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# Mastery of student concepts about substance pressure in biological systems viewed from Marzano's new taxonomy through the implementation of the think read group share reflect strategy

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## ABSTRACT

Substance pressure is a difficult topic for junior high school students; therefore, effective learning strategies are needed. This study aims to examine the application of the Think–Read–Group–Share–Reflect (TRGSR) strategy in facilitating students' understanding of substance pressure and to describe their concept mastery based on Marzano's New Taxonomy. The research used classroom action research involving 30 eighth-grade students, conducted through a pre-test, learning activities using the TRGSR strategy, and two post-tests. Data were collected using tests, worksheets, observation sheets, and student response questionnaires. The results showed that the highest concept mastery was in nutrient transport in plants and plant tissue structure and function, while the lowest was in applying substance pressure concepts to daily life. Most students' concept mastery was at the level of integration in the knowledge domain. Students gave positive responses to the TRGSR strategy, and its implementation was categorized as high. These findings indicate that the TRGSR strategy has potential as an alternative approach for teaching difficult science topics.

## INTRODUCTION

One of the Basic Competencies in Science Subjects in the 2013 Curriculum is 3.8 Basic Competencies namely explaining the substance pressure and its application in everyday life (Kemendikbud, 2017). It turns out that the substance pressure is also studied in the Independent Curriculum (Sutia et al., 2020). The subject material about this substance pressure is one of the materials that are considered difficult because the concepts are very complex (Idayanti et al., 2019; Mustikasari et al., 2017; Mutiyasih et al., 2017; Nisa et al., 2022; Rahmawati et al., 2016; Sari et al., 2022; Zulfa et al., 2020). There are still many obstacles that occur in mastering the concept, including students still experiencing difficulties in constructing the sub-concepts that must be built in order to understand the concepts to be studied (Çepni et al., 2010; Nisa et al., 2022). To teach the concept of substance pressure, it takes several cognitive levels gradually from a simpler cognitive level to a more complex one. To overcome this, researchers have developed several strategies, namely implementing problem-based learning (Rahmawati et al., 2016), applied the Probex method (Nashirotun, 2023) and the application of the make a match cooperative learning model (Suriati, 2021) as well as learning with a contextual approach (Kania et al., 2018).

The use of the think-read-group-share-reflect (TRGSR) strategy is effective in improving students' critical thinking skills in biology learning (Giri & Paily, 2020). TRGSR consists of five steps, namely the facilitator starts the learning session by posing a problem for students to think (think), then students are asked to read literature to understand the background of the problem and write down difficult scientific terms before they form groups (read). The third step is grouping (group), which involves forming groups, exploring, migrating, and forming arguments. The third step of TRGSR represents collaborative learning. The fourth step is the argumentation session (share), which allows students to think, negotiate, and ask questions by asking questions. During the argumentation, all student groups present their arguments. The final step of the strategy is to reflect (reflect), where students reflect on all the TRGSR activities they have carried out (Giri & Paily, 2020). Thus, learning with the TRGSR strategy can facilitate students in collaborative learning and constructivist learning, also has the opportunity to increase student interaction, their capacity to ask questions, revise what they know, respond to classmates, analyze and interpret data and so on (Giri & Paily, 2020). From a series of stages in the learning strategy, it is sufficient to facilitate students in various ways to master the subject matter, starting from thinking about problems (think), then seeking information from literature to solve problems and strengthening theories and data that show constructivist characteristics (read). In addition to developing individual competencies, it is also supported by collaboration through the group and share stages, and ends with feflect, where students complement each other's shortcomings, thus providing an opportunity to master the concept better. In language learning, the application of a think-pair-share strategy similar to TRGSR can improve reading skills as well as increase students' motivation in thinking, explore and share opinions and ideas (Hidayat & Rifdah, 2024; Irwandi, 2018; Rehman et al., 2021), can improve students' collaborative abilities (Sumekto, 2018) and communication skills (Rehman et al., 2021). In science learning, the use of the TRGSR strategy can be used to train students' 21st Century physiological literacy, especially critical thinking and also has the potential to deal with learning in science material that is considered difficult (Diana et al., 2021). So far, no research has been found regarding the use of the TRGSR strategy to improve mastery of the concept of substance pressure, those related to biological systems especially when viewed from Marzano's new taxonomy. Marzano's new taxonomy as a framework for capturing student learning processes and outcomes is still dearth used by educators (Irvine, 2020).

In Marzano's new taxonomy there are several advantages, including the separation of the knowledge dimension and the mental processing dimension (Basir et al., 2022; Diana, 2013; Diana et al., 2012, 2014; Irvine, 2020, 2021; Yang & Li, 2023). Knowledge itself has three domains, namely information, mental procedures and psychomotor procedures, each of which is related to each

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level of mental processing (Basir et al., 2022; Marzano & Kendall, 2008). In addition, the dimensions of mental processing include cognitive, metacognitive and self-systems, so that it can accommodate and assess all areas of student abilities. Another advantage of Marzano's new taxonomy is that it explicitly raises cognitive, affective and psychomotor domains that have not been exposed to other taxonomies (Basir et al., 2022; Irvine, 2020, 2021; Marzano & Kendall, 2006; Yang & Li, 2023). Due to the advantages of Marzano's new taxonomy, it can be used to capture the achievement of learning objectives for any material through various learning strategies, including to reveal mastery of the substance pressure concept derived from learning objectives based on curriculum demands through the TRGSR strategy. So far, the learning objectives of this material have been assessed for their achievement using the Revised Bloom's Taxonomy framework.

In this study, the implementation of the TRGSR strategy was carried out as a means to teach junior high school students about the concept of substance pressure so that the mastery of the concept can be revealed in terms of Marzano's new taxonomy, because in the TRGSR strategy students are required to make scientific arguments in solving problems given individually, then students discuss in groups and classes to find solutions to the problems given. Thus, the aim of this study was to reveal the profile of junior high school students' mastery of the concept of substance pressure in terms of Marzano's new taxonomy through the application of the TRGSR

Concepts about substance pressure in biological systems used in this study include: the pressure of a solid and the surface area, substance pressure in daily life, hydrostatic pressure with depth, connecting the upward compressive force and the object weight, the process of water transportation in plants, the structure of plant tissue with its function and the process of nutrients transportation in plants.

## METHODS

In this study, the action research method was used by focusing on the application of the Think-Read-Group-Share-Reflect learning strategy in revealing the ability to master the concept of substance pressure in biological systems. In this action research, two cycles model research design is used which includes planning, action, observation and reflection (Kemmis & Mc.Taggart, 1988). The following is the design carried out in this study (Figure 1).

In measuring mastery of the concept, a test was carried out on the substance pressure material in biological systems. Learning indicators about substance pressure in biological systems include (1) connecting the pressure of a solid and the surface area, (2) implementing substance pressure in daily life, (3) connecting the concept of hydrostatic pressure with depth, (4) connecting the upward compressive force and the object weight, (5) describing the process of water transportation in plants, (6) connecting the structure of plant tissue with its function, (7) describing the process of nutrients transportation in plants. The questions given are multiple choice questions. The pre-test is given at the beginning of the pre-cycle learning which contains material on substance pressure and its application in biological systems. Furthermore, in cycle 1, post-test 1 was given which contained the concept of substance pressure and its application to animals and humans. In cycle 2, post-test 2 were given about the concept of substance pressure on plant transportation.

The participants in this study were 11 male students and 19 female students from class VIII B at a junior high school in Sukabumi City, West Java. Samples were selected who were accustomed to using the What Sapp, Google Classroom, and Google Meet applications in learning, as a means to implement the TRGSR strategy at the think, read and group stages.

The stages in this study consisted of planning, implementation and reporting. The planning stage (pre-cycle) includes: (1) Literature study to find various information that substance pressure is science material which is considered difficult by various academic circles, TRGSR learning

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strategy, study of substance pressure in biological systems. (2) Preparation of a TRGSR learning plan, including strategy development and follow-up. (3) Preparation of learning tools, including research instruments in the form of questions about concepts related to substance pressure in biological systems that refer to the Junior High School Science subject curriculum. (4) Arrange for permits to schools for trials and implementation of the TRGSR strategy.

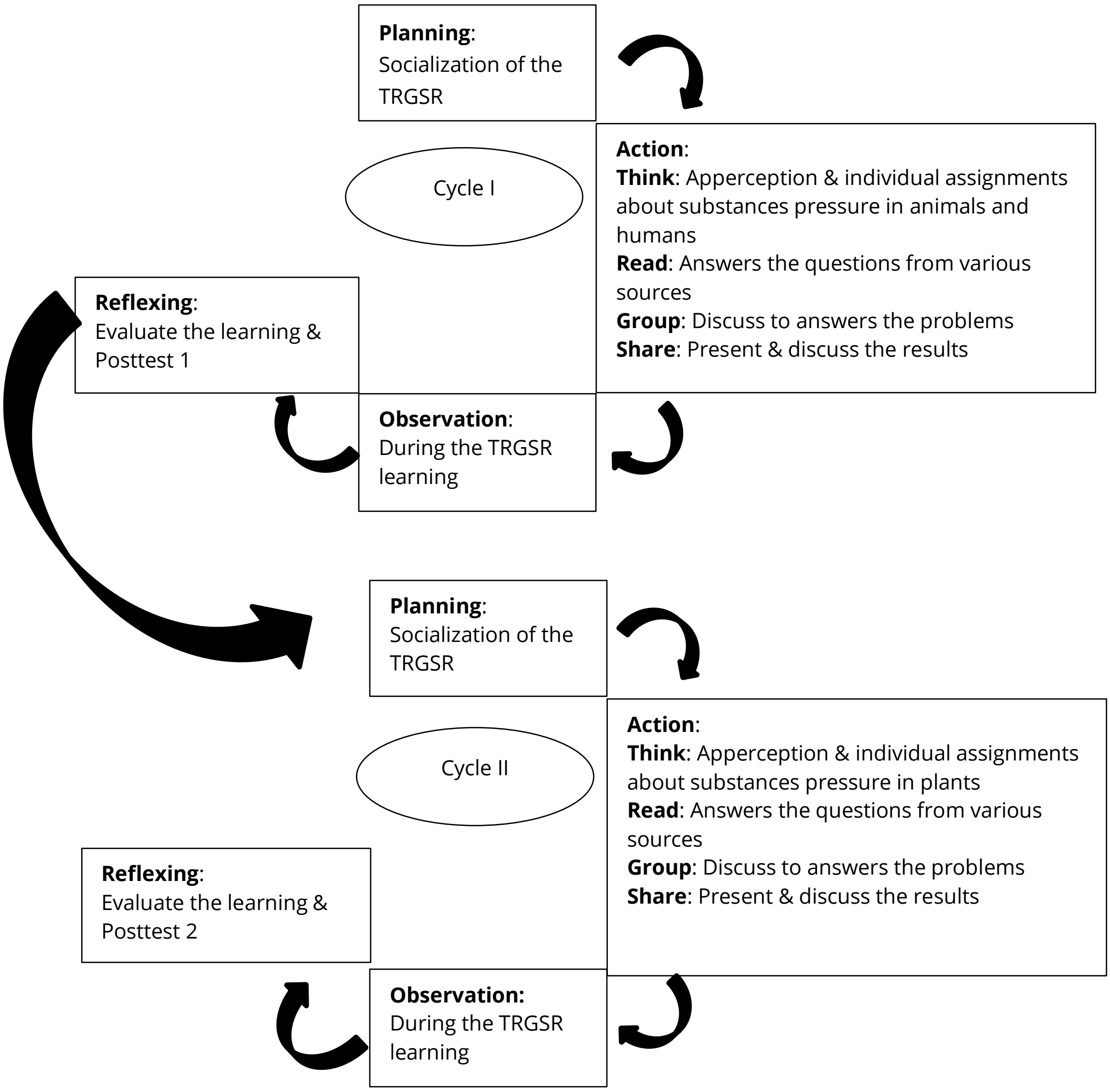


**Figure 1**. Action Research Design

The implementation phase of this research includes two cycles of action research (Figure 1), at the pre-cycle stage, the pre-test is given first. In cycle I consist of: (1) Planning in the form of maturation of the TRGSR learning strategy plan, including socialization of the TRGSR learning strategy by the research team to the students. (2) The implementation of cycle 1 was in the form of applying the TRGSR learning strategy to the subject matter of substance pressure in animals and humans. At the **think stage**, the teacher gives an apperception about the concept of solid pressure (the structure of chicken and duck legs on muddy roads) through the **Google Meet application**, and then students are given individual assignments in student worksheets given a discourse on the pressure of substances on animals and humans which is uploaded on **Google classroom.** At the **read stage** students are given the opportunity to look for answers to the questions given, from various sources such as science textbooks, the internet or from student notes. At the **group stage**, students in groups discuss answers to the problems that exist in

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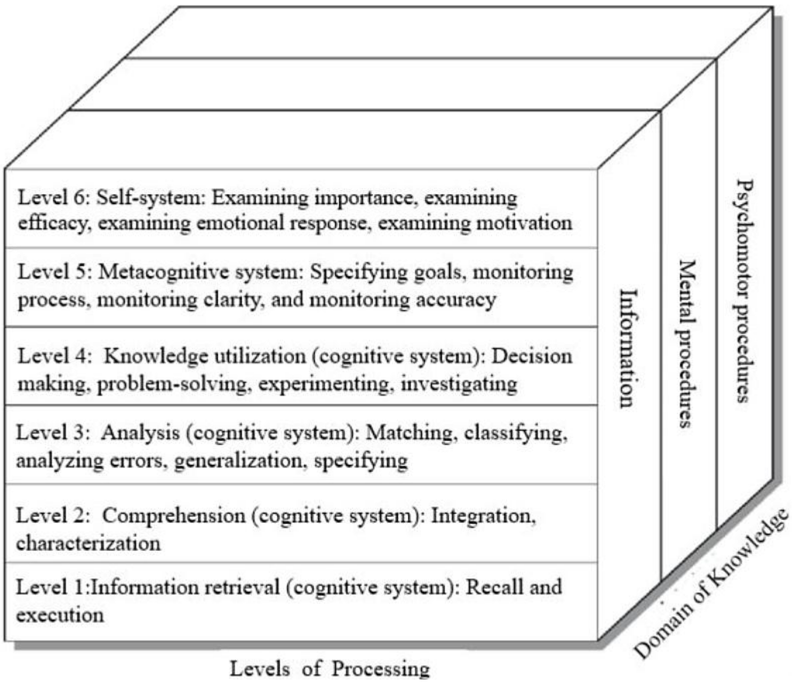
student worksheets 1 through the **What Sapp group** including observers so that student discussions can be observed. At the **share stage,** student groups present and discuss the results of working on worksheet 1. At the **reflect stage** students and teachers evaluate the learning of substance stress on animals and humans including students expressing difficulties in carrying out TRGSR learning and ends with post 1 on mastering the concept of substance pressure in animals and humans. (3) Observations were made during the implementation of the TRGSR learning strategy on substance stress in animals and humans. (4) Reflection is the reflect stage of TRGSR, namely students and teachers evaluate the learning of substance pressure in animals and humans, including students expressing difficulties in carrying out TRGSR learning and ends with posttest 1 about the concept of substance pressure in animals and humans. The stages of implementing cycle II are the same as the stages of cycle I, it's just that the learning materials, post-tests 2 and practical are about the substances pressure on plant transportation. During the implementation of the TRGSR strategy, observations were made about the implementation of the learning.

The instruments used were multiple choice questions, worksheets, student response questionnaires to learning, and observation sheets of TRGSR implementation. The indicator of concept mastery used in this research is a development of Basic Competency 3.8. of the Curriculum. All questions on the pre-test, post-test and worksheets instruments are projected on Marzano's new taxonomy (Figure 2).




**Figue 2.** Marzano's new taxonomy (Marzano & Kendall, 2008)

All pre-test, post-test and worksheet answers were checked and given a maximum score of 100 for the total of all questions, so that data on concept mastery scores was obtained for each student. To reveal the increase in students' mastery of concepts, the pre-test and post-test scores are calculated Normalized-gain (N-gain) and the category level using the Hake formula (Hake, 1998), which is written as follows.

$$\text{N-gain} = \frac{(\text{Posttest Score} - \text{Pretest Score})}{(\text{Maximum Score} - \text{Pretest Score})}$$

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N-gain was categorized as High Score: N-gain>0.7; Moderate Score: 0.3>N-gain>0.7; and Low Score: N-gain< 0.3. Data were analyzed using descriptive statistics namely by calculating the average score and t test.

Students' concept mastery scores from pre-test and post-test as well as worksheets categorized into categories according to Purwanto (2008) (Table 1). To assess the implementation of learning using the TRGSR strategy, an observation sheet is used which includes the think, read, group, share and reflect stages. The results of observations on the implementation of TRGSR learning were given a score of 4 if the statement was implemented very well, 3 if it was implemented well, 2 if it was implemented sufficiently, 1 if it was implemented poorly and 0 if it was not implemented. The observation sheets were examined and analyzed for each item. Then, the total score obtained from each TRGSR stage in both learning cycles was calculated and grouped according to criteria based on Afifah's (2016) rules (Table 2).

**Table 1.** Student mastery level categories (Purwanto, 2008)

| Mastery Level (%) | Category |
|---|---|
| 86 - 100 | Very Good |
| 76 - 85 | Good |
| 60 - 75 | Moderate |
| 55 - 59 | Low |
| ≤ 54 | Very Low |

**Table 2.** Learning Implementation Criteria (Afifah, 2016).

| Interval (%) | Criteria |
|---|---|
| 80 ≤ L ≤ 100 | Very high |
| 60 ≤ L ≤ 80 | High |
| 40 ≤ L ≤ 60 | Moderate |
| 20 ≤ L ≤ 40 | Low |
| 0 ≤ L ≤ 20 | Very Low |

L= Learning Implementation

## RESULTS AND DISCUSSION

Students' mastery of concepts before, during and after learning substance pressure on biological systems using the TRGSR strategy is shown in Table 3 and Figure 3. From Figure 3 it appears that all mastery of the concept of substance pressure on biological systems contained in each learning indicator increases both from pretest to posttest 1 and from pretest 2 to posttest 2. All learning indicators for students' mastery of concepts in terms of Marzano's New Taxonomy (Marzano & Kendall, 2008) are still at the level of mental processing integration with the information domain knowledge (Table 3). Based on Figure 3, the highest mastery of the concept is in the answer to posttest 2 about the structure of plant tissue with its function (LI6) and the process of nutrients transportation in plants (LI7). While the lowest mastery of the concept is in the pretest about the process of water transportation in plants (LI5) and the process of nutrients transportation in plants (LI7).

According to Purwanto's criteria (Purwanto, 2008) students' mastery of concepts before learning substance stress on biological systems using the TRGSR strategy is classified as very low (Table 4) with an average value of 53.8. After studying substance pressure in animals and humans using the TRGSR strategy it increased to moderate with an average value of 74.1 and in learning about the pressure of substances in plants is classified as good with the average value being 85.6

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(Table 3). The results of the analysis of the paired sample t test showed that the significance value obtained in the pretest and posttest 1 was 0.014 <0.05, which means that there was a significant difference between the pretest and posttest 1. The paired sample t test between posttest 1 and posttest 2 shows a significance value of 0.000 <0.05, which means that there is a significant difference between posttest 1 and posttest 2.

**Table 3**. Recapitulation of the Concept Mastery of Substance Pressure in Biological Systems

| No. | Learning Indicators | Processing Level & Knowledge Domain | Concept Mastery Score (%) & Category | | | | |
|---|---|---|---|---|---|---|---|
| | | | Pretest | Worksheet 1 | Posttest 1 | Worksheet 2 | Posttest 2 |
| 1 | Connecting the pressure of a solid and the surface area | Integration & Information | 63.3 (M) | 50.0 (VL) | 83.3 (G) | - | - |
| 2 | Implementing substance pressure in daily life | Integration & Information | 56.7 (L) | 75.0 (M) | 60.0 (M) | - | - |
| 3 | Connecting the hydrostatic pressure with depth | Integration & Information | 63.3 (M) | 100.0 (VG) | 83.3 (G) | - | - |
| 4 | Connecting the upward compressive force and the object weight | Integration & Information | 66.7 (M) | 100.0 (VG) | 70.0 (M) | - | - |
| 5 | Describing the process of water transportation in plants | Integration & Information | 26.7 (VL) | - | - | 84.0 (G) | 76.7 (M) |
| 6 | Connecting the structure of plant tissue with its function | Integration & Information | 60.0 (M) | - | - | - | 90.0 (VG) |
| **7** | Describing the process of nutrients transportation in plants | Integration & Information | 40.0 (VL) | - | - | 91.7 (VG) | 90.0 (VG) |
| | Average | | **53.8** (VL) | 81.3 (G) | **74.1** (M) | 87.9 (VG) | **85.6** (G) |
| | N-Gain | | | | 0,44 (M) | | 0.67 (M) |

Note: -: No data; VL: Very Low; L: Low; M: Moderate; G: Good; VG: Very Good

The initial student's conceptual mastery ability before learning is relatively low, also occurs in other students as in the students of State Madrasah Tsanawiyah at Southeast Sulawesi in studying about the pressure of solids (Suriati, 2021), students of Junior High School 1 Sukabumi West Java (Diana et al., 2021), students of Junior High School 4 Cianjur West Java (Kania et al., 2018) and the students of State Madrasah Tsanawiyah in Klaten Central Java (Nashirotun, 2023) as well as class IX students (Mutiyasih et al., 2017). The lowest learning indicator in the pretest was

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describing the process of water transportation and nutrients transportation in plants, each with an average score of 26.7 and 40.00. In the pretest question, students were asked to explain the capillarity of the stem which causes water to be transported up from the roots to other higher parts of the plant and circulated throughout the plant, only about 27% of students who can answer correctly. In answering this question, students must be able to integrate information between capillary forces and the attraction between water molecules along the capillaries. In other pre-test questions students were asked to explain the process of transporting nutrients to plants, only about 40% of students could answer them correctly.

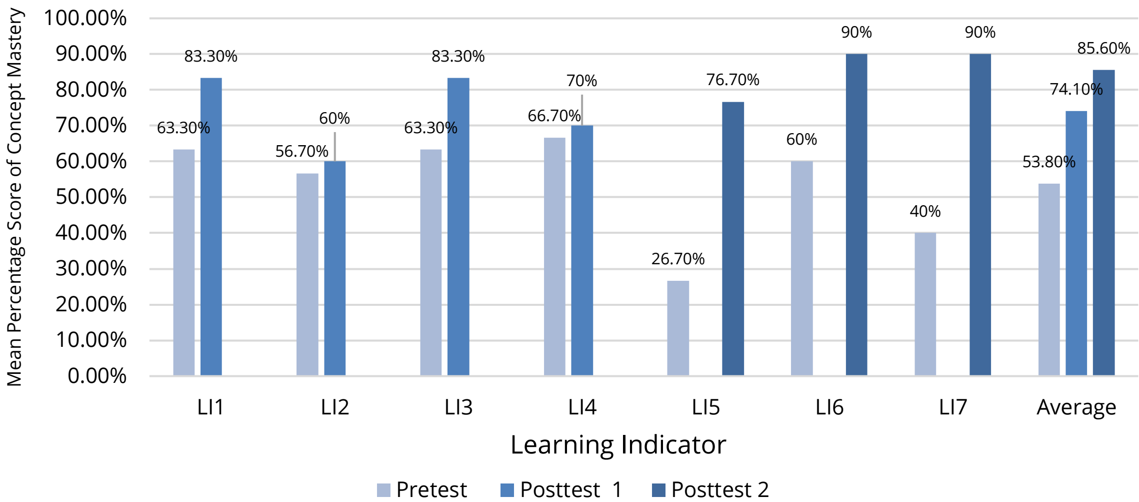


**Figure 3**. Mean percentage score of concepts mastery about substance pressure in biological systems.

Information:

LI1: Connecting the pressure of a solid and the surface area
LI2: Implementing substance pressure in daily life
LI3: Connecting the concept of hydrostatic pressure with depth
LI4: Connecting the upward compressive force and the object weight
LI5: Describing the process of water transportation in plants
LI6: Connecting the structure of plant tissue with its function
LI7: Describing the process of nutrients transportation in plants

During learning about substance pressure in animals and humans using the TRGSR strategy, the average student was able to answer the questions in worksheet 1 of 81.3 (Table 3) which is included in the good category. In answering the indicators relating the concept of hydrostatic pressure to depth, almost all students could answer them. Likewise, in answering the learning indicator connecting the upward compressive force and the object weight (Table 4). In worksheet 1 student are asked to explain why when diving in the sea at a certain depth the diver feels his ears hurt and his chest is tight. All groups of students could answer correctly and completely, that is, the deeper a liquid, the higher the pressure felt. This is in accordance with the principle of hydrostatic pressure in liquids that the water pressure is directly proportional to the depth of the water (Nisa et al., 2022; Rahmawati et al., 2016; Sutia et al., 2020; Yulianto et al., 2017). In addition, one application of the principle of hydrostatic pressure in daily life is the hydrostatic pressure experienced by divers on the seabed (Rahmawati et al., 2016; Sutia et al., 2020; Yulianto et al., 2017). With high mastery of these concepts, students are most likely given sufficient opportunities to think in the think and read stages as the initial syntax of the strategy in TRGSR cycle 1.

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In posttest 1, the students' mastery of the concept was at a moderate level, with an average score of 74.1 and gives an N-Gain value of 0.44 which is moderate (Table 3). The highest learning indicator in posttest 1 is connecting the pressure of solids and surface area. In the posttest questions about this indicator, students are required to explain why there is a difference in the depth of the plasticine that was overwritten by two coins with different positions; coin b which is vertical has a deeper trough than coin which is horizontal. As many as 83% of students could answer that the surface area of coin b is smaller than the surface area of coin a so that the pressure exerted is greater. This is in accordance with the principle of solid pressure that the smaller the pressure area, the greater the pressure, and vice versa (Nisa et al., 2022; Noval, 2018; Sutia et al., 2020; Yulianto et al., 2017). Means the pressure is inversely proportional to the area of the press.

Another highest learning indicator in posttest 1 is connecting between hydrostatic pressure and depth, with a concept mastery score of 83.3 (Table 3). In this indicator, students are required to explain the events of ships that can float on water. Most of the students could answer that ships get a buoyant force that pushes upwards greater than the weight of the ship so that the ship can float. This is in accordance with Archimedes' principle, namely when an object is wholly or partially immersed in a fluid which is stationary, and then the fluid will exert pressure on every part of the surface of the object that is in contact with the fluid. The pressure is greater on the part of the object that is immersed deeper (Nisa et al., 2022; Ongga et al., 2009; Sutia et al., 2020). The resultant of all forces is an upward force on the immersed object. The resultant force, which is directed upwards on the object, will equal its weight and will act vertically upward through its center of gravity. Good mastery of the concept of the relationship between hydrostatic pressure and depth by junior high school students is a quite encouraging starting point, because there are still misconceptions about pressure on water among Physics students (Ongga et al., 2009; Zulfa et al., 2020). This is different from the learning achievements of students of Junior High School in Kaliwungu Central Java which shows 50% of them have misconceptions (Idayanti et al., 2019), even more than 70% of Junior High School students in Sungai Raya West Kalimantan (Askaria et al., 2022).

During learning about the substances pressure in plants using the TRGSR strategy, the average student was able to answer the questions in worksheet 2 of 87.9 (Table 3) which is included in the very good category. In answering the indicators explaining the process of nutrients transportation in plants, almost all students could answer it. In worksheet 2 students are asked to conclude the factors that affect the transportation system in plant, it turns out that 91.67% of students (Table 3) can conclude that the cohesion force and adhesion and suction power of the leaves are factors that affect the water transportation in plants so that water in the roots can rise to the leaves as well as the presence of root compression. This principle is relevant to the theory that cohesion pressure plays a role in explaining the transport of water in the xylem (Taiz et al., 2018). This is most likely because students are right in obtaining information in the read stage, because in addition to providing videos on transportation in plants as well as from other additional literature that has been selected. Reading as syntax in the problem-based learning model also has a better impact on students' thinking scores (Azizah et al., 2020). Knowledge derived from this literature is also a capital for problem solving by students (Murawski, 2014).

In post-test 2, students' mastery of the concept is already in a **very good level**, with an average score of 85.6 and gives an N-Gain value of 0.67 which **is moderate** (Table 3). The indicators that gave the highest score in posttest 2 were relating the structure of plant tissue to its function and examining the process of nutrients transportation in plants. Both of these learning indicators provide a score of mastery of the concept at 90. In one of the posttest questions about indicator examining the process nutrients transportation in plants, students are required to explain the nutrients transportation in plants that occurs through a diffusion process, as much as 90% of students can answer it correctly, namely through the transfer of solutes from high concentrations to low concentrations. This is in accordance with the theory of passive transport, namely that diffusion occurs from a compartment with a high concentration of molecules to a compartment

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with a low concentration of molecules (Mader, 2007). In other posttest questions about indicator examining the process of nutrients transportation in plants, students are required to explain the function of xylem vessels. As many 90% of students answered correctly. One function of the xylem vascular tissue is to transport water and mineral salts from the roots to the leaves (Mader, 2007)

Based on the N-gain value which is classified as moderate (Table 4), it can be said that the application of the TRGSR strategy can in fact be used to improve junior high school students' mastery of concepts about substance pressure in biological systems. Almost all of the learning indicators only include the integration processing level with the domain of information knowledge when viewed from Marzano's new taxonomy. This shows that students' mastery of concepts found in this study is still very limited to cognitive level 2, namely comprehension, and has not yet reached cognitive level 3, analysis, and cognitive level 4, knowledge utilization. In addition, the knowledge domain is still limited to the information knowledge domain, not yet to the mental knowledge domain of mental procedures and psychomotor procedures. On the other hand, the implementation of the TRGSR strategy although has not been maximized (Picture 3) but according to Afifah's rules (Afifah, 2016) overall the criteria are high. These results correspond to success in increasing students' critical thinking skills (Giri & Paily, 2020) and increasing physiological literacy (Diana et al., 2021). It seems that this TRGSR strategy can also be used as a way to overcome the low mastery of concepts in other materials that are considered difficult such as the concept of physiology (Diana et al., 2021). This can also be proven in improving reading skills in learning English and science through the implementation of a strategy such as TRGSR, namely Think Pair Share (Hidayat & Rifdah, 2024; Irwandi, 2018; Rehman et al., 2021; Sumekto, 2018).

In this study, the reflect stage of the TRGSR strategy cycle I is the syntax with the lowest implementation, compared with other TRGSR syntax, both in cycle I and cycle II, which only reached 33.3 (Figure 4). This also occurs in the application of TRGSR in teaching physiology literacy for junior high school students (Diana et al., 2021) which indicates that students may be less used to being involved in evaluating learning and students are less open to expressing difficulties in learning. Therefore, students must have started to be involved in reflecting on learning, for example, reflection is done informally by the teacher. Or maybe the teacher is still not flexible in inviting students to reflect because they are still in cycle I of action research. Unlike the case in cycle 2, the reflect syntax has increased its implementation level to a high level of 80% from the original around 30% in cycle I.

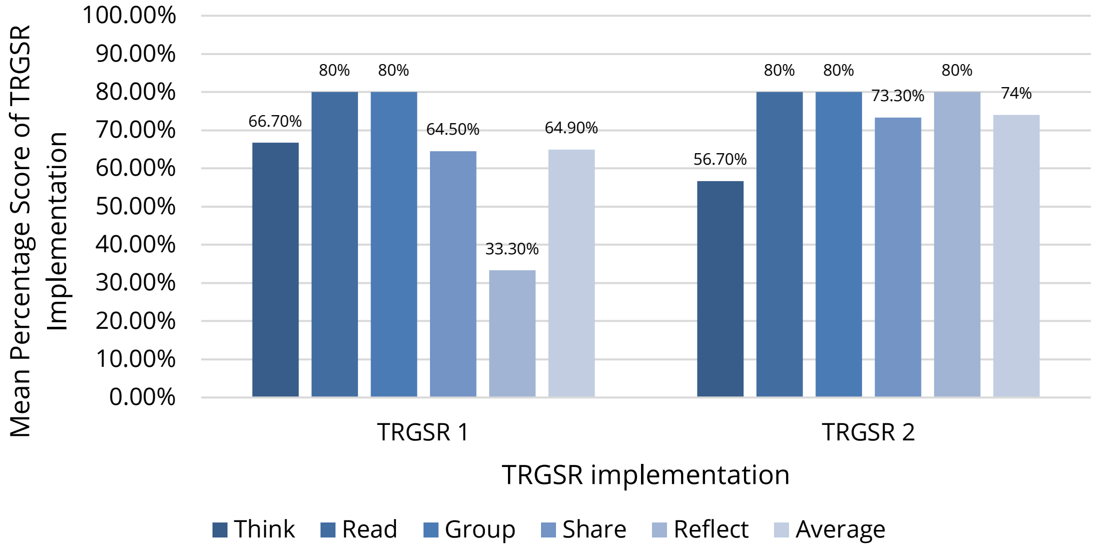


**Figure 4**. Mean percentage score of the TRGSR implementation strategy in substance pressure learning in biological systems.

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Based on Marzano’s new taxonomy, the implementation of the TRGSR strategy has entered the level of using knowledge and metacognition, along with other cognitive levels. Before carried out the transportation practicum on plants in cycle II, at the reading stage students are given the task of summarizing material from various sources meaning that students generalize and make decisions. In carrying out practicum students are also asked to solve problems, experiment (generate and test hypotheses) as well as specify goals. Then in the group stage there is more collaboration between students, the completion of practicum assignments about transportation in plants which requires students to work together and the discussions that are carried out become more intensive with the participation of good group members. Then at the reflect stage, it is easier for students to draw conclusions about learning outcomes from their practicum work which includes generalization cognitive levels. Because through doing practicum, students become more aware of the concepts being studied. In addition, working on worksheets through practicum really helps students’ master concepts in more depth and remember longer, because students are more actively involved in building their knowledge through questions on the worksheet (Rahmawati et al., 2016).

In this study, viewed from Marzano's New Taxonomy, the scope of students' cognitive levels regarding mastery of the concept of substance pressure is more dominant only in superficial learning comprehension (integration) (Table 3), so for further improvement, questions and worksheets should also include aspects of deep learning such as analysis, knowledge utilizing, metacognition and self-system. According to the recommendations of previous studies, Marzano's New Taxonomy framework can be used to reveal students' higher order thinking and can be used as a reference for compiling learning objectives (Betu, 2023; Irvine, 2021; Sari & Nada, 2022; Wulandari, 2021; Yang & Li, 2023).

Most students gave a positive response to learning by using the TRGSR strategy both in terms of attitudes, knowledge and skills. Most students agree that the TRGSR strategy evokes their scientific attitudes such as feeling interested in learning, daring to speak, active in learning and respecting the opinions of others. Most students agree that the application of the TRGSR strategy is considered to support them in mastering the concept of substance pressure in biological systems. Almost all students agreed that the implementation of the TRGSR strategy enhanced their collaborative skills. All of the students' positive responses to the TRGSR strategy clearly support mastery of this concept.

## CONCLUSION

Junior high school students' mastery of the concept of substance pressure in biological systems through the application of the TRGSR strategy shows that nutrients transportation in plants and the structure of plant tissue with its function are the highest mastery. The lowest concept mastery is in implementing substance pressure in daily life. Almost all projected mastery of concepts according to Marzano's taxonomy includes level of mental processing integration with the information domain knowledge.

In general, the implementation of the TRGSR strategy is high. The TRGSR strategy can be used to improve students' mastery of concepts in learning, besides supporting the realm of scientific attitudes and students' skills. In order for the implementation of this strategy to be more optimal, especially the reflect stage, the teacher must actively involve students in evaluating learning, for example by asking students informally about their difficulties during learning.

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