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The Effect of Project Based Learning Model with KWL Worksheet on Student Creative Thinking Process in Physics Problems

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Abstract
This study research was aim to analyze effect of project based learning model with KWL worksheet on Student creative thinking in solved physics problems. The type of this research was quasi-experiment with two-group pretest and posttest design with the population in this research is all college in Undergraduate Education Physics of State University of Medan in A.Y. 2012/2013 were randomly selected and divided into two classes: the experiment class and the control class. The research instrument was a essay test in higher order thinking with five item. Analysis data would be using ANOVA One ways. The result shown that Student creative thinking in project based learning model is greater than cooperative learning models. It proved learning process with Project Based Learning actually effective to advance Student creative thinking process and observations made by the observer indicated that the student activity positive increased.
Keywords: Project Based Learning Model, KWL Worksheet, Creative Thinking

1. Introduction

Education is a support in creating the nation's progress and the countries. This was seen at the education level of the people who becomes an assessment of the human resources (HR) level of a country. The higher human resources level in a country considered the more developed countries. An assessment in human resources level development can be seen in the attention to education in a country. An attention may be the government roles in advancing the education of the nations and states. Fraser (2002) describes the relationship between the environment and the learning process as an illustration of the variation in comparing, evaluation, and applying learning as observation in assessment learning outcomes.

Development of instructional media adapted to the development of technology to present new things in teaching so as to attract interest from Students. It can be seen from the use of ICT in learning that done by Jarosievitz (2012) in Physics teaching methods combined in the project. In application, activities more attractive by engaging multimedia and internet communication. Student can awareness to making project from media ICT to applied of knowledge to making material visualization in Physics. It will be shown creativity in Students activities.

The using of instructional media and learning through environmental adaptation of Students to be more creative and motivated in learning activities. Roy (2007) explained that express complex thinking can be achieved by looking at the environment and seek through the experience and views are obtained, which can lead to creativity in line with the spirit of understanding and goals achievement. In this case, Students can imagine, rational thinking, investigating, and designing something in the imagination realized. This activity is scientific knowledge in the values and assumptions of the Nature of Science (NOS) as proposed Liang, et al, (2005). So, Students will be motivated and more interested in learning because Student will feel that do have more meaning in life.

Even so, in learning activity at classroom as based on observations and interviews of Students in Undergraduate Physics Education at State University of Medan concluded that as long as the learning almost 80% Students are thinking how can finished study as quickly, whereas motivation of Students have high learning outcome in Physics learning but nothing support from learning to creativity advance, especially in creative thinking. Student learn Physics just with following instruction from Teacher. It was shown to solve problem in Physics which is not like as examples given. In solving problem of material Physics, Students can finished and solved it. But, Student rarely using another ways to solved it. This is due to lack of direct awareness to solving project effectively and efficiently in learning. It was shown with Student activity which less applied Physics concept in real life problems. Student solved of task and problem test of Physics just for getting pass of examination from Teachers.

In learning Physics theory, Student rarely thinking for advance creating ability to making something a new idea or way innovation in solving concept problem in Physics. Student just answer calculating of test but not understood of problem as clearly. So that the creativity of Students is not reached and the pattern of thinking is not systematic. Students are also arguments on the issues are rarely a problem. While the Physics experiment observation, Student just following steps in instruction of experiment. Student is rarely trained to making a new

steps or innovation in experiment. Student just trained to proved in experiment.

Based on consideration of the increased motivation and thinking ways of Students, the appropriated model can reached is Project Based Learning (PjBL) models. With PjBL Student will be trained to creative and innovative in learning. In this case, PjBL can also improve Student's creative thinking that can lead to the creation or realization of the planned project. Hong, et al, (2010) states that PjBL is a significant approach in enhancing the potential of changing the way teaching and learning is passive to enable Students with the tools and media support to improving learning outcomes. According Holubova (2008) PjBL has advantages in this type of teaching on Student activities and opportunities to solve multidisciplinary problems.

In addition, PjBL can be done in an environment outside of school, work together to teach, train Students examined, using various tools, technologies, and materials. This is confirmed ChanLin (2008) which states that it is important to do PjBL implementation by integrating technology in learning as Students planning on the experience of self-exploration. This is done because according to Nurohman (2008) have PjBL stages of learning that is consistent with scientists methods, so as to facilitate the internalization of values and spirit of the methods scientists to Students. Bell (2010) stated PjBL as innovation in learning approaches by Teachers with multiple strategies critical for success in the twenty-first century. In this study Students are expected to control the learning through inquiry properly, cooperative, collaborate, and create works from the reflection of knowledge.

To reached success in learning to PjBL according to Heo, et al, (2010) there are two things to note. First, learning support in order to create quality of Student interaction in learning. Second, the complexity of the project that made the problems that formed the topic of shared knowledge. In this case, as Teachers are expected to continue to maintain that Students remain on the right track, because Students need a facilitator as a guide in determining the success and motivation as the spirit to realize their project. However, the problems must be faced when using PjBL is the use of a fairly long time. This is because the level of planning and design. Not to mention if there is a failure in implementation, not all groups can set up an existing project, and cost issues.

For that, use the Know-Want-Learn (KWL) worksheet as controlling the activities to be more systematic and efficient use of time because it can focus more on Student work. In addition, Teachers are expected to be able to give encouragement, motivation, and facilitation of referrals when Students need it. This is done so that Students are more excited that the results are expected to be more optimal (Al-Khateeb and Idrees, 2010; Tucker, et al, 1997). KWL worksheet is proven to streamline the use and effectiveness of performance based on research Tucker, et al, (1997). According to Tucker, et al, (1997) to organize their ideas Students must be exploration in hand writing, illustrations, and determine for themselves the things that can assist them in connecting the ideas of settlement of a problem, both personally and in groups. This is confirmed by Cassady, et al, (2004) that the KWL is a self-report of what Students know and have learned, whereas the anchor task provides a way for Students to demonstrate what Student have learned. Moreover, KWL can be reach three-dimensional in learning ie service learning, social issues, and content learning.

The relationship between anxiety and originality approached significance in the direction predicted. The need to measure creativity as comprehensively as possible, and across different populations, was identified and discussed in relation to the results obtained. Another means, according to Barlow (2000) on the structure of which is presented on the level of intelligence of Guilford that divergent thinking is the ability to do something with the memory access in discovering a large number of ideas that matched a simply criteria. In this case, it is advisable to increased the creativity is focused on the various divergent production skills there seems to be a strong argument in favor of focusing upon the various skills related to transformations, which would support the idea of focusing some attention upon shifts in insight. This is confirmed by Rabari, et al, (2011) supports the evidence from several theoretical viewpoints suggested a link between divergent thinking and critical thinking, the creative attitude, and interaction with materials science. However, it points to some Level of independence among various components of the construct.

Based Munro (2004) explanation that creativity is seen as synonymous with divergent thinking. But, the link between divergent thinking and convergent thinking measured by the traditional intelligence is complex. The results obtained with traditional tasks intelligence measures not indicate creative potential. The creative thinking in science indicates some of the ways of thinking that have led to creative outcomes. The creativity in science involves search combined with recognition of patterns, enabling the use of information stored, evidence for the thinking used. In otherwise, processes for creative production are indicated in diaries, laboratory notebooks, and experiments. So, it takes the optimality in directing and implementing PjBL in learning.

1.1 Project Based Learning

Project based learning (PjBL) is a development in teaching as a learning approach introduced by John Dewey. However, in its development PjBL began to be used as a method of learning to draw and show creativity of students. Which is generally viewed from the presentation of an authentic problem situations and meaningful to students, who can provide their services to conduct an investigation and inquiry. The theory that supports

model of project based learning is the theory of constructivism pioneered by Piaget and Vygotsky. Project based learning is a teaching model that uses student's learning approach to the problem of an authenticity (constructivism). The authentic problems can be interpreted as a problem that is often found in daily life the day and making a project as the result of study. Project Based Learning has been defined in many ways. For this reason there exists no single definition. In the given definitions, PJBL has been referred to as a "model", "approach" or a "technique", or as "learning" or "teaching". Here is some of the view on PjBL in learning.

According Bell (2010) Project-Based Learning an innovative approach to learning that teaches a multitude of strategies critical for success in the twenty-first century. According Klein, et al, (2009) Project-based learning is the instructional strategy of empowering learners to pursue content knowledge on their own and demonstrate their new understandings through a variety of presentation modes. The same defined is explained Han and Bhattacharya (2001) that Project Based Learning is a teaching and learning strategy that engages learners in complex activities. It usually requires multiple stages and an extended duration and more than a few class periods and up to a full semester. Projects focus on the creation of a product or performance, and generally call upon learners to choose and organize their activities, conduct research, and synthesize information. While, Hadgraft (2012) explained Project Based Learning (PjBL) that is centered on the learning that emanates from a real engineering project.

In development, now PjBL adapted into start learning model that can lead students to be more persistent, creative, passionate, and interested in learning science. Model of PjBL engage students in learning requires students to be able to produce a final project of learning in lessons. By learning will held the creations and innovations of the ideas of students in completing something of a problem. Gibbs (2003) asserts that the benefits of Project-Based Learning as increased motivation, increased problem-solving ability, improved library, and Internet research skills, increased collaboration, increased resource-management skills, increased presentations, and publics speaking skills, the research that supports projects, constructivism, multiple intelligences, inquiry-based learning, discovery learning, problem-based learning, cooperative learning, process writing, and standards-based authentic multidisciplinary tasks. This is consist with the results of research conducted by researchers in applying PjBL as a model in the study of learning as Buck Institute for Education (2010) defined that Project Based Learning is an innovative model for teaching and learning. It focuses on the central concepts and principles of a discipline, involves students in problem-solving investigations and other meaningful tasks, allows students to work autonomously to construct their own knowledge through inquiry, and culminates in a realistic hands-on project.

Heo, et al, (2010) defined Project-based learning (PjBL) is an essential model for embodying the social–cultural perspectives of learning in educational settings. According Thomas (2000) Project-Based Learning is a model that organizes learning around projects, with based on challenging questions or problems. The PjBL that involve students in design, problem-solving, decision making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations. From some of these explanations can be seen clearly that the model of PjBL designed as a learning model that is used as a creative director and developer of students in learning to be more critical and innovative thinking on the problem. Project-based learning is an instructional model that involves students in investigations of compelling problems that culminate in authentic products. The projects that make for stronger classroom learning opportunities can vary widely in subject matter and scope, and can be delivered at a wide range of grade levels. Projects put students in active role problem solver, a decision maker, investigator, and documentation. The projects serve specific, significant an educational goals; Student are not diversions or adds-ons to the "real" curriculum. The PjBL learning activities are long-term, interdisciplinary, student-centered learning, and integrated with real-world issues and practices.

According Thomas (2000) that *PjBL projects are central, not peripheral to the curriculum*. This criterion has two corollaries. First, according to this defined feature, projects are the curriculum. In PjBL, the project is the central teaching strategy; students encounter and learn the central concepts of the discipline via the project. There are instances where project work follows traditional instruction in such a way that the project serves to provide illustrations, examples, additional practice, or practical applications for material taught initially by other means. However, these "application" projects are not considered to be instances of PjBL, according to this criterion. Second, the centrality criterion means that projects in which students learn things that are outside the curriculum ("enrichment" projects) are also not examples of PjBL, no matter how appealing or engaging.

In other words, PjBL have characteristics: *Student centered learning,* whereas the focus of the project remains grounded curriculum that must comply with the content standards and basic competencies. The PjBL starting from depth questions to be framed and is part of the learning curriculum called with questions within the scope of the curriculum (CFQ). The project involves the assessment process with a variety of assessment techniques. The project involves tasks and activities within a specific time period. The project relates to real life (contextual). Students demonstrate their knowledge and skills through the performance of works and published,

presented, or displayed. The support of technology in improving student learning. In addition, PjBL have principles, namely: 1**) Principles of centralized (centrality),** This principle asserts that the project work is the essence of the curriculum. This model is central to the learning strategy, where students learn the main concepts of a knowledge through project work. 2**) The principle of the driving questions/guide (driving question),** Project focuses on "questions or concerns" that could encourage students to strive to obtain concept or principle in certain field. The link between conceptual knowledge with real activity through the submission of questions or by providing definition of the problem in the form of weak so in this case the external work that can increasing student's motivation (internal motivation) to foster independence in learning tasks. 3**) Principles of investigation constructive (constructive investigation),** is a process that leads to the achievement of objectives, which contains the activities of inquiry, concept development, and resolution. In the investigation includes the design process, decision-making, problem-finding, problem solving, discovery, and model building. In this project-based learning activities have included the transformation and construction of knowledge. In this case, the Teacher must be able to design a project that is able to work to foster research, taste for trying to solve the problem, and curiosity is high. 4**) The principle of autonomy (autonomy),** can be used as an independent student in implementing the learning process, that is, free make choices, work with minimal supervision, and responsible. Therefore, student worksheets, laboratory work instructions, and the like is not an application of the principles of project-based learning. In this case only the Teacher acts as a facilitator and motivator to encourage student's independence. 5**) The principle of realistic (realism),** the project is something tangible and can provide a realistic feeling to the students, including choosing a topic, task and role of work context, collaborative work , product, customer, and standards of product. According Capraro and Slough (2009) said that *PjBL brainstorming* is used as a pedagogical technique to establish teams and encourage a common focus. It is during brainstorming sessions that teams develop shared knowledge and a group dynamic that will serve as the incubator for their work together and eventually will lead to the group solution. The term *relevance* has to have many meanings: the usefulness of the education to life-long learning, meaningfulness to self, importance to society, real-world applicability, and finally, the formation of moral decision-making. In PjBL, relevance is not an over simplification of these ideas, just a prioritization that is used to align learning with formal standards or student expectations. So in PjBL educators talk about educationally relevant, and it is this educational relevance that facilitates the development of rigorous and challenging experiences for students.

Thus, whereas in PjBL students are pulled through the curriculum by a meaningful question to explore, an engaging real-world problem to solve, or a challenge to design or create something. Before Student can be accomplished this, students need to inquire into the topic by asking questions and developing their own answers. To demonstrate what Student learn, students create high-quality products and present their work to other people. Students often do project work collaboratively in small teams, guided by the Teacher.

In the learning, PjBL model has been contributed components like as learner-centered environment, collaboration, curricular content, authentic tasks, multiple expression modes, emphasis on time management, and innovative assessment. According Baker, et al, (2011) said that Project-Based Learning Model engages students in relevant learning that positively impacts their local communities and ecosystems. Teachers or mentors facilitate, rather than direct, students as Student explore a system, ask questions, look at problems within that system, determine solutions, plan and ultimately implement a project. The projects of student can be pre-determined by an educator or can be completely determined by the students.

The result is a student-guided service learning project that involves students in the technological design process while building and enhancing content knowledge, problem solving abilities, systems thinking and, communication skills, e.g; 1) Asking questions (for science) and defining problems; 2) Developing and using models; 3) Planning and carrying out investigations; 4) Analyzing and interpreting data; 5) Using mathematics, information and computer technology, and computational thinking; 6) Constructing explanations (for science) and designing solutions; 7) Engaging in argument from evidence; 8) Obtaining, evaluating, and communicating information. Because of that PjBL is valuable; it effectively teaches content knowledge and skills, builds deeper understanding of concepts, and makes a school curriculum more engaging and meaningful for students. PjBL is one of the best ways to prepare students for the demands of life, citizenship, and work in today's world. PjBL is often focused on creating physical artifacts, but the artifacts are not as important as the intellectually challenging tasks that led to them. These artifacts and activities *could* be part of a rigorous project if Student help students meet a complex challenge and driving questions. According ChanLin (2008) that students need to participate in various actions.

Cakmakci and Tasar (2010) explained that in the project based learning perspective, learning is dealt with the reorganization of the cognitive structure of the learner. Permanent and efficient learning are a target in project based learning with active participation of the student. In this context, the project executor has important responsibilities such as preparation of the project plan, determination of sources and tools, continuous supplementation of the project with innovative changes via observation, and control of student activities with

knowledge transfers. The same defined is described Laffey, et al, (1998) which explained that a project is pertinent to learner's real worlds, requiring collaborative investigation and the production of a series of project artifacts, learners are able to acquire process skills such as planning, implementing, and monitoring of a project as well as the content knowledge. Blumenfeld, et al, (1991) described two components of PjBL: problems to be solved (or tasks to be accomplished), and tangible products as a result of the project.

PjBL projects are focused on questions or problems that "drive" students to encounter (and struggle with) the central concepts and principles of a discipline. The definition of the project (for students) must "be crafted in order to make a connection between activities and the underlying conceptual knowledge that one might hope to foster". Then, PjBL projects may be built around thematic units or the intersection of topics from two or more disciplines, but that is not sufficient to define a project. Projects involve students in a constructive investigation. An investigation is a goal-directed process that involves inquiry, knowledge building, and resolution. Investigations may be design, decision-making, problem-finding, problem-solving, discovery, or model-building processes. But, in order to be considered as a PjBL project, the central activities of the project must involve the transformation and construction of knowledge (by definition: new understandings, new skills) on the part of students. In otherwise, Capraro and Slough (2009) said that PjBL for the purposes here is the use of a project that often results in the emergence of various learning outcomes in addition to the ones anticipated. The learning is dynamic as students use various processes and methods to explore the project. The project is generally information rich but directions are kept to a minimum. The richness of the information is often directly related to the quality of the learning and level of student engagement. The information is often multifaceted and includes background information, graphs, pictures, specifications, generalized and specific outcome expectations, narrative, and in many cases, formative and summative expectations.

Another thing explained Thomas (2000) that there are a number of ways that research on student characteristics in PjBL can be conducted. Alternatively, PjBL designs or features in order to adapt to (accommodate, remediate) student characteristic variables. There are a number of student characteristic variables that might be investigated in the context of Project-Based Learning at five critical thinking behaviors (synthesizing, forecasting, producing, evaluating, and reflecting) and five social participation behaviors (working together, initiating, managing, inter-group awareness, and inter-group initiating). Results from the study are provocative, but difficult to assess. Overall, high-ability students engaged in the criterion social participation behaviors more than two and one-half times as frequently as low-ability students in the four classes observed and engaged in critical thinking behaviors almost 50% more frequently.

Thus, effective project-based learning has the following characteristics: leads students to investigate important ideas and questions, framed around an inquiry process, differentiated according to student needs and interests, driven by student independent production and presentation rather than Teacher delivery of information, requires the use of creative thinking, critical thinking, and information skills to investigate, draw conclusions about, and create content, and connects to real world and authentic problems and issues. According Buck Institute for Education (2010) that there are three 'conditions' that are necessary for successful Project Based Learning. **First**, A strong Teacher-student relationship. The PjBL works best when you have established a positive, communicative relationship with your students. PjBL is a community oriented, relationship driven style of teaching and learning. **Second**, An atmosphere that emphasizes rigor and accountability: Project Based Learning requires that students take responsibility for their own learning. The more Student understand the importance of solid learning and being accountable for results, the more Student will be self-directed and high-performing in learning. **Third**, an opportunity for student to involvement which respectful listening and good communication will improve the quality of projects. The Project-based Learning Model provides a scaffold or structure for students to engage in each of these practices by taking the steps to develop and implementation of a project. According Gibbs (2003) said Steps in Project Design generally shown in Determine goals, objectives, benchmarks based on standards; Determine the essential question and scaffolding questions; Determine the project medium, and parameters; Develop necessary handouts, check lists, support materials; Determine beginning, intermediate, and end dates; Provide prototypes; Gather necessary resources, including time; Develop rubrics for authentic assessment; Consider self-critique; Effective projects; Address issues that are broader than the brightest student; Allow everyone to achieve success; Recognize student's drive to important work; Engage in provocative issues; Lead students to do in-depth exploration; Connect know and do; Integrate cross curricular multiple intelligences; Allow the Teacher to play guide on the side and let students discovery and construct their own meanings.

In learning model has a syntax which is the phase of each activity, so it can run systematically. Syntax in order to help directed the learning. Syntax project based learning model can be seen in Table 1.

Table 1 Syntax of Project-Based Learning Model

Phase	Student Activities	Teacher Activities
Goal description	Step 1: Describe the Ecosystem	Explanation problem, coordinating student/peers, and giving motivation.
Specify criteria	Step 2: Define the Problem	Directed student in investigation.
Background knowledge	Step 3: Research the Problem	Guide and directed student to find information about problem from investigation.
Generated ideas	Step 4: Understand Stakeholder; Step 5: Determine possible solution	
Implement solution	Step 6: Develop a Plan	Assessment, collaboration, and supervised.
Reflect		
Generalize	Step 7: Implement the Plan; Step 8: Summarize, Evaluate, and Reflect	Moderate presentation, giving reflection, and assessment

The syntax is based on the phases contained in the steps in the key elements of PjBL. In students activity can be seen clearly the description of the activities in the following steps of learning in Table 2.

Table 2 Description of Phase Student Activities

Phase	Description of Indicators
Determined Project Step 1: Describe the Ecosystem Step 2: Define the Problem	(a) find general and originally idea, (b) Important and attractive, (c) Descriptive complex problem, (d) Showing relation idea, (e) Primary of problem solved ill defined.
Determined Context of study case Step 3: Research the Problem	(a) Questions about real world, (b) Student autonomy is primary, (c) Inquiry done in general context, (d) Student may manage time effectively and efficient, (e) Full study and self-control, (f) simulated professional work.
Activities Planning Step 4: Understand Stakeholder; Step 5: Determine possible solution	(a) read, (b) research, (c) observation, (d) interview, (e) record, (f) visited something about project, (g) internet access
Activities Process Step 6: Develop a Plan	(a) sketching, (b) analyzing, (c) counting, (d) generated, (e) advance prototype.
Applying Project Step 7: Implement the Plan; Step 8: Summarize, Evaluate, and Reflect	(a) Trying making project, (b) testing and verification, (c) evaluating result, (d) revised product, (e) make recycle project, (f) Classification the best product.

1.2 KWL Worksheet

A KWL (Know-Want-Learn) was described by Ogle in 1986 as a framework that is used to connect a prior knowledge of student to actively learning. The student begins by thinking about what Student already **Know** about the topic of study. Next, Student think about what Student **Want** to know, and finally, Student actively **Learn** something new about the topic. The students can do this activity independently, with minimal guidance from the Teacher, or it can be a Teacher directed activity. In other way, the K-W-L is a strategy that models the active thinking needed when reading expository text. The letters K, W, L stand for three activities students engage in when reading to learn: recalling what Student *KNOW,* determining what Student *WANT* to learn, and identifying what Student *LEARN* as Student read. KWL can be used as an introductory strategy in order for pupils to document their present level of knowledge and what gaps may exist in that knowledge, to structure progress in their learning and to analyze what new information has been learned after research.

This activity builds upon prior knowledge and understanding and develops teamwork skills. If the KWL chart is carried out in groups, it may consolidate communication skills and teamwork. On a KWL grid, pupils write under 'K' what Student think Student already know about a particular topic or issue. If pupils are working in groups, Student may wish to use a Post-It style activity before writing their combined ideas onto the grid. Pupils are then encouraged to think about the gaps in their knowledge by filling out what Student *want* to know

in the 'W' column. Once the topic is completed, pupils might return to their grids to fill in the final 'L' column. Here Student confirm the accuracy of their first two columns and compare what Student have learned with their initial thoughts on the topic in the 'K' column.

In the class, The KWL is designed for group instruction and can be used with either whole classes or smaller groups. It can be used in all curricular areas and at all grades in which students are reading expository material. 1) **Group instructions**. The initial group portion of this strategy involves three basic components: a. First, the Teacher engages students *in a discussion of what Student as a group already know about the concept the Teacher or the students have selected to introduce the lesson.* The Teacher lists this information on the chalkboard or overhead projector. When disagreements and questions emerge, the Teacher notes them and suggests that students may want to include them on the center column as questions Student want to have answered; b. Second, after students have volunteered all that Student can think of about the concept, Student should be asked to *categorize the information Student have generated.* The Teacher may need to identify one general category that incorporates two or more pieces of information on the board to model the building of chunks or categories; c. Third, after the students are somewhat familiar with this process, Student should be asked to *anticipate the categories of information Student would expect to have included in an article on the topic.* The categories of information identified will be useful in processing the information Student read and in future reading of a similar nature. 2) **Individual reflection**. After the group introduction to the topic, students should be asked individually to *list what Student feel confident Student KNOW about the concept.* Student can also write down the categories Student think are most likely to be included. At this time, the Teacher should help students raise those questions that have emerged during the discussion or that come from thinking of the major categories of information Student expect to find. 3) **Reading**. Students should be directed to read the text once Student have focused both on what Student know and what Student want to find out from reading. Depending on the length and difficulty of the text and the class composition, the text can either be read as a unit or be broken into sections for reading and discussion. As Student read, students should jot down information Student learn as well as new questions that emergency. 4) **Assessment of learning**. The final step in the process is to engage the students in *a discussion of what Student have learned from reading*. Their questions should be reviewed to determine how Student were resolved. If some have not been answered satisfactorily, students should be encouraged to continue their search for information.

According Ogle (1986) that the KWL (Know, Want, Learn) strategy provides a structure for activity and building prior knowledge, establishing a purpose for reading and for summarizing what was learned. The strategy can help students reflect and evaluate their learning experience, as well as serve as a useful assessment tool for Teachers. According Cassady, et al, (2004) The KWL involves a three-step process that takes place over the course of the service-learning activity. At the beginning of the service-learning activity or unit, students are asked the K question: "What do you know" about a particular subject? This information can help the Teacher get a sense of what students already know about a particular issue and then adjust what is being taught to ensure that the students' learning needs are met. Later in the unit, the students are asked the W question: "What do you need or want to know" about the subject? The W gives students a voice in determining what content could be explored further or emphasized as the unit unfolds. And finally, at the end of the unit, students are asked the L question: "What have you learned" about the subject? The L encourages students to reflect on what Student have learned. The KWL process allows each student to compare what student knew at the beginning of the unit with what Student know at the end, thus self-assessing what Student have learned. Consequently, there is a different assessment goal for each learning dimension. Using the fire safety for senior citizens service-learning project as an example, each of the three learning dimensions of service learning is described: **Learning about Service** Along with learning the content, successful service-learning also involves the performance of quality service to a recipient with a need. Regardless of whether the service recipient is an individual or the greater community, is located off or on the school campus, is part of a specific community or society at large, the service that the students provide must be of quality and must be executed well. Meeting a community need requires understanding of and preparation for the tasks to be performed. Therefore, a second focus of the assessment process involves assessing the quality of the service students provide. **Learning about the Social Issue** In successful service learning experiences, students also gain a deeper understanding of the local social issue that undergirds the service activity. This is another important element that distinguishes service-learning from community service. Therefore, a third focus of the assessment process involves measuring the depth of student's understanding of the local social issue around which their service-learning activities are focused. **Learning the Content** Service-learning uses service to the community as a means to contextualize academic content for students. Therefore, one of the primary focuses of service-learning assessment includes measuring the Level to which students gain understanding of academic curriculum being taught.

KWL provides a framework for learning that can be used across content areas to help students become active constructors of meaning. The KWL with strategy to help students write reports without copying, to guide

exploratory science activities, and to increase learning from multiple sources including films and video-tapes. This establishes a tone of respect for student's ideas and helps students take the risk of asking questions which then provides personal and corporate reasons for learning. This strategy is designed to help students develop more active approach to reading expository material. Teachers first model and stimulate the kinds of thinking needed for learning and then give students individual opportunities to list what Student know, what questions Student want answered, and what Student have learned from reading the text. In this way, the benefits of group instruction are combined with individual student commitment and responsibility. The KWL with strategy was developed to translate current research findings about the active, constructive nature of reading into an instructional lesson format. In classroom testing, KWL chart has been shown to be an effective tool to help students become more active thinkers and to help them remember greater what Student read (Ogle, 1986). It has also been useful in helping Teachers greater communicate the active nature of reading in group settings. According Shelley, et al, (1997) that the KWL helps to make textbooks as well as other materials meaningful. It encourages students to make connections between prior knowledge and new information thus facilitating the construction of meaning. In this paper, we have provided some insight into the factors that may require some fine tuning of the KWL procedures in the classroom, particularly taking into consideration the students' sometimes limited background knowledge. Considering these and other relevant factors, any Teacher can engage in effective implementation of the KWL. According Al-Khateeb and Idrees (2010) that the dependence of the KWL strategy on presenting the teaching content correspondently with the logical organization of the content, which is based on gradual advance from the easy to the more difficult, supported the learning process of the experiment group to learn the religious concepts and acquire the abilities of classification, construction and evaluation; since all depend on high-leveled thinking processes.

According Richardson (2012) that for using KWL chart will be applied in class with following fourth steps below: **Step 1:** Choose a general topic and create a table with three columns and two rows — one row for the headings and one larger one in which to write. Label the first column with a **K** for "What I **Know**," the second with a **W** for "What I **Want** to know," and the third with an **L** for "What I **Learned**" or a variation of this. Introduce the KWL strategy and model how to use it with the topic. **Step 2:** As a class group brainstorm what students already know about a specific subject topic. Highlight the importance of prior learning and how life experience and making connections to what we already know is a very important part of learning. Write these ideas under the **K** column. **Step 3:** Now have students generate a list of what else Student want to learn or questions Student want answered. Continue to demonstrate how to organize and categorize their suggestions and how to use this information to set a purpose for reading. Students can also turn textbook headings and subheadings into questions for the **W** column. Students now read (or listen) the text and actively look for answers to their questions as well as to verify their knowledge. **Step 4:** After reading with purpose Student discuss and record what Student learned in the **L** column, especially paying attention to **W** questions that were answered from the text or activity. Provide multiple opportunities for students to use the strategy in pairs or small groups until Student can use the strategy independently. The L column can also serve as notes for review and revision.

In this research was combined both Project Based Learning with KWL Worksheet. Project Based Learning Model with KWL Worksheet is a development of the PjBL model is done by combining the using of KWL Worksheet on the application of the PjBL model in learning phase. The combination process is done through a consideration of the compatibility activities on the purpose of two factors, both in the model and the applicable worksheet. The aim of improving and optimizing achievement of learning goals through a learning process which is the phase of the learning model, in this case PjBL model. Phase in PjBL models also adjusted for student activities to use KWL worksheet. With that combination PjBL learning model will be more effective and efficient using of time and the achievement of learning objectives. This is because the KWL these students can stay focused on the process of drafting the project plan that will result in learning as a result of the creative thinking process.

Using of KWL worksheet will be included in the first phase up to sixth phase on PjBL model (Goal description, Specify criteria, Background Knowledge, Generated ideas, implements solution, and Reflect). The using is intended to achieve the eighth phase (Generalize) as visualization projects planned and expected as controlling the student activities of plans are made. The controlling process is combined by the terms of KWL (Know-Want-Learn). The term of KWL adjusted to PjBL model phase process based on the purpose of each term in the KWL worksheet. The placement of each term in KWL worksheet PjBL positioned in phase on the model as follows: The term of K (Know in First phase until Third phase), the term of W (Want in Fourth phase), and the term of L (Learn in Fifth phase until Sixth phase).

1.3 Creative Thinking

Creativity is sometimes seen as synonymous with the divergent thinking. Wallach (1970) argued against this; while divergent thinking test scores predicted indicates of creative activity. According Wallach and Wing

(1969) creative thinking may sometimes involve the divergent thinking. In other way, Runco (1992) proposed that divergent thinking contributes to the potential for creative thought; divergent tests predict potential for creative performance; but divergent thinking performance is not a criterion of actual creativity.

By defines that creative thinking and divergent thinking having relations in thinking process. The link between divergent thinking and convergent thinking measured by the traditional intelligence is complex. The Divergent thinking test scores sometimes correlate moderately with various indication of traditional intelligence (Getzels and Jackson, 1962).

The relation both of creative thinking and divergent thinking explained Awang and Ramly (2008) that the creative thinking will make students move "sideways" to try different perceptions, different concepts, different points of entry. Students can use various methods including provocations to solve the problems. The creative thinking has very much to do with perception to put forward different views. The different views are not derived each from the other but are independently produced. In this sense, creative thinking has to do with exploration just as perception has to do with exploration. The different way in process thinking is like as the divergent thinking. In otherwise, creative thinking have indicators of a set of level to development for thinking process of student. The discription of these levels are shown at the result of student's task satisfied all criterion of creativity product.

The description of creative thinking level by Siswono (2009) are divided by five levels. **Level 5:** Student can synthesize ideas, generate new ideas from mathematical concepts and real life experience, and apply the ideas to construct some problems. **Level 4:** Student also revised when Student find a hindrance. **Level 3:** Student can synthesize ideas, generate new ideas only from mathematical concepts, and apply the ideas to construct some problems also revised when student meet a hindrance. **Level 2:** Student can synthesize ideas and generate new ideas only from mathematical concepts or real life experience. Student have not applied all ideas to construct some problems, but student can revise a problem when find a hindrance. **Level 1:** Student cannot synthesize ideas from mathematical concepts or real life experience, but can generate new ideas only from mathematical concepts or real life experience. Student has not applied all ideas to construct some problems also revised when find a hindrance. **Level 0:** Student cannot synthesize ideas from mathematical concepts or real life experience, and cannot generate new ideas. Student just recall the ideas.

The difference of the levels is based on fluency, flexibility, and novelty in mathematical problem solving and problem possing. Students at level 4 fulfilled three components of creative thinking indicators; and at level 3 fulfilled two components, flexibility and fluency, or novelty and fluency. Students at level 2 only satisfied one aspect that is flexibility or novelty, and at level 1 only satisfied a fluency aspect. Students at level 0 did not fulfill all components.

In learning, if the goal of education is to be able to not only remember facts, but also to use those facts to solve problems and make decisions, then students are best served when Student are asked questions that require them to complete more complex, higher order critical thinking, using higher order questions. Higher order questions are those that ask how or why something happens or how one event, object, or idea might be related to other events, objects, or ideas. These questions are phrased so that the person providing the answer must engage in creative thinking. That is, students might use facts and details in the process of answering the question, but Student must go beyond the facts and details to construct a rationale for the response. With higher order questions, the persons responding is actively asserting some position about causes or relationships. Questions phrased as higher order questions typically require the use of mental strategies associated with creative thinking. Then, student could evaluated in process creative thinking. According Kovacs (2011) that organized goals for teaching and learning is to create categories or types of questions and teaching objectives. The idea is that simple remembering some fact is a very "low level" question and objective. At the other end of the list is the "high level" act of creating new ideas or making new inferences. Below is a list that includes categories of questions and objectives that range from the lowest level (remembering) to the highest level (creating). In addition, Vangundy (2005) explained six major creative thinking principles: Separate idea generation from evaluation (creative potential until you apply this principle every time you generate ideas. The reason is simple; creative problem solving requires both of the divergent and the convergent thinking. Idea generation is divergent; you want to get as many ideas as possible. Idea evaluation is convergent; you want to narrow down the pool of ideas and select the best ones). Test assumptions (is probably the second most important creative thinking principle, because it is the basis for all creative perceptions). Avoid patterned thinking. Create new perspectives (two insightful thinkers and keeping sight of the big picture). Minimize negative thinking. Take prudent risks (we must take risks to have any chance to succeed).

According to Torrance and Safter (1999) the creativity indicators are a tool, trait, or tool used to evaluate creativity among individuals. Examples of creativity indicators include elaboration, originality, and openness. This is confirmed by Smith (1967) said that creativity is usually enriched where several of the learning conditions are present. The level of association depends on whether students see the creativity tasks as standard

tests of intelligence and convergent thinking or as more open-ended tasks with permissive instructions that encouraged them to think in original and divergent ways and were not tests that would be graded (Wallach and Kogan, 1965). The findings suggest that traditional intelligence tasks measures do not indicate creative potential. The creative thinking in science indicates some of the ways of thinking that have led to creative outcomes. The creativity in science involves search combined with recognition of patterns, enabling the use of information stored with those patterns to select the next step to modify the drawing. An evidence for the thinking used. The processes for creative production are indicated in diaries, laboratory notebooks, and the experiments. With the creative thinking, student will be creative in learning and making new learning and new generation more creative and innovative students in 21st century.

In the achievement of learning outcomes in the form Student creative thinking level can be seen from the process and outcomes of learning undertaken. Creativity is the highest intelligence level which shows and demonstrates the ability of Students in designing tools, ideas, solutions, or work as a result of their creativity. The results can be innovative creativity, original, applicable, and substitute, but most importantly can be useful for others. In this case, creativity is considered a process of creative thinking. To see patterns in creative thinking can be done by applying PjBL Model.

PjBL is a learning model that Students can demonstrate creative thinking to solve a problem. Moreover, the results obtained in this model a work or project as a result of Students creativity. The resulting project can be a tool, work plan, or solution of a problem-solving. In practice, Teachers must work hard to do the counseling and guidance to motivate on Student achievement. In addition, PjBL takes a very long time and the Teacher professionalism as a facilitator of learning. This is because Students are less able to focus and plan and possible in completing the project. For that Students need a broad mindset in designing projects to be achieved.

2. Methods

The population is a goal that the object of the study. Fraenkel, et al, (2012) explained that the population refers to all the members of a particular group of interested to the researcher and generalize the results of a study. Then, the population in this research is all college in Undergraduate Education Physics of State University of Medan A.Y. 2012/2013 as totally Student was 126 in regular class. The number of samples used to determine what class to be used as a sample group. This is because the sample of individuals who are already on the class number of the class has been drawn up by the school. Based on the preliminary study conducted that the existing at State University of Medan is homogeneous, then the withdrawal of samples was determined using a *cluster random sampling classes*. This study is a quasi-experiment research with this type of design is used *Factorial Design* to determine the effect of something imposed on Students as research subjects, which can be seen from the results of Students answers on the test.

3. Results

The results of effect of PjBL model to student creative thinking showed that there are differences in creative thinking of Students through between the Project Based Learning model with KWL Worksheet and Cooperative Learning model to solved problems in Physics. The process of learning made student to thinking applied idea for get solution for problem physics based on theoretical in practice. The result of Student creative thinking process can be seen in Figure 1.

In addition, some students understand less and greater understanding on the implementation of PjBL model. To overcome this, efforts made prior to start of learning first time described and given examples to students learning how the implementation and the results obtained so at the time of Students execution already understand what to do and not take more time for phases other learning. In otherwise, Student started to having habits with Creative thinking to solving problem in physics, still not just count and determine solution in problem analyze, but can giving contribution and alternative solution. For help to analysis of interaction can be seen in Table 3 from Anova Analysis.

Based on the Table 3 shown that Sig < 0.05 (0.000 < 0.05), it means H_0 *is rejected* and H_a *is accepted*. In other word, there are differences in creative thinking of Students through between the Project Based Learning model with KWL Worksheet and Cooperative Learning model to solved problems in Physics. It caused in PjBL model activity Student more giving ideas to groups for reach project finished. All of idea which are Student collect will be discussed and selected for make finish Project in learning.

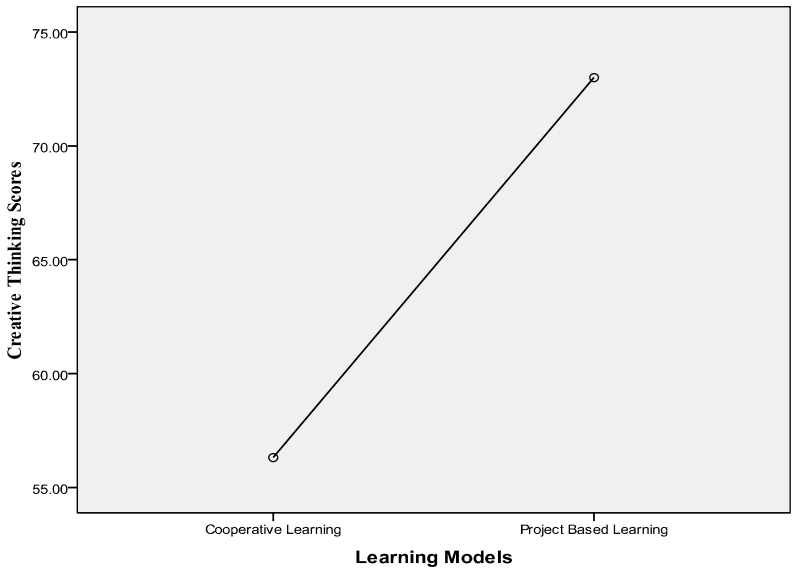

Figure 1 Relation of Learning Models with Creative Thinking Process

Table 3 ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5710.144	1	5710.144	44.862	.000
Within Groups	10309.849	81	127.282		
Total	16019.993	82			

Source: Mihardi Research Data in 2013.

4. Discussion and Conclusion

The result shown that Student creative thinking in project based learning model is greater than cooperative learning models. It proved learning process with Project Based Learning actually effective to advance Student creative thinking process. This is strengthened by the assessment of value average students creative thinking in the experiment class was higher than control class. It shown project based learning model is greater than cooperative learning model to reach creative thinking of student in learning. It caused in learning of PjBL model that student trained to design, analyze, and applying of their idea and this is appropriated with Hong, et al, (2010), Holubova (2008), Rillero and Zambo (2006), Kteily and Hawa (2010), and Mahanal, et al, (2012) which is concluded that PjBL model in learning would be trained Student creative thinking in solved and get finish of project. It caused in PjBL model activity Student more giving ideas to groups for reach project finished. All of idea which are Student collect will be discussed and selected for make finish Their Project in learning.

The Results of observations made by the observer indicated that the student activity positive increased. This is appropriate with ChanLin (2008) said that the implementation of integration technology into PjBL as planning for Student self–exploratory experiences. Adding by Bell (2010) said that implementation of PjBL make Student drive their own learning through inquiry. It was shown with successfully grounded to finish product from planning which is made in learning. But, not closing impossible still group in experiment class can't be finished and getting change planning at first time learning. These was caused time in learning as short time and student are not habit for done activity which is different with the others. Although the efforts are more concerned with and guiding students for work in groups with an active way to ask each student about what he has done in groups so students will be more motivated to be active in completing the task group to socialize

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