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Using Video Integrated with Local Potentiality to Improve Students' Concept Mastery in Natural Science Learning

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Abstract. This research is aimed at determining the effectiveness of using video that was integrated with local potentiality to improve students' concept mastery in natural science learning. A quasi-experimental, non-equivalent control group design was used to pursue the purpose of this research. The population was all first-year students of State Junior High School 2 of Jetis that was located in Bantul Regency. Two groups observed and assessed in this research were VII C as the experimental group and VII D as the control group. While the control group students learned natural science concepts through conventional teaching methods, the experimental group through video. The assessment used to measure students' concept mastery was a multiple-choice test related to the concepts of energy in the systems of life. The data related to students' concept mastery were analyzed using the one-way ANOVA and the normalized gain analysis. The findings revealed that the use of video that was integrated with local potentiality was effective to improve students' concept mastery in natural science learning. Furthermore, the significance of this research mainly lies in its findings that can be used as references to review or design natural science learning that is integrated with local potentiality.

1. Introduction

Natural science is a body of knowledge concerned with natural phenomena that occur in our surroundings [1]. Learning natural science requires a deep understanding of concepts. However, sadly, there are still many cases found where students are only urged to memorize concepts, and only a few attempts are made to encourage them to understand the meanings of those concepts thoroughly [2]. Achieving a good understanding of concepts should be started from meaningful cognitive processes either consciously or unconsciously, where students are allowed to integrate new inputs of knowledge with what they have learned [3]. Cognitive processes related to learning skills include the abilities to remember, understand, apply, analyze, evaluate, and create [4]. Then, it is crucial to encourage and help students develop qualities in those cognitive aspects through practices. They can be encouraged to learn concepts of natural science through the application of those concepts to everyday life; for instance, by exploring the local potentiality of the place they live in. The integration of local potentiality with natural science learning can help students understand concepts more properly and contextually [5]. Therefore, it is hoped that the integration of learning activities with local potentiality can give positive effects on the improvement of natural science learning achievement if compared to conventional models of teaching and learning [6]. The general purpose of this integration is to prepare students effectively to have a deeper and wider understanding of their surroundings as well as proper attitude toward local potentiality. So, they will in turn be ready to preserve and develop a variety of qualities of local potentiality in the area where they live [7].

Indonesia is the largest archipelago country in the world with more than 10.000 islands that include five main islands and thousands of smaller islands [8]. The diversity of geographical locations, sociocultural backgrounds, natural resources, and local infrastructures is the uniqueness of Indonesia based on which learning media can be developed [9]. One instance of local potentiality that can be integrated with natural science learning is a micro hydropower plant, particularly in relation to the concepts of energy in the systems of life. A micro hydropower plant is a small-scale type of hydroelectric power (typically less than 100 Kw), using the natural flow of water as its source of energy [10]. Water is classified as a source of renewable energy commonly used by humans, and also as clean energy due to its eco-friendliness [11]. The micro hydropower plant involved in this research is located in Wukirsari Village, Singosaren Subdistrict, Imogiri District, Bantul Regency, Yogyakarta. In this village, the micro hydropower plant uses river water flowing through a stream from Opak river. In relation to natural science learning, this manifestation of local potentiality can therefore be integrated into instructional materials for students to get knowledge about micro hydropower [12].

Regarding the development of instructional materials that were integrated with local potentiality of a micro hydropower plant before the use of video, prior researches conducted by [13] and [14] revealed several problems: (a) allocated time to visit the location of the micro hydropower plant was less efficient, (b) the transportation to take all students to the location of the micro hydropower plant cost so much money, (c) the risks of students getting involved in dangerous situations during the study tour to the micro hydropower plant were higher, (d) the weather was unpredictable, (e) handling students was seriously a difficult task, (f) the students paid less attention when the teacher attempted to strengthen their concept mastery, and (g) the students were easily distracted by their peers and lacking concentration [13], [14]. Thus, these problems were taken as situational backgrounds to improve instructional materials that were integrated with local potentiality. As a response to the previously mentioned problems, video for natural science learning was developed to give presentations about a micro hydropower plant without students having to visit it.

Video as a learning medium definitely requires students' capabilities in interpreting audio and visual inputs [15]. Indeed, those audio and visual inputs contain a lot of information that may include concepts, principles, procedures, and theories and their applications [16]. Using video in instructional activities, teachers can improve the effectiveness of learning by focusing more on real practices, maximizing efforts to achieve goals of learning in a relatively shorter time, securing students' enthusiasm for natural science learning, and visualizing abstract concepts [17], [18]. Some studies have revealed that the advance of technology can positively influence the process of learning, such as the use of video that has been known to be a very effective learning medium [19], [20], [21]. In order to solve a certain problem or study a certain phenomenon, students can extend and enhance their learning time by rewatching the video at home and therefore gathering more information. Each of them will have the opportunity to learn concepts taught to them independently. Thus, the use of video in learning can also encourage autonomous learning. Related to the cognitive aspects, another benefit of using video in learning is that video can show a particular process, relationship, or technique [22]. According to cognitive theories, particularly in relation to multimedia-based learning, a balanced combination of words and images can create a conducive learning atmosphere. Humans, in nature, mainly uses two channels through which they process information. Firstly, we use the visual channel to process symbols, pictures, or anything that our eyes are able to see. Secondly, we use the auditory channel to process sounds that our ears are able to hear. By activating these two channels, students will be able to learn more deeply and improve their memory function in storing information for a longer term [23].

Based on the explanations above, natural science learning that is integrated with local potentiality is considered able to encourage students to actively participate in learning activities. It is particularly in activities where they are allowed to do detailed observations on certain objects, raise their awareness of local potentiality, and improve their creativity to develop more manifestations of local potentiality in their area. In addition, this method of learning is also believed to be able to help students improve their concept mastery, which in turn will influence the results of their cognitive learning process. In this research, the researcher was aided by invaluable information from previous related studies and video that had been developed and validated, attempting to determine the effectiveness of using video that was integrated with local potentiality to improve students' concept mastery in natural science learning.

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2. Method

2.1. Research Design

This research was completed in November of 2017 in State Junior High School 2 of Jetis. The population in this research was all first-year students of State Junior High School 2 of Jetis located in Bantul Regency. Samples were randomly selected from two classes. They were VII C as the experimental group and VII D as the control group.

The procedures of this research were started by gathering preliminary data through a concept mastery test about energy that occurs in the systems of life. Multiple-choice tests were administered to students in the experimental group and the control group before treatment. Next, the experimental group received treatment where concepts of energy were taught to students through video that had been integrated with local potentiality of a micro hydro power plant. In contrast, the control group received treatment where concepts of energy were taught to students through power-point presentations. After treatment, tests to measure students' concept mastery before treatment were administered again to students in both groups.

In the first meeting, students in the experimental group were able to explain about energy, types of energy found in everyday lives, forms of local potentiality in relation to energy, and renewable and non-renewable resources of energy. In the second meeting, students were able to describe the transformations of energy. At last, in the third meeting, with the assistance of the video, students were able to understand and explain about the concepts of mechanical energy, kinetic energy and potential energy. They were also able to understand the law of conservation of energy. Meanwhile, all of those concepts were delivered to students in the control group by using power-point presentations only.

The video developed in this research contains audio-visual explanations about energy, types of energy found in everyday lives, types of energy found in a micro hydropower plant, renewable and non-renewable energy resources, mechanical energy, potential energy, kinetic energy, and the law of conservation of energy. Besides that, the video also provides instructions for students to do the experimental activities related to the concepts of transformations of energy. These activities were supported by the use of students' worksheets as a method to allow students to realize the conceptual knowledge that they obtained from the video. By learning through video, students can be more motivated and engaged in the processes of learning as they are enabled to create, design, understand, raise questions, and think more critically [33]. Furthermore, the non-equivalent control group design as the design of this research can be explained in the following table.

Table 1. Non-equivalent Control Group Design

Group	Pretest	Treatment	Postest
Experimental	O_1	X	O_2
Control	O_3	Y	O_4

Where:

O_1 : Initial concept mastery of the experimental group students
O_3 : Initial concept mastery of the control group students
X : The use of video that was integrated with local potentiality of a micro hydropower plant to teach the concepts of energy
Y : The use of power-point presentations to teach the concepts of energy
O_2 : Final concept mastery of the experimental group students
O_4 : Final concept mastery of the control group students

The data in this research were characteristically quantitative descriptive. A 20-item test consisting of multiple choices was used as the instrument to measure students' concept mastery. Aspects of concept mastery pursued in this research consisted of *remembering*, *understanding*, and *applying* [4], which were adopted from Anderson's taxonomy for learning, teaching, and assessing. The three aspects of concept mastery can be identified specifically based on 20 indicators as shown in the following table.

Table 2. Aspects and Indicators to Measure Students' Concept Mastery

Aspects	Indicator Items
Remembering	Stating the unit of energy
Understanding	Explaining the definition of energy
	Explaining one of the forms of energy found in a motor cycle
	Explaining the forms of energy found in a micro hydropower plant
	Explaining local potentiality in a certain area related to energy
	Explaining the advantages of a micro hydropower plant
	Giving examples of renewable energy sources
	Giving examples of non-renewable energy sources
	Explaining energy transformations in an inanimate object or an electronic device
	Giving examples of energy transformations found when someone runs
	Explaining energy transformations found in a micro hydropower plant
	Explaining the law of conservation of energy in energy transformations
	Explaining the mechanical energy when water falls into the turbine
	Explaining factors influencing the amount of potential energy
	Explaining factors influencing the amount of kinetic energy
Applying	Measuring the height of an object with potential energy
	Measuring the amount of kinetic energy in a certain event
	Measuring the speed of an object with kinetic energy
	Measuring the amount of potential energy using the mechanical energy formula

Adapted from: [13]

2.2. Data Analysis Technique

The data were analyzed using the one-way ANOVA with SPSS 23.0 with a level of significance less than 0.05 to determine the effectiveness of using video that was integrated with local potentiality to improve students' concept mastery in natural science learning. The statistical data related to the assessment of students' concept mastery consisted of mean scores, standard deviations, variances, and the lowest and highest scores. Then, the data were measured using a normalized gain analysis to determine the average normalized gain (g) of each group. The average normalized gain was calculated and classified using the following formula and categories.

$$g = \frac{posttest\ score - pretest\ score}{maximum\ score - pretest\ score}$$

The normalized gain scores were identified based on the categories shown in Table 3.

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Table 3. Categories of Normalized Gain Scores

No	Score (g)	Categories
1	(g) > 0.7	High
2	0.7 ≥ (g) ≥ 0.3	Medium
3	(g) < 0.3	Low

Source:[24]

3. Result and Discussion

In this research, the educational video for natural science learning integrated with local potentiality reveals facts about the micro-hydro power (MHP) plant located in Wukirsari, Singosaren Village, Imogiri District, Bantul Regency, Special Region of Yogyakarta. The MHP plant in this small village generates electrical energy used for the purpose of street lighting. The flowing water coming from the MHP plant is also used for rice field irrigation and fisheries. Not only bringing many considerable advantages to villagers, the MHP plant can also contribute to natural science learning as the medium through which students are helped to understand the concepts of energy in the systems of life. As a source of renewable energy, the MHP plant provides many things to learn regarding energy transformations, allowing the students to seek deeper understanding. The video which contained the concepts of energy found in an MHP plant was validated by experts consisting of lectures and teachers who assessed it based on its aspects of media and content. The result of the assessment on the video for natural science learning integrated with local potentiality of an MHP plant reached 91.38%. Thus, it can be categorized as a very good medium of learning.

The obtained results regarding students' concept mastery, specifically before and after the treatment with the video for natural science learning integrated with local potentiality of an MHP plant, can be described as following.

Table 4. Recapitulation of Results Regarding Students' Concept Mastery Before and After the Treatment

Components	Experimental Class		Control Class	
	Pretest	Posttest	Pretest	Posttest
Total students	28	28	28	28
Average score of concept mastery	51.96	79.64	41.25	57.32
The highest score of concept mastery	80	100	60	70
The lowest score of concept mastery	25	60	15	35
Variance	145.07	94.31	145.60	117.56
Standard deviation	12.04	9.71	12.07	10.84

The scores of concept mastery in both experimental group and control group revealed significant improvement. Based on the normalized gain analysis, it was found that the average normalized gain (*g*) for the experimental group was 0.58 and classified as falling into the medium category, while the average normalized gain for the control group was 0.27 and classified as falling into the low category. The results of the normalized gain analysis show that the students in the experimental group have a higher level of concept mastery compared to the students in the control group, as shown in Table 5 below.

Table 5. Average Normalized Gain Scores (g) for the Experimental Group and Control Group

No	Scores	Groups	
		Experimental	**Control**
1	Pretest	51.96	41.25
2	Posttest	79.64	57.32
3	*G*	0.58	0.27
4	Category	Medium	Low

According to the results of the normalized gain analysis above, it can be considered that integrating natural science learning with local potentiality of an MHP plant in a form of an educational video significantly helps increase students' interest and motivation to learn. The results are also in accord with the characteristics of a video as a medium for learning which is able to: (a) make concepts to be learned purposefully clearer to students as they can replay the video as many times as they need to grasp the information; (b) overcome learning obstacles related to distance and time; (c) improve students' thinking skills; and (d) help develop students' imagination in order that they become creative in dealing with learning challenges. It is important to be noted that the use of video in learning can affect students' emotions. In this case, it affects them positively bcause all students, regardless of their levels of abilities and achievements, are given the same opportunity to learn under the same circumstance. Therefore, with the use of video in learning, it is hoped that the students can show significant responses and improvement related to the goals of learning.

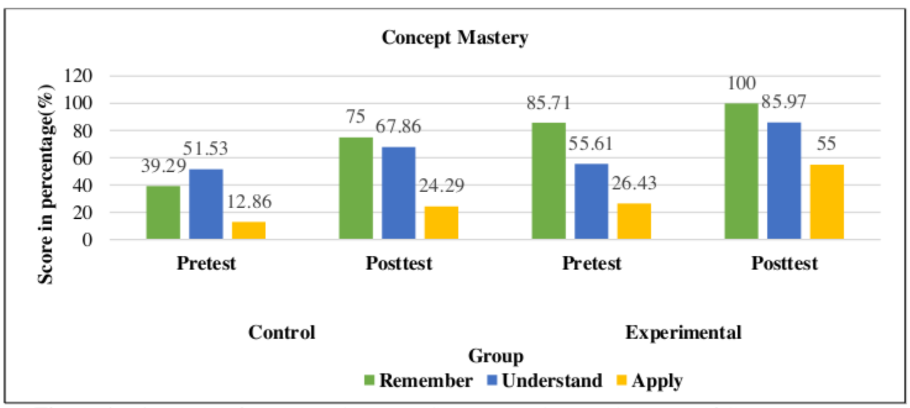

Figure 1. Histogram of Pretest and Posttest Scores Based on Each Aspect of Concept Mastery

As the focus pursued in this research, students' concept mastery is influenced by some psychological factors such as intelligence, attention, interest, attitude, motivation, maturity, and fatigue [25]. Besides that, concept mastery is also influenced by learning strategies [26]. In order to succeed in dealing with problems related to students' concept mastery, there are three aspects of concept mastery that need to be measured: *remembering, understanding,* and *applying*.

The aspect of concept mastery that achieved the highest improvement was remembering. To make learning a more meaningful process, the aspect of remembering must be integrated into learning activities by leading students' abilities to remember to the aspect of knowledge as a wider scope and not as a separate and isolated one [27]. Undoubtedly, students are required to improve their thinking skills to process the patterns of knowledge. However, it is likely that they are unable to contruct higher levels of concepts if they lack of fundamental information because they have trouble remembering [28].

The next aspect that showed a significant improvement after *remembering* was *understanding*. This aspect of concept mastery requires students to have a sufficient understanding in order to be able to arrange and organize concepts that they have learned. They must be able to answer questions or solve problems with the right pieces of information or solutions based on their understanding. This means that, after the phase of remembering concepts, students need to mentally and thoroughly perceive the intended meanings or significance of the concepts they have learned [29]. Regarding the aspect of understanding, both experimental and control groups showed significant improvements. Learning through real examples is considered able to encourage students. It also makes them understand concepts more easily if compared to learning only through presentations of abstract concepts.

The last aspect of concept mastery is *applying*. The statistical findings showed that this aspect had the lowest improvement. It mainly refers to cognitive processes where students are able to perform procedural actions in solving problems. Thus, it is closely related to procedural knowledge, including the abilities to carry out a certain task by following the procedures to do it and implement certain concepts in real-life situations. Carrying out a certain task by following the procedures is the form of a cognitive process in dealing with problems, in which students know what to do and how to do it in order to achieve satisfactory results [30]. Then, implementing certain concepts in real-life situations is connected to the abilities to understand and create something. Therefore, it can be said that applying is a continuous process that starts from the knowledge of certain formulas or procedures to solve problems. If students meet with difficulties in understanding procedures to solve certain problems, then it will negatively affect the aspect of applying as the consequence.

Table 6. The Analysis Results with the One-way ANOVA

	F	**Sig.**
Concept Mastery	65,85	0,000

To sum up the quantitative results from the one-way ANOVA, it can be said that students' concept mastery in natural science learning was significantly affected by the use of video that was integrated with local potentiality. It was shown by the significance value of 0.00, which is less than 0.05. This finding corresponded to the results of previous related studies conducted by [13] and [14]. They similarly concluded that natural science learning that was integrated with local potentiality could improve students' concept mastery, particularly in the scope of energy and how it works in the systems of life [13], [14]. On that account, natural science learning in the junior high school level needs to focus on activities that connect the students to everyday life, where they are given the opportunities to turn the concepts they have learned into real experiences [31]. In this way, students will be more motivated to learn.

With the use of video in natural science learning, particularly about energy transformations found in a micro hydropower plant as pursued in this research, students were allowed to have a better understanding of energy, the forms of energy, and the sources of renewable and non-renewable energy. Students could also learn about how the micro hydropower plant in Wukirsari operated to generate electricity by using the flow of river water. Furthermore, in the aspect of applying, they were given the opportunities to determine the amount of kinetic, potential and mechanical energy by using formulas they had previously learned. Natural science concepts about energy transformations that particularly occur in a micro hydro power plant, as well as tests to measure students' concept mastery, were all presented in the video. However, in comparison to the experimental group, students' concept mastery in the control group did not make satisfactory progress, especially in the aspects of *remembering* and *understanding*. In this group, natural science concepts were only presented through power-point presentations. Their aspect of *applying* also seemed weak. It was primarily caused by the lack of opportunities where students could be engaged in real practices, such as using formulas to quantitatively investigate the transformations of energy.

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Reflecting on the different learning outcomes of the experimental group and the control group, we can say that the aspects of *remembering, understanding,* and *applying* are very important. It is because they are inarguably elemental factors that determine students' concept mastery. Therefore, students need to improve these three aspects in order to achieve higher-order levels of thinking. Consequently, teachers must more actively encourage their students to get involved in activities that can develop their skills than just give long lectures. So, students will not only know concepts, but they are also able to understand and bring concepts to reality. Finally, we can say that the results of this research correspond to Jeenthong's findings, in which it was concluded that students involved in meaningful experiences with proper guidance showed a better understanding of real-life contexts and better concept mastery than students taught with conventional methods [32].

4. Concluisons

Based on the statistical analysis results, it can be concluded that the use of video that was integrated with local potentiality was effective to improve students' concept mastery in natural science learning. The video could be replayed as many times as needed in order to help students understand the main topics of learning according to their level of abilities. The statistical analysis using the ANOVA test had proved this, where it was found that the significance value was at 0.00 (less than 0.05). This finding revealed that the improvement of students' concept mastery in the experimental group was better than the improvement of students' concept mastery in the control group. It was also indicated by the results of the normalized gain analysis, in which the average normalized gain score for the experimental group fell into the medium category while the average normalized gain score for the control group fell into the low category. The significance of this research mainly lies in its findings that can be used as references to review or design natural science learning that is integrated with local potentiality, especially in order to improve students' mastery of natural science concepts and to assess instructional media.

5. References

[1] Bill Tillery, Eldon Enger, and Frederick Ross 2011 *Integrated Science* (New York: Mc Graw Hill Connect Learn Succeed)

[2] Izaak H. Wenno 2010 *J. Ilmiah Pendidikan Cakrawala Pendidikan* **2** 176-188

[3] Jim Vanides, Yue Yin, Miki Tomita, and Maria Araceli Ruiz-Primo 2005 *Using Concept Map IN The Science Classroom*, NSTA, Science Scope **28** (8) 27-31

[4] Anderson, L. W., & Krathwohl, D. R 2001 *A Taxonomy for Learning, Teaching, and Assessing*, (London: Longman)

[5] Laurens, T., Laamena, C., Matitaputty, C. 2014 *Proceedings of International Seminar Innovation in Mathematics and Mathematics Education*, Yogyakarta, **66** 571-576

[6] I Wayan Suastra and Ketut Tika 2011 *J. Penelitian dan Pengembangan Pendidikan Undiksha*, **5** (3) 258-257

[7] Zainal Arifin 2014 *Konsep dan Model Pengembangan Kurikulum* (Bandung: PT Remaja Rosdakarya Offset)

[8] Jessica Hanafi and Anthony Riman 2015 *The 22nd CIRP Conference on Life Cycle Engineering,* **29** 444-449

[9] Mendikbud 2013 *Peraturan Menteri Pendidikan & Kebudayaan Republik Indonesia Nomor 81A Tahun 2013 tentang Implementasi Kurikulum*

[10] Gunawan, A., Oktafeni, A., and Khabzli, W 2013 *J. Rekayasa Elektrika*. **10** (4) 202-206

[11] Laghari JA, Mokhlis H, Bakar AHA, and Hasmaini Mohammad 2013 *J. Renewable and Sustain Energy Reviews* **20** 279-293

[12] Riris Riezqia Budy Rahardini, I Gusti Putu Suryadarma, and Insih Wilujeng 2017 *The 4th International Conference on Research, Implementation, and Education of Mathematics and Science (4th ICRIEMS)* **1868** 080008-1–080008

[13] Desak Made Megawati 2016 *Pengembangan Perangkat Pembelajaran Materi Energi pada Pemanfaatan Pembangkit listrik Mikro Hidro di Daerah Terpencil untuk Meningkatkan Keterampilan Proses IPA dan Penguasaan Konsep* (UNY Yogyakarta: Thesis-Unpublished).
[14] Riris Riezqia Budy Rahardini 2017 *Pengaruh Pembelajaran IPA Terintegrasi Potensi Lokal Pembangkit Listrik Tenaga Mikro Hidro Terhadap Keterampilan Proses IPA dan Penguasaan Konsep* (UNY Yogyakarta: Thesis-Unpublished)
[15] Chapman Rackaway 2012 *J. of Political Science Education* **8** 189–200
[16] Cynthia J. Brame 2016 *Essay CBE—Life Sciences Education* **15** 1–6
[17] Azhar Arsyad 2014 *Media Pembelajaran* (Jakarta: PT Raja Grafindo Persada)
[18] Dash S, Kamath U, Rao G, Prakash J, and Mishra S 2016 *Audio-visual aid in teaching "fatty liver" Biochem Mol Biol Education* **44** 241–245
[19] Schmid RF, Bernard RM, Borokhovski E, Tamim RM, Abrami PC, Surkes MA, Wade CA, and Woods J 2014 *J. Computer Education* **72** 271–291
[20] W Allen Moore and A. Russell Smith 2012 *Innov Educ Teach Int* **49** 401–414
[21] Brent R. Stockwell, Melissa S. Stockwell, Michael Cennamo, and Elise Jiang 2015 *Blended Learning Improves Science Education-Cell* **162** 933–936
[22] Smaldino and Sharon E 2014 *Pearson New Internatioal Edition: Instructional Technology and Media for Learning* (USA: Pearson)
[23] Mayer RE and Moreno R 2003 *Education Psychology* **38** 43–52
[24] Hake, R. R 1999 *Analyzing Change/ Gain Scores* (USA Indiana University: Dept. of Physics, Indiana University 24245 Hatteras Street, Woodland Hills, CA, 91367)
[25] Riki Apriyandi Putra, Fransisca Sudargo, Sri Redjeki, and Adianto 2014 *International Journal of Science and Research* **3** (3) 498-502
[26] John W. Santrock 2011 *Educational Psychology* (New York: The McGraw-Hill Companies)
[27] Rebekah E. Smith, Ute Johanna Bayen, and Claudia Martin 2010 *Article Development Psychology* **46** 230-244
[28] Rustaman 2005 *Pengembangan Kompetensi (Pengetahuan, Keterampilan, Sikap, dan Nilai) melalui Kegiatan Praktikum Biologi* (Bandung: FMIPA UPI)
[29] Ben R. Newell and Amdt Bröder 2008 *Judgment and Decision Making* **3** (3) 195-204
[30] Ton de Jong and Fergusson-Hessler 1996 *Educational Psychologist* **31**, 105-113
[31] Kementerian Pendidikan Nasional 2013 *Panduan Pengembangan Pembelajaran IPA secara Terpadu* (Jakarta: Direktorat Pembinaan SMP)
[32] Jeenthong, T., Ruenwongsa, P., and Namkang 2014 *Procedia - Social and Behavioral Sciences* **116** 3292-3296
[33] Poore, M 2013 *Using Social Media in The Classroom* (Los Angeles: SAGE Publiations Ltd)

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