INFLUENCE LEARNING MODEL CREATIVE PROBLEM SOLVING AGAINST SKILLS STUDENT PROBLEM SOLVING ON SOUND WAVE MATERIAL AT MAN 3 PADANG CITY

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ABSTRACT

Study This against the background Because low skills solution problem students in the eye Physics lessons at MAN 3 Padang City. This caused by because the learning process is lacking contextual and lack of exercise in solve related issues with material learning physics . For That in the learning process required A application of appropriate learning models . One of the learning models that can be used is a Creative Problem Solving learning model . The purpose of this research is This there For can know the influence of the Creative Problem Solving learning model on skills solution problem students on the material wave sound at MAN 3 Padang City. Study This is pre-experimental research with one group pretest posttest design . Population from study This is participant educate Phase F MAN 3 Padang City. Samples from study This taken use technique Purposeful sampling. The test instrument used that is instrument skills essay questions solution problem . Research results on hypothesis testing skills solution problem get mark significance < 0.05 which shows that there is significant difference between the average pretest and posttest results . So that can concluded that the creative problem solving learning model is significant influence skills solution problem student.

Keywords : *Creative Problem Solving, Problem Solving Skills, Sound Wave*

INTRODUCTION

The onset of the twenty-first century is recognized as the dawning of the Industry 4.0 period, establishing itself as a time of interconnectedness and worldwide integration. The demands of existence in this twenty-first century are numerous, especially in the realm of learning and development [1]. An educational approach tailored to the requirements of the twenty-first century incorporates diverse knowledge sets, proficiency in various skills, a cultivated mindset, and the aptitude to leverage technological advancements [2]. The present instructional model underscores cultivating the inherent aptitudes of students through the provision of enhanced guidance throughout their educational journey [3]. Navigating the educational framework of this twenty-first century necessitates a specific array of competencies, including effective communication, analytical reasoning, collaborative spirit, adept problem-solving abilities, forward-thinking innovation, and imaginative creativity [4]. This empowerment enables individuals to sustain a thriving and competitive presence in a progressively sophisticated and cutting-edge era characterized by global interconnectedness [5].

One of required skills in face various challenge in life that is skills solution problem . Skills solution problem is ability in understand , identify , and find method For overcome A problems . Skills solution problem can useful in develop new ideas For build new knowledge . There are some indicator solution problem according to [10] namely ; (1) understanding problem ; (2) planning a problem-solving strategy problem ; (3) implementing problem-solving strategies problems , and; (4) checking return acquisition the solution used . So in learning this 21st century everyone should own ability solution problem Because ability solution problem become indicator the most important thing to do owned by participants educate [3] .

Based on the tests conducted that The problems that occurred at MAN 3 Padang City were: low ability solution problem student especially in the eyes Physics lesson , thing the seen from test sheets completed by students on one of the material physics . Where are the test results done? students at MAN 3 Padang City can seen in the following diagram :

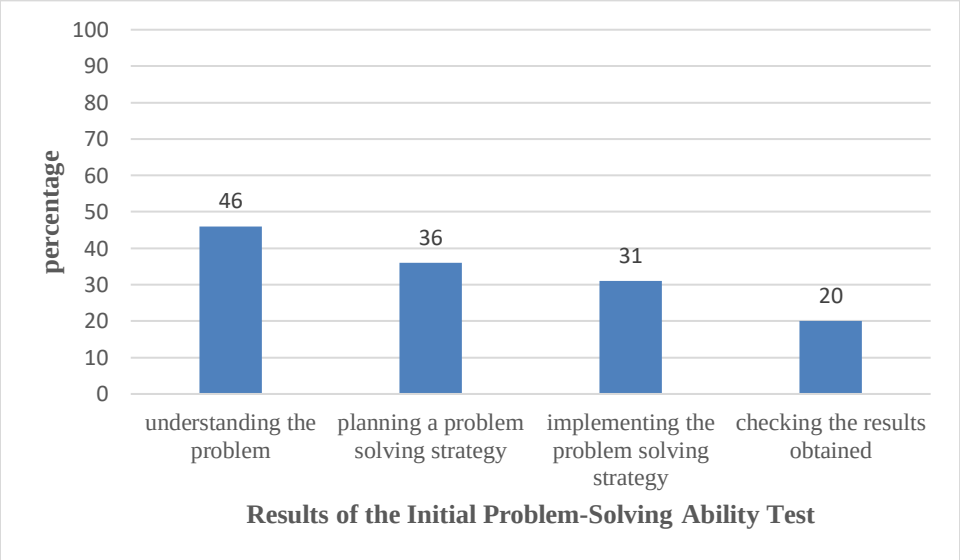


Figure 1. Diagram Of Initial Ability Test Results Solution To Problem

Based on the initial test results diagram ability solution problem students , where in because contains 4 indicators namely (1) understanding problem , (2) planning a solution strategy problem, (3) implementing a resolution strategy problems , and (4) checking return the results obtained . It can be seen based on the diagram that ability solution problem students at MAN 3 Padang City still classified as very low and necessary be improved . So it is necessary a learning model to become alternative such as *the creative problem solving* (CPS) model is needed For increase skills solution problem student .

The foundation of the creative problem-solving (CPS) learning model rests on creative problem solving. CPS involves cognitive functions, focusing on one's capability to discover groundbreaking answers when confronted with difficult and open-ended issues. This is achieved by enhancing creative thought processes, such as producing fresh concepts, modifying methods, and utilizing resolutions across diverse situations [7]. Creative problem-solving abilities were cultivated by Alex Osborn and Sydney Parnes. When using the creative problem-solving model, there exist six stages serving as essential frameworks. These steps are commonly known as OFPISA and consist of: (1) Discovering the objective; (2) Gathering facts; (3) Identifying the problem; (4) Generating ideas; (5) Determining the solution; (6) Achieving acceptance [8]. CPS-based education prompts learners to participate in problem discussions, perform research, and assess the outcomes of their problem-solving efforts; this refines abilities in logical, divergent, and convergent thought processes, alongside decision-making within problem-solving scenarios [9]. Furthermore, the CPS strategy is able to be integrated with modern learning resources, like videos or basic tools, with the aim of maximizing the learning process and encouraging students' creative sides [10]. Typically, employing the OFPISA steps in CPS education proves to be both pertinent and successful when tackling the demands of education in the 21st century, which requires both creativity and flexibility from the students [11].

The creative problem-solving (CPS) educational structure functions as a framework for acquiring problem-solving abilities and enhancing existing competencies. The distinctive attribute of the CPS approach, setting it apart from alternative methodologies, resides in its mandate for students to employ ingenuity in resolving challenges [12]. Creative problem-solving represents an adaptation of problem-based education, leveraging methodical technological strategies to arrange imaginative concepts for tackling predicaments [13]. The Creative Problem-Solving notion itself embodies a modification of learning through confronting problems, which employs structured and methodical processes to compile inventive thoughts when addressing existing difficulties [14]. CPS enhances scholastic performance and equips learners with essential skills, enabling them to confront practical difficulties with heightened innovation and efficacy [15].

The creative problem-solving instructional approach offers several benefits, notably its capacity to develop students' problem-solving abilities, refine their thinking processes, foster innovative concepts, and offer hands-on experience in tackling genuine issues [16]. When students encounter problems right from the start of their education, they learn to address challenges on their own, improving their capacity to come up with useful solutions and helping them use what they have learned in different real-world scenarios [17]. Moreover, integrating problems early in the learning process empowers students to become proficient self-sufficient problem solvers [18]. CPS delivers not only

an engaging and relevant educational experience but also dramatically improves mathematical problem-solving abilities and advanced cognitive capabilities [19].

Based on problem said , research This aim For know how far is the learning using the creative problem solving (CPS) model can influence skills solution problem students . Research This will done in context learning on the material wave sound . Research This expected can give contribution in a way theoretical in the world of education . In addition , in general practical , results study This expected can made into references by teachers, developers curriculum , and takers policy education in designing relevant teaching materials and learning strategies with need participant educate 21st century

METHOD

Methods used in the research This is method quantitative with type study pre-experimental design . In research This experiment done without existence control to influential variables . Where in the research this is the priority is treatment just without existence comparison with group control [9] . Design Research used in the study This that is one-group pretest-posttest designs . Sugiyono state that design This there is pre-test before given such treatment results treatment the can seen with precise and accurate Because can compared to with condition after given treatment (posttest) [12]Research design can seen in the table following :

Research Design

O_1 X O_2

Information :

O 1 : Pretest (before given treatment)
O 2 : Pretest (after given treatment)
X : Treatment (treatment)

Study This done during four times that took place during four week at MAN 3 Padang City. Instruments study in the form of designed essay test For measure skills solution problem students. Implementation study done with give test initial (pretest) for know skills solution problem student before treatment , then give treatment in the form of learning material wave sound, and ends with giving test final (posttest) for measure skills after treatment [13].

Result data *pretest* and *posttest* analyzed use statistics descriptive and statistical inferential statistics descriptive used For describe the data with count average value , value highest value lowest and standard deviation , so that can give description general results Study student before and after treatment . Statistics inferential used For test hypothesis research . The process of data analysis in statistics inferential involves two steps . First , Shapiro-Wilk is used For test normality of pretest and posttest data . Second , the Wilcoxon Signed-Rank Test was used For determine significance difference score Because the result show that the data is not normally distributed . All data analysis was carried out using SPSS 25 and Microsoft Excel 2019.

RESULTS AND DISCUSSIONS

Study This aim For know the influence of learning models *creative problem solving* to skills solution problem students on the material wave sound . Skills solution problem analyzed based on four indicator that is understand problem , planning a solution strategy problem , implement problem solving strategies problem , and check return acquisition results obtained . Data obtained through the pretest and posttest given to 39 students class XI MAN 3 Padang city after follow learning using a creative problem solving model . Following This explained the data obtained For every indicator skills solution problem .

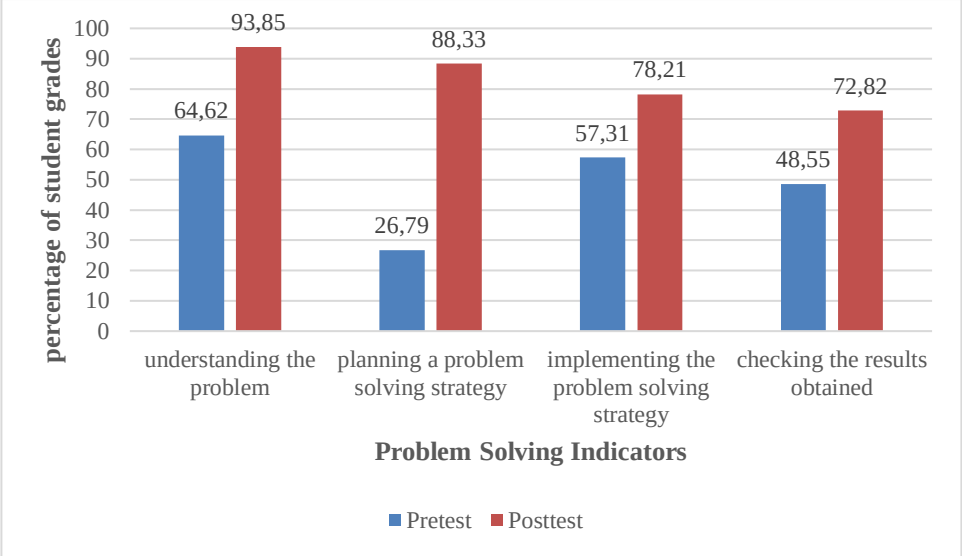


Figure 2. Percentage Score Skills Solution Problem Student Class XI In Every Indicator

Figure 2 shows the percentage diagram results *pretest* and *posttest* skills solution problems in each indicator skills solution problem . The results show that percentage every indicator skills solution problem own difference . Indicator understand problem For results *pretest* obtained percentage of 64.62 and for results *posttest* obtained percentage of 93.85. Indicator planning problem-solving strategies problem For results *pretest* obtained percentage of 26.79 and for results *posttest* obtained percentage mark of 88.33. Indicator implementing problem-solving strategies problem For results *pretest* obtained percentage mark of 57.31 and for results *posttest* obtained percentage mark of 78.21. Indicator inspect return acquisition results obtained For results *pretest* obtained percentage mark of 48.55 and for results *posttest* obtained percentage mark of 72.82.

Skills solution problem students in class XI were analyzed in a way descriptive based on four indicator main , namely understand problem , planning a solution strategy problems , implementing resolution strategies problem , and check return the results obtained . The average measurement results at the pretest stage show mark lowest on the indicator planning a resolution strategy problem with value 26.79 and value highest on the indicator understand problem with value 64.62. After given treatment using a learning model *creative problem solving* on the material wave sound, the average score increased in a way significant in all indicator with mark highest stick to the indicators understand problem with value of 93.85, followed by planning a solution strategy problem with value 88.33, check return results obtained with value 72.82, and implement

the completion strategy problem with value of 78.21. The visualization in Figure 2 shows pattern the increase that consistent in all indicators , which reflect influence intervention learning. Descriptive statistical analysis pretest and posttest scores shown in Table 1.

Table 1. Statistics Descriptive Skills Solution to problem

Statistics	Pretest	Posttest
Minimum value	32	64
Maximum score	65	100
Average	49.40	83.97
Median	52	85.33
Standard Deviation	9.22	9.33

Table 1 shows size centralization and dissemination of data results *pretest* and *posttest* in class sample with amount student as many as 39 people. The results of the skills *pretest* solution problem student with score highest 65 and score the lowest is 32. Meanwhile results *Posttest* t skills solution problem student with score highest 100 and score lowest 64. Average score of results *pretest* which is 49.40 and the average score of results *posttest* 83.97. Then standard deviation from results *pretest* is 9.22 and standard deviation from results *posttest* namely 9.33.

Before embarking on hypothesis testing, evaluations of normality and homogeneity were performed to ascertain the suitability of statistical methods. The Shapiro-Wilk normality test yielded a significance level of 0.038 (< 0.05) for the pretest data, suggesting a non-normal distribution. Similarly, the posttest data displayed a significance level of 0.010 (<0.05), also indicating a deviation from normal distribution. Consequently, the hypothesis was assessed employing a non-parametric approach, specifically the Wilcoxon Signed Rank Test. The homogeneity test revealed a significance value of 0.000 (<0.05), implying a potential impact from the application of Creative Problem Solving learning models on students' problem-solving abilities.

Study This done in line with theory put forward by Alex Osborn and Sidney Parners . Osborn and Sidney developed skills solution creative problems . Osborn stated that development talent creative happen due to deliberate , especially in the field of education . Learning models *Creative Problem Solving* emphasize on skills teaching and solving problem , then development skills and arrangement solution innovative [10]. Research This aim For know the influence of learning models *Creative Problem Solving* (CPS) against skills solution problem students on the material Sound Waves at MAN 3 Padang City. Based on results research that has been done through stages *pretest* , administration treatment , *and posttest* , data was obtained that happen improvement mark skills solution problem student after CPS learning model is applied .

For ensure that improvement the significant in a way statistics , results data *pretest* and *posttest* analyzed using the Wilcoxon Signed Rank Test. The results of the analysis show existence significant difference between mark *pretest* and *posttest* at level significance of 0.05. This is means that the Creative Problem Solving (CPS) learning model provides influence positive to skills solution problem students . With Thus , the use of the CPS model is not only capable increase results learn , but also train student think more creative , systematic , and innovative in finish problem physics , especially in materials Sound Waves.

An examination of scores prior to and following the test indicates that the CPS framework has a beneficial effect on enhancing pupils' capabilities in problem-solving. This agrees with the

conclusions of studies by [12], which indicates that using the CPS learning strategy can dramatically improve students' academic achievement and problem-solving skills. This positive change happens because the CPS framework allows students to actively explore, thoroughly examine, and come up with creative solutions to problems based on the OFPISA phases (identifying the objective, gathering facts, defining the problem, generating ideas, discovering solutions, and gaining acceptance).

By following the OFPISA stages, students become accustomed to thinking systematically, from identifying goals to evaluating the resulting solutions. This process not only improves cognitive abilities but also trains collaborative and communication skills among students when discussing emerging ideas. In the context of physics learning, particularly in the Sound Waves material that demands conceptual understanding and application in everyday life, the CPS model can help students connect theoretical concepts with real-life situations. This makes learning more meaningful, because students are not only memorizing formulas but also able to apply concepts to solve problems they face in everyday life.

Upon scrutinizing the data through statistical evaluations employing the Wilcoxon Signed Rank Test—chosen due to the non-normal data distribution and the implementation of a One Group Pretest-Posttest design—a significance level (Asymp. Sig 2-tailed) of 0.000, which is less than the threshold of 0.05, was observed, indicating the rejection of the null hypothesis (H0) and the acceptance of the alternative hypothesis (H1). Hence, the inference drawn is that the Creative Problem Solving learning model exerts an impact on the problem-solving capabilities of students specifically concerning the Sound Waves subject matter.

This result shows that the implementation of the Creative Problem Solving (CPS) learning model is effectively capable of increasing students' problem-solving skills. Findings show that when students are given the chance to be involved in the process of finding problems, analyzing information, and compiling solutions, they can more easily understand concepts learned. In the context of the Sound Wave material, the CPS model helps students connect physics concepts with their implementation in everyday life, so that learning becomes more meaningful and impactful on improving study results.

One of the factors that makes the CPS model effective in increasing students' problem-solving skills is because CPS is based on student-centered learning, where students play an active role in the learning process. This model also provides room for students to find ideas and solutions creatively in groups. This is in accordance with research results by Malisa et al. (2018) and Wisela et al. (2020), which state that the CPS learning model is capable of stimulating students' problem-solving ability through group discussions and direct problem-solving experiences.

In addition, the application of the CPS model provides opportunities for students to work together, exchange ideas, and test various alternative problem solutions before determining the best solution. This process makes students more actively involved in learning and fosters a sense of responsibility for the results achieved together in their group. Thus, learning does not only focus on the mastery of concepts but also on direct experience in solving physics problems relevant to everyday life. This is in line with similar research results that show that CPS implementation is capable of increasing learning effectiveness as well as producing a deeper conceptual understanding in students.

From the implementation of learning, it is known that students' problem-solving skills increase significantly in the aspects of understanding problems and planning problem-solving strategies. Students are able to identify relevant information from the given problems and compile

systematic solution steps. This result is in line with the opinion of [14], which states that the CPS model trains students in looking for problems, evaluating findings, and producing solutions creatively.

Improvements in both aspects show that the CPS model is capable of helping students build a stronger conceptual understanding while guiding them to design targeted resolution strategies. Thus, students are not only fixated on memorizing formulas but also skilled in connecting available information with the right solution procedure. This has a positive impact on the physics learning process because students are better prepared to face variations in questions and real problems related to the Sound Waves material.

Generally speaking, the use of the Creative Problem Solving (CPS) teaching approach yields advantageous outcomes concerning the problem-solving capabilities demonstrated by pupils attending MAN 3 in Padang City. The study's findings indicated that pupils, subsequent to their involvement in educational activities utilizing the CPS framework, exhibited an improved capacity to comprehend the presented problem, pinpoint crucial data, and devise more organized procedures for its resolution. This underscores the potential of the CPS approach as a viable substitute instructional method for honing skills relevant in the 21st century, notably problem-solving proficiency, a competency of considerable significance within the curriculum.

The application of the CPS model in physics learning also provides a more meaningful learning experience for students. The learning process is not only oriented towards theoretical mastery of the material but also encourages students to apply the concepts they have learned to solve real-life problems relevant to everyday life. Thus, students not only gain cognitive understanding but also develop analytical thinking skills in solving various types of problems.

Furthermore, the results of this study corroborate previous research findings that suggest problem-solving-based learning models can improve learning outcomes while providing a more active and collaborative learning experience. This suggests that the use of CPS can help teachers create a more interactive learning environment, foster student self-confidence, and provide students with broader opportunities to develop their potential.

With these advantages, the CPS learning model can be a relevant alternative strategy for physics and other subjects. Consistent implementation of CPS is expected to improve the quality of learning in schools and produce graduates with 21st-century skills, particularly in problem-solving, better prepared to face the challenges of an increasingly complex global era.

Furthermore, this research provides practical implications for physics teachers, enabling them to be more creative in designing learning. By utilizing the Creative Problem-Solving model, teachers can provide challenges in the form of contextual problems relevant to students' lives, thus orienting learning not only toward cognitive achievement but also toward developing social, collaboration, and communication skills. This will help students become more adaptable in facing various real-life situations and foster learning independence, which is crucial in facing the challenges of the 21st century.

CONCLUSIONS

The research results indicate a significant difference between the pretest and posttest scores of students' problem-solving skills before and after the implementation of the Creative Problem Solving (CPS) learning model. This difference demonstrates that students' problem-solving abilities were positively influenced by the learning treatment given. The improvement in scores is

not only numerical evidence but also reflects changes in the way students approach and respond to problems presented during learning. They showed better understanding in identifying problems, analyzing relevant information, and formulating appropriate solutions.

The statistical assessment, performed via the Wilcoxon Signed Rank Test due to the non-normal distribution of the data and the implementation of a One Group Pretest-Posttest research design, yielded a significance value (Asymp. Sig 2-tailed) of 0.000, which is below the 0.05 threshold. This outcome suggests the rejection of the null hypothesis (H0) and the acceptance of the alternative hypothesis (H1). As a result, it is reasonable to infer that employing the CPS learning model exerted a statistically notable impact on the students' abilities to solve problems, specifically concerning the Sound Waves content within the realm of physics education.

This statistical finding strengthens the argument that the CPS model is an effective instructional strategy in improving students' cognitive skills, especially in mastering abstract concepts and applying them in real-life contexts. The increase in posttest scores compared to pretest scores shows that students were not only able to retain information but also could process and apply the concepts they learned to solve problems more effectively. Thus, the CPS learning model serves as a meaningful alternative in physics education to promote active, student-centered learning and to enhance problem-solving competencies.

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