Analysis of Physical Concepts Mastery in Visual Basic for Application Implementation

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Abstract Mastery of the concepts of physics in particular on the material characteristics of the wave is still less dominated among learners. The purpose of this study was to determine the learners' mastery of concepts of physics based on Bloom's Taxonomy in the material by applying a wave of media Visual Basic for Application, This study used a Quasi-experimental research. Count collection instrument in this research is to test the ability of kogitif consisting of 15 items objectively. On average grade learners mastery of concepts is evident that the percentage of aspects C_1, C_2, C_4 categorized as high, while the aspect C_3 of being categorized. Overall the average value of the experimental class is higher than the control class obtained a value of 81% and 73%.

Keywords: Mastery of concepts, Visual Basic for Application, characteristics of the wave

1. Introduction

According to Ausubel, concepts are objects, events, situations or characteristics that have characteristics that represent each culture by a symbol mark (object, event, situation or properties that process common critical attribute and are designated in any given culture accepted by some sign or symbol) (Dahar, 2011). So, the concept is an abstraction and the characteristics of an event (the fact) that facilitate communication between humans and which allows for human thinking. To obtain a good learning in physics, learners should be able to develop the capacity to think and not just memorize the lesson, but the lesson students are able to understand the concepts being taught so that students can solve and find solutions of a problem (Masril., 2008).

According to Eggen, as quoted by Ain (2013) states that the mastery of the concept of thinking can make various demands such as remembering, explain, finding facts, cite examples, generalize, apply, and the analogies and declare a new concept in other ways. Mastery of concepts when necessary, as part of efforts to help learners to overcome the weaknesses and obstacles and resolve the problems that are relevant to the concept. Learners in the learning process are not always able to understand what the teacher, the level of understanding obtained by learners is different, there are students who really understand, little understood, did not understand even some that understand what the teacher (Mustafa, et al., 2019).

The concept of physics can be observed in the phenomena that occur in the life and everyday environment. Some phenomena can be clearly seen and felt by the sensory organs. However, some happen quickly, so it can not be captured directly because of the limitations. human senses, especially in matter waves. If you do not use tools for the study, learners will be difficult to observe the phenomenon being studied. Thus learners just know the phenomenon of verbal explanation of teachers (Chairilsyah & Kurnia, 2018). Whereas verbal explanation received and processed by the learners are different. For learners that are difficult to imagine, he will only be used to memorize the concepts of physics without knowing the real picture of the process. Learners are capable of imagining does not

mean being better understood, because these explanations will be visualized differently by each student's appropriate level of individual imagination. That way, students can not master the concepts properly. The concept that does exactly that later would lead to misconceptions. Inaccuracy concepts, students will be trouble again settle issues both theoretical physics or mathematical. If allowed to continue will result in low student learning outcomes students will be trouble again settle issues both theoretical physics or mathematical. If allowed to continue will result in low student learning outcomes students will be trouble again settle issues both theoretical physics or mathematical. If allowed to continue will result in low student learning outcomes (Ika et al., 2014).

The concept in physics based on Bloom's Taxonomy, the multilevel structure that identifies thinking skills ranging from low level to high. Bloom's Taxonomy comprises three domains, namely cognitive, affective and psychomotor. Mastery discuss the concept more cognitive domains. Cognitive features 6 levels namely knowledge (C_1), understanding (C_2), implementation (C_3), analysis (C_4), synthesis (C_5) and evaluation (C_6) (Arikunto., 2009).

Therefore, we need a media that according to the 2013 curriculum-based learning curriculum 2013 ICT (Information and Communication Technology). Learners can develop skills in computer mengeoperasikan and already know the importance of education to be a problem in a process of problem-solving in everyday life (Ying, 2016). Exposure to the Minister of Education and Culture on curriculum development in 2013 that the 21st century ICT-based learning, in the sense that teachers should be technology literate where the teacher must be able to take advantage of ICT in the learning process (Afandi, 2014). Favorable media is media that the media uses technology to access the information needed learners from teachers, friends, and application software (Fabian., 2016). The advantages of Visual Basic Application (VBA), which has its own charm in the form of images and sound so easy to understand as a medium of learning physics and the media riveted to the students so that students do not get bored and creative in using the media (Melisa., 2015).

This research was also supported by previous research on media that was developed by a computer using Excel Miscrosoft utilize Visual Basic by suhendra (2013), which gives the potential effects on the activity and student learning outcomes. Looking at the characteristics of the media, one of the concepts that correspond to the animation is delivered using wave characteristics. Waveform characteristics is one of the concepts of physics who taught at the high school level second class. Matter waves are intimately associated with everyday life, seen from the example the concept logitudinal waves in spring and transverse waves and an example on the rope and the surface of the water.

Based on the description that has been presented, using this media can increase the mastery of concepts students on the material characteristics of the wave.

2. Methodology

This study aims to determine how the percentage of learners in mastering the concepts of physics based on Bloom's Taxonomy. The design of the study is a Quasi-experimental research that aims to determine the result of "something" imposed on "subjects" ie learners. The study involved two classes, the samples are given a different treatment. In the experimental group was given treatment in the form of Visual Basic Application, and grade control is given treatment in the form of conventional learning.

Table 1. Draft Observations

Group	Treatment	posttest
Experiment	X	O_1
Control		O_2

(*Reference*: *Sukmadinata., 2010*)

This study uses the instrument in the form of test form of objective measures of mastery of concepts of physics. Having obtained the test data and then do the first stage of engineering percentages. Mechanical persentese (%) is used to determine the level of mastery of the concept of learners, using the formula:

$$UC = 100\% \text{ x } \frac{The\ group\ of\ learners\ understands\ the\ concept}{Total\ of\ learners}$$

$$DUC = 100\% \text{ x } \frac{The\ group\ of\ learners\ dont\ understand\ the\ concept}{Total\ of\ learners}$$

The second stage of classifying each question based on Bloom's Taxonomy. The third stage is a recapitulation persentaase average level of mastery of concepts based on Bloom's Taxonomy. The fifth stage is entering the category level of mastery of concepts derived from the calculation of the percentage of students previously by category level of mastery of concepts in Table 2 :

Table 2. Category Level Control Concept

Percentage(%)	Category
0≤X≤ 30%	Low
30%≤X≤ 70%	moderate
70≤X100%	High

(*Reference:Yudi Kurniawan et al, 2014*)

3. Result and Discussion

Mastery of the concepts of physics in the material characteristics of the wave by providing an objective matter-shaped test sheet. This concept mastery study cognitive measure of C_1 till C_6. Indicators mastery of concepts using Bloom's Taxonomy on cognitive aspects are given, understand, quantify, and analyze. Problem objective consists of 15 questions and each of the indicators are grouped according to each cognitive domain of Bloom's Taxonomy is a matter of numbers 1 and 13 classified categories remember (C_1), question 2,3,4,5,6,10,14, and 15 classified categorized (C_2), question 11 and 12 classified categories apply (C_3), and about the numbers 7,8, and 9 are grouped categories analyzed (C_4).

The average value of the mastery of the concepts of physics each cognitive domain based on Bloom's Taxonomy can be seen in the following diagram :
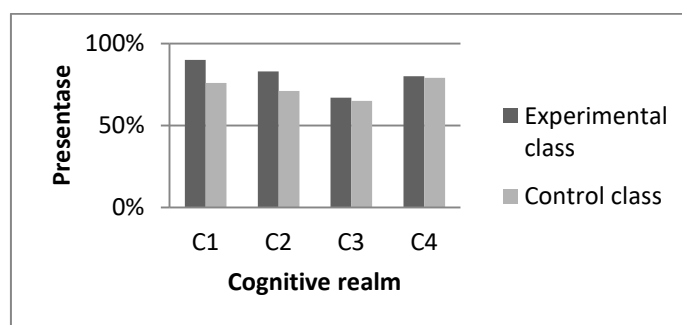
Figure 1. Diagram of the average value of the mastery of the concepts of physics based on Bloom's Taxonomy

Based on Figure 1, the cognitive obtain a percentage of the average value of 90% that is the experimental class and control class 76% in the high category. Cognitive C_1 domain is to capture relevant knowledge from long-term memory. Given the cognitive processes that most low tingkatanya. Including identifying, write or states (Andreson., 2001). The high average value of this aspectdue to exceptional learners already drilled matters to this level. In line with research conducted by Diona (2015), states that matter are identical to the questions that have been described, so the students only need to recall.

Cognitive C_2 obtain a percentage of the average value of 83% that is the experimental class and control class 71% categorized as high. Cognitive domain C_2 is constructing meaning or understandings based on prior knowledge possessed, linking new information with knowledge. Including interpreting, exemplifying, classifying, inferring, comparing and explaining (Andreson., 2001). The high average value of this aspect due to learners already know the aspect C_1, so that learners can understand such questions as to be able to understand, it is necessary to first know or recognize. In line with research conducted by Diona (2015), states that such questions require that students understand the concepts that exist on the matter.

Cognitive C_3 obtain a percentage of the average value of 67% that is the experimental class and control class 65% is average. Cognitive C_3 problem solving closely connected with such procedural knowledge in mathematics problem. Including calculating, applying and getting used to (Andreson., 2001). The average yield in this category due to learners' lack of exercises and weak in math ability In line with research conducted by I Nyoman (2016), stated that the lack of learners in optimizing learning applications so that students lacking in trained workmanship matter and links between the two or more information.

Cognitive C_4 obtain a percentage of the average value of 80% that is the experimental class and control class 79% categorized as high. Cognitive C_4 domain is the decomposition of a problem. This category also includes analyzing the parts related to one another. This category includes the cognitive processes differentiating, organizing, and atributing (Andreson., 2001). The high average value in this aspect due learners can solve a problem that is contained in the proficiency level. In line with research conducted by I Nyoman (2016), states that such questions require learners to be able to analyze problems in the form of problem-solving

If the overall terms of the average value of understanding the concepts of physics students on the material characteristics of the wave can be seen in the following Figure 2:
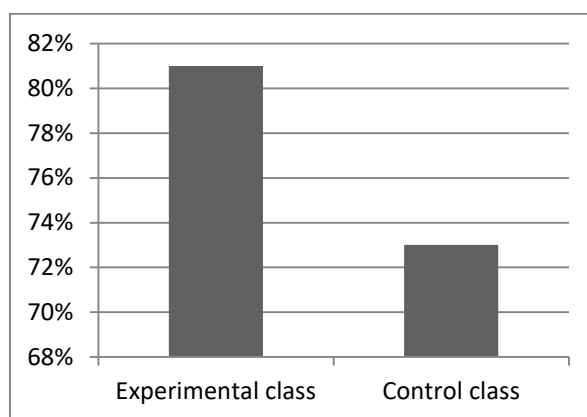
Figure 2. Diagram of the average value of the overall understanding of physics concepts

Based on Figure 2, can be viewed as a whole the average value of the experimental class is higher than the control class. The average value of classroom experiments and control of 81% and 73% due to the experimental group was given treatment using instructional media in the form of Visual Basic Application of the conventional learning.

4. Conclusion

Based on the results that the understanding of the concept based on the material characteristics of Bloom's Taxonomy show mastery of the concept of learners at the high category in the aspect C_1, C_2, C_4, while aspects C_3 of the middle category and need to be improved. Overall the average value of the experimental class is higher than the control class due to using Visual Basic Application instructional media make it easier for learners in penguasai concept.

Acknowledgement

References
Abraham & Grybowski. 1992. Understading and Misundertanding of Eight Grader of Five Chimistry Concept Found in Textbooks. *Journal of Research in Science Teaching*, 105-120.
Afandi, R. 2014. Implementasi Kurikulum 2013 dalam Mempersiapkan Sumber Day Manusia Indonesia Menghadapi "Masyarakat Ekonomi ASEAN'.*Prosiding Seminar Nasional Pendidikan*. Pascasarjana Unesa ISSN : 2407-1293 Halaman 109-117.
Ain, T.N. 2013. Pemanfaatan Visualisasi Video Percobaan Gravity Current Untuk Meningkatkan Pemahaman Konsep Fisika Pada Materi Tekanan Hidrostatis. *Jurnal Inovasi Pendidikan Fisika*. 02(02):97-102.
Andreson, L.W., Krathwohl, D.R. 2001. *A Taaxonomy for Learning, Teaching, and Assesing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Addison Wesley Longman, Inc.
Arikunto.2009. *Dasar-Dasar Evaluasi Pendidikan*. Jakarta: PT Bumi Aksara.

Chairilsyah, D. & Kurnia, R. (2018). Teacher Assessment to School Readiness on the 5-6 Year-Old Children in State Kindergarten in Pekanbaru (Motoric Physical, Social Emotional, Moral, Language, and Cognitive Aspect). *Journal of Educational Sciences, 2(2),* 74-82.

Diona Amelia, Susanti, Arif Fatahillah. 2015. Analisis Hasil Belajar Matematika Siswa pada pokok bahasan Himpunan Berdasarkan Ranah Kognitif Taksonomi Bloom. *Jurnal Edukasi UNEJ* II(1):1-4

Fabian, K., Topping, K.J., Barron, I.G., and Chuah, K. M. 2016. Mobile Technology and Mathematics: Effects on Students' Attitudes, Engagement, and Achievement. J. *Comput. Educ*. 3(1): 77-104

I Nyoman Sugiana, Ahmad Harjono, Hairunnisyah Sahidu, Gunawan. 2016. Pengaruh Model Pembelajaran Generatif berbantuan Media Laboratorium Virtual Terhadap Penguasaan konsep Fisika Siswa pada Materi Momentum dan Implus. *Jurnal Pendidikan Fisika dan Teknolog*i (ISSN. 2407-6902) Vol. II No 2.

Melisa Cahyadi dan Siti N.K. Visualisasi Solusi Analitik dari Osilasi Pegas dengan Menggunakan Visual Basic for Application (VBA). *Prosiding Simposium Nasional dan pembelajaran SAINS 2015* (SNIPS 2015) 8 dan 9 Juni 2015, Bandung.

Mendez dan Slisko (2013). Sofware Scorative and Smartphone as Tools For Implementation of Basic Processes of Active Physics Learning in Classroom: An intial Feasbility Study With Prospective Teachers. *European J Of Physics Education* 4(2) : 17-24.

Mustafa, M. N., Hermandra & Zulhafizh. (2019). Teachers' Strategies to Design Media to Implement Communicative Leaning in Public Schools. *Journal of Educational Sciences, 3(1),* 113-24.

Nurhayati. 2014. Penggunaan Media Animasi Berbasis Visual Basic (VBA) Spreadsheet Excel Untuk Meningkatkan Penguasaan Konsep Mahasiswa Pada Materi Potensial Osilator Harmonik Sederhana. *Jurnal Edukasi Matematika dan Sains* 3(1) :54-55, IKIP PGRI Potianak. Potianak.

Pietzner, V. 2014. Computer-Based learning in Chemistry Classes. *Eurasia Journal of Mathematics, Science & Technology Education*. 10(4): 297-31.

Pratiwi, M. (2019). Student Tutoring, Facilitator and Explaining Models: A Problem Solving Metacognition towards Learning Achievements of Informatics Students. *Journal of Educational Sciences, 3(2)*, 145-154.

Ratna W Dahar. 2011.*Teori-teori Belaja*r. Jakarta : Erlangga.

Sufi Ani Rufaida, Rini Budiharti dan Ahmad Fauzi. 2012. Profil Kesalahan Siswa SMA dalam Pengerjaan Soal dan Materi Momentum dan Impuls. *Jurnal FKIP Universitas Negeri Sebelas Maret*. Vol.3 No.2

Yudi Kurniawan dan Andi Suhandi. 2015. The Three Tier-Test for Identification The Quantity of Students Missconception on Newton's on Newton's First Laws. *Full Paper Journal Globaluminators Full Paper Mul Tidi Sci Plinary Studies* 2, 313-319.

Suhendra, S. 2013. Pengembangan Bahan Ajar Sistem Persamaan Linier dengan Miscrosoft Excel di Sekolah Menengah Atas. Tesis s2. Palembang: PPS Universitas Sriwijaya.

Ying, H.W., Huang, I., & Jen, G.H..2016. Comparison of the effects of project-based computer programming activities between mathematics-gifted students and average students. J. *Compt. Edu.* 3(1): 33-45.