# APPLICATION OF HIGHER ORDER THINKING SKILLS (HOTS)-BASED PROBLEM-BASED LEARNING MODELS TO INCREASE THE CRITICAL THINKING ABILITY OF STUDENTS IN EDUCATION IN ECONOMIC LESSONS IN CLASS XII SMAN 11 MAKASSAR

[1]Sitti Hajerah Hasyim, [2]Muhammad Hasan, [3]M. Yusuf A. Gampo, [4]Sitti Nurbia

[1,2,3]Universitas Negeri Makassar, Makassar, Indonesia
[4]SMA Negeri 11 Makassar, Makassar, Indonesia

*Abstract*: This study aims to find out the effectiveness of the HOTS-based PBL model in improving students' critical thinking skills, with more specificity to see differences in the HOTS pre-test scores for control group and treatment group, differences in the HOTS post-test score for the control group and the treatment group, and differences in the HOTS pre-test scores and post-test scores for the treatment group. This research is a quantitative approach that uses experimental studies. Sampling is done randomly so that all samples in the group are balanced and have the same characteristics. This research was conducted on economic subjects in Class XII SMAN 11 Makassar. The sample used in this study was 60 students. The results of this study confirm that the HOTS-based PBL model can improve critical thinking skills in students.

*Index Terms*: Problem Based Learning, Higher Order Thinking Skills, Critical Thinking Ability

_____

## I. INTRODUCTION

Several researchers have conducted studies related to the curriculum and the process of economic learning, specifically those associated with the application of various learning models that can improve economic learning activities and outcomes at multiple levels of education (Fullbrook, 2004; Siegfried, 2008; Coyle, 2012; Fullbrook, 2012; Mearman et al., 2013; Snellman et al., 2015; Hasan, 2017).

In economic learning at the Senior High School level, teachers often face various problems related to the implementation of learning that can make students understand economic concepts, economic phenomena, and their application in daily life, so to overcome these problems, teachers must find and apply a new learning model that is appropriate to the needs, interests, and abilities of students (Vasiliki, 2016; Mappe & Hasan, 2017).

The weak ability of students to understand economic concepts, economic phenomena and their application in everyday life is caused by the process of economic learning only implemented in the realm of low-level thinking skills (LOTS). Low-level thinking skills are the necessary skills that must be acquired before students can reach higher-level thinking skills (HOTS). In low-level thinking skills, an essential thing that is achieved is that the material can be remembered and understood. Recognizing, understanding, and applying are included in low-level thinking skills. Low-level thinking skills are not enough for the economic learning process. There must be higher-order thinking skills, which include analyzing, evaluating, and creating (Brookhart, 2010).

In the era of the Industrial Revolution 4.0, thinking skills, especially creativity, are critical because human creativity has become the primary economic source (Florida, 2002). Economic education in the era of the Industrial Revolution 4.0 requires students to have skills in making decisions and think critically and creatively before entering the next level of education and the world of work.

Related to the skills needed in the Industrial Revolution 4.0 era, Scott (2013) and Bialik et al. (2015) stated that there are four competencies, which include creativity, critical thinking, communication, and collaboration. Furthermore, Scott (2013) and Bialik et al., (2015) stated that 21st-century skills could be grouped into two main components, which include abstract skills related to thinking skills (creative thinking and critical thinking), and concrete skills (communication and collaboration). Besides, creative thinking skills and critical thinking skills are included in higher-order thinking skills (Moseley et al., 2005; Miri et al., 2007).

HOTS is one of the important components for someone to be able to solve new problems in the 21st century (Brookhart, 2010). HOTS also plays an important role in applying, connecting, or manipulating prior knowledge to address new issues effectively (Brookhart, 2010). In the revised Bloom taxonomy, HOTS is defined as an incision between the top three levels of ability in the cognitive dimension (analyzing, evaluating, creating), and three levels of knowledge dimension (conceptual, procedure, metacognitive) (Anderson & Krathwohl, 2001; Thompson et al., 2008). Therefore, HOTS is measured using tasks, including analyzing, evaluating, and creating conceptual and procedural knowledge, or metacognition. It means that familiarizing students with HOTS activities is important to help them get ready to solve new problems, adjust to new situations, and make decisions about particular issues.

The effort taken to overcome this is by applying the HOTS-based PBL model. The proposed model is based on previous studies, which state that the PBL model has remarkable results in the didactic methodology. PBL is an open inquiry learning that can improve student learning outcomes and improve problem-solving skills through higher-order thinking skills, develop students' independent and interpersonal learning skills (Neo et al., 2002; Sungur et al., 2006).

## II. METHOD

This research is a quantitative approach that uses experimental studies. This preliminary study aims to compare students' critical thinking skills in the HOTS-based PBL model with traditional learning. The stages can be seen in Figure 1 below.
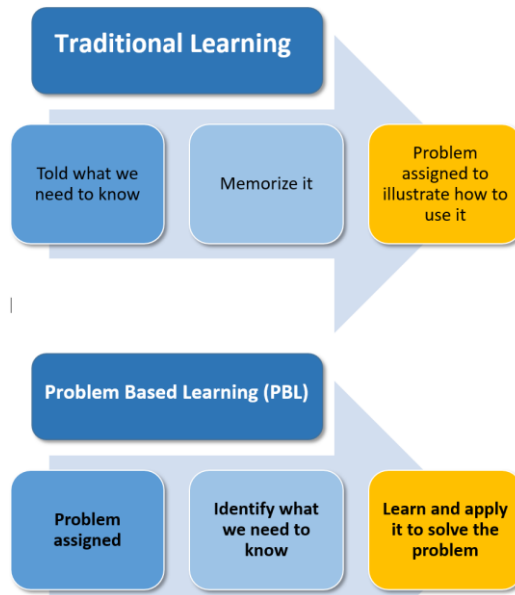


Figure 1 Comparison of the Implementation of PBL Learning and Traditional Learning

In this study, economic learning will be designed using HOTS-based PBL learning, with the emphasis being on promoting learning by thinking. The teacher is a learning facilitator who must sharpen the thinking skills of students. In this study, thinking skills are categorized using a framework known as Revised Bloom's Taxonomy (RBT) (Anderson et al., 2001; Krathwohl, 2002).
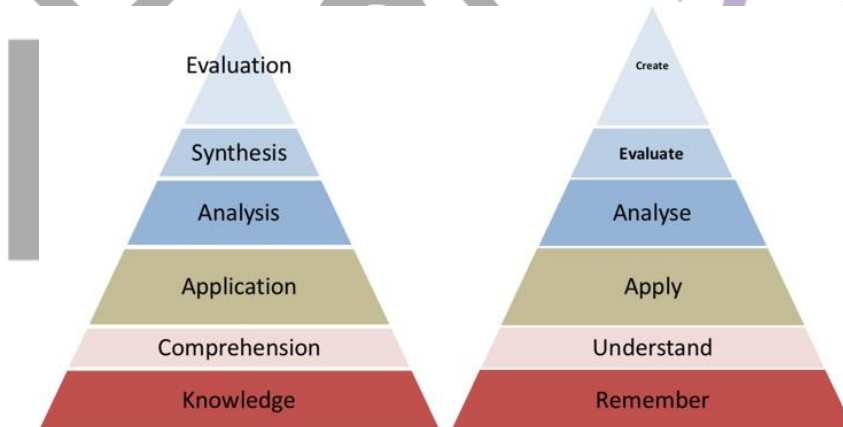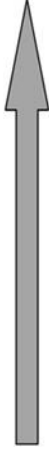


Figure 2 Early Bloom Taxonomy and Revised Bloom Taxonomy

Bloom's revised taxonomy categorizes thinking into six different levels, which include creating, evaluating, analyzing, applying, understanding, and remembering. In RBT, evaluation precedes creation because it is assumed that before students can make something, students need to evaluate it. Also, creating is a very complex task that requires students to put together individual parts in different ways, or form a completely new product. The figure below explains the thinking skills associated with each of the six categories of thinking in the cognitive domain (Anderson et al., 2001).

Revised Bloom's Taxonomy of Thinking Levels and Thinking Skills Involved

| | Levels of Thinking | Thinking Skills Involved |
|---|---|---|
| HOTS | Creating | • Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. |
| | Evaluating | • Making judgments based on criteria and standards through checking and critiquing. |
| | Analyzing | • Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing. |
| | Applying | • Carrying out or using a procedure through executing or implementing. |
| | Understanding | • Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining. |
| LOTS | Remembering | • Retrieving, recognizing, and recalling relevant knowledge from long-term memory. |

Figure 3 Thinking Skills in RBT

Sampling is done randomly so that all samples in the group are balanced and have the same characteristics (Hasyim and Hasan, 2008). This research was conducted on economic subjects in Class XII SMAN 11 Makassar. The sample used in this study was 60 students. Students are divided into two groups, 30 students in the control group and 30 students in the treatment group. The sample is chosen based on the level of stratification of student learning outcomes in economic subjects. This study uses HOTS-based learning tools as a means of intervention, and evaluation instruments used are HOTS test assessment (pre-test and post-test) and critical thinking skills questionnaire.

### III. RESULTS AND DISCUSSION

This study aims to see the effectiveness of the HOTS-based PBL model in improving students' critical thinking skills. In this regard, this study will focus on looking at differences in HOTS pre-test scores for the control and treatment groups, differences in HOTS post-test scores for the control and treatment groups, and differences in the HOTS pre-test scores and post-test scores for the treatment group.

Associated with differences in the HOTS pre-test scores for the control group and the treatment group, independent analysis of the t-test sample did not show a significant difference between the treatment group and the control group in the pre-test score at HOTS, because the significance value obtained was higher when compared with a significant level used ($0.745 > 0.05$). The findings show that the control and treatment groups were similar in terms of knowledge before the intervention (Table 1).

Table 1. Pre-test scores for the Control Group and Treatment Group

| Group | N | Mean | SD | t | Sig. |
|---|---|---|---|---|---|
| Pre | 30 | 22.51 | 10.72 | - 4.867 | 0.745 |
| Post | 30 | 23.25 | 8.46 | | |

Source: Author's computation, 2019

The findings indicate that both groups had the same level of critical thinking skills before the intervention. This finding also shows that both groups used in this study (control and treatment) have the same level of achievement. Equality of students in terms of critical thinking skills between the two groups is an important aspect of ensuring the two groups are equal and comparable.

Independent analysis of t-test samples showed a significant difference between the treatment and control groups in the HOTS post-test score. It can be seen in Table 2 below.

Table 2 Post-test scores for the Control Group and Treatment Group

| Group | N | Mean | SD | t | Sig. |
|---|---|---|---|---|---|
| Pre | 30 | 45.28 | 11.01 | - 3.208 | 0.001 |
| Post | 30 | 56.20 | 13.49 | | |

Source: Author's computation, 2019

The findings of this study indicate that the control and treatment groups have different levels of critical thinking skills after the intervention. The results showed that the post-test score on the topic of the service company's accounting cycle increased after the response of the HOTS-based PBL model as well as the traditional approach in the learning process. However, the score for students with the HOTS-based PBL model is better than the score for students who experience learning the conventional method. Improved ratings indicate that students understand better when they learn about the topic of the service company accounting cycle through the HOTS-based PBL model. It is because the HOTS-based PBL model encourages students to be actively involved in their learning, especially in the topic of the service company's accounting cycle, the recording stage.

The findings of this study, through paired t-test analysis, found that there were significant differences between the pre-test and post-test scores of the treatment group. It shows that there are significant differences in students' critical thinking skills before and after PBL interventions. It can be seen in the following Table 3.

Table 3 Pre-test and Post-test scores for the Treatment Group

| Group | N | Mean | SD | T | Sig. |
|-------|----|-------|-------|----------|-------|
| Pre | 30 | 34.17 | 8.17 | - 12.452 | 0.002 |
| Post | 30 | 52.21 | 12.30 | | |

Source: Author's computation, 2019

These findings indicate that PBL has a positive impact on students' critical thinking skills. The strength of PBL is that students learn how to obtain knowledge content and understand learning content as a whole. Other studies also show PBL has a significant impact on analytical skills and reflective thinking. All of these studies are PBL effects on the cognitive domain. Therefore, it can be concluded that the HOTS-based PBL model is significant in improving critical thinking skills in students.

## IV. CONCLUSIONS

The results of this study confirm that the HOTS-based PBL model can improve critical thinking skills in students. It can be seen from the significant difference between the pre-test and post-test scores of the treatment group. It shows that there are significant differences in students' critical thinking skills before and after PBL interventions. HOTS-based PBL model stimulates students' thinking and then motivates students to solve assigned problems.

## V. ACKNOWLEDGMENT

## REFERENCES

[1] Anderson, L.W. dan Krathwohl, D.R. (2001). *A taxonomy for learning, teaching, and asessing: A revision of Bloom's taxonomy of educational objectives. A Bridged Edition.* New York: Addison Wesley Longman, Inc.
[2] *Bialik*, M., Bogan, M., Fadel, C., & Horvathova, M. (2015). *Character education for the 21st century: What should students learn?*. Boston, MA: Center for Curriculum Redesign. Retrieved from: www.curriculumredesign.org.
[3] Brookhart, S. M. (2010). *How to assess higher order thinking skill in your classroom*. Alexandria, Virginia: ASCD.
[4] Coyle, D. (2012). *What's the use of economics? Teaching economics after the crisis*. London: London Publishing Partnership.
[5] Florida, R. (2002). *The rise of the creative class and how it's transforming work, leisure, community and everyday life*. New York: Basic Books.
[6] *Fullbrook*, E. (2004). *A guide to what's wrong with economics*. London: Anthem Press.
[7] Fullbrook, E. (2012). To observe or not to observe: Complementary pluralism in physics and economics. *Real-World Economics Review*, 62(4), 20-28.
[8] Hasan, M. (2017). Pengaruh kompetensi profesional terhadap kinerja guru ekonomi Sekolah Menengah Atas Negeri di Kabupaten Gowa. *Economix*, 5(2).
[9] Hasyim, S.H., Hasan, M. (2008). *Penelitian tindakan kelas*. Makassar: Indoreplan.
[10] Krathwohl, D.R. (2002). A revision of Bloom's taxonomy: An overview. Theory Into Practice, 41(4), 212-218.
[11] Mappe, Nuraisyiah, dan Hasan, Muhammad. 2017. Penerapan Model Pembelajaran Kooperatif Tipe NHT untuk Meningkatkan Hasil Belajar Siswa Pada Mata Pelajaran Ekonomi di Kelas XI IPS 2 SMA Negeri 5 Makassar Jurnal Economix, 9 (1), 107-117.
[12] Mearman, A., Papa, A., Webber, D.J. (2013). Why do students study economics?. *Working Papers 20131303*, Department of Accounting, Economics and Finance, Bristol Business School, University of the West of England, Bristol.
[13] Miri, B., David, B. C., & Uri, Z. (2007). Purposely teaching for the promotion of higher order thinking skills: A case of critical thinking. *Research in Science Education*, 37(4), 353-369.
[14] Moseley, D., Baumfield, V., Elliott, J., Gregson, M., Higgins, S., Miller, J., & Newton, D. (2005). *Frameworks for thinking: A handbook for teaching and learning*. New York: Cambridge University Press.
[15] Neo, K. W., Ehyn, Y. K., & Megan. (2002). *Authentic problem based learning: Rewriting business education.* Singapore: Prentice Hall.
[16] Scott, G. (2013). Improving learning and teaching quality in higher education. *South African Journal of Higher Education*, 27 (2), 275-294.

[17] Siegfried, J. (2008). Trends in undergraduate economics degrees through june 2007. *Journal of Economic Education*, 39(3), 297-301.

[18] Sungur, S., Tekkaya, C., & Geban, O. (2006). Improving achievement through problem based learning. *Journal of Biological Education*, 40(4), 155-160.

[19] Snellman, K., J. M. Silva, C. B. Frederick, and R. D. Putnam. (2015). Inequity outside the classroom: Growing class differences in participation in extracurricular activities. *Voices in Urban Education,* 40(1), 7-14.

[20] Thompson, E., Luxton-Reilly, A., Whalley, J. L. Hu, M., P. Robbins. (2008). Bloom's taxonomy for CS assessment. *Proceeding Tenth Australasian Computing Education Conference (ACE 2008)*, Wollongong, Australia. 155-162.

[21] Vasiliki, B., Panagiota, K., & Maria, S. K. (2016). A new teaching method for teaching economics in secondary education. *Journal of Research & Method in Education*, 6(2), 86-9.