Volume 8 Number 2, August 2023, pp. 245-252
P-ISSN:2477-7935
E-ISSN: 2548-6225
DOI: 10.59052/edufisika.v8i2.27828

THE RELATIONSHIP BETWEEN STUDENT DEMOCRATIC CHARACTERS AND THE PROBLEM SOLVING LEARNING MODEL

Yash Gurbani[1], Ahmad Mansur Nawahdani[2,*], Miftahul Zannah Azzahra[3]

[1]Heidelberg University, Heidelberg, Germany
[2,3]Science Education, Universitas Jambi, Jambi, Indonesia
Corresponding author email: ahmadmansurnawahdani@gmail.com

Article Info
Recieved: 15 Aug 2023
Revised: 22 Aug 2023
Accepted: 10 Sep 2023
OnlineVersion: 10 Sep 2023

Abstract :
Democratic character is very important for students to have, one of the efforts to improve students' democratic character is to apply a problem-solving learning model. This study aims to answer the research question, namely how is the relationship between democratic character variables and solving learning models in high school students in Jambi and Heidelberg in physics subjects. The method used in this research is a mixture of quantitative and qualitative methods. The results of the study are the correlation test which states that the relationship with the data results is less than 0.05, which means that there is a relationship between the two variables. The conclusion from this study is that there is a relationship between students' democratic character and students' problem-solving learning models. The novelty of this study is at the same time a differentiator from previous research, namely testing whether there is a relationship between students' democratic character and problem-solving learning models. The limitation of this research is that it only describes the democratic character based on the school, but it has not been carried out based on gender in each school. Researchers suggest conducting further research to compare the characteristics of democracy and problem-solving models with an analysis based on gender.

Keywords: Democratic Character, Physics, Problem-Solving

INTRODUCTION

The problem solving learning model is a learning model that focuses on teaching and problem solving skills followed by strengthening the skills themselves. Some of the advantages of the problem solving learning model are that it makes students appreciate learning based on everyday life more (Ariyanto et al., 2018). Train and familiarize students to face and solve problems skillfully. Can develop students' thinking skills creatively. Students have started to be trained to solve problems from school (before entering real life). Train students to design an invention. So it can be concluded that the problem solver learning model is very effective and important in learning (Castro, 2023).

In essence, learning physics is an ideal way to acquire abilities in the form of skills, maintain attitudes, and gain a better understanding of concepts related to everyday experiences. These skills,

attitudes and concepts cannot be separated from one another(Astalini et al., 2018; Syahrial et al., 2020). Basically learning physics aims to master a product in the form of a collection of laws, theories, principles, rules, and formulas that are built through concepts according to the research process. The product of science, especially physics, is a collection of knowledge in the form of facts, concepts, principles, laws and theories about natural phenomena. Physics learning is essentially a physics learning process, which emphasizes physics as a product, as a process, and as an attitude (Astalini et al., 2022). Physics as a product is a collection of knowledge in the form of facts, concepts, principles, laws, and theories about natural phenomena. This physical material must be obtained by students through physics classes. By mastering physics, students are expected to be able to understand and apply science, solve problems, and develop science and technology.

Teachers not only educate students academically, but also have an important task in shaping their personality. This supports the fact that education not only shapes intellectual generations, but also personality and personality with the hope that it will happen in the future. The next generation is born who grow and develop with characters that breathe the noble values of the state and religion. Character education is urgently needed by Indonesia at this time to overcome the country's moral decline and multifaceted crisis (Nursakinah et al., 2022; Yathasya et al., 2022). Democratic is a way of thinking, behaving, and acting that values the rights and obligations of himself and others (Asrial et al., 2020; Lailah & Tenri, 2018). A democratic attitude can also be said as a person's view of life to prioritize equal rights and equal obligations for all citizens. Democracy is an idea, action or action that respects the rights and obligations of oneself and others (Jama, 2023). A democratic attitude can also be described as a way of life for those who prioritize equal rights and equal obligations for all citizens.

The problem solving learning model is a learning model that focuses on teaching and skills in solving problems followed by strengthening the skills themselves (Putri & Simbolon, 2022). Some of the advantages of the problem solving learning model are that it makes students more appreciative of learning based on everyday life (Ariyanto et al., 2018; Wibowo et al., 2021). Train and accustom students to face and solve problems skillfully. Can develop students' thinking skills creatively. Students have started to be trained to solve problems from school (before entering real life). Train students to design an invention. So it can be concluded that the problem solving learning model is very effective in learning.

This research is in line with previous research conducted by (Lailah & Tenri, 2018) which examined democratic character in student learning. This research is also in line with previous research conducted by (Ariyanto et al., 2018)regarding the problem solving learning model. The novelty of this study is at the same time a differentiator from previous research, namely testing whether there is a relationship between students' democratic character and problem solving learning models.

The importance of this research is very important, namely to find out the relationship between democratic character variables and problem-solving models in physics subjects at the high school level so that they can be used as learning for students, teachers and schools. In this study, the variables used are democratic character variables and problem-solving models. However, this research has a weakness, namely only conducting tests at the level not at the gender level to find out more specifically the democratic character and problem-solving models based on gender, namely female students and male students. This study aims to find out the results of student descriptive statistics on the variable democratic character and problem-solving models in high school physics subjects, and to find out whether there is a relationship between democratic character and problem-solving models in high school physics subjects.

RESEARCH METHOD

This study used a mix method research with an explanatory design. Mix method research is research that combines quantitative research methods and qualitative research methods (Kamid, Rohati, et al., 2021). Explanatory design can be carried out with several stages of research, namely starting from collecting data, analyzing data and formulating quantitative analysis results, then continuing with data collection, analyzing and formulating qualitative data, and ending with interpreting the results of the research.

The instrument in this study used 2 types of instruments, namely observation sheets. The observation sheets used consisted of democratic character sheets and problem solving model sheets.

As well as interviews conducted with students. There are 22 valid statement items on this democratic character variable instrument using a Likert scale. The scale consists of 4 points with a very appropriate score of 4 very bad, 3 not good, 2 good, 1 very good. Each statement is representative of each parent communication indicator. There are 10 valid statement items on the democratic character variable. There are 12 valid statement items on the problem solving model variable.

The description of the lattice instrument observation sheet for democratic characters and problem solving models in physics subjects is as follows:

Table 1. Description of democratic characters and problem-solving models in physics subjects

Variable	Statement Item Number
Democratic character	1,2,3,4, 5,6,7,8,9,10
Problem-solving models	11,12,13,14,15,16,17,18,19,20,21,22

Because the observation sheets on democratic character variables and problem solving models in physics subjects in high schools use a Likert scale consisting of 4 categories, there are intervals in each category, and the intervals in each category can be seen in table 2.

The description of the category of student discipline characters in physics subjects is as follows:

Table 2. Categories of democratic character communication and problem solving models in physics subjects

Category	Interval	
	Democratic character	Problem-solving models
Very not good	10.0 - 17.5	12.0 – 21.0
Not good	17.6 - 25.0	21.1 – 29.0
Good	25.1 - 32.5	39.1 – 38.0
Very good	32.6 - 40.0	38.1 – 48.0

The population and sample of the research is research that is investigated with the characteristics and other things that will be needed in a study (Kamid, Sofnidar, et al., 2021). The population in this study were 50 high school students in Jambi and Heidelberg. The sampling technique is total sampling. The subjects taken were grade 10 consisting of 25 high school students in Jambi and 25 high school students in Heidelberg. The reason for taking this subject is because at the senior high school level at the 10th grade level it is very effective to see democratic character variables and problem solving models in these students (Ernawati et al., 2021).

The data analysis technique used is random sampling. The use of random sampling in this study saves time, money and effort, and also allows for more precise and thorough research results, because all data from Senior High Schoolller research objects will be easier to analyze in detail (Amin et al., 2021).

In collecting data, the first activity that must be carried out is to select students based on the categories provided by the researcher, then provide observation sheets and interviews about democratic character and student problem solving models. This observation sheet is addressed to students at senior high school in Jambi and senior high school in Heidelberg, namely 50 students who are the subjects of this study, which aims to determine the relationship between democratic character and problem-models. Then the observation sheet data is processed using the SPSS application. The use of the SPSS application serves to view descriptive statistics, in the form of mean, min, max, percentage, and student categories(Amin et al., 2021). The results were tested using SPSS by carrying out three tests, namely descriptive statistical tests, assumption tests, and hypothesis testing. In the assumption test two tests are carried out, namely the normality test and the linearity test. The normality test functions to determine whether the data being tested has a normal distribution. The linearity test serves to see whether the data is linearly distributed or not (Budiarti et al., 2022). Then test the hypothesis in the form of a correlation test. Correlation test to determine the relationship between democratic character variables and problem solving models. These tests were then tested using SPSS 26 to obtain accurate results. The following is the research procedure.

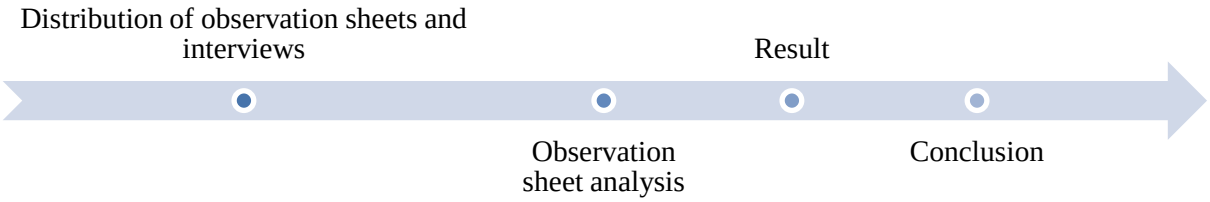

Figure 1. Research procedure

RESULTS AND DISCUSSION

The following describes the results of descriptive statistics on the variable democratic character and the problem-solving model. Where are the results obtained from the distribution of observation sheets and interviews at senior high school in Jambi and senior high school in Heidelberg. Descriptions of student democratic character variables in physics are shown in the following table.

Table 3. Description of students' democratic character variables in physics subjects

Class	Category	Interval	F	%	Mean	Med	Min	Max
High School in Jambi	Very not good	10.0 - 17.5	0	0	3.5	3.0	2.0	4.0
	Not good	17.6 - 25.0	5	20				
	Good	25.1 - 32.5	13	52				
	Very good	32.6 - 40.0	7	28				
High School in Heidelberg	Very not good	10.0 - 17.5	3	12	3.3	3.0	1.0	4.0
	Not good	17.6 - 25.0	7	28				
	Good	25.1 - 32.5	12	48				
	Very good	32.6 - 40.0	3	12				

Based on table 3 above, it can be seen that in high schools in Jambi the dominant students are in the good category with a percentage of 52%, while in high schools in Heidelberg the dominant students are in the good category with a percentage of 48%. So it can be concluded that the democratic character of students in physics subjects in high schools in Jambi is higher than in high schools in Heidelberg.

The description of the problem-solving model variables is shown in the following table.

Table 4. Description of the problem solving model variables

Class	Category	Interval	F	%	Mean	Med	Min	Max
High School in Jambi	Very not good	12.0 – 21.0	3	12	3.6	3.0	1.0	4.0
	Not good	21.1 – 29.0	7	28				
	Good	39.1 – 38.0	10	40				
	Very good	38.1 – 48.0	5	20				
High School in Heidelberg	Very not good	12.0 – 21.0	5	20	3.3	3.0	1.0	4.0
	Not good	21.1 – 29.0	8	32				
	Good	39.1 – 38.0	9	36				
	Very good	38.1 – 48.0	2	8				

Based on table 4 above, it can be seen that in high schools in Jambi the dominant students are in the good category with a percentage of 40%, while in high schools in Heidelberg the dominant students are in the good category with a percentage of 36%. So it can be concluded that the problem solving model in high school in Jambi is higher than in high school in Heidelberg.

Democratic character normality tests and student problem solving models are described in the following table:

Table 5. Democratic character normality test and student problem solving models

Class	Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
High School in Jambi	Democratic character	.0345	25	.200	.477	25	.496
High School in Heidelberg	problem-solving models	.0342	25	.200	.457	25	.483

Based on the results of the table above, it can be concluded that the data is normally distributed. The normality test was obtained by the Kolmogorov-Smoirnov test, a significance value of > 0.05.

Democratic character linearity tests and problem-solving models are described in the following table:

Table 6. Uji linearitas karakter demokratis dan model problem solving

Class	Variabel	N	Sig.
High School in Jambi	Democratic character	25	0.33
High School in Heidelberg	problem-solving models	25	0.32

Based on the table above, it can be concluded that the linearity test for the variables above has a linear relationship between High School in Jambi and High School in Heidelberg. It is proven that the sig result is less than 0.05.

Democratic character correlation tests and problem-solving models are described in the following table:

Table 7. Democratic character correlation test and problem-solving model

Class	Variable	N	Sig.
High School in Jambi	Democratic character	25	0.45
High School in Heidelberg	problem-solving models	25	0.44

Based on the table above it can be concluded that there is a comparison between High School in Heidelberg and High School in Jambi. It is evident from the results of sig. (2-tailed) is Senior High Schoolller than 0.05.

Results of Interviews with Teachers

In interviews with teachers at senior high school in Jambi and senior high school in Heidelberg regarding what learning model is appropriate that teachers teach students so that students can improve students' democratic character. The teacher says that the right learning model is a problem-based learning model, namely the problem-solving learning model. Where this learning model greatly improves students' ability to solve problems in physics subjects. However, there are a number of problems, one of which is the limited time in learning physics at the two high schools.

Discussion

The resulting data is processed using three types of tests, namely descriptive statistical tests, assumption tests, and hypothesis tests. Descriptive statistical test to see the results of the percentage, median, mean, minimum, and maximum by analyzing the results data based on several existing categories (Kamid, Rohati, et al., 2021). Based on table 3, the average number of students chooses the good category with a percentage for senior high school in Jambi 52% and senior high school in Heidelberg 48% with a good category. So, it can be concluded that senior high school in Jambi is superior to senior high school in Heidelberg in the variable of democratic character. Based on table 4, the average number of students chooses the good category with a percentage for senior high school in Jambi 40% and senior high school in Heidelberg 36% with a good category. So, it can be concluded that senior high school in Jambi is superior to senior high school in Heidelberg in the problem-solving model variable.

The next test is the assumption test which consists of a normality test and a linearity test. Test the first assumption analysis about the normality test. The normality test was carried out to find out

whether the data is normally distributed or not by looking at the Kolmogorov Smirnov results greater than 0.05(Amin et al., 2021). Based on table 5, the results of the normality test for disciplinary character and students' understanding of concepts, namely at senior high school in Jambi, namely 0.200 and at senior high school in Heidelberg, namely 0.200, it can be concluded that the results obtained are > 0.05 so that it can be said that the data is normally distributed. Based on table 6, the results of the linearity test for the character of discipline and students' understanding of concepts, namely at senior high school in Jambi, namely 0.033 at senior high school in Heidelberg, namely 0.032, can be concluded that the results obtained are > 0.05 so that it can be said that the data is distributed linearly.

Furthermore, the hypothesis test is carried out, namely the correlation test. The correlation test was carried out with the aim of knowing the relationship between the two schools with the relationship between the two variables by looking at the Kolmogorov Smirnov results greater than 0.05 (Kamid, Syaiful, et al., 2021). Based on table 7, the results of the correlation test of students' scientific attitudes and literacy were at senior high school in Jambi, namely 0.045 and at senior high school in Heidelberg, namely 0.044, so it can be concluded that there is a relationship between senior high school in Jambi and senior high school in Heidelberg. It is proven by the results of sig. Senior High Schoollller than 0.05.

This research is in line with previous research conducted by (Lailah & Tenri, 2018) which examines the democratic character of student learning. in this study said that the democratic character of students is very important for students to have. in line with this research because this research also says that the democratic character of students is also very important for students, especially students at the senior high school level. However, previous research did not carry out several tests as was done in this study. So, this research is more accurate because it does three types of testing.

This research is also in line with previous research conducted by Ariyanto et al., (2018) about the problem solving learning model. in this study said that the problem-solving learning model. In line with this research because the problem-solving learning model applied by the teacher in learning for students is very important. However, previous research did not compare the two classes as was done in this study to see whether the problem-solving learning model was appropriately applied to students.

The short-term impact of this research is that it is useful for students, teachers and schools in improving the democratic character of students in senior high schools for the better. The long-term impact of this research is that it can be used as a source or benchmark in making scientific articles and further research. The limitation of this research is that it only describes the democratic character based on the school, but it has not been carried out based on gender in each school. Researchers suggest conducting further research to compare the characteristics of democracy and problem-solving models with an analysis based on gender.

CONCLUSION

Based on the formulation of the problem in the research, it can be concluded that senior high school in Jambi has a democratic character and a problem-solving model that is superior to senior high school in Heidelberg. There is a relationship between the character of discipline and students' understanding of concepts at senior high school in Jambi and senior high school in Heidelberg in physics subjects. The researcher suggests conducting research by examining the variables of the character of discipline and students' understanding of concepts with other variables such as the character of student cooperation. Researchers suggest conducting research at the high school level.

ACKNOWLEDGMENTS

The researcher would like to thank those who contributed and supported this research.

REFERENCES

Amin, A., Alimni, Azzahra, M. Z., & Septi, S. E. (2021). Associative and Comparative Study on Students' Perseverance and Religious in Islamic Education Subject. *Pendidikan Progresif, 11*(3), 676–691. https://doi.org/10.23960/jpp.v11.i3

Amin, A., Kurniawan, D. A., Azzahra, M. Z., & Septi, S. E. (2021). Parental Communication Increases Student Learning Motivation in Elementary Schools. *International Journal of Elementary Education*, *5*(4), 622–630. https://doi.org/10.23887/ijee.v5i4.39910

Amin, A., Kurniawan, D. A., Septi, S. E., & Zannah, M. (2021). The Study of Differences and Influences of Teacher Communication and Discipline Characters of Students. *Jurnal Ilmiah Sekolah Dasar*, *5*(4), 622–630. https://doi.org/10.23887/jisd.v5i4.39546

Ariyanto, M., Kristin, F., & Anugraheni, I. (2018). Penerapan Model Pembelajaran Problem Solving untuk Meningkatkan Kemampuan Berpikir Kritis dan Hasil Belajar Siswa. *Jurnal Guru Kita*, *2*(3), 106–115. https://jurnal.unimed.ac.id/2012/index.php/jgkp/article/view/10392/9331

Asrial, Syahrial, Maison, Kurniawan, D. A., Novianti, U., & Parhati, L. N. (2020). Local account analysis that can be integrated into the basic IPS competence in class VI basic school. *Journal of Educational and Social Research*, *10*(5), 66–74. https://doi.org/10.36941/JESR-2020-0088

Astalini, A., Kurniawan, D. A., & Sumaryanti, S. (2018). Sikap Siswa Terhadap Pelajaran Fisika di SENIOR HIGH SCHOOLN Kabupaten Batanghari. *JIPF (Jurnal Ilmu Pendidikan Fisika)*, *3*(2), 59. https://doi.org/10.26737/jipf.v3i2.694

stalini, Darmaji, Kurniawan, D. A., Jaya, H., & Husna, S. M. (2022). Analysis of Teacher Responses to the Use of Web-based Assessment to Assess Students' Attitudes towards Science Subjects. *Integrated Science Education Journal*, *3*(3), 66–71. https://doi.org/10.37251/isej.v3i3.282

Budiarti, R. S., Kurniawan, D. A., Septi, S. E., & Perdana, R. (2022). Differences and Relationship Between Attitudes and Self Efficacy of Female and Male Students in Science Subjects in Junior High School. *Jurnal Pendidikan Sains Indonesia*, *10*(1), 73–88. https://doi.org/10.24815/jpsi.v10i1.21979

Castro, E. A. M. (2023). Analysis of Problem Solving Ability of First Middle School Students in Learning Science. *Integrated Science Education Journal*, *4*(2), 43–53. https://doi.org/10.37251/isej.v4i2.329

Ernawati, M. D., Asrial, Perdana, R., Septi, S. E., & Rahmi. (2021). Evaluation of Students' Attitudes and Science Process Skills toward Middle School Science Subject in Indonesia. *Jurnal Pendidikan Progresif*, *1*(2), 258–274. https://doi.org/10.23960/jpp.v1

Jama, I. A. (2023). The Effect of School Leadship on Student's Academic Achievement: Case Study Bosaso Secondary Schools in Puntland. *Journal Evaluation in Education (JEE)*, *4*(1), 36–39. https://doi.org/10.37251/jee.v4i1.291

Kamid, Rohati, Rahmalisa, Y., Anggo, M., Septi, S. E., Azzahra, M. Z., & Nawahdani, A. M. (2021). Engklek Game " in mathematics : How difference and relationship student attitude towards science process skills ? *Cypriot Journal of Educational Sciences*, *16*(6), 3109–3123. https://doi.org/https://doi.org/10.18844/cjes.v16i6.6500

Kamid, Sofnidar, Septi, S. E., & Citra, Y. D. (2021). The contribution of the traditional game of congklak to mathematics learning: How is the relationship and influence of interest, cooperative character and student responses. *Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran*, *11*(2), 280–295. https://doi.org/10.25273/pe.v11i2.9995

Kamid, Syaiful, Theis, R., Septi, S. E., & Widodo, R. I. (2021). Traditional " Congklak " Games and Cooperative Character in Mathematics Larning. *Jurnal Ilmiah Sekolah Dasar*, *5*(3), 443–451. https://doi.org/http://dx.doi.org/10.23887/jisd.v5i3.37740

Lailah, N., & Tenri, O. (2018). Strategi Guru dalam Pembentukan Karakter Siswa di SENIOR HIGH SCHOOL Negeri 1 Bissappu Kabupaten Bantaeng. *Jurnal Sosialisasi Pendidikan Sosiologi-FIS UNM*, *3*(2), 136–142. http://ojs.unm.ac.id/sosialisasi/article/view/2376

Nursakinah, Histuti, L., Silvia, N., & Sinambela, P. (2022). Identifikasi Sikap Toleransi Antar Umat Beragama di Lingkungan Sekolah Dasar. *Journal of Basic Education Research*, *3*(3), 80–85. https://doi.org/10.37251/jber.v3i3.266

Putri, M. A., & Simbolon, P. A. . (2022). Model Pembelajaran Problem Solving Dan Korelasinya Terhadap Kemampuan Berpikir Kritis Siswa. *Journal Evaluation in Education (JEE)*, *3*(3), 87–91. https://doi.org/10.37251/jee.v3i3.263

Syahrial, Asrial, Maison, Mukminin, A., & Kurniawan, D. A. (2020). Ethnoconstructivism analysis: Study of pedagogic mathematics competence of primary school teachers. *International Journal*

of Evaluation and Research in Education, *9*(3), 614–624. https://doi.org/10.11591/ijere.v9i3.20256

Wibowo, F. C., Sanjaya, L. A., Susanti, D., Robby, D. K., Darman, D. R., Brata, W. W. W., Kurniawan, D. A., Aditya, F. P., Ilham, A., Bahtiar, I. R., Adhima, F., Shiddiqy, A. R. A., Widiatmoko, S., & Samsudin, A. (2021). (ISO) Media for improving learning quality using analysis RapidMiner. *AIP Conference Proceedings*, *2320*(March). https://doi.org/10.1063/5.0037556

Yathasya, D., Romadonia, M., Ningsih, I., & Zulkhi, M. D. (2022). Perbandingan Karakter Cinta Tanah Air dan Cinta Damai dalam Pembelajaran IPS. *Journal of Basic Education Research*, *3*(3), 86–90. https://doi.org/10.37251/jber.v3i3.270