Abstract: This study aims to develop a decent learning tools (valid, practical, and effective). This research is based on the low ability of critical thinking of students. This research uses Dick & Carey model which is tested on grade V SDN Kebraon 1. The result of research shows that learning tools developed reaches average score above 3.6 which means valid. The test results of practicality of instructional devices show the average percentage obtained exceeds 75% which means performed very well. While the results of the effectiveness test is known that the percentage obtained exceeds 75% which means the response of students is very positive, and equal to 58.3% increased N-Gain calculation after the critical thinking evaluation test. The final results indicate that learning tools developed are appropriate for use in the learning process.

Keywords: Eligibility of instructional devices; IPA; Project based learning model; Critical thinking

Introduction
The 21st century life is a life without boundaries, globalization, internationalization, and the exploration of information and communication technology is very easy. According to NCREL and Metiri Group (in Turiman, 2011), the digital economy era of the 21st century requires a knowledgeable and skilled workforce to generate innovation and increase the productivity of a country. In order to compete in the 21st century, students must be prepared early in school. The era of 21st century competition requires people to be able to compete, so it must be equipped with various skills. Therefore, students must be able to solve problems with superior thinking ability to be ready to plunge into global society.

To overcome challenges in the 21st century, students need to be equipped with 21st century skills to strengthen the competitive soul of this era. In Turiman (2011), four major components of 21st century skills are digital literacy era, creative thinking, effective communication skills, and high productivity. Based on the four main components that have been described, one of the most important components today is the ability to think creatively that includes critical thinking skills. This is revealed by Zubaidah (2016), that the ability to think critically is one of the important aspects and become the skills that students need to have to face the challenges of
the 21st century because of the influence of globalization, the problems that arise in life more diverse.

To find out the critical thinking skills of the students, a limited test was conducted on several students in the form of a description that the indicators were based on the opinion of R. Ennis (in Costa, 1985), namely: (1) to explain simply; (2) building basic skills; (3) make a conclusion; (4) explains further; and (5) develop strategies and techniques. The test results showed 0% of students with very critical category, 10% of students with critical category, 90% of students with less critical category, and 0% of students with uncritical category. So the greatest result is students in the category of less on critical thinking skills.

The emergence of project based learning model (Project Based Learning) comes from constructivism theory which refers to contextual learning (Khamdi, 2007). Learning using this model is linked to the lives around students and students directed to building knowledge independently. The project-based learning model can be defined as a learning model that involves the centralization of meaningful questions and problems, problem solving, decision-making, the search process of multiple sources, the provision of opportunities for members to work in collaboration, and closing with presentations. (Thomas, in Jagantara, 2014).

Based on the study of some learning tools in elementary school, there is no learning tool available to train critical thinking skills. Therefore it is necessary to develop a learning device based on Project Based Learning model.

**Literature Review**

The importance of critical thinking ability is also expressed by Trilling and Fadel (2009: 76), which calls critical thinking a basic skill in the 21st century. Trilling and Fadel's opinion is supported also by Anderson, Krathwohl, & Airasian (2001: 56) critical early on in accordance with Bloom's Taxonomy includes remembering, understanding, applying, analyzing, evaluating, and creativity that are incorporated in a creative learning design in school.

In addition, based on Attachment Permendikbud no. 22 years 2016 on standard processes for elementary and secondary education units, learning in schools should use scientific inquiry learning so that students have the ability to think scientific, act and behave scientifically, and able to reveal the results of his work as one of the important ability in communicating . This is supported by UNESCO which views education as a building that is supported by four pillars of learning to know, learning to do, learning to be, and learning to live together. In addition, the success of science learning is influenced
by several factors, namely: curriculum, four pillars of education, resources, learning environment, teaching effectiveness, and evaluation of learning (Wiyanto, 2009: 63).

The project-based learning model can be defined as a learning model involving the centralization of meaningful questions and problems, problem solving, decision-making, the search process of multiple sources, the provision of opportunities for members to work in collaboration, and closing with real-world product presentations (Thomas, in Ni Luh, 2012). Projects in this lesson are carried out within a certain time in a collaborative manner, producing a product, whose results will then be presented and presented. Project implementation is done in an innovative, unique, focusing on solving problems related to student life. Project-based learning is part of a learner-centered instructional method.

The use of project based learning model in this research is based on constructivism learning theory that emphasizes one's activeness in developing and composing comprehension and knowledge (Santrock, 2004). In addition, this model can also trace the critical ability of the child according to its development in Piaget theory that is sensory-motor stage, pre-operational, concrete operational, and formal operational (Dahar, 2011). This model has a learning syntax that can be tailored to the learning steps to train students’ critical thinking skills.

One of the previous studies was also performed by Remziye Ergul and Elif Keskin Kargin (2014) under the title The Effect Of Project Based Learning On Student's Science Success. The results of this study indicate that project-based learning affects the quality of learning in schools.

**Material and Methodology**

3.1 Data

Data collection is done through: (1) validation of learning devices by two experts; (2) observations related to the implementation of learning and student activities by two observers; (3) questionnaire distribution to find out student response during learning; and (4) giving critical thinking test. Data analysis technique using quantitative descriptive analysis technique.

The test of learning devices using one group pre-test post-test design is illustrated with the following pattern (Fraenkel, Wallen, & Hyun, 2012):

<table>
<thead>
<tr>
<th>Early Test</th>
<th>Treatment</th>
<th>Finish Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O</td>
<td>X</td>
</tr>
<tr>
<td>O</td>
<td>X</td>
<td>O</td>
</tr>
</tbody>
</table>

Then after a trial, to determine the degree of improvement of critical thinking skills using inferential statistics through N-Gain score analysis by the formula (Hake, 1999):

\[
g = \frac{(s_{post}) - (s_{pre})}{skor_{max} - (s_{pre})}
\]

(1)

After testing the device, the students' critical thinking test results will be analyzed using N-
Gain and converted according to the criteria in Table 1 below.

**Table 1. N- Gain Score Criteria**  
(Sundayana, 2014)

<table>
<thead>
<tr>
<th>$g$</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>$g &gt; 0.7$</td>
<td>High</td>
</tr>
<tr>
<td>$0.3 \leq g \geq 0.7$</td>
<td>Medium</td>
</tr>
<tr>
<td>$g &lt; 0.3$</td>
<td>Low</td>
</tr>
</tbody>
</table>

The degree of reliability of the device validation results and the acquisition of observed scores of instructional learning will be analyzed by the Percentage of Agreement formula, as follows (Borich, 1994):

\[
\text{Percentage of Agreement} = \left(1 - \frac{A - B}{A + B}\right) \times 100\% \quad (2)
\]

An assessment instrument is said to have a match between validator or observer if the value of Percentage of Agreement is $\geq 0.75$ or $\geq 75\%$. The average total score of device validation results will be converted according to Table 2 below.

**Table 2. Criteria Categorization Learning Device Validity (Ratumanan & Laurens, 2011)**

<table>
<thead>
<tr>
<th>Validate Score Interval</th>
<th>Assessment Category</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6 $\geq$ SV &gt; 4</td>
<td>Valid</td>
<td>Can be used without revision</td>
</tr>
<tr>
<td>2.6 $\geq$ SV &gt; 3.5</td>
<td>Valid</td>
<td>Can be used with a few revisions</td>
</tr>
<tr>
<td>1.6 $\geq$ SV &gt; 2.5</td>
<td>Less Valid</td>
<td>Can be used with many revisions</td>
</tr>
<tr>
<td>1.0 $\geq$ SV &gt; 1.5</td>
<td>Invalid</td>
<td>Not yet in use, still need consultation.</td>
</tr>
</tbody>
</table>

After the learning was done, the observation result of the learning activity, the student activity, and the student's response were analyzed descriptively quantitatively by calculating the observation result with the following formula (Arifin, 2009):

\[
P = \frac{\sum k}{\sum n} \times 100\% \quad (3)
\]

Then, the percentage of learning activities will be converted using the criteria listed in Table 3 below.

**Table 3. Criteria for the Implementation of Learning (Riduwan, 2012:15)**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0% \leq P &lt; 25%$</td>
<td>Not done</td>
</tr>
<tr>
<td>$25% \leq P &lt; 50%$</td>
<td>Less done</td>
</tr>
<tr>
<td>$50% \leq P &lt; 75%$</td>
<td>Well done</td>
</tr>
<tr>
<td>$75% \leq P &lt; 100%$</td>
<td>It worked very well</td>
</tr>
</tbody>
</table>

While the percentage of student activity observation will be converted using the criteria contained in Table 4 below.

**Table 4. Student Activity Percentage Criterion (Arifin, 2009)**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0% - 24%$</td>
<td>Not done</td>
</tr>
<tr>
<td>$25% - 49%$</td>
<td>Less done</td>
</tr>
<tr>
<td>$50% - 74%$</td>
<td>Well done</td>
</tr>
<tr>
<td>$75% - 100%$</td>
<td>It worked very well</td>
</tr>
</tbody>
</table>

Finally, the student's response questionnaire will be converted according to Table 5 below.

**Table 5. Criteria for Percentage of Student Response (Riduwan, 2012)**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0% \leq P &lt; 25%$</td>
<td>Very weak</td>
</tr>
<tr>
<td>$25% \leq P &lt; 50%$</td>
<td>Weak</td>
</tr>
<tr>
<td>$50% \leq P &lt; 75%$</td>
<td>Enough</td>
</tr>
<tr>
<td>$75% \leq P &lt; 100%$</td>
<td>Very strong</td>
</tr>
</tbody>
</table>
Method
This research is a study of learning device development of Learning Implementation Plan (RPP), Student Textbook (BAS), Student Activity Sheet (LKPD), and critical thinking test. Device development conducted in this study refers to the model of Dick & Carey. This research begins by analyzing basic competencies, analyzing students, analyzing learning, and formulating indicators and learning objectives. Furthermore, the preparation of benchmark reference tests, choosing learning strategies, selecting media and teaching materials, and developing learning tools. Learning tools that have been developed are then validated and tested.

Result
Based on the results of validity test, practicality test, and effectiveness test can be seen that the learning device developed feasible for use in learning, described as follows.

1.1. Validation Test Result
The result of the learning device validation test shows that the learning tools developed are very valid with the average score obtained above 3.6 and the percentage of matching assessment given by two validators more than 75%.

The result of the average score of learning device validation can be seen in Figure 1 below.

1.2. Practically Test Result
The practicality of instructional tools seen from the implementation of learning and student activities. The results of observation of the implementation of learning shows that in general the implementation of learning tools developed included in very good category with the percentage of average score obtained above 75%.

While the results of observations on student activity indicate that in general the student activity during learning performed very well with the average percentage obtained exceeds 75%.

The test results of practicality of instructional devices can be seen in Figure 2 below.
1.3. Effectiveness Test Results
The effectiveness of instructional tools viewed from the results of the questionnaire of student responses and the results of critical tests.
In general, students' responses to learning with learning tools developed in the mentioned aspects show an average percentage above 75% which means that most students respond positively.

While the critical thinking test results showed N-Gain score that was 58.3% of students showed a high category increase.

Discussion
The validation test results show the average scores obtained from both validators exceed 3.6 and the percentage of agreement level of the two validators exceeds 75% which means the learning devices are in very valid category and are suitable for use in learning.
Learning steps designed to train students to play an active role in learning, while the teacher as a facilitator because in the digital literacy era students as a subject of learning play an important role in the retrieval of information, while teachers become facilitators for students who will help students to confirm on any information obtained (Dewi, 2015).
The practicality of learning tools that have been developed can be seen from the implementation of learning and student activities. The result of observation of the implementation of learning shows that the learning is done with very good category with the percentage of average score obtained above 75%. While the results of observations on student activity indicate that in general the student activity during learning performed very well with the average percentage obtained exceeds 75%.
An important factor affecting students to learn is the extent to which the planned lesson plans are accomplished and how much actual time students need in learning (Muijs & David, 2008).
Learning takes place in accordance with the steps contained in the RPP. While BAS, and LKPD used as much as possible to be a means for students to explore with friends and find their own concepts. The teacher acts as a facilitator, and the student is the center of learning (student centered). This is in accordance with the opinion of Djamarah & Zain (1996), that in carrying out his duties as an educator, a teacher must master the material to be taught and the methods he uses when learning.
In the observation of student activities tailored to the indicator of critical thinking, as Paul & Elder (2008) discloses, one is said to be critical if: (1) raises important questions about a problem; (2) collecting and assessing information in a relevant manner; (3) make conclusions and solutions through appropriate reasoning; (4) open mindedness; (5)
communicates effectively in conveying solutions to problems.

Implementation of learning becomes important in accordance with the theory of constructivism that students prepare their own knowledge independently and actively. Bruner also revealed with discovery learning then the students will get maximum learning outcomes.

While the effectiveness of learning tools that have been developed can be seen from the results of questionnaire responses of students and the results of critical thinking evaluation. The result of questionnaire of student response to the learning is very good with an average score of 97.74% which means that students respond positively to learning activities using learning tools developed. This categorization adopted the opinion of Riduwan (2003), who categorized the 81% - 100% response as a very strong category (very positive). The high percentage of students who respond positively indicates that students support, feel happy, interested, and enthusiastic about the learning that has been implemented.

At the pilot stage, the critical thinking test results showed an increase in pre-test and post-test scores indicating an increase in students' critical thinking skills. From the calculation of N-Gain, as much as 58.3% of students showed a high category increase and the rest experienced an increase in the medium category.

**Conclusion**

This study concludes that learning tools with project based learning model to improve students' critical thinking ability is suitable for learning based on the prevalence of learning tools, the implementation of learning well, the increasing of students' critical thinking ability, and good response from the students.

**References**


in Education 8 ed. New York: Ally and Bacon.


