



## **DEVELOPING MATERIALS FOR ACTIVE LEARNING OF GUIDED INQUIRY-INTEGRATED BOWLING CAMPUS ON THE TOPIC OF SENSE OF HEARING AND SONAR SYSTEM OF LIVING ORGANISM**

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### **ABSTRACT**

This study is categorized as developmental research since it puts to its core the developing materials process for active learning of guided inquiry-integrated bowling campus. This research aims to construct adequate learning materials that are based on the criteria of validity, practicality, and effectiveness. The developed learning materials are lesson plan, teaching material, student worksheet, and posttest which were validated by experts to perceive information on materials' validity and were tested to 25 eight graders of Junior High School on even semester of academic year 2015/2016 by using One-Group Pretest and Posttest Design. Data analysis was undertaken in quantitatively-qualitatively descriptive way resulting: 1) Valid categorized material validity (score 3.39); 2) Student worksheet legibility shows 100% for its interesting and understandable contents, 96% for its interesting appearance and its readable and adequate student book legibility for Junior High School students displaying the average sum of sentences the researcher took from sample text which was 5.69 sentences within 100 words under average sum of 145.8 syllables; 3) Very good execution rate (average score of 3.53); 4) Students responded very positively (98.58%); 5) Student centered learning activity; 6) Increase of students' learning outcome (N-gain 0.88 and  $t = 23.04 > t_{0.05;24} = 1.711$ ). This research concludes that materials for active learning of guided inquiry-integrated bowling campus which were developed have been proved valid, practical, and effective to enhance learning outcome of Junior High School students.

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**Keywords:** Bowling Campus, Guided Inquiry

### **INTRODUCTION**

National education has the function to develop skill and to create character as well as dignified national civilization in order to educate its people. This national education aims to expand students' potentials in order to become God serving individuals having noble, healthy, bookish, competent, creative, independent characters and to perform democratic way of citizenship as well as being responsible ones. The comprehensively intelligent Indonesians are the people with brilliantly spiritual, emotional, intellectual and kinesthetic characters which are embodied in visions

and missions of national education in Strategic Plan of National Education Ministry (2010-2015).

Based on learning outcome of Science in Indonesia, authentically obtained from Science literacy outcome of Indonesia students undertaken by *The Organization for Economic and Development* (OECD) in PISA (*The Programme for International Student Assessment*), it is reported that science ability of Indonesia students is still on lowest ten of the list of all 65 countries achievement. This result signals relatively low achievement of Indonesia students especially in some ability to: 1) comprehend the complex information; 2) understand theory, analyze, and solve problem; 3) utilize tools, their procedures, and problem solving;

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and 4) perform investigation (National Education Ministry, 2013).

Learning outcome can be regarded "pass" if it reaches the criterion of minimum passing standard (In Indonesia commonly abbreviated as KKM which stands for *Kriteria Kelulusan Minimum*) which was determined by teacher of all subjects in every education unit. KKM is a target of education unit in achieving competency in every subject matter. Basically, every learning related stakeholder (education unit and students) hopes to gain maximum learning outcome so that every unit has to put some effort to possibly pass the determined KKM.

Based on the result of interview with the eighth graders of State Junior High School of 1 Larangan Pamekasan of academic year 2015/2016 with determined KKM of 75, it is shown that many students' achievement were still below the KKM. There were 60% of them with achievement below the KKM while the 40% remainings' were above this standard. On the other hand, observation result on teaching and learning activities shows that many students were reluctant to pose question and to deliver opinion, and they paid attention less to the teacher while the teacher performed explanation on material. They would pay attention if the teacher admonish them to. The learning situation was still undertaken in teacher-oriented way. The students were set to listen to their teacher's explanation and demonstration and also were asked to proceed worksheet so that the learning process could not instantly be regarded to be carried in an optimal way.

One of the efforts that can be used to enact students more active in learning process is a refinement on process especially by using active way of learning. Active learning is any learning that enables students to play active role in learning process both in form of student to student interaction and student to teacher interaction.

Active learning model is such a model in organizing learning system through active learning method which leads to independent learning. The ability to learn independently is the end point of active learning. To obtain such situation, learning activities are set so that it can go meaningfully for students. Activities which include students' participation in solving problem are the activities that can trigger mind expansion (Silberman, 2006).

The selected topic in this research is the sense of hearing and sonar system of living organism. This topic was chosen because these two concepts can be found in everyday life by the students. Besides, the topic of sense of hearing

and sonar system entails many derived concepts that need investigation, observation, and experiment conducted by using scientific approach. Nevertheless, students still tend to treat this topic as difficult matter to learn so that the innovation towards learning and learning strategy need to be undertaken to make students more active and engaged.

Gulo (2002) defined inquiry model as learning sequence that includes maximally all the ability of students to investigate and to find systematically, critically, logically, and analytically so that they can formulate by themselves their own discovery confidently. By the use of inquiry activities, teacher's extensive guidance becomes important part. Inquiry approach makes it easier for students to develop independently for its thinking system, investigation, and way to act (Pavelich and Abraham, 1979). Investigation and trial can exercise students to perceive science processing skill. Hence, to exercise this skill, inquiry based model can be utilized. A guided inquiry learning enables students to obtain chance to expand knowledge and helps them to develop conceptual understanding (Pandey, et al., 2011; Banerjee, 2010; Barthlow, 2011; Blanchard, et al., 2009; Wilson, et al., 2010; Brown, 2010; and Wenning, 2011).

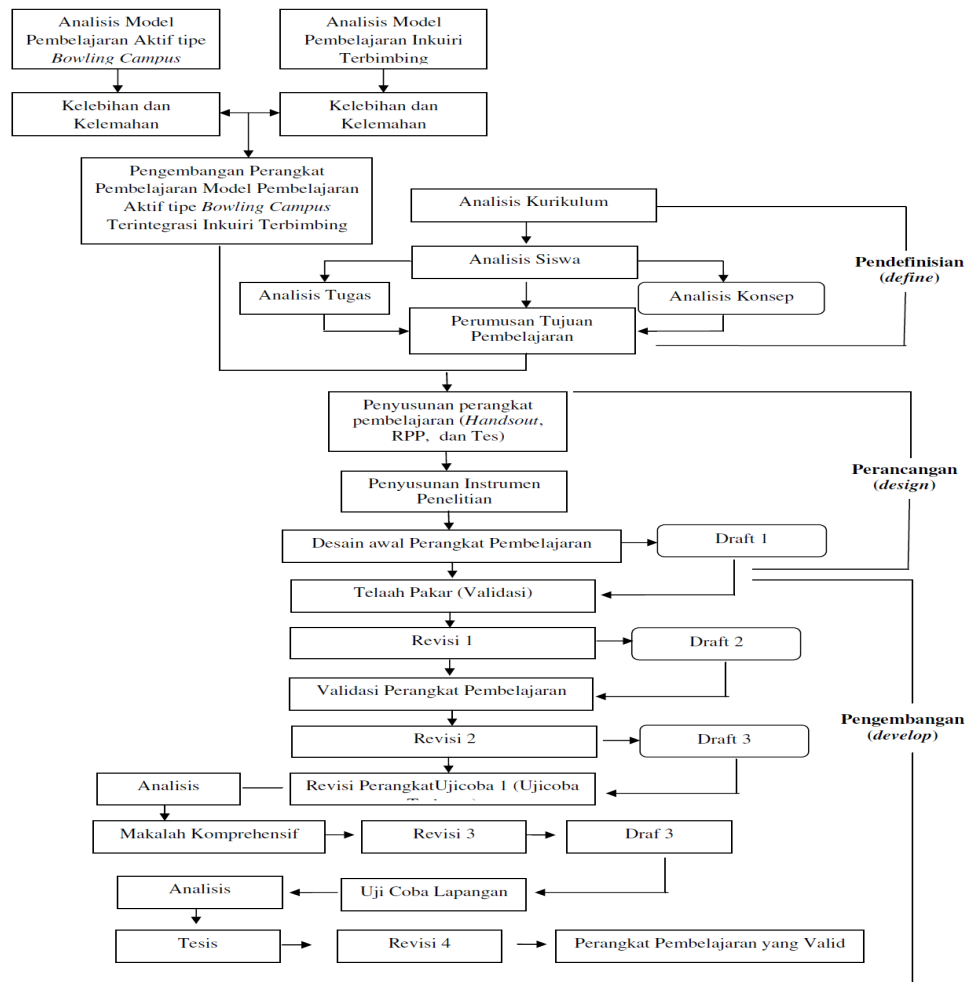
Based on this consideration, it is important to develop a learning that can exercise students to build the way of thinking and to find a concept as well as to develop analyzing skill amongst them without any particular student's dominion. This is very in line with what mandated by 2013 curriculum which highlights scientific approach essence. However, students are not used to engage in inquiry based learning, so this research addresses guided inquiry based learning.

## METHOD

This research is developmental study which aims to develop teaching and learning materials which base on four D model that is modified based on necessity. The design of developing teaching and learning material in this research is given in this following Figure 1.

Research was undertaken to 25 eight graders of State Junior High School of 1 Larangan, Pamekasan of academic year 2015-2016 by using *One-Group Pretest-Posttest Design*, because this research was applied in one group without any comparison group. This research instrument was then validated by experts.

Observation, test, and questionnaire are the technique used to collect the data. The topic



**Figure 1.** Flow chart on phases of Developing Materials (adapted from Thiagarajan, 1974)

being concerned is sense of hearing and sonar system of living organism.

## RESULT AND DISCUSSION

The result of tested materials carried out in State Junior High School of 1 Larangan, Pamekasan which was based on materials validity, materials legibility, learning execution, students' activity, students' learning outcomes, students' responses, is elaborated as follow

Based on the validity of developed materials, it is obtained that: lesson plan validity on every aspect entailed two categories: good and very good. Validity of materials were reported valid. Worksheet validity including instruction aspect, content correctness, procedure, and question was indicated valid. Posttest validity including content, language, and question writing was proved valid and very valid.

The practicality aspect of materials was

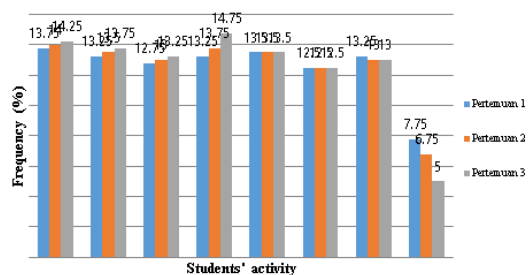
indicated by learning execution, legibility of teaching material and student worksheet, and students' responses. Generally, legibility aspect for teaching and learning materials was reportedly good. Teaching material was used as means to support learning activity, content included in teaching material was reportedly relevant and adequate. Cain & Evans (1990), explained that if content included in teaching material is not valid or showcases misconception, that book cannot function as it is supposed to, as learning sources and means (enhance learning quality)

Content included in student worksheet is relevant to the one included in syllabus and lesson plan, so that basic competency can really be achieved. This statement is in line with what Devi et al (2009) explained, content included in student worksheet supported the achievement of basic competency, and that content can be derived from book, paper, internet, and scientific journal. Activity entailed in student worksheet displays

action or activities undertaken by students. Those actions or activity facilitate students to exercise their science processing skill. The determination of learning source was based on learning goals and content which are about to be mastered by students, or in other way, providing an experience to students appropriately to achieve learning goals.

The developed teaching and learning material for active learning of guided inquiry-integrated bowling campus were embodied in research instrument which was developed based on 2013 curriculum, in which science learning in Junior High School is undertaken by using scientific approach including observing, asking, collecting data, associating, and communicating (National Education Ministry, 2013)

The observation result on students' activities during the learning process in meeting 1, 2, and 3 showing the activity the students did the most with highest rate are listening and paying attention to teacher's explanation; doing experiment/observation; as well as posing question or opinion. Meanwhile, the lowest ones are showing irrelevant activity to learning process.



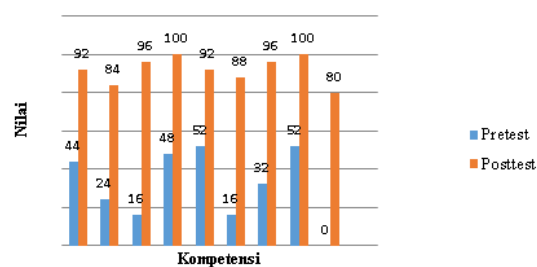
**Figure 2.** Percentage Diagram of Students' Activity.

Vigotsky argued that the development of life process depending on the social interaction and social learning plays important role to cognitive development (Khulthau & Todd, 2008). Noviwati (2010) stated that active learning of guided inquiry-integrated bowling campus used by the teacher can make students more active in learning process, plan the bases of scientific thinking within the students themselves, so that in this learning process, students can be even more active in solving problem.

Activity in active learning of guided inquiry-integrated bowling campus is one of activities that can be used to increase students' understanding on particular concept they are studying. However, in this research, the obstacles faced are the lack of students' understanding about scientific method and time consuming issue, so that

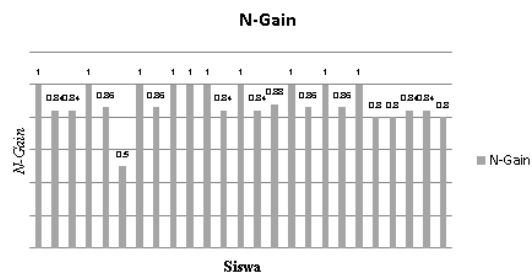
students cannot perform inquiry activities in an optimal way. The alternative solution conducted to tackle these obstacles are teaching students the scientific method in earlier phase of learning process and providing the appropriate amount of time so that learning process can go well.

There is significant increase on knowledge of students prior to and after learning based on analysis on pretest and posttest for obtaining the outcome of studying knowledge. Passing learning by the students reflects the increase of conceptual understanding of students.



**Figure 3.** Nilai : Score, Kompetensi : Competency.

This increase of students' conceptual understanding has its connection to students' activities during the learning process, especially in observation and experiment. In those activities, students found themselves their own new knowledge by the use of teacher's guidance.



**Figure 4.** N-Gain Diagram.

The result of calculation by using n-gain and paired t-test also implies the increase on students' learning outcome in knowledge aspect. Every student has different increase score. It is because the cognitive ability of students different to each other. It is in line with Piaget who assumed that students grow through equal intellectual development order, but those growths happen to develop in different progress (Jufri, 2013)

Based on analysis on students' responses towards material development (including; teaching material and student worksheet) as well as learning execution by the use of active learning

of guided inquiry integrated bowling campus, it is obtained that on average there are 98.58% students who responded positively with strong criteria (Riduwan, 2010). Positive response is shown by the students during the learning by using material which was developed based on constructivist theory on good learning which makes students learn, stressing on students' active participation, and put teacher as facilitator (Westwood, 2008)

## CONCLUSION

Based on research output, it can be concluded that: materials on active learning of guided inquiry integrated bowling campus are proved to be appropriate: valid, practical (the developed materials can be used in learning process), and effective (the developed materials can enhance students' learning outcome). Teaching and learning materials by using active learning of guided inquiry integrated bowling campus are proved to be able to increase learning outcome of Junior High School students.

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