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Implementation of RODE Learning Model: Improving Science Learning Outcomes of Junior High School

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Abstract: This study aimed to determine the improvement of science learning outcomes by applying the RODE learning model. The subjects in this study were 19 students in the eighth grade of SMPN 3 Karang Intan in the even semester of the 2022/2023 academic year. Three observers assessed the RODE model implemented by the science teacher in her class on hydrostatics pressure material in the first cycle and Archimedes' law material in the second cycle. The Four pretest-posttest questions calculated the students' science learning outcomes. The success criterion of this study was that ≥ 75% of the research subjects obtained a score of ≥70. The data analysis used mode scores on observation data and pretest-posttest results for each cycle. According to the data analysis results, Teachers can apply the RODE learning model very well, with the mode score increasing from 3 in the first cycle to 4 in the second. 100% of students' science learning outcomes increased, with a mode score of 5 becoming 70 in the first cycle and a mode score of 30 becoming 100 in the second. Thus, the RODE learning model enhanced the science learning outcomes of eighth-grade students of SMPN 3 Karang Intan.

Keywords: Mode score; Student learning outcomes: RODE learning model

Introduction

Physics is a branch of science that studies natural phenomena related to matter, energy, and their interactions. Learning Science Physics in Junior High School aims to provide a fundamental understanding of physics principles, develop various skills, and prepare students for higher education. Physics is a teaching material with material characteristics that teach conceptual knowledge and procedural skills (Kusuma et al., 2020). Understanding concepts, practical abilities, and developing students' skills result from learning Natural Sciences (Science) Physics in Junior High School (SMP). The student learning outcomes gauge the effectiveness of the learning activities that teachers carry out. Learning outcomes in the form of numbers or scores after being given a test are used as a measure of student success in understanding or knowing a teaching material. There are five criteria for assessing learning outcomes, namely 81%-100% solid, 61%-80% strong, 41%-60% sufficient, 21%- 40 weak, and < 20% very weak. Other criteria for the success of the learning process are 76%-99% Very Good, 60%-75% Good, <60% Less. Based on these learning outcome assessment criteria, a student can be successful if he obtains a score of 75; in other words, mastering 75% of the teaching material taught by the teacher (Kinasih & Mariana, 2021; Rahmatiah, 2023). Researchers discovered that over 75% of students with physics learning outcomes scores less than 60 received remedial instruction to enhance their learning outcomes. This information stems from the experience of teaching physics in the previous year. Preliminary test results in this study showed that 95% of students scored below 70. The reality that the researchers found was coherent with other researchers who stated the low learning outcomes of physics, namely 85% of students still scored below minimum completeness criteria, and physics became one of the subjects that students did not like (Keller et al., 2017; Khusna, 2021; Kinasih &

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Mariana, 2021; Rahmatiah, 2023). A few reasons why physics learning outcomes are low are that the majority of students do not actively participate in their education, that students find physics to be a complicated subject, that students find physics to be uninteresting, and that students have low interest and motivation in the subject (Harjati, 2023; Khusna, 2021; Nurfa & Nana, 2020; Rahmatiah, 2023; Sudiartha, 2022). This condition requires teachers to improve the quality of results and the physics learning process. One way that teachers can reflect on the teaching process is through classroom action research.

Classroom action research needs to be carried out by teachers to conduct systematic studies in planning, implementing, and evaluating teaching practices in the classroom. Implementing PTK allows teachers to develop professional competencies, increase teachers' understanding of teaching materials, and identify and use innovative learning methods to achieve good learning outcomes more effectively. Teachers may enhance the quality of their instruction and provide more engaging and pertinent content by using PTK to gather data on student participation in the learning process and reactions to previous instruction. That will help students attain higher learning objectives. Thus, teachers can create a more exciting and interactive learning experience and environment in the learning process. The learning environment is another essential factor in the foundation of successful education in Indonesia. Students who feel at home in high school score one point higher than students who do not feel at home in school (Khusna, 2021; Pusat Penilaian Pendidikan, 2018).

In this study, researchers reflected on teaching physics on hydrostatic pressure teaching materials and Archimedes' law. Hydrostatic pressure material requires students to understand the basic principle of the influence of depth on hydrostatic pressure. Similarly, in the material of Archimedes' law, students are required to understand the basic principle of buoyancy force proportional to the weight of the fluid displaced by a submerged object. In addition to developing measurement skills, both materials also require students to be able to measure hydrostatic pressure and calculate buoyancy forces (Serway & Jewett, 2019; Young & Freedman, 2012). Thus, hydrostatic pressure teaching materials and Archimedes' laws have the characteristics of teaching materials that teach conceptual knowledge and procedural skills. Both materials in this study also require problem-solving, collaboration, and communication skills, as well as critical thinking skills that students need to train.

Teachers need to choose and use innovative learning models to improve the quality of physics learning in the classroom. Among several innovative learning models, the RODE learning model stands out as one of the newly created learning models as an innovative learning model for teaching science topics. The RODE learning model is a learning model that has been reported as valid, practical, and effective as an innovative learning model and provides recommendations for trials at the secondary school level in science (physics) learning (Kusuma et al., 2020, 2022a, 2022b, 2023). With the focus of the RODE learning model on practicing communication skills in teaching and learning activities, students are actively involved in the exchange of information and ideas that encourage the formation of knowledge and understanding of the teaching material learned by students and have an impact on the learning outcomes that will attain (Kanyesigye et al., 2022; Kusuma et al., 2020; Suryani, 2022).

The advantages of the RODE model claim that it is easy to apply, makes students more active in learning, and effectively makes teaching materials more accessible to understand at a high level, making researchers interested in conducting tests on junior high school students according to research recommendations. The results of this study will be new findings in applying the RODE learning model in physics learning at the middle school level. Based on the description above, researchers are interested in conducting classroom action research to prove whether applying the RODE learning model can improve student learning outcomes on hydrostatic pressure material and Archimedes' law in grade VIII SMPN 3 Karang Intan.

Method

Classroom action research is a reflective activity carried out by teachers to improve the quality of the teaching process in the classroom by selecting and implementing innovative teaching strategies based on weaknesses and shortcomings felt by teachers in previous teaching (Afdalia & Asmawati, 2022; Gore et al., 2017; Sudiarta, 2019). Using the RODE learning models, four sessions in the even semester of the 2022–2023 academic year have taken place with 20 students in grade VIII SMPN 3 Karang Intan, discussing hydrostatic pressure teaching materials and Archimedes' law. The first cycle involves teaching resources on hydrostatic pressure, while the second focuses on teaching materials on Archimedes' law. *Classroom Action Research* design of Kemmis and McTaggart adapted to the steps in conducting action research in the classroom, including planning, action and observation, and reflection (Djajadi & Rauf, 2020; Medriati & Risdianto, 2020; Saleh, 2022; Sudiartha, 2022; Suryani, 2022). The flow of stages for each cycle is shown in Figure 1.

Figure 1. Classroom action research scheme (modifications of Kemmis & Taggart design)

The corrective action teachers in this study take is to choose and apply the RODE learning model by adapting the steps of classroom action research, as shown in Figure 1. Simply put, Table 1 lists the tasks the teacher completed during every phase of their classroom action study.

At the planning stage, researchers discussed with collaborators in preparing lesson plans that applied the RODE learning model for the first cycle by considering the initial test results and documentation of physics learning outcomes in the previous year. Researchers also compiled test instruments for learning outcomes, physics, matter, hydrostatic pressure, Archimedes' law, and learning observation sheet instruments. Researchers received an explanation of how to carry out physics learning by applying the RODE learning model from collaborators who designed and developed the RODE learning model. Furthermore, the researcher asked three colleagues to become observers in the implementation of learning to conduct and explained the role of observers when observing and assessing the implementation of learning by scoring on learning observation sheet instruments. After completing the lesson plan, pretest and posttest questions, and learning observation sheets, the researcher gave the materials to three observers to utilize in their classroom action study.

Table 1. Summary of the Description of the Classroom Action Research Activity

Cycle	Activity Description	
	Teachers	Observer
First		
Planning	1. Compiling lesson plan with RODE learning model for hydrostatic pressure matter 2. Compiling Pretest Instruments and Posttests of hydrostatic pressure matter 3. Compiling First Cycle Learning Observation Sheet Instruments	1. Provide advice and suggestions to researchers in compiling research instruments 2. Receive explanations from researchers related to learning observations and filling in assessment scores on learning observation sheet instruments
Action and Observation	1. Provide pretest questions with hydrostatic pressure material to students 2. Coordinate with observers regarding the implementation of learning observations to be carried out 3. Carry out physics learning with the RODE learning model on hydrostatic pressure teaching materials 4. Provides posttest with hydrostatic pressure matter	1. Observe the learning process carried out by researchers 2. Give scores to learning observation sheet instruments
Reflection	1. Make data analysis of the first cycle pretest and posttest results 2. Analyse learning observation data 3. Discuss learning outcomes and assessment of First cycle learning observations with observers and collaborators 4. Make conclusions First cycle findings and decisions proceed to Second cycle	1. Provide suggestions to researchers regarding implementing learning with the RODE learning model based on the results of observer observations
Second		
Plan	1. Develop lesson plan by taking into account the results of the First cycle reflection, suggestions and solutions from observers and collaborators 2. Drafting Pretest and Posttest Instruments for Archimedes' legal material 3. Compiling Learning Observation Sheet Instruments	1. Provide advice and suggestion to researchers in compiling research instruments
Action and	1. Provide pretest questions with Archimedes law material to	1. Observe the learning process carried

Cycle	Activity Description Teachers	Observer
Observation	students 2. Coordinate with observers regarding the implementation of learning observations to be carried out 3. Carry out physics learning with the RODE learning model on Archimedes' law teaching materials 4. Provide a posttest with Archimedes' law material	out by researchers 2. Give scores to learning observation sheet instruments
Reflection	1. Make data analysis of the results of the second cycle pretest and posttest 2. Analyse learning observation data 3. Discuss learning outcomes and assessment of observations of Second cycle learning with observers and collaborators 4. Make conclusions of classroom action research that has been carried out in two cycles	1. Provide advice and suggestions to researchers related to the implementation of learning with the RODE learning model based on the results of observations in the second cycle

Research instruments are tools for obtaining research data. In this study, the instruments used were learning outcomes tests on hydrostatic pressure material and Archimedes' law and learning observation sheets. Students were given a pretest and posttest to determine the improvement in learning outcomes (Salar & Turgut, 2021; Suryani, 2022). The study is designed in two cycles, each in two meetings. Each cycle has a pretest at the start of the first meeting and a posttest after the second meeting. Data on student learning outcomes are analyzed using score mode and then descriptively concluded qualitatively. Implementing the RODE learning model is said to be successful if the number of students who obtain a score of ≥70 amounts to ≥75%. Determining the mode of student learning outcome scores and percentage calculations is carried out computationally using formulas in the Microsoft Office ECXEL 2021 application.

Three observers observed the implementation of actions, namely physics learning, by applying the RODE learning model and assessing the learning process by giving scores 1-4 on the observation sheet instrument. The observation data was analyzed using the mode score analysis of the three observers for each aspect assessed and then classified with criteria as in Table 2.

Table 2. Criteria for Observation Results of RODE Model Application (Kusuma et al., 2022b)

Score Interval	Criterion
3.25 < p < 4.00	Excellent
2.50 < p < 3.24	Good
1.75 < p < 2.49	Bad
P ≤ 1.74	Very bad

Result and Discussion

Before applying the RODE learning model in physics learning, researchers provide a pretest for hydrostatic pressure material at the beginning of the First cycle, then carry out learning by applying the RODE learning model and giving a posttest at the end. Likewise, in the second cycle, researchers provide a pretest for Archimedes' law material at the beginning of the second cycle, carry out learning by applying the RODE learning model, and provide a posttest at the end..

The four stages of the RODE learning model are Read, Outline, Discussion, and Evaluation. Documentation of teaching activities carried out by teachers by applying the RODE learning model is shown in Figures 2 – 5 below.

Figure 2. Read phase

Figure 2 shows that students have been in groups, read student worksheets, paid attention to the teacher's explanation of the learning objectives, and collaborated in working groups to find materials and learning resources.

Figure 3. Outline phase

Figure 3 shows that students take part in completing student worksheets, discussing data analysis, and making presentations of group work.

Figure 4. Discussion phase

During the discussion phase, students fell into presenter and audience groups, which helped them to exchange information, ideas, and understanding in classical discussion. The presenter group was allowed to present the results of completing student worksheets in group work in class discussions. Students can ask, answer questions, convey, and respond to other students' ideas. At the end of the phase, the teacher explains and corrects if there is a misconception during the classical discussion.

Figure 5. Evaluation phase

In the evaluation phase, students are allowed to make and deliver conclusions about the subject matter with teacher guidance, assess the presentation of the presenter group, provide input on the learning process, and heed the teacher's instructions on the topic taught at the upcoming meeting.

Table 3 summarizes the learning activities utilizing the RODE learning model for the First and Second cycles.

Table 3. RODE Model Learning Activities First Cycle and Second Cycle

Syntax RODE Learning Model	Teacher Activities	Student Activities
First Cycle		
Read	1. Teachers convey learning objectives and motivate students to be actively involved in learning 2. The teacher distributes students-worksheet hydrostatic pressure material 3. Teachers form student working groups of 3-4 people per group 4. Teachers give direction and facilitate students to read and explore sources and learning materials of hydrostatic pressure material	1. Listen and pay attention to the explanation of learning objectives delivered by the teacher 2. Receiving and reading students-worksheet hydrostatic pressure material 3. Incorporate into a workgroup 4. Collaborate in working groups and find materials and learning resources for hydrostatic pressure materials
Outline	1. Teachers guide and facilitate discussion and distribution of tasks in working groups 2. Facilitate and guide working groups to complete the students-worksheet hydrostatic pressure material 3. Guide working groups to make group presentations	1. Take part in task completion in workgroups 2. Find and write down hydrostatic pressure experiment data according to students-worksheet hydrostatic pressure material 3. Make data analysis and discuss in working groups 4. Create a presentation based on the results of a working group discussion
Discussion	1. Explain the rules of the class discussion game	1. Understand and obey the rules of the class discussion delivered by the teacher

Syntax RODE Learning Model	Teacher Activities	Student Activities
	2. Facilitate class discussions 3. Guiding students to be respectful during class discussions 4. Facilitate the delivery of responses, questions, rebuttals from presenter groups and audiences 5. Guiding students (audience) in assessing presenter group presentations 6. Check students' understanding of hydrostatic pressure	2. One of the students representing the working group presented the results of their respective group work in front of the class in turn 3. The audience group pay attention to presenter, provides questions and / or responses to the work of the presenter group 4. One member of the presenter group provides answers and/or responses to audience group questions 5. Provide assessments to the presenter group according to the rules of the game explained by the teacher 6. Ask the teacher a part of the hydrostatic pressure material that is not yet understood 7. Paying attention to the teacher's explanation of hydrostatic pressure
Evaluation	1. Guiding students to conclude learning hydrostatic pressure material 2. Guiding students to respond to presentations and learning processes that have been carried out 3. Reward the group of presenters who get the highest score based on audience ratings 4. Deliver the subject matter topic for the next meeting 5. Closing the lesson with prayers and greetings	1. Summing up hydrostatic pressure material according to teacher's guidance 2. Responding to the learning process carried out 3. Also give rewards in the form of applause to the working group that achieves the highest assessment score from the audience assessment 4. Pay attention to the teacher's explanation of the subject matter at the next meeting 5. Participate in prayer sessions and answer greetings from teachers
Second Cycle		
Read	1. Teachers convey learning objectives and motivate students to be actively involved in learning 2. Teacher distributes students-worksheet Archimedes law's material 3. Teachers form student working groups of 3-4 people per group 4. The teacher directs and facilitates students to read and explore the sources and learning materials of Archimedes' law material	1. Listen and pay attention to the explanation of learning objectives delivered by the teacher 2. Receiving and reading students-worksheet Archimedes law's material 3. Incorporate into a workgroup 4. Collaborate in working groups and find materials and learning resources for Archimedes' legal materials
Outline	1. Teachers guide and facilitate discussion and distribution of tasks in working groups 2. Facilitate and guide working groups to complete the students-worksheet Archimedes law's material 3. Guiding working groups to make group presentationsk	1. Take part in task completion in workgroups 2. Find and write down data on Archimedes' law experiment according to the students-worksheet Archimedes law's material 3. Make data analysis and discuss in working groups 4. Create a presentation based on the results of a working group discussion
Discussion	1. Explain the rules of the game and facilitate class discussion 2. Guiding students to be respectful during class discussions 3. Facilitate the delivery of responses, questions, rebuttals from presenter groups and audiences 4. Guiding students (audience) in assessing presenter group presentations 5. Check students' understanding of Archimedes' law	1. Understand and obey the rules of the class discussion delivered by the teacher 2. One of the students representing the working group presented the results of their respective group work in front of the class in turn 3. The audience group provides questions and / or responses to the work of the presenter group 4. One member of the presenter group provides answers and/or responses to audience group questions

Syntax RODE Learning Model	Teacher Activities	Student Activities
		5. Provide assessments to the presenter group according to the rules of the game explained by the teacher 6. Ask the teacher what part of Archimedes' law material is not yet understood 7. Pay attention to the teacher's explanation of Archimedes' law
Evaluation	1. Guiding students to conclude learning Archimedes' law material 2. Guiding students to respond to presentations and learning processes that have been carried out 3. Reward the group of presenters who get the highest score based on audience ratings 4. Deliver the subject matter topic for the next meeting 5. Closing the lesson with prayers and greetings	1. Summing up hydrostatic pressure material according to teacher's guidance 2. Responding to the learning process carried out 3. Also give rewards in the form of applause to the working group that achieves the highest assessment score from the audience assessment 4. Pay attention to the teacher's explanation of the subject matter at the next meeting 5. Participate in prayer sessions and answer greetings from teachers

Learning in the first and second cycles by applying the RODE learning model was observed and assessed by three observers, with a summary of observational data presented in Table 4.

Table 4. Summary of Learning Process Observation Mode Score

Learning Activities	First cycle	Second cycle
Introductory Activities		
Read Phase	3	4
Outline Phase	3	4
Core Activities		
Outline Phase	3	4
Discussion Phase	3	4
Final Activities		
Evaluation Phase	3	4

The analysis of observational data showed that the three observers assessed that the teacher had carried out learning using the RODE model well, with a mode score of 4 for each phase of the learning model in both cycles of classroom action research carried out in this study. In the first cycle, the observer scored mode 3 for the implementation of learning by applying the RODE model. Based on these results, teachers have practically carried out learning with the RODE learning model. As stated by Pujani et al. (2019), through discussions with researchers, model teachers, and observers, teachers have been able to overcome the obstacles encountered in the first cycle and understand how to carry out each phase of the RODE learning model very well in teaching hydrostatic pressure material and Archimedes' law; students are actively involved in learning activities and information exchange that encourage the formation of student knowledge and understanding of the subject matter. This condition aligns with the findings that the RODE learning model is practical to be applied in science (physics) learning (Kusuma et al., 2022b).

Teachers have well implemented the four phases of the RODE learning model. Referring to Table 4, in the first cycle, the teacher obtained a mode three score, and in the second cycle obtained a mode four score in carrying out learning with the RODE learning model. Some notes of obstacles faced and resolved by teachers are that in the outline phase of *the* first cycle, students still need to pay attention to the student worksheets given to guide hydrostatic pressure experiment activities. However, with the guidance and direction of the teacher, students refocus on completing the task by working together in groups according to the student worksheets given. Students will learn more actively, share ideas and information, and comprehend the material more readily if teachers support them as they work on student worksheets (Blajvaz et al., 2022; Djajadi & Rauf, 2020). During the discussion phase, students still struggle with shyness and reluctance to go center stage and share the outcomes of their group projects, but they also overcome limited audience engagement. The teacher handles both of these things by providing motivation and appropriate guidance, and students become active in giving questions, answering questions, and giving responses so that during the discussion phase, there is an exchange of information and ideas between students, which, in the end, students gain knowledge and understanding of hydrostatic pressure and Archimedes' law. In the evaluation phase, students are not used to conveying understanding or conclusions from the material studied. However, the teacher has given direction in making conclusions by asking students to connect the conclusion sentences that the teacher conveys and then asking students to repeat the conclusion sentences together.

The obstacles encountered by teachers in the first cycle have been overcome well and become a concern in the second cycle by minimizing obstacles in learning, as stated by Winarti (2021), namely controlling students who are less solid in group work, motivating students to continue to learn to develop knowledge and dare to express opinions, providing guidance as long as students seek solutions to the problems given. So that in the second cycle, the RODE learning model can be implemented more smoothly in teaching Archimedes' law material. Thus, the RODE learning model can be applied practically well without obstacles teachers cannot overcome. Time management and teacher-selected instructional priorities may enhance the quality of learning that can overcome the low learning outcomes of students (Kanyesigye et al., 2022; Kwarikunda et al., 2020).

Student learning outcomes measure the success of the learning process carried out by teachers. Learning outcomes with high scores indicate a successful learning process and low learning outcomes indicate the learning process is unsuccessful and has not achieved learning objectives (Rahmatiah, 2023; Ramadhanti et al., 2022). In addition to two questions on hydrostatic matter, students also received two questions on Archimedes' law. Figure 6 shows the students' answer fields when given a pretest in the first cycle, and Figure 7 shows students' answers when given a post-test in the second cycle.

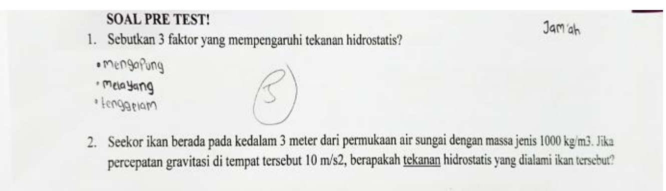
SOAL PRE TEST!
Jam'ah
1. Sebutkan 3 faktor yang mempengaruhi tekanan hidrostatis?
• mengapung
• melayang
• tenggelam
(5)
2. Seekor ikan berada pada kedalam 3 meter dari permukaan air sungai dengan massa jenis 1000 kg/m3. Jika percepatan gravitasi di tempat tersebut 10 m/s2, berapakah tekanan hidrostatis yang dialami ikan tersebut?

Figure 6. The pretest students' responses received the lowest scores in the first cycles

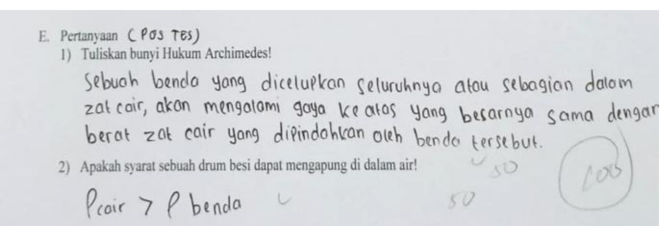
E. Pertanyaan (Pos tes)
1) Tuliskan bunyi Hukum Archimedes!
Sebuah benda yang dicelupkan seluruhnya atau sebagian dalam zat cair, akan mengalami gaya ke atas yang besarnya sama dengan berat zat cair yang dipindahkan oleh benda tersebut.
2) Apakah syarat sebuah drum besi dapat mengapung di dalam air! 50 (100)
$\rho_{cair} > \rho_{benda}$ 50

Figure 7. The post-test students' responses received the highest scores in the second cycles

The pretest and posttest findings showed what the study's learning objectives were. Following the completion of both cycles, student learning outcomes are determined. Table 5 presents a summary of the pretest and posttest results.

Table 5. Pretest-Posttest Mode Score Summary

	First Cycle		Second Cycle	
	Pretest	Posttest	Pretest	Posttest
Mode Score	5	70	30	100
Percentage N≥70	5 %	100 %	5 %	100 %
Percentage N<70	95 %	0	95 %	0

Table 5 shows that in the first cycle, there was an increase in the learning outcome mode score from 5 to 70, and in the second cycle, the student learning outcomes increased from a mode score of 30 to 100. The results of data analysis of learning outcomes in Table 5 show that in teaching physics subjects, applying the RODE learning model can improve student learning outcomes on hydrostatic pressure material and Archimedes' law. Posttest analysis showed that 95% of students had achieved a score of ≥ 70 with a mode of 70 in the first cycle and a score of 100 mode in the second cycle. The high percentage of students who obtained a score of ≥ 70 after applying the RODE learning model shows that students are motivated, understand the teaching material optimally, are actively involved in learning, and the learning carried out by the teacher can be said to be successful. The exam results that students receive after learning indicate whether they have learned at least 75% of the subject, which is required by the learning success criterion (Rahmatiah, 2023; Sudiartha, 2022). The success of grade VIII students of SMPN 3 Karang Intan in learning physics must be distinct from the motivation factors teachers have paid attention to when applying the RODE learning model. One of the recommendations of the RODE learning model is for teachers to motivate students in the Read phase so that students are actively involved from the beginning to the end of learning. This condition refers to the ARCS learning theory, which states that students who are motivated at the beginning of learning will be actively involved in the learning process so that the understanding obtained by students as a result of learning lasts longer and impacts student success in learning. Improvements in teacher actions in motivating students at the beginning of learning ultimately impact student learning outcomes (Afjar et al., 2020; Banda & Nzabahimana, 2023; Kinasih & Mariana, 2021; Kusuma et al., 2020; Nurnaifah et al., 2022; Ramadhanti et al., 2022; Suryani, 2022).

Table 3 shows that the second phase of the RODE learning model is *Outline*. In this phase, students form and collaborate in working groups, discuss to compile alternative problem-solving, agree on conclusions from solving tasks given by the teacher in the group, and choose materials and forms of presentations to inform the results of solving workgroup problems to other groups in class discussion sessions. In this phase, the improvement of actions that need to be considered by teachers is the formation of working groups in addition to facilitating students to access learning resources and materials. In order for students to learn and build knowledge and understand the subject matter well, the teacher must guide students in the process of collaboration, monitor and ensure all members play an active role in group discussions, exchange ideas for problem-solving (Blajvaz et al., 2022; De Hei et al., 2018; Hamka & Purwanto, 2021; Kusuma et al., 2022b; Nurkhin et al., 2022; Slavin, 2018; Suryani, 2022; Xiang & Han, 2021).

During the Discussion phase, the working group discussion outcomes are incorporated into the presentation materials given to other groups during class discussion sessions. At this stage, the teacher facilitates the exchange of information between students from different working groups. The presenter group presents the group work results to other groups as an audience. Students can ask each other questions, convey ideas/responses, and practice explanation skills. The exchange of information through asking, answering questions, explaining, and giving responses in the *discussion* phase will encourage building knowledge and increase students' understanding of the subject matter. This condition is by information processing theory, which states that students who process information seriously and earnestly have better memory and understanding of the subject than students who do not. Per Vygotsky's social constructivist theory, exchanging ideas allows students to build mutual understanding. In the learning process, students need to come up with ideas to help compile knowledge and understanding to solve the problems faced (Alemu, 2020; Blajvaz et al., 2022; Kusuma et al., 2020; Medriati & Risdianto, 2020; Moreno, 2010; Nurkhin et al., 2022; Slavin, 2018).

The evaluation phase is the final phase of RODE learning. In this phase, the teacher facilitates students to convey the conclusions and understanding that students have obtained in learning. In the first cycle, students convey the conclusion of hydrostatic pressure material, and in the second cycle, the conclusion of Archimedes' law material. Students convey an understanding of the two materials built in the outline phase and refined in the process of exchanging ideas or broader understanding in class discussions in the discussion phase. The teacher also guides students to provide an assessment of the presenter group's presentation and each working group's work. Next, as a group, choose which group receives the highest score and a prize before the instructor ends the lesson. Students will be encouraged to continue their positive learning practices and have their understanding reinforced by this setting. The RODE learning model's four stages strongly emphasize knowledge exchange activities that students carry out under the direction and facilitation of teachers in work groups and class discussions. This process will encourage the building of knowledge and understanding of teaching materials in students according to social constructivist theory, information processing learning theory, connectivity theory, and ARCS theory, which will make students master the information and knowledge discussed well, which in the end, students will have good learning outcomes (Afjar et al., 2020; Arends., 2012; Downes, 2012; Kusuma et al., 2022a; Santrock, 2011; Slavin, 2018).

Applying the RODE model in physics learning shows teachers to innovate to increase activeness and facilitate meaningful learning for students. Student activity involved in learning will affect student learning outcomes. Improved learning outcomes in both the first and second cycles are supported by students actively involved in learning (Amsikan, 2022; Djajadi & Rauf, 2020; Hamka & Purwanto, 2021; Saidi, 2022; Suryani, 2022; Yani et al., 2021). Thus, after two cycles of application of the RODE learning model, students' science (physics) learning outcomes on hydrostatic pressure material and Archimedes' law can increase. Teachers teaching hydrostatic pressure and Archimedes' law material applied the four phases of the RODE learning model is expected to help students overcome difficulties in learning physics material and help teachers change students' views that physics lessons have a high level of difficulty, complicated, whole of formulas and students who pay less attention to the teacher's explanation in learning become happy students, focus on paying attention to teachers and actively involved in physics learning (Darta, 2020; Hamka & Purwanto, 2021; Mardiana, 2021; Rafiqah et al., 2021).

Conclusion

The application of the RODE learning model in physics learning on hydrostatic pressure teaching materials and Archimedes' law for grade VIII students of SMPN 3 Karang Intan has a positive impact by increasing students learning outcomes in pretest score mode 5 and 70 posttest score mode in the first cycle and score 30 for pretest and 100 posttest score mode in the second cycle. Further research can investigate other physics teaching materials at the high school level.

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