

The Influence of Microbiology Dictionary and Microbiology Textbook Utilization in the Contextual Learning Framework on Biology Students Higher Order Thinking Skills

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Abstract -The purpose of this study was to determine the effect of the utilization of microbiology dictionaries and microbiology textbooks in the contextual learning of the higher order thinking skills of biology students in microbiology courses. The type of the research is quasi-experimental. The population of this study was all sixth-semester students of Biology, State University of Medan, which consisted of eight classes. The sampling technique was random sampling, namely the experimental class1 by using microbiology textbooks in the contextual learning order, experimental class2 by using microbiology dictionaries in the contextual learning and control classes with direct learning in the contextual learning order. The total sample is 102 students. Data were collected using tests. The high-level thinking skills of students were analyzed by covariate analysis techniques (Anacova) and Tukey's advanced tests. The results showed that there was an effect of the utilization of microbiology dictionaries and microbiology textbooks in the contextual learning of students' higher order thinking skills.

Keywords: Dictionary, Textbooks, Contextual, Higher Order Thinking Skills

I. INTRODUCTION

A learning process which involves high-level thinking skills will become a meaningful learning. The implementation of the learning process of science in universities tends to be identical with material information with a broad scope [11];[14]. One indicator of student understanding of the scope of science material is the mastery of various thinking skills, including explaining skills, gathering evidence, giving examples, formulating generalizations, applying concepts, making analogies, using reasoning, and presenting scientific concepts in new situations. Therefore, learning in universities should pay attention to and apply the higher order learning scheme. Higher order thinking skills are now increasingly needed among students because this way of thinking can be applied in solving problems in real life. There are many problems that students will and even always find in their daily lives, so it needs thinking skills to overcome these problems [8]

According to Bloom's revised taxonomy, the cognitive process is divided into Lower Order Thinking and Higher Order Thinking. Capabilities including LOT are the ability to remember, understand, understand and apply, while HOT includes the ability to analyze, analyze, evaluate and create [4];[20].

Higher order thinking ability is an important aspect of teaching and learning so that the learning process should pay attention to students' thinking skills. Higher order thinking will occur when someone associates new information with existing information stored in his memory and will connect or rearrange and develop the information to achieve a goal or find a solution for a difficult situation [15]. The learning process is more likely to be focused in one direction, and students are less aware of the thinking process so that meaningful and relevant learning processes are less achievable. This is in line with Suwardjono's (2009) opinion that students consider lecturers to be the main source of knowledge and who are experts in their fields, students only obtain knowledge without knowing the process and understanding of that knowledge. It must be recognized that higher order thinking is far more needed in the present than in the past [3].

Teaching materials are also a factor that can influence learning outcomes [6];[5]. Teaching materials are information, tools and or text needed by educators for planning and reviewing the implementation of learning[7]. The availability of teaching materials in the learning process can improve the quality of learning and learning outcomes [5]; [12]; [2]. Teaching materials are also able to make the learning process in the classroom more interesting, practical, effective, and able to make learners play a more active role in the learning process in the classroom

According to [22], Contextual Teaching and Learning (CTL) is a holistic learning process and aims to help students to understand the meaning of teaching material by linking it to the context of their daily lives (personal, social and cultural context), so as to be able to have knowledge and dynamic and

flexible skills to actively construct themselves. Contextual Teaching and Learning Approach (CTL) is a way of presenting lesson material by exposing students to problems that must be solved or resolved in order to achieve educational goals that are linked to daily life [21]

II. METHODS

The method used in this study was a quantitative method with a quasi-experimental design approach. Both the experimental class and the control class were given tests of high-level thinking skills before and after applying the learning scheme. The population in this study were all sixth-semester students, Biology Department, State University of Medan. Random sampling technique was used. The number of samples was 102 people: the experimental class1 consisted of 35 people were taught by using microbiology textbooks in the contextual learning order, the experimental class2 35 people who were taught using a microbiology dictionary in the contextual learning and the control class were 32 people taught using direct learning in the contextual learning order.

III. RESULT AND DISCUSSION

A. University Student Higher Level Thinking Ability

The influence of microbiology dictionaries, microbiology textbooks, and direct learning in the contextual learning order of students' higher order thinking skills that were analyzed by covariance analysis technique (Anacova) using SPSS. The result showed significant differences ($F = 29.191$; $P = 0.00$). Additionally, the results of the Tukey's test showed that the high-level thinking skills of students who were taught by using the microbiology dictionary (76.25 ± 7.06) differed significantly with microbiology textbooks (85.97 ± 6.53) ($P = 0.000$). Higher order thinking skills of students who were taught using microbiology textbooks (85.97 ± 6.53) differed significantly from direct learning (73.81 ± 8.83) ($P = 0.000$), but higher order thinking skills of students' who were taught using the microbiology dictionary (76.25 ± 7.06) was not significantly different from direct learning, (73.81 ± 8.83) ($P = 0.381$) as can be seen in Figure 3.1 below:

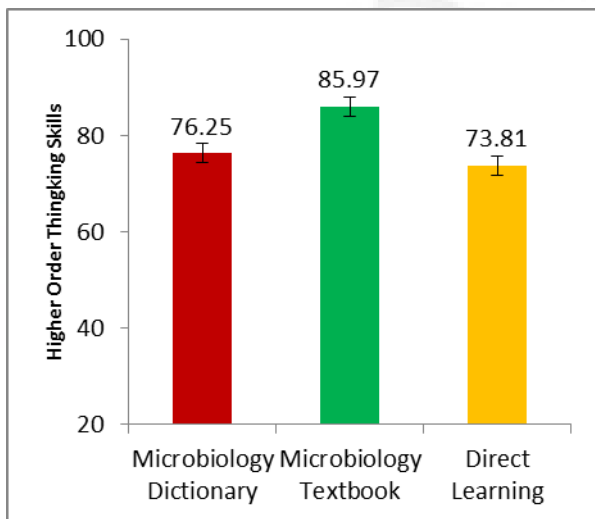


Fig 3.1. Comparative Diagram of Post-test Results of Student Higher Order Thinking Skills

The above diagram shows that the average posttest higher order thinking ability of students taught by microbiology textbooks in contextual learning is higher than that of taught by using a microbiology dictionary in the contextual learning order. The lowest posttest score is students who are taught by direct learning in the contextual learning setting.

Comparative recapitulation of higher order thinking skills of students based on bloom taxonomy which refers to: analyzing (C4), evaluating (C5), and creating (C6) which are taught by using microbiology dictionaries, microbiology textbooks, and direct learning in contextual learning settings in microbiology courses of Biology program in State University of Medan is stated in Figure 3.2.

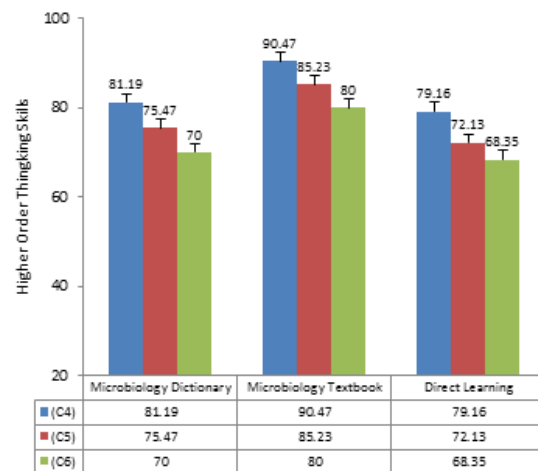


Figure 3.2. Comparative Diagram of Higher Order Thinking Skills of Students Based on Bloom's Taxonomy.

The diagram in Figure 3.2 shows that the students' higher order thinking skills in the aspects of analyzing (C4), evaluating (C5) and creating (C6) which are taught by using microbiology textbooks in contextual learning settings are higher than learning using microbiology dictionaries in contextual learning settings. The lowest average score is students who are taught by direct learning in the contextual learning setting.

Contextual learning is a learning that links the content of the lesson to the real world and is motivated in connecting knowledge and its application in life. When we discuss teaching methods, of course, we must consider the learning media used. Lecturers as facilitators only help and direct students in learning, where students are expected to be able to utilize teaching materials to support their success. This applies to students of the Biology Department of the State University of Medan, where microbiology dictionaries and microbiology textbooks in contextual learning settings may influence students' higher order thinking skills.

This is in line with the research by [19] that states the use of media dictionaries is very effective in improving

understanding with a significant influence. Tarigan in [23] suggests that textbooks are also a learning tool commonly used in schools and universities to support a teaching program. In this communication process, at least three things are involved, namely (a) communicator: in this case the author as the messenger, (b) communicant: in this case the reader as the recipient of the message, and (c) the contents of the message: in this case the content / the concept of scientific discipline to be conveyed. [10] state that textbook will always play an important role in education because it is one of the compulsory references for institutions or schools. Based on the results of [16], it was found that there was a positive and significant influence on the use of media books on learning outcomes.

IV. CONCLUSION

There is an effect of applying microbiology dictionaries, microbiology dictionaries, and direct learning in the contextual learning order to students' higher order thinking skills. Based on the average, it is known that the thinking ability of students taught by using microbiology textbooks is higher than learning using microbiology dictionaries and direct learning in the contextual learning order.

V. RECOMMENDATION

For further researchers, in addition to the lecturers who are partners, researchers also need to inform students about the procedures for implementing microbiology dictionaries and microbiology textbooks in the contextual learning order that will be applied and the time allocation for each stage to be more effective and efficient.

REFERENCES

- [1] Abdu, Raheem, B.O. & Oluwagbohunmi, M.F. 2015. Pre-Service Teachers' Problems of Improvisation of Instructional Materials in Social Studies in Ekiti State University. *Journal of Education and Practice*.
- [2] Adebule, S.O. & Ayoola, O.O. 2016. Impact of Instructional Materials on Students' Academic Performance in Mathematics in Secondary School in Ekiti State, Nigeria. *Research Journal of Educational Studies and Review*. 2 (1):1—4.
- [3] Al 'Azzy, U. L. & Budiono, E. 2013. Penerapan Strategi Brain Based Learning yang dapat Meningkatkan Keterampilan Berpikir Tingkat Tinggi. [Online]. Retrieved from: <http://jurnalonline.um.ac.id/data/artikel/artikel.pdf>. (Retrieved 02 February 2018)
- [4] Anderson, L., and Krathwohl, D. 2001. *Assessing: A Revision of Bloom's Taxonomy*. Publishing Co, New York, US.
- [5] Enu, J., Agyman, O.K. & Nkum, D. 2015. Factors Influencing Students' Mathematics Performance in Some Selected Colleges of Education in Ghana. *International Journal of Education Learning and Development*. 3 (3):68—74.
- [6] Etsey, K. 2005. Causes of Low Academic Performance of Primary School Pupils in the Shama Sub-Metro of Shama Ahanta East Metropolitan Assembly (SAEMA) in Ghana. *Paper* presented on the Regional Conference on Education in West Africa, Department of Educational Foundations University of Cape Coast, Senegal, 1-2 .
- [7] Hamdani. 2011. *Strategi Belajar Mengajar*. Bandung: Pustaka setia.
- [8] Hasruddin Irmayati, M. Binari. 2017. Preliminary Research Pengembangan Buku Ajar Mikrobiologi Berbasis Literasi Sains. *Conference Proceeding Nasional III Biologi dan Pembelajarannya Universitas Negeri Medan*.
- [9] Hasruddin, Rahmawati, Edi., Syahmi. 2017. Pengembangan kamus Mikrobiologi berbasis Kontekstual. *Thesis*. PPs Unimed.
- [10] Ibrahim, R. Dan Nana Syaodih. 2003. *Perencanaan Pengajaran*. Jakarta: Rineka Cipta.
- [11] Noblitt, L., Vance, D. E., & Smith, M. L. D. (2010). A comparison of case study and traditional teaching methods for improvement of oral communication and critical-thinking skills. *Journal of College Science Teaching*, 39(5), 26.
- [12] Nwike, Matthew C., & Catherine, O., 2013. Effects of Use of Instructional Materials on Students Cognitive Achievement in Agricultural Science. *Journal of Educational and Social Research*. 3, (5), 43- 51.
- [13] Olayinka, A.R.B. 2016. Effects of Instructional Materials on Secondary Schools Students' Academic Achievement in Social Studies in Ekiti State, Nigeria. *World Journal of Education*. 6 (1):32—39. DOI: <https://doi.org/wje.v6n1p32>. (retrieved 09 February 2018).
- [14] Reynolds, J., & Moskovitz, C. 2008. Calibrated Peer Review Assignments in Science Courses: Are They Designed to Promote Critical Thinking and Writing Skills. *Journal of College Science Teaching*, 38(2), 60.
- [15] Shadiq, F. 2007. Bagaimana Cara Matematika Meningkatkan Kemampuan Berpikir Tingkat Tinggi para Siswa, (Online), (<http://fadjarp3g.wordpress.com/bagaimana-cara-matematika-meningkatkan-kemampuan-berpikir-tingkat-tinggi-para-siswa>, (retrieved February 02, 2018).
- [16] Supriyo . 2015. Pengaruh Buku Teks dan Cetak Terhadap Hasil Belajar. *Jurnal Pendidikan Ekonomi*. 1(3).
- [17] Suwardjono. 2009. Revolusi Paradigma Pembelajaran Perguruan Tinggi Dari Penguliahan ke Pembelajaran.
- [18] Widiyanto, S., 2017. Peningkatan Reading Comprehension Siswa SD Melalui Penggunaan Media Kamus Bergambar Bergambar Bahasa Inggris. *Jurnal Basicedu*, 1(1)
- [19] Winarti. 2015. Profil Kemampuan Berpikir Analisis dan Evaluasi Mahasiswa dalam Mengerjakan Soal Konsep Kalor. *Jurnal Inovasi dan Pembelajaran Fisika*. 2 (1). 19-24.
- [20] Wulandari, L., Susanti, E. & Martini, K.S., 2015. Penerapan Pendekatan Pembelajaran Contextual Teaching and Learning (CTL) untuk 87 Meningkatkan Kemampuan Berpikir Kritis dan Prestasi Belajar. *Jurnal Pendidikan Kimia (JPK)*, IV(1): p.145
- [21] Yamin, Martinis. 2013. *Paradigma Baru Pembelajaran*. Jakarta: Referensi. Yee, M. H., Widad B. O., Jailani B. M.Y. 2011. The Level of Marzano Higher Order Thinking Skills Among Technical Education Students, International. *Journal of Social Science and Humanity*. 1 (2).