

The Guided Inquiry Worksheet: Growing with Scientist in Indonesia Middle School

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Abstract-The purpose of this is to develop and validate a guided inquiry worksheet to improve science process skills and understanding concepts at Indonesia middle school. Our project is based on concrete activities on material temperature and heat linked to the daily life. Actually, the worksheets learning have not been optimally students to abilities in questions, searching, understanding, finalizing answers 'what', 'why', and 'how' a phenomena by occurring natural through systematic and benefitting in daily activity. In this context, reform that students involved in exploring and understanding how scientists build, evaluate, and apply scientific knowledge in a scientific inquiry context using open-ended questions and experiences in their own

Keywords-*inquiry; worksheet; scientist; middle school*

I. INTRODUCTION

Natural science is important for human beings, but students in middle school didn't like to understand it. They haven't exploration, trials error and opportunity to freely in learning nature, or produce something from the perspective of natural sciences. Science is a 'basic' to scientists accept social roles and responsibilities. The estimate competence students of his behavior is correlated to his life experience. At 2011 TIMSS and 2012 PISA, Indonesia was low ability in 63 rank from 64 countries participated [1]. Indonesia's average score was 382, which left behind. The achievements number in 2006 and 2009 an ironic decrease, from 50 rank in 2006 to the 60 rank in 2009, and the 63 rank in 2012. The readiness appropriate students' not interconnected to harmoniously, creatively, actively [2]. It's important for teacher remain the impact on outcomes student [3], with engagement inquiry learning [4]. Natural science combines experience and product form hands-on activity and minds-on activity. Learning of teaching is a complex practice to build concepts and a person's memory [5]. The learning of teaching possibility students to discover nature and confront it scientific skills with own insight. Understanding concept is creating an opinion by activities on own experience. The use of the worksheets more active and successful in a meaningful learning and make them active during teaching process [6].

The worksheets are important tools to help students in own minds and participate activity with cognitive activities to consider the information [7]. Worksheet can be used evaluation students at the end of subject learning [8]. Science is a systematic, tentative, dynamic, empirical, provable, process and being solution natural phenomena [9], understanding for others knowledge [10]. The scientists were able to listen, understand, and responding decision-making. The constructivist theory investigated for new content [11]. Teachers' should help to find meaning of what have been learn and their competency [12], with group activities increased personal and sosial development [13] demanded by their team [14]. Students understanding of natural phenomena [15] it's difficult asocial interaction [16] This strategy for teaching "learning to learn" to carry out inquiry. The ability of scientists for listen, understand and solve by self-constructing to produce or appropriate credible, relevant and beneficial solution [17]. To enhance attractiveness learning and interest supported by worksheets, multimedia and e-learning [18].

This guided inquiry worksheet intendend on material temperature and heat by the systematic design of instruction. The development of the worksheet is made by conducting a learner and needs analysis materials with appropriateness lesson objectives to achieve instruction goals. In developing guided inquiry worksheet could make positive students on learning science and scientific literacy in a classroom. This worksheet appropriate plans the process of instruction as well as processes for assessing the results of this instruction for contribute potential students and supporting learning resources to growing with new scientists moving on, ask, search, analyze, investigate and build meaningful through enhance understanding concept an investigation process in their own experiences [19].

II. METHOD

This development of research refer to the systematic design of instruction by Dick, Carey and Carey [18]. The research recognize problems on hypotheses formulate for solving them, carry out an experiments, and collecting data for problem solving. The design of teaching planning attempts to improve outcomes learning. This research components approach include teachers, learners, content, learning activities, material,

system evaluation and performance environment learning to realize learning outcomes so as expected [17].

The developing guided inquiry worksheet for an assessment refers to validity, practicality and effectiveness. The content validity and construct validity based on theoretical and consistency among learning with validators (experts, practitioners, and students). The practicality device can be applied in the classroom, and able to the obstacles that arise. An effectiveness is a quality of instructional through observation of managing learning, activity and process skills, understanding concepts by pretest and posttest, and student response. This formative assessments is flexible and continuously adapted based on going through this assessment. Phases guided inquiry worksheet of this learning: 1) teacher asks questions, 2) collecting literature to answer the problems, 3) assessment and related knowledge, 4) analyze and self-reflection with guidance teacher, and 5) reports an investigation and discussed to answer the problems.

III. RESULTS AND DISCUSSION

The use of guided inquiry worksheet invention processing skills and concept understanding. Inquiry through verification and identification problems by hypothesis, predicting, trial errors, collecting and analyzing. Inquiry is the better understanding, an ability integrating and interconnecting different aspects to integrated connection in lesson study. The categorized as successful to new knowledge performance in either similar or different context. The worksheet with pictures represent to achieve learning objectives. The pictures an effectively achievement by letting questions and discuss materials with their peers or teachers [19]. They have ideas and thought problem solving by using intellectual reasoning, good planning, and complex-understood by benefitting environment potentials as the learning sources [20]. This is importance of a well organized and sequenced set of procedures support for successful instructional [21].

This Inquiry worksheet through lesson direct students and task learning. Students will learn if they are involved in their learning, make them motivated and accepts responsibility for their own learning. This product is very important to improve learning students and performances. An object, events, situation, or properties that designed culture by some accepted sign or symbol [22]. Science concept is an abstract mental-construct which is formed by interconnected perceptions on earth as a relevant ideas. Effective inquiry improves conceptual understanding. This essence of science is an inquiry process to discover "pattern" of natural science which observation, exploration, investigation, modelling, hypothesis formulation and experimentation on various natural phenomena.

The use of inquiry worksheet opportunities for two competencies: 1) conduct an investigated as well as scientist or researcher, 2) The investigation gain understanding what they have learned. That knowledge is personal and construct meaning through interaction with others [23]. This position of learning is no notified, but must find out for them selves the

various resources in surrounding, physical, natural, social, and cultural environment.

IV. CONCLUSION

The use Inquiry worksheet increase motivate and responsibility for learning, performance and conceptual understanding. The guided inquiry worksheet achieved students after instruction, they are: 1) students demonstrate process skill and understanding concept of a function at a set point, 2) students compare and contrast continuous and discontinuous functions. 3) student related the concept of function to real life situations. That developing guided inquiry worksheet have been modified by author to better a learner centered approach to supports the cognitive constructivist approach for teaching and learning. The ability of scientists in Indonesia middle school for listening, understanding and self-constructing, produce or appropriate credible, relevant and beneficial solution to enhance attractiveness learning through their positive emotional and interest supported by guided inquiry worksheets.

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