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FOREWORD

I am pleased to put into the hands of readers Volume-5; Issue-6: 2018 (June, 2018) of **"International Journal of Advanced Engineering Research and Science (IJAERS) (ISSN: 2349-6495(P) | 2456-1908(O)" ,** an international journal which publishes peer reviewed quality research papers on a wide variety of topics related to Science, Technology, Management and Humanities. Looking to the keen interest shown by the authors and readers, the editorial board has decided to release print issue also, but this decision the journal issue will be available in various library also in print and online version. This will motivate authors for quick publication of their research papers. Even with these changes our objective remains the same, that is, to encourage young researchers and academicians to think innovatively and share their research findings with others for the betterment of mankind. This journal has DOI (Digital Object Identifier) also, this will improve citation of research papers. Now journal has also been indexed in **Qualis (Interdisciplinary Area) (Brazilian system for the evaluation of periodicals, maintained by CAPES).**

I thank all the authors of the research papers for contributing their scholarly articles. Despite many challenges, the entire editorial board has worked tirelessly and helped me to bring out this issue of the journal well in time. They all deserve my heartfelt thanks.

Finally, I hope the readers will make good use of this valuable research material and continue to contribute their research finding for publication in this journal. Constructive comments and suggestions from our readers are welcome for further improvement of the quality and usefulness of the journal.

With warm regards.

Dr. Swapnesh Taterh
Editor-in-Chief
Date: June, 2018

Editorial/ Reviewer Board

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Appliance of Textbook Basic on Process Image of Human Respiratory System against High School Student's Critical thinking Ability

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Abstract*— *Study in 21st century having much transformation in science and technology. An effective knowledge is a knowledge that includes student's ability in understanding study subject. Therefore,to support an optimum study process there is a need of a text book. Therefore, Process Image (PI) is a series of pictures/diagrams in a shape of object in an order that have a differences in situation, position, shape and combination in a whole and certain complexity. Study in Biology especially in a main study of human respiratory system is a study that have the most complexity. This happened because the study subject is abstract in a process that can't be seen directly because it is inside human body. Objective of this research is to knowing the effectivity of textbook basic on process image. Human respiratory system processing subject against high school student's ability in criticism. Subject of the research is students in XI Science 3 in Senior High School of Arjasa 2017/2018 academic Period. Data collecting technique is performance test. The results showing that textbook basic on process image on student's ability to critical thinking in a good criteria

Keywords*— *Textbook, process image, human respiratory system, critical thinking.

I. INTRODUCTION

Progress in science and technology require human skill, one of the methods is using a good textbook. Basic on the research results of 10 Senior High School in Jember (5 school in Jember regency and 5 school in Jember City) that textbook with much sentences doesn't support them to train and develop thinking analyzing skill. This result is supporting Tania *et al.*, (2015) statement, that ever textbook existed is not good enough to support students study activity.

Lack of thinking skill is shown by a low score on student's study result. This can be seen from the average score from Jember Regency and Bondowoso Regency (5 schools from Jember Regency and 5 schools from Bondowoso Regency) in the human respiratory system subject academic year 2016/2017 the score is 56,6 or below the minimum score of 80. Lack of processing and thinking skill caused by student and teachers that too much rely on subject presentation (Bannert, *et al.*, 2015). Therefore, it is vital that good study activity can improve student's ability to thinking and processing subject.

A good learning activity is an activity that able to teach the student how to use their cognitive ability, so students able to evaluate the methods of their studies as an appliance of high-level thinking ability. Basically, high-level thinking ability is one of Critical Thinking Ability. Critical Thinking is a directed and clear process that used in mental activity such as analyzing assumption, taking decisions, problem-solving, and doing scientific research (Johnson, 2011: 183). Critical thinking ability can be used by student in analyzing skill and in understanding certain concept in a subject. Ennis (2011) states that, Critical Thinking skill can be used by the student in analyzing, evaluating information, logic thinking, and deciding certain actions. Other than that Critical Thinking can be a tool that stimulates students to think and helps students to get a better study result (Choy and Chech, 2009). Critical Thinking Ability capable to get someone to prepare in realistic career life. A study that orientates on developing

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student's Critical Thinking Ability is relevant to be applied basic on process image.

The process image is series of pictures that visualize certain situation (thing, phenomenon or genesis) through pictures, different phase/series in position, situation, form either its coherent combination and a whole, so it helps the readers understand it (Sutarto: Widita, 2017). Usage of process image help students in analyzing a genesis or problem with more detail because in Process Image there are different phases in a genesis. This caused Process image's role in learning can create student's creativity and interest in understanding such complex concept (Yusmar, 2017). This process image appropriate to use specially in Biology subject that categorized as a difficult subject.

Learning Biology is supposed to be applied with appropriate approach and methods. This is because of many difficult concepts in Biology subject. While learning Biology a teacher is supposed to know that Biology is more than just fact and concept, because in Biology there are compilations of a process and a concept that can be applied also developed in real life. The main subject respiratory system is a subject that has high complexity. This is because the subject is abstract that the all process cannot be directly seen (inside the human body). Human Respiratory System subject is about organ structure, mechanism and also respiration dysfunctional (breathing) that less effective if presented with lecture method and memorizing. The Process Images textbook subject can be interpreted as a medium that used to help students understanding a Biological (genesis, thing, or phenomenon) genesis. Basically, in stimulating student's memory, there is a need for effective hints (Allan et al., 2001). Because of that, with the usage of Process Images textbook, this process can enhance student's critical thinking ability.

II. METHODOLOGY

This kind of research is still a prototype (Research and Development). This research method is a (mixed methods) composed of quality and quantity method. Prototype research is a developing research method that used to design a new product or new procedure, then systematically tested in the field and perfected high quality and effective criteria. The product of this research is Process Image textbook in Senior High School Respiratory System subject. Developing research Biology textbook is using developing model Sugiyono (2011) that composed in phases such as Introduction, Design, and Develop. The research design is performance test of critical thinking ability. Assessment is taken while the student is in study activity with assessment indicator such as analyzing; answering and questioning; consider relevant sources; making hypothesis; definition; and reviewing. This design is used to know the effectiveness of this textbook. Subjects of the research are students in XI SCIENCE 3 in Senior High School of Arjasa, Jember academic period of 2017/2018. Analysing technique that used to know the effectiveness of textbook basic on Process Image against Critical Thinking ability using critical thinking formula (Watson, 2008). Basically textbook basic on Process Image of Human Respiratory System is effective if the minimum critical thinking criteria are "good".Therefore the formula to calculate critical Thinking ability is:

$$Cs = \frac{C}{N} \text{x} 100$$

Information:
Cs = Critical Thinking Score
C = Critical Thinking
N = Total score

Criteria Assessment of Critical Thinking Percentage can be seen in Table 1

Average Critical Thinking Indicator	Critical Thinking Category
$20 \leq P < 36$	Bad
$36 \leq P < 52$	Not Enough
$52 \leq P < 68$	Good Enough
$68 \leq P < 84$	Good
$84 \leq P \leq 100$	Vey Good

III. RESULTS

Collecting data method that is used to measure the effectiveness of textbook on process image is performance test. This assessment is executed when students had a study session in class, students are being tested with some indicator such as analyzing, answering and questioning; consider the relevant source; making hypothesis; making definition, and reviewing. Study session in class is done with dividing students into some group, then students are asked to explain Process Images in the book without teacher involvement and make presentation the subject in front of the class.

The result of this research is a quantity and quality data that is analyzed descriptively then interpreted according to the chosen criteria. Based on Table 2. we can notice that the average critical thinking ability of XI SCIENCE 3 against textbook basic on Process Image Human Respiratory System subject is 83,46 % that interpreted as "Good".

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Table.2: Average Percentage of Student's Critical Thinking in XI SCIENCE 3 and XI SCIENCE 5 in Highschool of Arjasa

Component Aspect	XI SCIENCE 3		Interpretation
	Every Aspect Average	Value	
Analysing	4,21	84,2	Very good
Answering and Questioning	4,26	85,2	Very good
Considering Relevant Source	4,13	82,6	Good
Making Hypothesis	4,18	83,6	Good
Definitioning	4,21	84,2	Very good
Reviewing	4,05	81	Good
Total score	**25,04**	**500,8**	**-**
Value (%)	**-**	**83,46**	**Good**

Based on Table 2, there is a result that student's Critical Thinking ability is affected by textbook based on Process Image human respiratory system subject. Results of the both class XI SCIENCE 3 aquired in a good criteria with a conclusion that textbook basic on Process Image in human respiratory system subject can enhance student's Critical Thinking ability. Percentage of Student's Critical Thinking ability Histogram can be seen in Table 1.

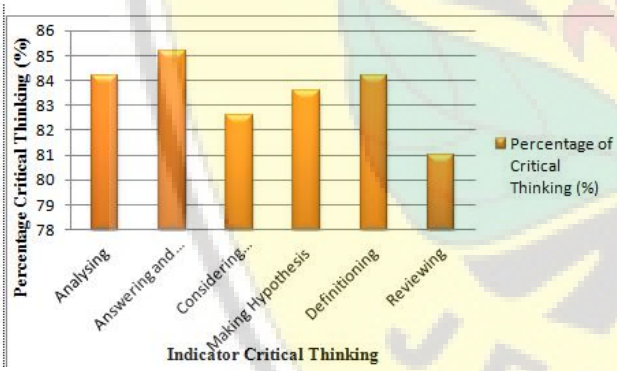

Fig 1: Average Percentage of Critical Thinking Histogram in Senior High School of Arjasa

IV. DISCUSSION

This Research is a research and development method. The objective of this research is to know the effectiveness of textbook basic on process images with human respiratory system against student's critical thinking ability. There is a need for a field test of the effectiveness using Process Images textbook as the main study source.

Measurement in Critical thinking criteria (*Performance Test)* Students in XI SCIENCE 3 can be seen on Tabel 2 in order 83,46 % with criteria of "good". In measuring critical thinking ability student is tasked to analyzing, answering and questioning, considering the relevant source, making a hypothesis based on a literature, make definition, and reviewing is also affected by learning process that forced them to be able to discuss things in a group and understanding also solved a few problems. Critical thinking measurement is done by measuring process through discussion. This makes student able to reconstruct their knowledge and build a presentation model that used from previous study group from solving problems. This is alike with the statement of Tan et al., (2013) states that discussion in learning can be done with a group of students discussing a natural phenomenon, explaining and propose some possibilities of answers than the problems is presented as a relevant solution. Because of that Process Images study can actually affect student's critical thinking ability. This is alike with Livington (1997) states that high-level thinking ability (critical thinking ability) can be practiced through group discussion, thinking training, and evaluation of behavior.

Critical thinking ability of student has a big connection with intelligent and also processing process image information. Gardner states (Hadywinoto dan Setiabudi. 2003:52) that intellegence is used to solve problems. This means everyone has a different level of intelligence. In learning process, it creates an ability to think critically in the performance of brain to process information. Therefore, students ability to think is stimulated so they can develop their critical thinking ability. In learning Biology specially human respiratory system textbook basic on Process Image, brain have a role to invite students to optimize their brain memory capacity through freeing students to make their own concept, using variations of pictures and attractive colour, and giving the students to give brain a chance to transfer memory to long-term memory saving. This is a like with Craig state (2007) that studies using picture component, colour, writing, and diagram caused brain to be used in different situationin facilitating their ability to critical thinking.

Commonly, brain (*cerebrum*) composed in two part that called right hemisphere and left hemisphere that connected with corpus callosum (Chambell and Reece, 2008; Kalat, 2010; Pinel, 2009). In left brain have a role in the ability for verbal/writing (verbal), language, logic, math, number, and intelligence. In right brain it's role is responsible for picture, music, global understanding, creativity, and visual (Albrecth, 2013; Corballis, 2014; Long et al., 2012). In the right brain, it has holistic and intuitive cognitive style in the left brain it has analitical and rational cognitive style (Dehaene et al., in Supradewi, 2010). From the explanation above it is important to keep brain having a balance performance. Balance in the right brain (right hemisphere) and left brain (left hemisphere is needed in the learning process.

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V. CONCLUSION AND SUGGESTIONS

From the results and explanations above we can conclude that textbook basic on Process Images is effective against student's critical thinking ability with a "good" criteria.

From the result of research, researchers suggest for a further research for a greater good this developing research can be done on a large scale, so the textbook effectiveness is undoubted.

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REFERENCES

[1] Albertch, K. 2013. "Star Trek" Character as Cognitive Archetypes?. https://www.psychologytoday.com. (diakses 21 Mei 2018).

[2] Allan, K., Wolf, H. A., Rosenthal, C. R. and Rugg, M. D. 2001. The Effects of Retrieval Cues on Post-retrieval Monitoring in Episodic Memory. *Brain Research* 12: 289-299.

[3] Bannert M, et al. 2015. Shortand longterm effects of students' self-directed metacognitive prompts on navigation behavior and learning performance. *Computers in Human Behavior*. 293-306.

[4] Campbell, N. A., and Reece, J. B., J, B. L..2008. *Biology*. Jakarta: Erlangga.

[5] Choy,C. & Chech, K.P. 2009. Teacher perception of Critical Thinking Among Students and its Influence on Higher Education. *International Journal of Teaching and Learning in Higher Education.* 20(2), 298-206.

[6] Clément, P. and Carvalho, G., 2007. Biology, Health and Environmental Education for better Citizenship: teachers' conceptions and textbook analysis in 19 countries. *Journal Proceedings WCCES XIII (World Council of Comparative Education Societies).* Sarajevo, CD-Rom, 15 pp.

[7] Corballis, M. 2014. Left Brain, Right Brain: Facts and Fantasies. *Plos Biology*, 12(1):1-6

[8] Craig, D. 2007. Applying Brain-Based Learning Principles to Athletic Training Education. *Journal of Flagstaff*. Northen Arizona University. 6(3): 130-141.

[9] Ennis, R.H. 2011. *The Nature Of Critical Thinking:* An Outline of Critical Thinking Disposition & Abilities, Emiritius Professor, University of Illionis.(Online),(http://faculty.education.illinois.edu/rhennis/documents/TheNatureofCriticalThinking_51711_000.pdf), accessed 20 May 2018.

[10] Johnson, D. W., &*Johnson*, R. T. 2001. *Learning together and alone: Cooperative,competitive, and individualistic learning*. Boston: Allyn & Bacon

[11] Kalat, J. W. 2010. *Biopsikologi*. Jakarta: Salamba Humanika

[12] Livingston, J. A. 1997. Metacognition: an Overview, (Online), (http://www.gse.buffalo.edu/fas/shuell/cep564/Metacog.htm, diakses 20 Mei 2018).

[13] Long, D. L. Johns, C. L., and Jonathan, E. 2012. Hemispheric Differences in the Organization of Memory for Text Ideas. *Brain & Language*, 123 (2012):145-153.

[14] Pinel, J. P. J. 2009. *Biopsikologi*. Yogyakarta: Pustaka Pelajar.

[15] Supradewi, R. 2010. Otak , Musik, dan Proses Belajar. *Buletin Psikologi*.18 (2):56-58

[16] Tan, S. K., Chong, Y. H., and Shuhui, T. 2013. Teaching school science within the cognitive and affective domains. *Journal Asia-Pacific Forum on Science Learning and Teaching*. Vol: 14 (3): 2-3

[17] Tania, L *and* Fadiawati, N. 2015. The Development of Interactive E-Book based Chemistry Representations referred to the Curriculum of 2013. *Jurnal Pendidikan IPA Indonesia*.4(2): 164-169.

[18] Taufiq, M., N. R dan Widiyatmoko, A. 2014. Pengembangan Media Pembelajaran IPA Terpadu Berkarakter Peduli Lingkungan Tema Konservasi Berpendekatan Science-edutainment. *Jurnal Pendidikan IPA Indonesia JPII*. Vol.. 3(2):140-145.

[19] Watson, G. & Glaser, E. M. (2008). *WatsonGlaser Critical Thinking Appraisal: Short Form Manual*. USA: Pearson Education, Inc.

[20] Yusmar, F., et al. 2017. A Concept: Enhancing Biology Learning Quality by Using Procces Image. *Journal of Pancaran* . DOI 10.25037Bakken, J. P., & Simpson, C. G. 2011. Mnemonic strategies: success for the young-adult learner. The Journal of Human Resource and Adult Learning. 7 (2).