7 shows students in the mutual assistance aspect of the cooperation indicator dominant in the good category with a percentage of 79.1% at Valmiera Secondary School, and dominant in the very good category with a percentage of 54% at Valmiera Viesturs Secondary School.

The results of interviews with Junior High School students in Indonesia are in accordance with aspects of the cooperative character indicator, these students explained that during presentation activities in front of the class students tended to be reluctant in expressing their opinions. This is because students are afraid of being laughed at by their friends if something goes wrong. Students say that when doing assignments students often do it together and in groups to get good results. Some students always thank their friends who have helped them. Students always behave politely and politely to the teacher when doing learning.

Based on the results of interviews with Junior High School students in Latvia according to the indicators of the character of cooperation, it can be seen that the students explained that during the presentation activities they did the presentations well. During discussion activities in class students are lacking in giving their opinions or students tend to be passive. Furthermore, in doing school work

students work together and help each other if their friends ask for help. Students ask for help in polite language, and always say thank you.

The result data were processed using descriptive statistics to see the mean, media, frequency, and percentage by analyzing the results based on the existing categories. Descriptive test results obtained in table 4 description of the aspect of giving encouragement to the cooperation indicator obtained by Junior High School 16 Muaro Jambi with a percentage of 70% in the good category while Junior High School 18 Kerinci with a percentage of 66% in the good category. So it was concluded that Junior High School 16 Muaro Jambj was superior to Junior High School 18 Kerinci in the aspect of mutually encouraging cooperation indicators. Based on table 6, a description of the mutual assistance aspect of the cooperation indicator for Junior High School 16 Muaro Jambi with a percentage of 46% in the very good category and Junior High School 18 Kerinci with a percentage of 75.5% in the good category. So it was concluded that Junior High School 16 Muaro Jambi was superior to Junior High School 18 Kerinci in the aspect of mutual assistance from the cooperation indicator.

Based on the results of the descriptive test, it was obtained from table 5 that the description of the aspect of giving encouragement to the cooperation indicator was obtained by Valmiera Secondary School with a percentage of 45% in the very good category while Valmiera Viesturs Secondary School with a percentage of 54% in the very good category. So it can be concluded that Valmiera Viesturs Secondary School is superior to Valmiera Secondary School in the aspect of mutually encouraging cooperation indicators. Based on table 6, the description of the aspects of mutual assistance from the cooperation indicator of the Valmiera Econdary School with a percentage of 79.1% in the good category, from Valmiera Viesturs Secondary School, a percentage of 54% in the very good category. So it is concluded that Valmiera Viesturs Secondary School is superior to Valmiera Secondary School in the aspect of mutual assistance from the cooperation indicator.

Students on the mutually encouraging aspect of the cooperative character indicator have an impact. Students who encourage each other in cooperation can provide motivation and encouragement to each other (Mandala & Pujiati, 2020). In the context of students in Indonesia, the mutually encouraging aspect of this cooperation indicator has a significant impact, Suherman et al. (2019) explained because students can optimally build the nation and character of Indonesia. Likewise in Lutvia's country Students who encourage each other can complement each other and accelerate their learning progress (Jermolaveja et al., 2021).

Students on the mutual assistance spec of the cooperation indicator had a significant impact. Students who are involved in helping each other with the character of cooperation tend to be more involved in the learning process (Carstensen et al., 2021). Mutual assistance between students in Indonesia has a positive impact, being able to share knowledge, experience, and skills (Setiawan et al., 2022). Mutual assistance between students in Latvia also has a positive impact, both for students who provide assistance and for students who receive assistance. When students help each other, students learn to work together, communicate, and build good relationships with others (Surikova & Pīgozne, 2018). This can help students develop skills that are important in everyday life.

Cooperation is an important aspect in learning Natural Sciences (IPA). Science involves exploration, observation, and experimentation which requires cooperation between students (Chowdhury, 2016). Good cooperation between students to achieve the process and results of group efforts in doing assignments (Tanner et al., 2003). This collaborative activity focuses on encouraging students to support the sharing of information and resources (Abdunabievic et al., 2022). In addition, supporting an inclusive and respectful classroom atmosphere is also important to facilitate the character of cooperation between students.

CONCLUSION

An analysis of 25 article reviews explains the important factors in cultivating the character of Caring for the Environment in high school level students. By caring for the environment students can recognize the types of waste according to their group. There are several schools that are still low on environmental care for students. This is because teachers, principals and parents do not participate in implementing environmental care. The impact caused by students besides making students comfortable learning also helps students get used to living a healthy and clean life.

Exploration of the Character ... (Marcis Aizinsh, et al) pp:139-147

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