IOSR Journal of Research & Method in Education (IOSR-JRME)
e-ISSN: 2320–7388, p- ISSN: 2320-737x Volume 12, Issue 5 Ser. V (Sep. – Oct. 2022), 40-45
www.iosrjournals.org

Bloom Taxonomic Approach in the Construction of Cognitive Measurements

Helvy Yunida[1], Awaluddin Tjalla[2], LussyDwiUtami Wahyuni[3]
Postgraduate Doctoral Program, State University of Jakarta, Department of Educational Research and Evaluation[123]

ABSTRACT
Infection prevention and control training is a technical training for Puskesmas staff. In infection prevention and control training there are several stages of activity. The stages are preparation, training process, and training evaluation stage. participants must take the pre-test and post-test for the learning evaluation process. The pre-test aims to find out how far the participants have been exposed to the material, while the post-test is to find out how far the participants can understand the material. Based on the test results, participants often get a minimum score.According to the participants, the questions asked were difficult to understand. Questions that are too difficult to understand and complex make participants fail to pass because the joint scores must be fulfilled, so participants have to do remedial. For this reason, it is necessary to evaluate the questions, to get correct and proper questions. The questions are valid and reliable, with predictable difficulty levels, and known differences. So it is necessary to prepare measuring instruments related to learning objectives and methods used. So that the training participants can go through the evaluation process in the form of pre-test and post-test properly because the questions are made according to the measuring instrument used.
Keywords: *Bloom's Taxonomy, Construction, Measuring Tool, Cognitive*

Date of Submission: 14-10-2022 Date of Acceptance: 30-10-2022

I. Introduction

definitions of evaluation to be human mental constructions whose correspondence to some "reality" is not and cannot be an issue. There is no answer to the question, "But what is evaluation?" The construction we have labelled fourth-generation evaluation is more informed and sophisticated than previous constructions. But like those earlier forms, this form will prove inadequate sooner or later and will require revision, refinement, extension, and probably even complete replacement. Indeed, we take it to be our obligation to seek out aspects of evaluation that this form does not handle well in a continuing effort at reconstruction. Evaluation as we know it did not simply appear one day; it is the result of a developmental construction and reconstruction process involving several interacting influences. Evaluation outcomes represent meaningful constructions that individual actors or groups of actors form to"make sense" of the situations in which they find themselves. The findings are not "facts" in some ultimate sense but are, instead, literally created through an interactive process that includes the evaluator (so much for objectivity!) as well as the many stakeholders that are put at some risk by the evaluationEgon G. Guba(Guba, 1989)

According to the ROI Model Evaluation Program, Phillip stated that Return on Investment (ROI) is the process of measuring, collecting and analyzing data before and after the training program to determine the benefits of training investments. Meanwhile, according to Kirk Patrick that there are 4 steps of training evaluation, namely: Reaction, learning, behavior and Result. Phillips ROI model is the same as Kirkpatrick, but with an extra step, namely in the fifth step of the Phillips ROI model, namely: evaluating the return on investment (ROI) program. To do this, it is necessary to measure the difference between training costs and training outcomes. When the training results are so good that the results outweigh the costs, then according to Phillip's ROI Model positive training has been achieved. When the costs of training outweigh the results, something needs to change. But what is the changed process so that it can correct the shortcomings in the training. (share Ridwan's slides). Pre test and post test is one of the evaluations carried out in learning in a training. To see the extent to which the trainees capture the learning outcomes from before the lesson begins, until the lesson ends... although pre-test and post-test are not the only ways, they are one of the ways currently being carried out in training. Likewise, the infection prevention and control training conducted in Pangkal Pinang, Bangka Belitung.

Infection prevention and control training is a Health Engineering training aimed at Puskesmas staff. In this training, to find out the results of the training process, one evaluation technique is used by conducting an assessment using pre-test and post-test. In accordance with the infection prevention and control training

curriculum, the learning assessment was carried out before learning began and before the training closed. Training participants are required to take pre-test and post-test. When the participants filled out the questions given, the scores of the participants varied. There is a value that is good, moderate and there is also a value that is less. The results of the evaluation of participants through the pre-test and post-test, there is a level of difficulty and a level of ease of the questions given. When the questions given to participants are considered easy, the scores will be high. But when the question is considered difficult by the participants, the pre-test and post-test scores will be low. According to (Dali, 2022), a good question should not be too difficult and not too easy. Therefore, when the question is made too difficult or too easy, the item will be removed, discarded or replaced. When there are questions that are too difficult or too easy, the questions can also be stored in the question bank, so that when the questions are needed, they can be used. Measurement, in a broad and concise sense according to (Dali, 2022), is the assignment of numbers to the attributes of the subject according to the rules. In the measurement there are numbers, attributes, subjects. numbering rules. Numbers are data. The attribute of the subject is the measuring target. Mental measurement is a measuring target in the form of non-physical quantities, such as learning outcomes, attitudes towards reading, or intelligence.

Evaluation is carried out using measuring instruments, so that what is measured measures what should be measured, so that it is tested in terms of validity and reliability. When going to measure weight, use a scale. To measure blood pressure using a blood pressure meter and so on. The formulation of learning objectives is one element in the training program. The learning objectives in the training program will affect the materials, learning methods, media and learning aids and evaluations. Learning objectives can also be adjusted to their competencies according to their field of work. Just as everyone cannot become an expert in all fields, so does formulating learning objectives. Not all learning objectives have to reach the highest level. Not all learning objectives are all done at one time. To help formulate it, one model that can be used in this case is Bloom's taxonomy. Bloom's taxonomy is a hierarchical structure that identifies thinking skills from low to high levels. Bloom's Taxonomy was first published in 1956 by an educational psychologist, Benjamin Bloom. Then in 2021 it was revised by Krathwohl and other experts in the flow of cognitivism. The result of this revision is known as the Revised Bloom's Taxonomy. Revisions are made only in the cognitive domain by using verbs. Bloom's taxonomy is a hierarchical structure that identifies thinking skills from low to high levels. Bloom's taxonomy is divided into three domains, namely: cognitive, affective and psychomotor. These three domains are important in learning. However, the cognitive domain as described above is more widely used. (Dian NF, 2021). Meanwhile, what is discussed in this study uses the cognitive domain. Participants are expected to master in terms of knowledge or in terms of knowledge. The hierarchical structure used by researchers today is the bloom taxonomic domain of C1, C2 and C3. Adapted to the capacity of the trainees who come from Basic Health facilities.

II. Research Purposes

GENERAL PURPOSE

Knowing Bloom's Taxonomy Approach in the Construction of Cognitive Measurement Tools

SPECIAL PURPOSE

Knowing the Grid of Cognitive Domain Measuring Instruments Construction, conducting validity and reliability tests, knowing correct and incorrect items in the construction of cognitive domain measuring instruments, knowing different tests on the construction of cognitive domain measuring instruments, Knowing the grouping of cognitive domains in the construction of measuring instruments and knowingtest the level of difficulty in the construction of measuring tools for the cognitive domain.

III. Research Methods

The research method is carried out descriptively quantitatively, what is meant by quantitative research according to (Creswell, 2017) is: "testing a theory by detailing specific hypotheses, then collecting data to support or refute these hypotheses. while what is meant by descriptive statistics according to (Sugiyono, 2011) are: "statistics used to analyze data by describing or describing the data that has been collected as it is without intending to make conclusions that apply to the general public or generalizations. the study population were participants in infection prevention and control training. Where the number of training participants as many as 30 people. What is meant by population according to (Sugiyono, 2011) is: "a generalization area consisting of objects/subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions. While the sample according to (Sugiyono, 2011) is: "part of the number and characteristics possessed by the population. The researcher took the total population or saturated sample, that is, all participants were used as respondents. The research time was carried out for 3 days, namely from 13-15 October 2022, while the research site was in Pangkal Pinang-Bangka Belitung. Data collection techniques using data primary, where the researcher uses an instrument in the form of questions through the questionnaire. given 10 questions about the construction of cognitive measuring tools. While the data analysis technique using SPSS 25.

IV. Research Result

TABEL 1
Cognitive Measuring Instrument Construction Grid

RESEARCH VARIABLE	INDICATOR	NO.INSTRUMENT ITEMS
Construction of cognitive measurement tools Bloom's Taxonomy domain	Infection prevention and control	1,2,3,4,5,6,7,8,9,10
C1 cognitive realm		1,2
C2 cognitive realm		3,4,5,6
C3 cognitive realm		7,8,9,10

The instrument grid for convenience corresponds to the domain of cognitive measuring instrument construction.Consists of 10 questions, with the scope of infection prevention and control.With cognitive domains C1, C2 and C3.

TABEL 2
Test the validity and reliability of the research instrument
Case Processing Summary

Cases	N	%
	Valid	100.0
	Excluded[a]	.0
	Total	100.0

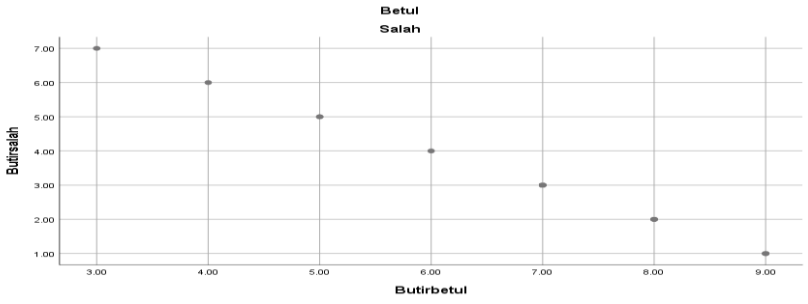
Listwisedeletionbasedonallvariables in theprocedure.
This first output describes the amount of valid data to be processed and the data issued and the percentage.It can be seen that there are 10 valid data or cases with a percentage of 100% and no data is issued. (Priatno, 2018)

TABEL 3
Reliability Statistik

Reliability Statistik	
Cronbach'sAlpha	N ofItems
0,996	10

This second out is as a result of reliability analysis with the Cronbach Alpha technique.It can be seen that the Cronbah Alpha value is 0.623.According to Sekaran (1992) in DuwiPriyatno (2018), reliability less than 0.6 is not good, while 0.7 is acceptable and above 0.8 is good.The value is more than 0.6, so the results are reliable and the number of items (N) is 10 question items.The questions were corrected and items that were too easy and too difficult were removed.

TABEL 4
The results of the item count and item analysis are true or false



Based on the table of processed results using SPSS 25, and based on the comparison of manual calculations, the values obtained are between 70-90.It can also be explained that the highest score is 90, while the lowest value is 30, with an average value of 71.67%.

TABEL 5
Different Test Criteria

Criteria	sum	Range	%
very good	2	86-100	20
good	3	80-85	30
enough	2	70-75	20
bad	2	<60	20
Very bad	1	< 50	10

The results of the different test showed that there were 2 criteria (20%), 3 very good (30%), moderate (20%), bad (20%) and very bad 1 (10%).

TABEL 6
Bloom's Taxonomy Cognitive Field Grouping Results

Cognitive Realm Levels	Infection Prevention and Control Variables	Number of Questions
Remember (C1)	1,2	2
Understand (C2)	3,4,5,6	4
Apply (C3)	7,8,9,10	4
Analyze(C4)	-	-
evaluation(C5)	-	-
Create(C6)	-	-
Jumlah		10

The results of the cognitive domain of Bloom's Taxonomy in this study consisted of C1: 2 questions, C2:4 questions, and C3: 4 questions.The cognitive domain of questions, including level 1 and level 2 and level 3, is at the stage of knowledge and knowing, understanding and applying

TABLE 7
Difficulty Test

Level of Difficulty Difficulty Medium Easy Total Infection prevention and control 10% 50% 40% 100% Based on the manual calculation of the wrong items and correct items, the highest score was obtained as the highest value, namely easy questions as much as 40%, the smallest value obtained on difficult questions, namely 10%.

V. Discussion

The instrument grid is made to make it easier to classify items according to the construction domain of cognitive measuring instruments. Of the 10 questions that will be distributed with the scope of infection prevention and control, groupings are made. From the six cognitive domains of Bloom's taxonomy, questions were made that fall into the realms of C1, C2 and C3. Due to the needs of the program, the researchers created three domains of cognitive domains C1-C3, namely knowing, understanding and applying. This is because the participants in the infection prevention and control training are basic health care workers. The services provided are Individual Health Efforts and Public Health Efforts. More towards prevention and promotion of health with basic services, so it does not really need analysis, synthesis. Although evaluation is definitely needed. Because every activity according to its quality requires improvements, so that the longer the activity, the better and more complete.

According to Sugiyono (2011), that the validity test in research data is often only emphasized on validity and reliability tests. In quantitative research, the main criteria for research data are valid, reliable and objective. Validity is the degree of accuracy between the data that occurs in the object of research and the power that can be reported by researchers from the actual data from the object of research. According to the results of Riska Amalia's research (2022) that the results of the analysis and the percentage of validity of odd PAS questions for class VII mathematics at SMP Negeri 1 Wonopringgo from a total of 40 multiple choice items which are valid with 36 (90%) and invalid questions because totaling 4 (10%) items. in class VIII questions, there are 30 (75%) valid questions and 10 (25%) items in the invalid category. As for the questions for class IX SMP, there are 38 (95%) valid questions and 2 (5%) invalid questions. A test item is said to have high validity. Items that have high validity image the question as having skills that need not be doubted. accuracy in measuring the ability of students. The results of the reliability test above on odd PAS questions for class VII mathematics, the reliability coefficient value of Conbrach's Alpha with 72 samples is 0.872, which means that the level of reliability is high, because the questions in class VIII have a reliability coefficient of Conbrach's Alpha of 0.906, this means that the level is also high. Similar to the class IX questions, the reliability results are quite high, namely the reliability coefficient value of Conbrach's Alpha of 0.907. Therefore, it can be concluded that the odd Semester Final Assessment (PAS) questions for mathematics subjects at SMP Negeri 1

Wonopringgo for the academic year 2020/2021 can be said to have high reliability, all of them, both class VII, VIII, and class IX.

According to the results of the validity test of Riski Amelia's research (2022), the calculated value shows a range of 0.80-1.00. In terms of the content validity index value of all questions for class VII, VIII, and IX, it shows very high but each of these questions still needs revision, as in the material aspect there are several questions that are not in accordance with the indicators and competencies. Aspects of construction there are still questions that have pictures, graphs, tables that are not clear and read well. While in the language aspect, almost all of them are in accordance with the language study indicators, except that there are questions whose answer choices are repeating words. This means that when the results of the validity test are not yet valid, then the invalid questions are replaced or revised. So that the processed data is completely in a valid state. Based on the results of the validity and reliability test using SPSS 25 with the Cronbach alpha test, the data was declared valid, but after the reliability test was carried out, the test results were not reliable, so the questions were too difficult and too easy to remove. Because based on the results of the calculation of true and false items, there are no questions that are too easy, but there are questions that are too difficult. Then the difficult question was removed. After being corrected, the results of the analysis using SPSS 25 statistics using cronbah alpha test results become valid and reliable.

According to research (Riska Amalia1, 2022), the results of the differentiating power test are as follows: the distribution of levels of cognitive domains of Bloom's taxonomy. It shows that for the level of remembering (C1) there are 12 (30%) questions, in the understanding category (C2) there are 7 (17.5%) questions, and about applying (C3) there are 10 (25%) questions. Class VIII questions consist of the level of remembering (C1) there are 11 (27.5%) items, the category of understanding (C2) there are 18 (45%) items, questions that include the criteria for applying (C3) there are 6 (15%) items question, the calculation value used for the differentiating power is the value in the person correlation in the validity test. Then the results of the different power values in SPSS are categorized into different power values according to the criteria. Based on the results of the discriminatory power test above, it shows that the odd math problem at SMP Negeri 1 Wonopringgo for the 2020/2021 academic year for class VII contains 2 (5%) very bad questions, 2 (5%) questions once, 14 (35%) questions in the sufficient category. , and 22 (55%) good questions. Meanwhile, class VIII consists of 4 (10%) very bad questions, 5 (12.5%) bad questions, 10 (25%) enough questions, 18 (45%) good questions, and 3 (7.5%) questions. very well. In class IX, there are 2 (5%) bad questions, 12 (30%) enough questions, and 26 (65%) good category questions. The description of the results of the differentiating power of questions for class VII, VIII, and class IX, all questions with good categories are more than questions in other categories, which means that the odd Semester Final Assessment (PAS) questions in mathematics at SMP Negeri 1 Wonopringgo have good discriminating power. Risk Amalia1, S. M. (2022). Based on the results of statistical tests using SPSS 25, different test results were obtained which showed that the criteria were evenly distributed. From very good to very bad. Even if it is averaged, it is still better to compile the data. However, the different test results from this research can be said to be quite good. Due to the combination of the highest grade level and the intermediate grade, it raises other grades, so the average grade is quite good

According to research (FaizZulkifli, 2022), Meanwhile, the level of "applying" is done by the instructor to test the ability of students to apply the definitions and formulas that have been learned correctly. The "evaluating" level requires students to assess information gathered from a variety of sources without any guidance or linkages to build. The revised Bloom level sequence's highest levels, "evaluating" and "creating," require HOTS from students and are rarely assessed at the diploma or degree level, especially the "creating" level (Dunham et al., 2015). shows examples of questions for the statistics and probability course that have undergone document analysis according to each topic and level of difficulty. Based on the results of grouping the Cognitive Domain of Bloom's Taxonomy, the results of the cognitive level of Bloom's Taxonomy in this study consisted of C1: 2 questions, C2: 4 questions, and C3: 4 questions. The cognitive domain of questions, including level 1 and level 2 and level 3, is at the stage of knowing, understanding and applying. This is in accordance with the training needs according to the participants' criteria. In infection prevention only use level 1 personal protective equipment, where at this level only participants' abilities are needed from the knowing stage to implementing, while the stages in C4 and C5, will be carried out on Referral level training participants, namely Hospitals.

VI. Conclusion

1. Grid Instrument Construction of Cognitive domain Measuring Instruments, obtained almost equal percentages in the distribution of the grid questions. But more spread in the cognitive domains of bloom taxonomy C2 (understanding) and C3 (applying)
2. In the validity test, all data is valid, while in the reliability test, it is not reliable, so there are data issued and revised

3. The comparison of correct and incorrect items in the cognitive domain measuring instrument construction is 21 versus 9, meaning that most of the items are correct, compared to incorrect items.
4. Different tests on the construction of cognitive domain measuring instruments obtained relatively almost the same results, none of which stood out very well or very badly. But With a pretty good average score
5. grouping cognitive domains in the construction of measuring instruments in making questions using Bloom's taxonomy approach, three cognitive domains are obtained, namely C1, C2 and C3 6. Test the level of difficulty in the construction of measuring tools for the cognitive domain, the results tend to be moderate to easy, compared to moderate to difficult. Test the level of relative difficulty is quite good

SUGGESTION

1. Criteria Training participants should meet the requirements, so they can follow the best according to their competence
2. Homogeneous participants, easier in the learning process, as well as in terms of evaluation, should be the attention of the training organizers

Reference

[1]. Creswell, J. W. (2017). Research Design, Qualitative, Quantitative, and Mixed Methods Approach. (A. F. Pancasari, Translator) Yogyakarta, Indonesia: Edition 4, 11th edition of Pustaka Pelajar. Picked October 14, 2022

[2]. Dali, S.N. (2022). Score Theory On Mental Measurement (Third ed. ed.). Jakarta, DKI Jakarta, Indonesia: PT Nagarani Citrayasa. Picked October 15, 2022

[3]. Dian NF, M. (2021, Novemver). Bloom's Taxonomy: A Model in Formulating Learning Objectives. (D. B. Sari, Editor.) Taken October 15, 2022, from the Education and Training Center of the National Library of the Republic of Indonesia: https://pusdiklat.perpusnas.go.id/berita/read/160/taksonomi-bloom-model-dalam-merumuskan-unjuk- learning

[4]. FaizZulkifli, R. Z. (2022, March). A Revised Bloom's Taxonomy: An Essential Approach to Constructing Assessment Questions for the Probability and Statistics Course. International Academic Research in Business ang social Science(Vol. 12, No. 3, 2022), 588 – 602. doi:https://www.researchgate.net/profile/Faiz.Zulkifli/publication/359533331_A_Revised_Bloom's_Taxonomy bloom

[5]. Guadalupe Elizabeth Morales-Martinez and Janneth Trejo-Quintana, D. J.-C.-H. (2021, February). Chronometric Constructive Cognitive Learning Evaluation Model: Measuring the Construction of the Human Cognition Schema of Psychology Students. International Journal of Learning, Teaching and Educational Research (Vol. 20, No. 2, February 2021), pp. 1-21. doi:https://doi.org/10.26803/ijlter.20.2.1

[6]. Guba, E. G. (1989). Fourth Generation Evaluation. The Publishers of Professional Social Science Newbury Park London • New Delhi. Picked October 15, 2022

[7]. Kirkpatrick, D. & Kirkpatrick, J. (2007). Implementing the Four Levels: A Practical Guide for Effective Evaluation of Training Programs. Berrett-Koehler Publishers.

[8]. Priatno, D. (2018). SPSS Easy Guide to Processing Data for Students & the General. Yogyakarta, Special Yogyakarta, Indonesia: Andi. Picked October 15, 2022

[9]. Riska Amalia1, S. M. (2022). Analysis of Bloom's Taxonomy Distribution of Mathematics Semester Final Assessment Questions at SMP Negeri 1 Wonopringgo 2020/2021. Journal of Mathematics Education (Vol. 2 No. 02 (2022)). Taken October 15, 2022, from http://e-journal.iainpekalongan.ac.id/index.php/circle

[10]. Sugiyono. (2011). Educational Research Methods, Quantitative, Qualitative Approaches, and R & D. Bandung, West Java, Indonesia: Alfabeta, CV. Taken October 14, 2022, from www.cvalfabeta.com

[11]. Sulistio, D. (2022, June). Students' Ability to Analyze Indonesian Language Tests according to the Cognitive Aspects of the Anderson and Krathwohl Model. Journal of Indonesian and Foreign Language Education (Vol. 5, No. 1, 2022), Page: 1-21. doi:DOI: https://doi.org/10.31540/silamparibisa.v5i1.

Helvy Yunida, et. al. "Bloom Taxonomic Approach in the Construction of Cognitive Measurements." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 12(05), (2022): pp. 40-45.