

DEVELOPMENT OF AUTHENTIC ASSESSMENT TOOLS BASED ON OUTCOME BASED EDUCATION (OBE) IN HYDROLOGY AND DRAINAGE COURSES

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Abstract

Outcome Based Education (OBE) based authentic assessment in hydrology and drainage courses in the Civil Engineering Study Program has become the focus of attention in the world of education. The concept of OBE-based authentic assessment for hydrology and drainage courses. This study aims to analyze the implementation of OBE-based authentic assessment in hydrology and drainage courses to evaluate the achievement of learning objectives. The research method used is descriptive analysis with data collection through observation and interviews. The research in this case study uses qualitative by collecting data from observations, interviews, and analyzing documents related to the authentic assessment process. Research and Development (R&D) approach [14], this research uses the 4D model: Define, Design, Develop, and Disseminate [10]. The case study was conducted in the Civil Study Program involving 5th semester students totaling 48 students with 2 different classes. The research procedure is through validation and evaluation of experts, while practicality is assessed through the involvement of students and lecturers, and effectiveness is measured by student performance for 1 semester. The OBE approach allows thorough measurement of student competence in accordance with the expected abilities. The results showed that OBE-based authentic assessment can improve student understanding of the learning materials used, as well as develop practical skills in the field of hydrology and drainage. The assessment of CPMK (course learning outcomes) of 85% and CPL (graduate learning outcomes) of 80% is expected to make a positive contribution to the development of learning assessment methods in the future.

Keywords: Authentic Assessment, Outcome Based Education (OBE), Higher Education, Hydrology and Drainage.

1. INTRODUCTION

OBE-based authentic assessment in hydrology and drainage courses has an important role in evaluating students' understanding and ability to apply their knowledge in a real context. In the context of hydrology and drainage, authentic assessment integrated with the Outcome-Based Education (OBE) approach can provide an accurate picture of the extent to which students have achieved the competencies set out in the curriculum.

Furthermore, the follow-up of assessment results aims to: 1) monitor, improve and evaluate learning objectives; 2) assessment of learning outcomes to determine graduation from courses and graduation from study programs; 3) feedback for students questioning the results of the assessment; and documentation of student learning outcomes for lecturers, study programs and universities (President of the Republic of Indonesia, 2021) [5].

This gives students the opportunity to develop their practical and analytical skills, and prepares them to become competent professionals in the field of hydrology and drainage. In addition, universities also have an obligation to pay attention to the Tri Dharma of higher education, hence the publication of scientific papers.

This can have an impact on the quality and ranking of the accreditation itself, as mandated in Permendikbud number 3 of 2020 concerning National Higher Education Standards, Permendikbud number 5 of 2020 concerning Study Program accreditation, and BAN-PT Regulation number 5 of 2019 concerning study program accreditation instruments that refer to 9 (nine) accreditation assessment standards.

In addition, there is a circular letter from the Ministry of Research, Technology, and Higher Education Number: B/323/B.B1/SE/2019 concerning the obligation to publish scientific papers for undergraduate, master, and doctoral students. Therefore, it is necessary to increase the quantity and quality of output products produced by lecturers and students in a structured and systematic manner in a learning process that is oriented towards output products (learning outcomes) [4]. The principle of accountability is an assessment carried out in accordance with clear procedures and criteria, agreed upon at the beginning of the lecture, and understood by students.

The transparent principle is an assessment whose procedures and results can be accessed by all stakeholders. Assessment techniques carried out by lecturers can be in the form of observation, participation, performance, written tests, oral tests, and questionnaires.

The assessment instrument consists of a process assessment in the form of a rubric and/or an assessment of the results in the form of a portfolio or design work. Attitude assessment can use observation assessment techniques. Assessment of mastery of knowledge, general skills, and specific skills is carried out by choosing one or a combination of various techniques and instruments applied by the lecturer.

The final result of the assessment is an integration of various assessment techniques and instruments used: (a) compile, convey, agree on the stages, techniques, instruments, criteria, indicators, and assessment weights between the assessor and the assessed in accordance with the learning plan; (b) carry out the assessment process in accordance with the stages, techniques, instruments, criteria, indicators, and assessment weights that contain the principles of assessment; (c) provide feedback and opportunities to question the assessment results to students; and (d) document the assessment of student learning processes and outcomes in an accountable and transparent manner. Lecturer assessment procedures include the planning stage, assigning tasks or questions, observing performance, returning observation results, and giving final grades.

Assessment procedures at the planning stage can be carried out through gradual assessment and / or reassessment. The implementation of the assessment is carried out in accordance with the learning plan, namely measuring Course Learning Outcomes (CPMK) which is an aggregation of Sub-Course Learning Outcomes (Sub-CPMK). The implementation of the assessment can be carried out by: (a) lecturers or teams of lecturers; (b) lecturers or teams of lecturers by involving students; and/or (c) lecturers or teams of lecturers by involving relevant stakeholders [9].

2. METHOD

The method used in the development of OBE-based authentic assessment in hydrology and drainage courses is 4D (Define, Design, Develop, Disseminate) a research that aims to explore authentic evaluation approaches in the context of hydrology and drainage learning in higher education. The 4D (Define, Design, Develop, Disseminate) development procedure is as follows:

2.1 Define stage

Define is the initial stage of development so as to ultimately produce a new assessment model. First, conduct a need analysis of the literature relevant to the development of the assessment model so that the development will produce a novelty that is unique and different from the concept of OBE-based authentic assessment. Furthermore, analysis of the broadcast curriculum and multimedia that will be used as a guide in developing Hydrology and Drainage textbooks as one of the products produced in this study.

Analysis of the needs of lecturers and students about the current learning conditions with the expected conditions carried out using a questionnaire. The needs analysis questionnaire was prepared to find out several aspects, including a) cognitive aspects of students of the Faculty of Engineering Civil Engineering Study Program in general contained in questions number 1-4, b) aspects of student competence in Hydrology and Drainage courses.

The assessment of the needs analysis questionnaire uses a Likert scale with a rating of 1-5 each for current conditions and expected conditions. The questionnaire is complete. The needs analysis questionnaire is also given to graduate users, namely civil engineering programs that work in construction companies. The results of the needs analysis of these users are an illustration in developing a learning development model that can be used by graduate users, so that graduate users are involved in being responsible for student competence.

1) Planning Stage (Design)

The design stage is part of designing a model to be developed. The authentic assessment developed with the teaching material in the Hydrology and Drainage course sets out the practical competency standards that students must achieve after completing this subject. An action taken is to determine the main idea in the material. This idea is expanded in such a way that it is able to facilitate and be understood by students.

The model can be developed in its implementation which requires tools as guidelines for implementing the model, namely a) model reference book, b) reference book for lecturers and instructors, c) student reference book. The design of the product must first go through experiments with experts so that it is declared feasible for future use.

2) Development Stage (Develop)

The develop stage is the stage of testing products that have been made in such a way. Products that have been made must include elements of validation of the construct of a product. The validation process is accompanied by discussions or direct interviews with experts regarding improvements that must be made, namely by the method of design. The authentic assessment device is consulted first to experts or experts and supervisors, then the design is assessed by competent people

(validators) who have understood the principles of development, namely lecturers at the FT-UNP Postgraduate Program, lecturers as users of graduates later [9]-[10].

3) Disseminate Stage

The dissemination stage is the final stage of product development of a product. The stage of testing the product to the subject to assess whether the product is effective for improving learning outcomes. In more detail the assessment development procedure can be seen in Figure 2.1 below:

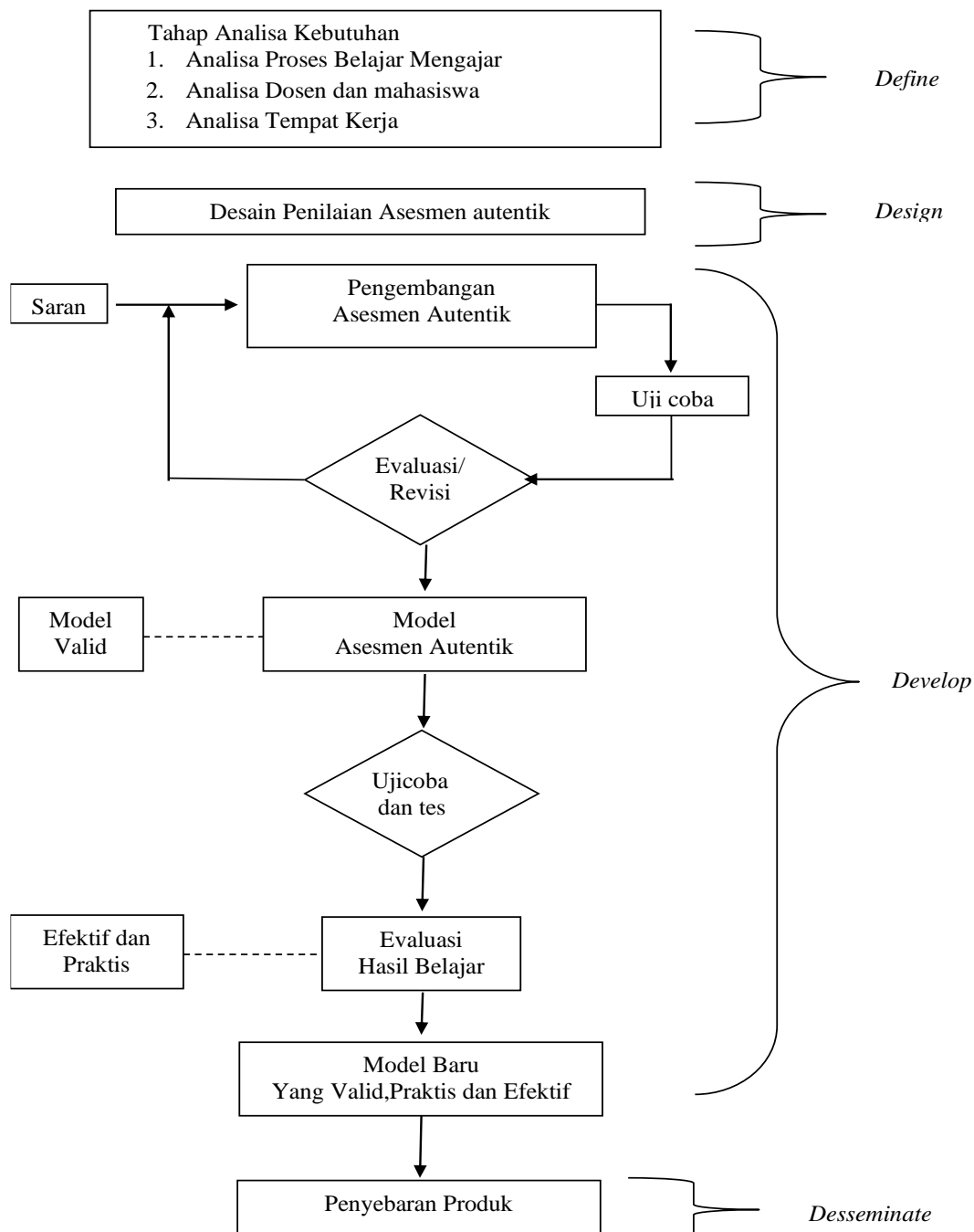


Figure 2.1: Stages of Development modified from the 4-D model

This study highlights the importance of assessment methods that can reflect the real abilities and knowledge possessed by students related to the topics studied. With a focus on Outcome-Based Education (OBE), this research makes an important contribution to the development of more relevant and representative evaluation methods to enhance learning in hydrology and drainage courses.

3. RESULTS AND DISCUSSION

3.1 OBE Assessment

Assessment is one or more processes to identify, collect, and prepare data to evaluate the achievement of student learning outcomes. Effective assessment usually uses direct measurement, indirect measurement, quantitative measurement and relevant qualitative measurement according to the outcome to be measured. Appropriate sampling methods may also be used as part of the assessment process. Assessment is also the systematic collection, review and use of information about educational programs that are conducted with the aim of improving student learning and development.

In accordance with Permendikbud No. 03 of 2020, universities are required to carry out learning assessment standards in order to fulfill graduate learning outcomes. Assessment of the process and student learning outcomes includes: (a) assessment principles; (b) assessment techniques and instruments; (c) assessment mechanisms and procedures; (d) implementation of assessment; (e) assessment reporting; and (f) student graduation[14].

Lecturers are required to carry out assessment principles which include educational, authentic, objective, accountable, and transparent principles which are carried out in an integrated manner. The educative principle is an assessment that motivates students to be able to: (a) improve planning and learning methods; and (b) achieve graduate learning outcomes. The authentic principle is an assessment that is oriented towards the continuous learning process and learning outcomes that reflect students' abilities during the learning process. The objective principle is an assessment based on standards agreed between lecturers and students and free from the influence of the subjectivity of the assessor and the assessed. Accountable principle is an assessment that is carried out in accordance with clear procedures and criteria, agreed upon at the beginning of the lecture, and understood by students. The transparent principle is an assessment whose procedures and results can be accessed by all stakeholders.

3.2 Assessment techniques

What is done by lecturers can include observation, participation, performance, written tests, oral tests, and questionnaires. Assessment instruments consist of process assessment in the form of rubrics and/or outcome assessment in the form of portfolios or design works.

Attitude assessment can use observation assessment techniques. Assessment of mastery of knowledge, general skills, and specific skills is carried out by choosing one or a combination of various techniques and instruments applied by the lecturer. The final result of the assessment is an integration of the various assessment techniques and instruments used.

The assessment mechanism at least consists of activities: (a) compiling, conveying, agreeing on the stages, techniques, instruments, criteria, indicators, and assessment weights between the assessor and the assessed in accordance with the learning plan; (b) carrying out the assessment process in accordance with the stages, techniques, instruments, criteria, indicators, and assessment weights that contain the principles of assessment, (c) providing feedback and opportunities to question the assessment results to students; and (d) documenting the assessment of student learning processes and outcomes in an accountable and transparent manner [4].

Lecturer assessment procedures include the planning stage, assignment or questioning activities, performance observation, return of observation results, and giving final grades. Assessment procedures at the planning stage can be carried out through phased assessment and / or reassessment. The implementation of the assessment is carried out in accordance with the learning plan, namely measuring Course Learning Outcomes (CPMK), which is an aggregation of Sub-Course Learning Outcomes (Sub-CPMK). The implementation of the assessment can be carried out by:

- a) Lecturers or a team of lecturers;
- b) Lecturers or a team of lecturers by involving students; and/or
- c) The lecturer or team of lecturers by involving relevant stakeholders.

3.3 Forms of assessment

- a) Project assessment is a class-based assessment of tasks that must be completed within a certain time. The task can be an investigation of a process or event that starts from planning, collecting data, organizing, processing data, and presenting data.
- b) Portfolio assessment is a continuous assessment based on a collection of information that shows the development of students' abilities in a certain period. Portfolios basically assess the work of individual students in one period for a subject.
- c) Self-assessment is an assessment technique in which learners are asked to assess themselves in relation to the status, process and level of achievement of the competencies they learn in certain subjects. Self-assessment techniques can be used to measure cognitive, affective and psychomotor competencies.
- d) Performance assessment is an assessment of student learning that includes all assessments in the form of writing, products, or attitudes except multiple choice, matching, true-false, or short answer forms, (Danielson, 1997). Performance assessment has advantages that can reveal students' potential in problem solving, reasoning, and communication in written and oral forms. Marhaeni (2008:12) classifies that there are three main components in performance assessment, namely performance tasks, performance rubrics, and scoring guides. A performance task is a task that contains a topic, task standards, task description, and task completion conditions.

Table 3.1: Student grades based on SLO recap

No.	NIM	Nama Mahasiswa	L/P	Hidrologi dan Drainase (Paket Semester 5)									
				Nilai CPL 20%			Presensi 25%	UTS 10%	UAS 20%	Nilai Angka	Nilai Huruf	Bobot	Lulus Y/N
				1	2	3							
	21180005	JESSYCA RIZKY MUTIA	P	85,00	65,00	60,00	100.00	65.00	85.00	79.75	B+	3.30	Y
2	21180010	AFRI ALDO	L	85,00	60,00	55,00	93.33	65.00	85.00	78.08	B+	3.30	Y
3	21180015	AHMAD RIZKI	L	75,00	60,00	50,00	93.33	65.00	85.00	78.08	B+	3.30	Y
4	21180020	ANDRIAN MAULANA	L	85,00	50,00	50,00	93.33	65.00	85.00	78.08	B+	3.30	Y
5	21180022	ANGGI SYAHPUTRI	P	75,00	50,00	65,00	86.67	65.00	85.00	76.42	B+	3.30	Y
6	21180031	BAHRUL ULUM	L	80,00	50,00	50,00	80.00	65.00	85.00	74.75	B	3.00	Y
7	21180032	BELLA FAMELIA	P	75,00	65,00	50,00	93.33	65.00	85.00	78.08	B+	3.30	Y
8	21180039	EGA VALENSIO	L	85,00	50,00	50,00	86.67	65.00	85.00	76.42	B+	3.30	Y
9	21180043	FARHAN HIDAYAT	L	80,00	50,00	60,00	93.33	65.00	85.00	78.08	B+	3.30	Y
10	21180046	FEBRI AFANDI	L	80,00	55,00	50,00	73.33	65.00	85.00	73.08	B	3.00	Y
11	21180049	GHIINA SALSABILA	P	73,00	50,00	50,00	100.00	65.00	85.00	79.75	B+	3.30	Y
12	21180051	HAFIDHZAL ILMU NADZHIF	L	77,00	65,00	55,00	80.00	65.00	85.00	74.75	B-	3.00	Y
13	21180056	INDAH MILA SARI	P	85,00	50,00	50,00	100.00	65.00	85.00	79.75	B+	3.30	Y
14	21180062	M. HASAN ALHAMD	L	80,00	55,00	60,00	93.33	60,00	65,00	65.33	B-	2,60	Y
15	21180066	MUHAMMAD ADE PUTRA	L	80,00	60,00	60,00	100.00	65.00	85.00	79.75	B+	3.30	Y
16	21180070	MUHAMMAD FARHAN	L	85,00	65,00	50,00	86.67	65.00	85.00	76.42	B+	3.30	Y
17	21180074	MUHAMMAD JADID	L	75,00	55,00	50,00	80.00	65,00	65,00	65.00	B-	2,60	Y
18	21180077	MUTHIA LIYAN C	P	85,00	50,00	55,00	93.33	65.00	85.00	78.08	B+	3.30	Y
19	21180079	NAZHIF ANGGURA	L	83,00	50,00	65,00	100.00	65.00	85.00	79.75	B+	3.30	Y
20	21180086	RAYHAN AL BAHSYAR	L	77,00	55,00	55,00	93.33	65.00	85.00	78.08	B+	3.30	Y
21	21180090	RIFDATUL MUTHIAH	P	83,00	65,00	50,00	93.33	65,00	65,00	65.33	B-	2,60	Y
22	21180095	RIRI SAR TIKA	P	80,00	65,00	50,00	86.67	65.00	85.00	76.42	B+	3.30	Y
23	21180096	RIZKI AIDIL ADHA	L	88,00	60,00	50,00	93.33	65.00	85.00	78.08	B+	3.30	Y
24	21180101	SHABRI KHIDHIR	L	78,00	55,00	55,00	93.33	65.00	85.00	78.08	B+	3.30	Y
25	21180024	Aulia Putri S	P	85,00	60,00	60,00	95.50	75.50	85,00	80,50	B+	3.30	Y

In hydrology and drainage learning in accordance with the OBE curriculum there are 4 CPMK points. Each CPMK has points that are targeted to achieve learning. 4 CPMK points have a relationship with one another, the following are the results of the CPMK of Civil Study Program students in Hydrology and Drainage courses.

Table 3.2: Student Score Table based on CPMK 1, 2, 3 and 4 Hydrology and Drainage subjects

Nama Mahasiswa	CPMK 1	CPMK2	CPMK 3	CPMK 4	Ket.Lulus Y/N2
JESSICA RIZKY MUTIA	85,00	75,00	70,00	70,00	Y
AFRI ALDO	85,00	60,00	55,00	70,00	Y
AHMAD RIZKI	75,00	60,00	50,00	65,00	Y
ANDRIAN MAULANA	75,00	50,00	50,00	70,00	Y
ANGGI	75,00	70,00	65,00	60,00	Y
SYAHPUTRI	80,00	50,00	60,00	70,00	Y
BAHRUL ULUM	75,00	65,00	50,00	70,00	Y
BELLA FAMELIA	82,00	50,00	70,00	65,00	Y
EGA VALENSIO	80,00	60,00	60,00	70,00	Y
FARHAN HIDAYAT	80,00	65,00	60,00	50,00	Y
FEBRI	73,00	50,00	50,00	70,00	Y
GHINA SALSABILA	77,00	65,00	55,00	70,00	Y
HAFIDHZAL ILMU	85,00	70,00	80,00	80,00	Y
INDAH M ILA SARI	80,00	55,00	60,00	70,00	Y
M. HASAN ALHAMD	82,00	60,00	60,00	70,00	Y
MUHAMMAD JADID	85,00	65,00	50,00	70,00	Y
MUTHIA LIYAN C	75,00	85,00	50,00	70,00	Y
NAZHIF ANGGURA	85,00	50,00	55,00	60,00	Y
RIFDATUL MUTHIAH	83,00	70,00	65,00	70,00	Y
RIRI SARTIKA	77,00	55,00	55,00	70,00	Y
RIZKI AIDIL ADHA	83,00	65,00	50,00	75,00	Y
SHABRI KHIDHIR	80,00	65,00	50,00	70,00	Y
M. FARHAN	83,00	60,00	70,00	80,00	Y
RAYHAN AL BASYAR	78,00	65,00	55,00	70,00	Y
AULIA PUTRI S	85,00	85,00	75,00	85,00	Y

Strengthening the results of OBE-based authentic assessment, a graph can be made based on table 3.2 recapitulating student assessments based on CPMK, the graph can be seen below:

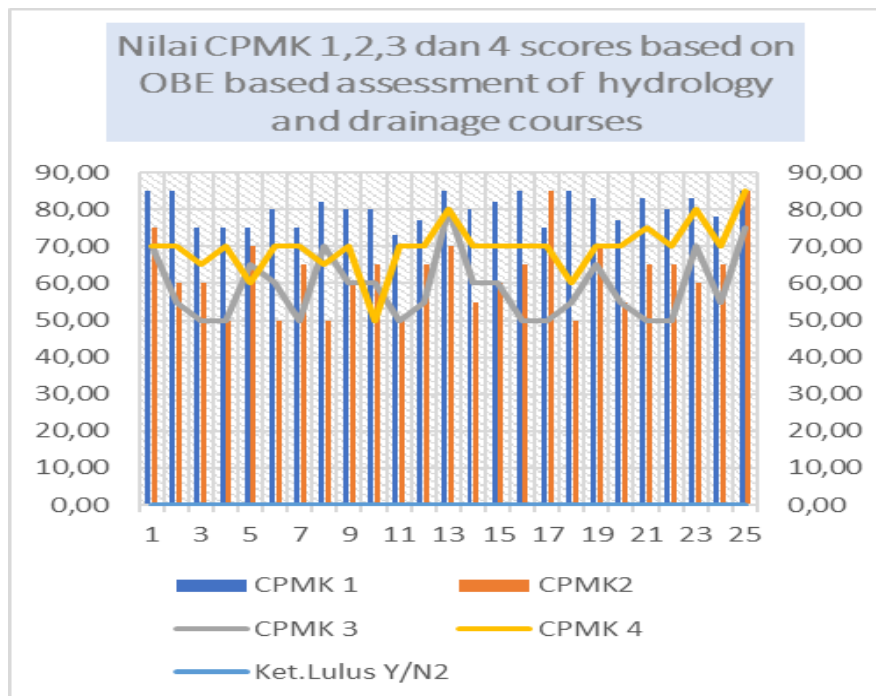


Figure 3.2: Graph of Students Based on CPMK

Furthermore, to enrich the assessment of CPMK assessment results, a graph of CPL (graduate learning outcomes) can be seen in Figure 3.2 below.

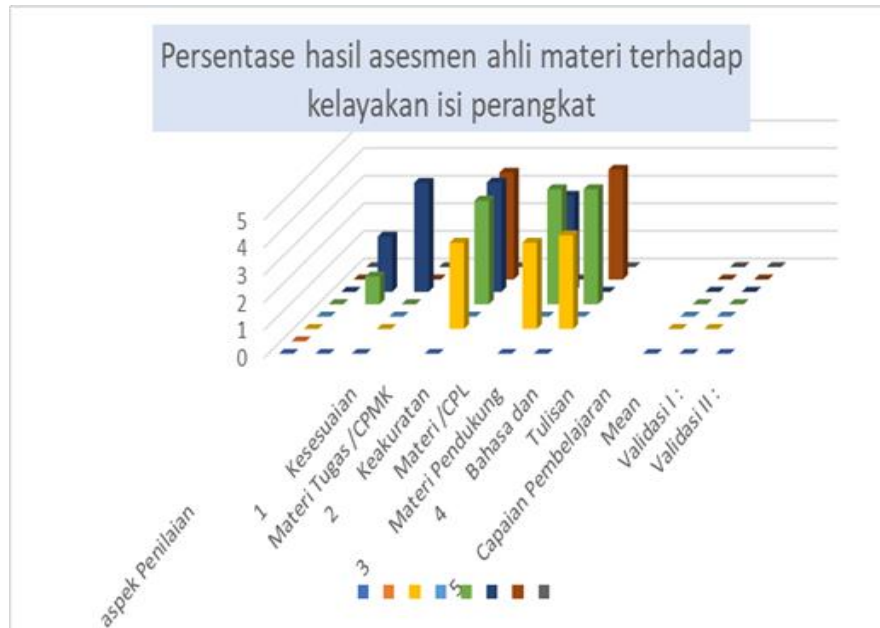


Figure 3.2: Expert-based assessment of the content of teaching materials based on learning outcomes

Learning tools in the OBE (Outcome-Based Education) curriculum serve to emphasize the sustainability of innovative, interactive, and effective learning processes. OBE influences the entire educational process, including curriculum design, formulation of objectives and learning outcomes, educational strategies, learning methods, assessment procedures, and the educational environment [20].

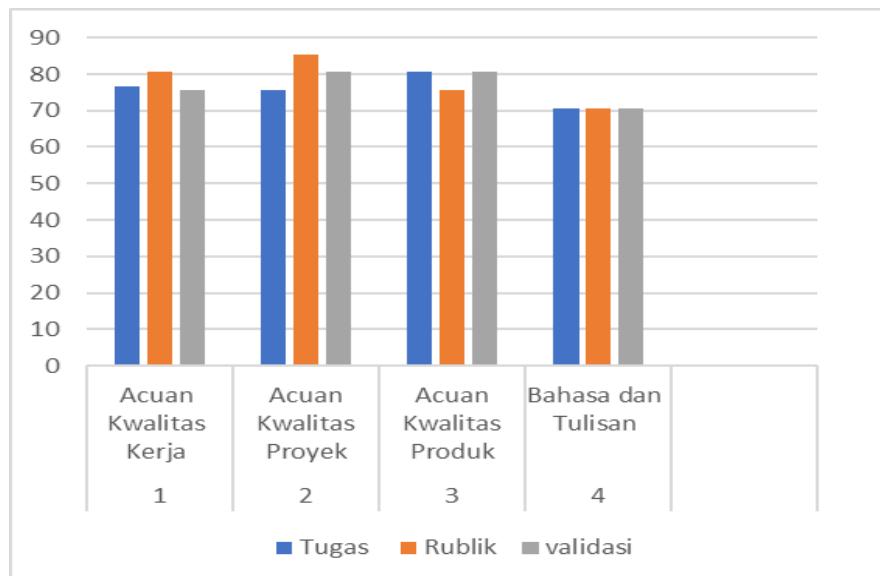


Figure 3.3: Histogram of Feasibility Assessment of OBE-Based Authentic Assessment Tool

Contextual assessment of the feasibility of assessment devices by Evaluation and Learning Assessment Experts based on Skills Assessment in Hydrology and Drainage courses obtained results as in Figure 3.3.

4. CONCLUSIONS

a. Conclusion

The results obtained have been able to fulfill the objectives of this study, namely to make a measurement of the success of the learning process based on the results of the course graduation score accompanied by CPMK and CPL. From this research, it can be seen the learning outcomes of each student who uses the OBE curriculum. The following can be described the conclusion of the development of OBE-based authentic assessment tools in Hydrology and Drainage courses.

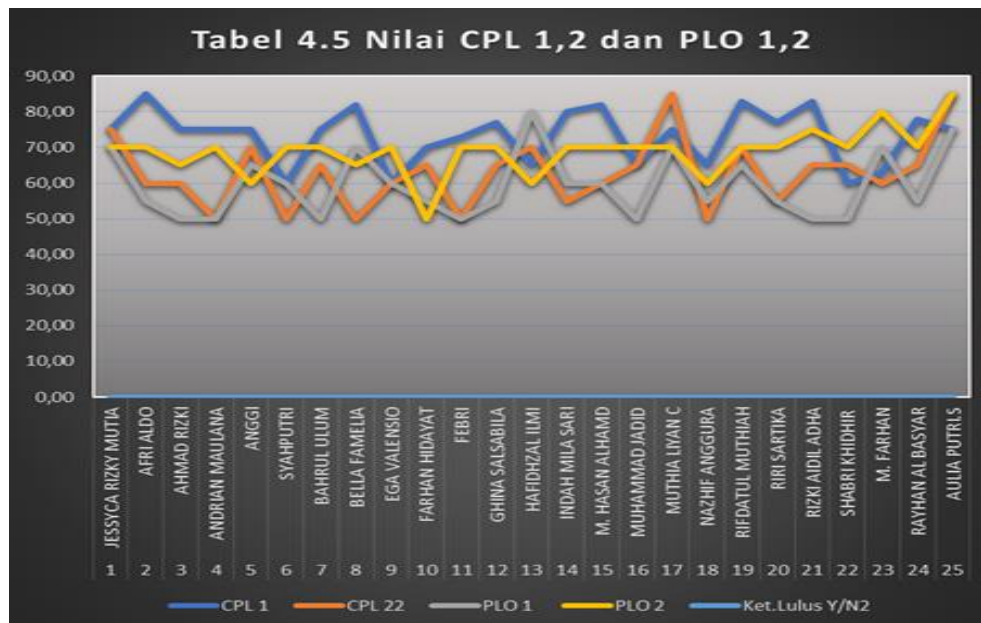


Figure 4.1: Graph of SLO and PLO values

The results of the assessment of student success in Hydrology and Drainage courses have increased towards CPMK by 80% and for SLOs get results of 75%, and assessment tools by 83%. Program Learning Outcomes (PLO) of 78%.

b. Suggestion

This study shows the learning outcomes of each student who uses the curriculum. Because quantitative measurement of the achievement of CPMK and PLO is very important in this OBE concept, a system is needed that can manage the OBE curriculum so that the achievement of PLO can be seen for the next curriculum development. Therefore, in this research, a separate application is needed that can create an OBE-based Graduate Learning Outcomes Assessment Information System. This application provides convenience to related parties in managing the OBE curriculum, especially in the Study Program.

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