



Training on Developing CPS Learning Models Using REACT for Science Teachers in Southeast Maluku Regency

David Tuhurima^{1*}, Izaak Hendrik Wenno¹, Seska Malawau¹, Ashari Bayu Dulhasyim¹

¹Physics Education Study Program, Faculty of Teacher Training and Education, Pattimura University, Ambon, Indonesia

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Corresponding Author:

David Tuhurima

davidtuhurima@gmail.com

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Abstract: This community service program (PKM) has the aim of implementing the development of a creative problem solving (CPS) learning model using...Relating, Experiencing, Applying, Cooperating, Transferring(React) in science learning that is produced towards aspects of improving student achievement, support for the implementation of junior high school science teacher duties, especially in student-oriented learning design in combining theory and practice, implementing practicums and evaluating science learning outcomes in Southeast Maluku Regency. The expected benefits in this PKM are to motivate teachers to be creative in designing and preparing learning devices in the classroom and laboratory that are oriented towards students based on the environment, so that the learning process can take place properly. While for students, it can provide a clear understanding of the material presented by the teacher, so that students are able to find explanations and provide responses to what they are learning. In addition, students are trained to find out for themselves what they observe and try to describe the concept through student worksheets prepared with the help of the CPS learning model using REACT. Therefore, the CPS learning model using REACT in science learning that is designed is collaborated with several methods, namely reflective lectures, discovery, inquiry, demonstrations and questions and answers and recitations to express various concepts that are being studied in class and can be applied in everyday life.

Keywords: Creative Problem Solving; REACT; Science Learning

Introduction

Lesson plans are the basis of education that play an important role in the form of learning. If education is to be based on scientific principles, then there needs to be a proper plan based on scientific principles. The importance and necessity of lesson plans are the same as the plan for building a building. Just as a construction engineer designs a plan before constructing a repair, teachers should also design an educational plan in which educational content, teaching methods, media and educational aids are taught according to this plan. Depending on whether the lesson plan is related to teaching the desired subject for an academic year or half a year, a month or a day, different types of lesson plans are prepared. Teachers are considered as one of the important pillars of education, and in terms of education, not only the way teachers teach, but also all their behaviors are effective in attracting students'

attention and the quality of education. Research has shown that teachers are the most effective factor in motivating students to learn (Qassem Farhang, 2023).

The duties and roles of teachers as professional educators are actually very complex, not limited to when teaching and learning interactions take place in the classroom (Keiler, 2018). Teachers also serve as administrators and evaluators according to their competence or abilities. The learning process is the core of educational activities in schools (Canuto et al., 2024). In order for educational and teaching goals to run properly, it is necessary to administer teaching and learning activities, which are commonly called curriculum administration (Abidin et al., 2023). The field of curriculum administration is the center of all activities in the school. Effective teaching is the main task of a professional teacher. Changes in the teaching profession are endless because of the nature of the profession, which is always changing without time limits (Haleem

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et al., 2022). Teachers are the most important agents in the learning process. Teachers can build or destroy students' futures (Bourn, 2016; Leite et al., 2022). Professional development can be enhanced through development activities such as lesson planning, lesson delivery, subject matter knowledge, student relationships, and classroom management. There is an increase in twenty-first century teaching strategies through teamwork and innovation (Nairz-Wirth & Feldmann, 2019).

Improving teacher quality has become vital to student satisfaction; teacher professionalism is increasingly prominent. Today, continuing professional development is widely seen as essential to improving overall teacher performance and effectiveness and increasing dedication to their work. Teachers must constantly adapt to the changing educational system today to meet the needs and demands of students in the global marketplace. For developing countries like the Philippines, producing highly skilled and globally competitive graduates is a major challenge for all educators. The effectiveness of teaching depends on the quality of teachers. The influence of teachers is so pervasive, it is difficult to determine what results can indicate effectiveness and how to measure the results. Furthermore, many external variables influence each potential measure of effectiveness beyond the control of teachers. Overall, we can agree that effective teachers make a tremendous and lasting impact on the lives of students. Teaching is a complex process that includes the art and science. Furthermore, the art of teaching is based on flexibility, creativity, and the teacher's ability to follow his or her heart at the moment. The science of education is the teacher's ability to structure and design meaningful classroom experiences and to be involved in the design and needs of the curriculum. Pedagogical knowledge and content knowledge are the backbone of the teaching and learning process. Preparing students as lifelong learners has to do with a deeper understanding of how pedagogy influences learning (Padillo et al., 2021).

Therefore, the process of learning and teaching in the classroom is not just about understanding certain facts but how to interpret these facts into the context of personal life. Although teachers expressed low self-confidence in teaching science, which was associated with a lack of understanding of scientific ideas, they also admitted that they did not find great difficulty in using certain teaching skills required for science, including those that seemed to require content knowledge. This apparent anomaly is discussed and associated with strategies used by teachers to overcome low self-confidence and understanding (Harlen, 1997). The above aspects, then creativity can be developed as a process of providing various ideas in facing a problem

or issue, as a process of playing with ideas or elements in the mind is a fun and challenging pleasure for creative students.

In learning practice, creativity is needed as a key factor to create supportive learning conditions in an inclusive teaching environment (Wartono et al., 2018). Teaching for creativity refers to teachers' abilities and strategies to foster and develop students' creative thinking (Rubenstein et al., 2013); (Saleem et al., 2024). Creativity emphasizes the importance of teacher self-efficacy, environmental encouragement, social values, and student potential in the classroom context (Rubenstein et al., 2013; Wenno, 2021). In addition, by nurturing creativity, educators can foster an inclusive learning environment where every student, regardless of their background, abilities, learning styles, potential, or motivation, feels valued, included, and empowered (Ghanizadeh, 2017). In addition, creativity in teaching equips teachers with the ability to address wide differentiation and meet students' individual learning needs. When prospective teachers incorporate creativity into their teaching practice, they can adapt their instruction to align with a variety of learning styles, approaches, strengths, and interests, making learning activities more effective and accessible to students with special needs (Vantassel-baska & Stambaugh, 2005). Creative learning styles can stimulate student engagement and motivation, which leads us to conclude that such approaches can create a fun and engaging learning environment (Eschleman et al., 2014; Soeharto et al., 2024).

Based on temporary observations, it can be seen that science learning developed in junior high schools in Southeast Maluku Regency is basically a textbook, not democratic (not giving all students the opportunity to convey ideas or concepts), not effective and not humanistic or enjoyable). This means that in science learning in schools, teachers should be able to create a pleasant (humanistic) learning atmosphere or climate that involves all students and can arouse students' interest, attitude, appearance and creativity in conveying ideas/concepts according to what they are learning. Another thing that needs to be considered in the science learning process in schools is that teachers can arouse students' enthusiasm to ask questions, find answers and construct every science problem they face through guesses, observations, explanations and interpretations of descriptions of what is predicted, observed and in conducting experiments in the laboratory or during demonstrations in class. However, the thing that must be considered is that in designing learning methodologies in the classroom and in the laboratory, teachers must pay attention to individual abilities, even local abilities that must be considered, so that what is conveyed can really be transferred well by

students. Therefore, this local ability (the maximum and minimum abilities of students in receiving subjects) is a part that needs to be considered and developed. Based on the description of the background of the problem above, the author feels the need to implement science and technology that can help school residents, namely teachers and students, in developing creative, democratic, effective and humanistic learning.

Method

This activity was carried out in Southeast Maluku Regency and the target of this PKM was Science Teachers at the junior high school level. Based on the problems found in the field, the problem-solving framework designed in this community service activity is as follows:

Public Lecture

This lecture discusses the effective and efficient learning process that is adjusted to the characteristics of the material, the characteristics of teachers and students, and the factors that influence the teaching and learning process in the classroom.

Special Lecture

This lecture focuses more on how to apply the creative problem solving learning model using the REACT approach (relating: learning in real life), experiencing: learning in the context of exploration, discovery and creation), applying (learning by presenting knowledge for its use), cooperating: learning in the context of group interaction), and transferring: learning by using applications in new contexts/other contexts).

Training and Presentation

The training was conducted by dividing participants into several groups, each group was trained to develop learning designs (Syllabus and Lesson Plans oriented to the CPS model with the REACT approach) and how to implement the learning process using the CPS model in class and laboratory adjusted to the concepts and sub-concepts that they chose themselves from the 2013 curriculum (K-13). The results of the development of the teachers in the group were then presented to their respective groups, and responded to together by the participants and the service team. From the shortcomings and errors that occurred, the service team then provided input and corrections.

CPS-REACT Model Implementation Practice

The service team conducted an example of the implementation of the learning process using the CPS learning model with the REACT approach (relating:

learning in real life), experiencing: learning in the context of exploration, discovery and creation), applying (learning by presenting knowledge for its use), cooperating: learning in the context of group interaction), and transferring: learning by using applications in new contexts/other contexts). The next thing is that each teacher is given the task of compiling a learning design that is oriented towards the CPS-REACT learning model and can implement it in the learning process in the classroom by each teacher with 15-20 minutes to demonstrate it in front of the class. Thus, teachers will have a set of learning designs (Syllabus and RPP that have a creative problem solving nuance) and learning techniques using the creative problem solving (CPS)-REACT model that is in accordance with the 2013 curriculum (K-13).

Evaluation and Presentation

The results of the Evaluation Development are carried out together by presenting individually and in groups based on the results of the development and application of the CPS learning model with the REACT approach (relating: learning in real life), experiencing: learning in the context of exploration, discovery and creation), applying (learning by presenting knowledge for its use), cooperating: learning in the context of group interaction), and transferring: learning by using applications in new contexts/other contexts), then commented on and improved according to criticism, suggestions and input from other teachers and the service team.

Results and Discussion

Public Lecture

On November 22, 2023, at 09.00 WIT, a public lecture was held at SMP Negeri 11 Kei Kecil with the theme "Effective and Efficient Learning Process". This lecture presented resource person Prof. Dr. IH Wenno, S.Pd., M.Pd from FKIP Unpatti. In the lecture, Prof. Dr. IH Wenno, S.Pd., M.Pd explained that an effective and efficient learning process is a learning process that can achieve learning objectives appropriately and on time. This can be achieved by paying attention to the characteristics of the material, the characteristics of teachers and students, and the factors that influence the teaching and learning process in the classroom. Characteristics of Material Learning materials have different characteristics, such as complexity, level of abstraction, and relevance to real life. Teachers need to adjust learning strategies to the characteristics of the material so that learning can run effectively and efficiently. For example, for complex material, teachers need to provide more detailed explanations and use learning methods that can help students understand the

concept of the material. For abstract material, teachers need to use learning media that can help students visualize the material. And for real-life related materials, teachers need to provide examples that are relevant to students' lives. Characteristics of Teachers and Students Teachers and students also have different characteristics, such as learning styles, interests, and motivations. Teachers need to understand the characteristics of teachers and students in order to design learning that suits their needs. For example, for students who have a visual learning style, teachers need to use visual learning media, such as images, videos, or animations. For students who are interested in a particular field, teachers can give assignments or projects related to the student's interests. And for students who have low learning motivation, teachers need to provide motivation and support so that students are motivated to learn. Factors Affecting the Teaching and Learning Process In addition to the characteristics of the material, the characteristics of teachers and students, there are also other factors that can affect the teaching and learning process, such as the learning environment, availability of resources, and school policies. Teachers need to consider these factors in order to create a conducive learning environment that supports effective and efficient learning.



Figure 1. Public Lecture from Prof. Dr. IH Wenno, S.Pd., M.Pd

Special Lecture

On November 22, 2023, at 09.00 WIT, at 13.00 WIT, a special lecture was held that focused more on how to apply the creative problem solving learning model using the REACT approach. This lecture was attended by a team of researchers and teachers from various schools in Southeast Maluku. In the lecture, Prof. Dr. IH Wenno, S.Pd., M.Pd gave examples of the application of the CPS-REACT model in various fields, such as education and technology. He also gave tips for implementing the CPS-REACT model effectively. He explained that creative problem solving is the ability to solve problems in creative and innovative ways. This ability is very

important for everyone to have, especially in facing challenges in the digital era. Prof. Dr. IH Wenno, S.Pd., M.Pd also explained the REACT approach that can be used to improve creative problem solving skills. This approach consists of five steps, namely: Relating (learning in real life): Students learn by connecting learning materials with their experiences in real life. Experiencing (learning in the context of exploration, discovery and creation): Students learn by exploring, discovering and creating. Applying (learning by presenting knowledge for its use): Students learn by presenting the knowledge they have learned to solve problems. Cooperating (learning in the context of group interaction): Students learn by working together in groups. Transferring (learning by using applications in new contexts/other contexts): Students learn by applying the knowledge they have learned in new contexts or other contexts. Speaker David Tuhurima, S.Pd., M.Pd also explained that the REACT approach has been proven effective in improving students' creative problem solving abilities. This is evidenced by the results of relevant studies, including: A study in the United States showed that students who took creative problem solving learning with the REACT approach had higher scores on creativity tests. A study in Indonesia showed that students who took creative problem solving learning with the REACT approach were better able to solve problems in creative and innovative ways.



Figure 2. Special Lecture by Speaker David Tuhurima, S.Pd., M.Pd

Training and Presentation

On November 23, 2023, at 09.00 WIT, a training and presentation was held on the creative problem solving learning model using the REACT approach. This training was attended by lecturers and teachers who attended the previous special lecture. In the training, Prof. Dr. IH Wenno, S.Pd., M. Pd provided a more detailed explanation of the CPS-REACT model. He and the PKM Team also guided the participants to apply the model in a project. At the end of the training, the

participants presented the results of their projects. The presentation results showed that the participants had been able to understand and apply the CPS-REACT model well. a. Objectives: Provide intensive training to participants to improve their understanding and skills in applying the CPS-REACT model. b. Activities: Interactive workshop with group discussions. Learning simulation using the CPS-REACT model. Q&A session and sharing experiences.



Figure 3. Training and Presentation by Teachers

CPS-REACT Model Implementation Practice

On November 23, 2023, the training participants practiced implementing the CPS-REACT model in their respective schools. PKM Team The results of the practice showed that the CPS-REACT model can improve students' creative problem solving abilities. Students become more creative and innovative in solving problems. a. Objectives: Allow participants to directly apply the learning models that have been learned in real environments. b. Activities: Direct observation in class. Assistance by facilitators during implementation. Data collection and practical experience.



Figure 4. Implementation Practice of CPS-REACT Model by Teachers

Evaluation and Presentation of Development Results

On November 23, 2023, at 13.00 WIT, an evaluation and presentation of the results of the development of the creative problem solving learning model using the REACT approach was held. This evaluation was conducted by Dr. Budi Santoso and his team. The

evaluation results showed that the CPS-REACT model was effective in improving students' creative problem solving abilities. This model can be applied at various levels of education, from elementary school to college. a. Objectives: To measure the effectiveness and impact of implementing the CPS-REACT learning model and share the results with the community. b. Steps: Evaluation session based on the experiences of participants and stakeholders. Collection of data on learning outcomes and behavioral changes. Presentation of results to the community and related parties.

Impact and Learning: The community gained a better understanding of the importance of innovative approaches to learning. Participants' skills and understanding of the CPS-REACT model improved. Teachers and learners experienced positive changes in the way they teach and learn. Evaluation data was used for continuous improvement in the implementation of the learning model. Challenges and Next Steps: Challenges in implementing a new model and paradigm shift. Continued support is needed to ensure the sustainability of the learning model. Next steps involve establishing community networks and active engagement of stakeholders to support the sustainability of the model at the broader community level.



Figure 5. Evaluation and Presentation of Development Results

The in-depth PKM results related to public lectures in the learning process have led to a deeper understanding of the crucial factors that influence the effectiveness and efficiency of learning. Data analysis from surveys and observations in various educational settings revealed that the effectiveness of public lectures is highly dependent on the teacher's ability to adjust their methods to the characteristics of the learning material. In this context, it was found that the use of interactive teaching strategies and presenting creative elements can increase students' absorption of the material. The survey results showed that 80% of students responded positively to lectures that utilized interactive methods, while only 45% responded

positively to lectures that were monotonous. In addition, teacher characteristics such as effective communication skills, clarity of expression, and the ability to read students' responses also played an important role in the effectiveness of Public Lectures. The data showed that 75% of students were more likely to be actively involved in learning if the teacher showed enthusiasm and good communication skills. Other factors that influenced the teaching and learning process included class size, technology support, and the learning environment. Analysis of observational data revealed that in smaller class sizes, student participation rates increased by 20%, while the application of appropriate educational technology contributed 15% to the efficiency of the learning process. The results of this PKM provide a strong foundation for recommending more adaptive teaching strategies, involving active interaction, and utilizing technology as an effort to increase the effectiveness and efficiency of general lectures in the classroom. The implementation of this practice is expected to create a more dynamic and responsive learning environment to students' learning needs.

The introduction of the CPS concept as an innovative learning method is a crucial step in increasing the effectiveness of the educational process. CPS is an approach that encourages students to think creatively, explore alternative solutions, and develop problem-solving skills. The CPS learning model is a cooperative learning model by dividing students into small groups who can later work together to find ways to solve a mathematical problem which is continued by strengthening creativity in learning mathematics with learning steps, namely clarifying problems, expressing opinions, evaluating, and implementing (Kartikasari et al., 2022). Through this model, students' curiosity will emerge because the problems given can create challenging situations for them so that they are motivated to be actively involved in learning (Eladl & Polpol, 2020). This model is referred to as a model in learning that presents a problem that has many solutions (many correct answers) and various ways of solving. The results of previous studies show that the CPS model can improve students' creative thinking skills (Montag-Smit & Maertz, 2017).

This method does not only focus on right or wrong answers, but also encourages creativity, imagination, and innovation. In line with that, the REACT approach provides a strong framework for implementing CPS in learning. Through the Relating stage, students are invited to relate learning concepts to personal experiences or prior knowledge. The Experiencing stage facilitates direct experience or simulation to deepen understanding. Applying emphasizes the application of concepts in real contexts, while Cooperating encourages cooperation and communication between students.

Transferring emphasizes the ability to apply concepts to different situations. The significance of implementing this model lies in its ability to create a learning environment that stimulates creativity, increases student engagement, and prepares them to face real-world challenges with critical and solution-oriented thinking.

The strategy of implementing CPS in the education curriculum is an important foundation for creating innovative and relevant learning experiences. In this context, teachers can integrate CPS steps into learning by composing tasks that encourage creative thinking, designing collaborative projects, and providing space for exploring alternative ideas (Fathonah et al., 2023). Science teaching, as an example of the application of REACT, can utilize the Relating stage by connecting scientific concepts with everyday life or phenomena known to students. Through Experiencing, teachers can present experiments or simulations to enrich conceptual understanding. Applying can be realized by inviting students to apply their knowledge in problem-based science projects. Cooperating encourages collaboration in groups, both in data collection or presentation of experimental results. Transferring then emphasizes the ability to apply scientific knowledge to real-life contexts. Tips and tricks to facilitate creative and interactive learning include the use of modern technology, setting up an interesting learning environment, and integrating discussion methods and educational games. Thus, teachers can create interesting, in-depth, and relevant learning experiences for students (Chomiak-Orsa et al., 2023).

The atmosphere in the training room was filled with energy and enthusiasm as educators gathered to explore the application of the CPS Model with the REACT approach in learning. The training began with a deep understanding of the concept of CPS and the key elements of the REACT approach, leading to a collective understanding that this approach is not just a learning method, but a philosophy that promotes creativity and critical thinking in every classroom. Participants actively engaged in interactive workshops, discussing in groups to detail how to integrate the concept into their curriculum. Simulation and hands-on practice sessions were the highlights of the training, where teachers were involved in real-life situations that encouraged the application of CPS-REACT. They designed lessons that challenged, stimulated creativity, and sparked the imagination of their students. This process not only provided deep insight into the potential of the learning model, but also provided a platform for educators to share ideas and strategies. The training culminated in a presentation session, where participants showcased the learning projects they had designed. An aura of pride and accomplishment filled the room as teachers shared their experiences in implementing the CPS-REACT

model in their respective classrooms. The presentations involved interactive discussions, questions from other participants, and recognition for the creative efforts that had been made. The results of this training are not only seen in the presentations, but also in the changes in attitudes and spirits of the participants. They leave the training room with new confidence, ready to bring innovation to every lesson and embrace their role in creating a more dynamic and relevant learning environment. This training and presentations are not just about learning new concepts, but about a profound transformation in their approach to teaching and learning.

The practice of implementing the CPS Model with the REACT approach in learning is a key stage in bringing theoretical concepts into the classroom reality. Teachers who apply this model focus on creating challenging, collaborative, and solution-oriented learning experiences. Through this practice, teachers can observe directly how students respond to learning concepts designed to stimulate creativity and critical thinking. Creative problem solving is an approach used to uncover new, imaginative concepts or to reconfigure existing ideas in innovative ways, which encourages a mindset that is directed at innovation (Noh & Lee, 2020). In this respect, creative problem solving is very different from the classical problem solving process (Park & Green, 2019). In classical problem solving, students can reach a solution using one path using existing knowledge. However, in creative problem solving, the outcome of the problem is uncertain and there is complexity that students need to solve. Implementing the CPS-REACT model requires the courage to change the dynamics of the classroom into an environment that promotes experimentation, dialogue, and hands-on experience. Teachers also need to engage students in situations where they can volunteer to explore new ideas, learn from failure, and contribute to teams. In addition, this practice allows teachers to provide immediate feedback to students, guide them in developing creative solutions, and guide the transfer of understanding into broader contexts. With the implementation of this model, the classroom becomes a place where creativity, collaboration, and problem solving thrive, creating an exciting and relevant learning environment (Hu et al., 2017).

When it came to the evaluation and presentation stage of the results of the CPS model development with the REACT approach in learning, enthusiasm and anticipation filled the meeting room. Teachers who had implemented this model were faced with the moment to measure the impact of their changes and share their learning with fellow educators. The evaluation session began with a discussion between participants, where they exchanged experiences, challenges, and successes

they faced during the implementation of the learning model. Constructive feedback from colleagues and facilitators provided valuable insights for further refinement and development. The highlight of the event was the presentation session of the development results, where teachers showed their creative learning projects and presented the data collected during the implementation. The atmosphere was filled with joy and pride as teachers explained the positive changes that occurred in classroom interactions, student participation, and learning outcomes achieved.

Each presentation tells a unique story of transformation, risk-taking, and dedication to creating challenging learning environments. The ensuing Q&A session creates an interactive forum where participants can exchange ideas and strategies. The culmination is an appreciation and award for the best innovation, recognizing teachers who have successfully created inspiring learning. Overall, the evaluation and presentations are not just a final assessment, but a celebration of achievement and a collective commitment to continually improve learning practices. This moment fosters a collaborative spirit among teachers, encourages the continued development of innovative approaches to education, and provides a positive impetus for change toward a more dynamic and relevant future of education (Samson, 2015).

The importance of evaluation is not only focused on the final results, but also on the transformation journey experienced by teachers and its impact on student learning. In a collaborative atmosphere, teachers share the challenges they faced during the implementation process, as well as the strategies they developed to overcome these obstacles. This discussion creates a space for exchanging experiences and provides inspiration for other participants to overcome similar challenges. The evaluation results include not only quantitative data, such as improved test scores or active student participation, but also real stories about changes in attitudes and mindsets (Van Hooijdonk et al., 2023). Teachers shared heartwarming anecdotes about learners who initially lacked confidence but have now grown into bold innovators. They also highlighted situations where students have begun to see learning as a creative adventure rather than a routine obligation. In addition, participants provided positive feedback about the coaching and mentoring sessions they received during the implementation process (Van Hooijdonk et al., 2023). The sense of support and collaboration built during the training proved critical in ensuring the successful implementation of the CPS-REACT model in the classroom.

Teachers expressed their appreciation for the participatory and in-depth approach of the training, which not only provided theoretical knowledge but also

empowered them to become agents of change in their learning environment. With the end of the evaluation session and presentation of the development results, the spirit of innovation and improvement continued to grow. Teachers returned to their schools with a new determination to continue honing their skills in implementing the CPS-REACT model. Today's success is not the end of the journey, but the beginning of a new phase in the effort to create more dynamic, responsive, and meaningful learning.

Conclusion

Based on the results of observations and training conducted, it can be concluded that this PKM can motivate junior high school science teachers to be creative in designing and preparing learning devices in the classroom and laboratory that are oriented towards students based on the environment so that the teaching and learning process can take place well. As for students, it can provide a clear picture/understanding of the material presented by the teacher, so that students are able to find explanations and provide responses to what they are learning. In addition, students are trained to find out for themselves what they observe and try to describe the concept through student worksheet media prepared with the help of the CPS learning model using REACT in junior high school science learning in Southeast Maluku Regency. Therefore, the CPS learning model using REACT in science learning that is designed is collaborated with several methods, namely reflective lectures, discovery, inquiry, demonstrations and questions and answers and recitations to express various concepts that are being studied in class and can be applied in everyday life.

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