

Learning Outcomes of the Educational Program Formulation and Evaluation



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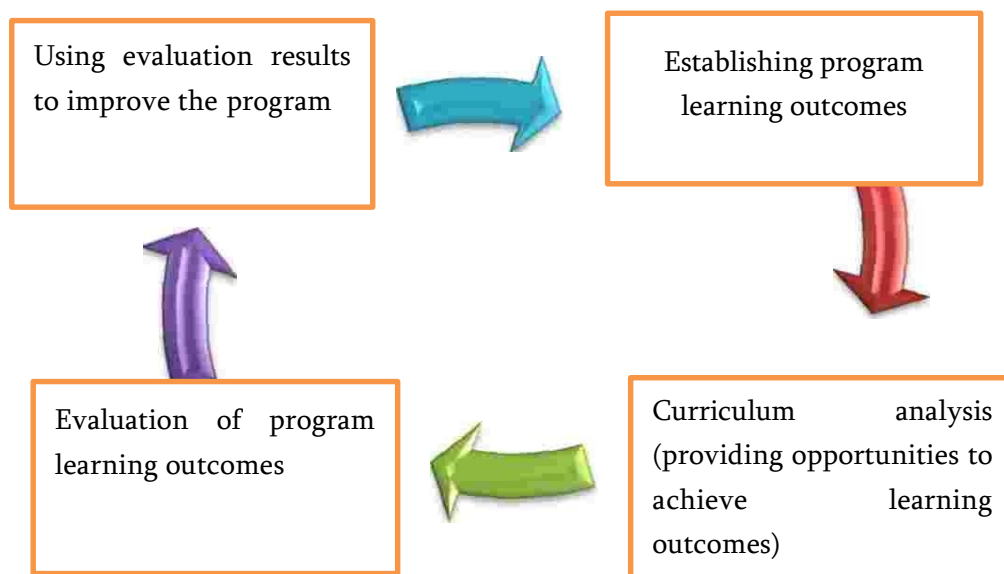
Introduction

Assessment of the learning outcomes of an educational program is an ongoing process. This process allows program head(s) and academic staff to establish program learning outcomes and ensure that the program is structured to foster the development of the stated learning outcomes. Also, by assessing learning outcomes, we measure to what extent students achieve these learning outcomes and make data-informed decisions to improve the program further. The evaluation of program learning outcomes is required to satisfy both national and international accreditation standards.

The evaluation of learning outcomes of an educational program consists of four stages:

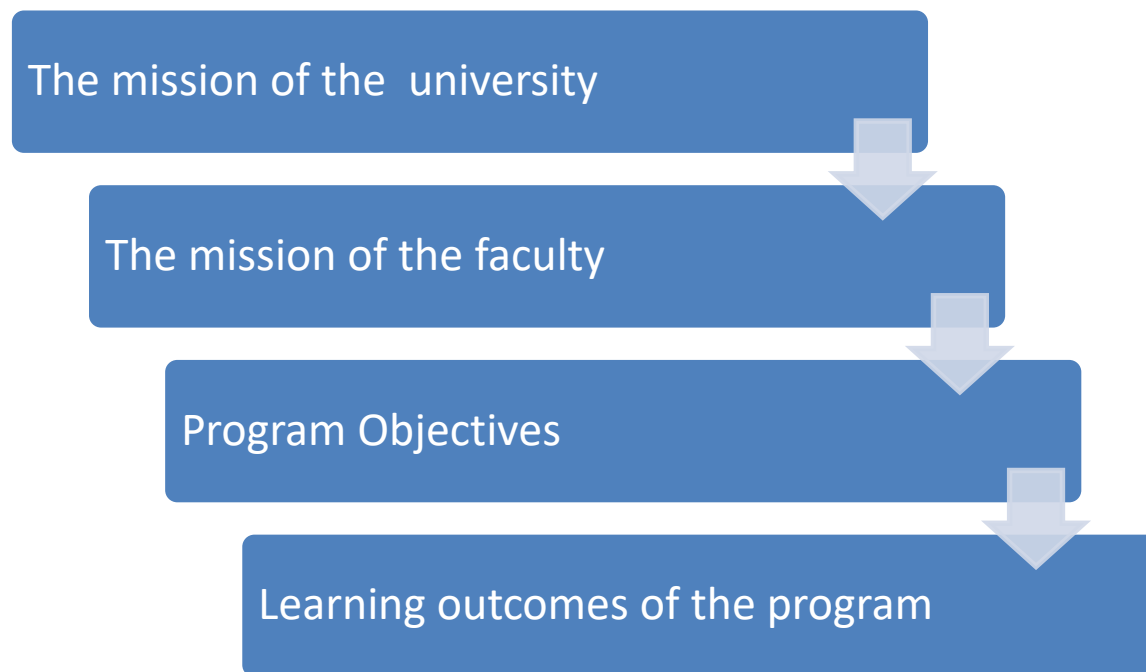
- Establishing the learning outcomes of the educational program;
- Curriculum analysis that determines whether the program provides sufficient opportunities for the students to achieve the program learning outcomes;
- Assessment of the learning outcomes of the educational program, which includes data collection and analysis to determine students' achievement of learning outcomes at the desired level;
- Using evaluation results to improve the program;

Figure 1: A four-stage cycle of the evaluation of the learning outcomes of the educational program



Formation of the Learning Outcomes of the Educational Program

It is essential to consider the mission of the university and the faculty (if available) when developing the learning outcomes of the educational program. The faculty's mission should follow and be consistent with the university's mission. Program head(s) and academic staff should develop all educational programs considering the mission statement, which is the university's foundation. The program's objectives should be directly related to the mission of the university and the faculty, and the program's learning outcomes should be aligned with the program's objectives. When the learning outcomes of the program are linked to the program objectives and mission of the university and the faculty, achievement of learning outcomes of the program is one of the indicators that the program objectives and mission of the university and the faculty are also achieved.



The goal of the educational program is a broad and general statement of teaching intentions. Objectives describe what results the program should achieve. The program objectives convey what knowledge, skills, and values are needed for students, what program graduates will do, and how they will contribute to the development of the field. The program's objectives are more general than the program's learning outcomes. e.g., the program's purpose is to teach students fundamental theories and approaches in the field of X.

The learning outcomes of the educational program describe what students know, what they understand, and what they are able to do after completing the program. The learning outcomes can be described in three categories - knowledge and awareness, ability and/or responsibility and autonomy. The learning outcomes of the program answer the question below - what the program graduates should know, and what should they be able to do? The learning outcomes of the program should be directly derived from the objectives of the program. Formulating the program's learning outcomes requires the determination of the skills and knowledge needed for the students to achieve the defined goals of the program.

Mapping of Program Objectives and Learning Outcomes

A compliance map of program objectives and learning outcomes is prepared to ensure the learning outcomes are relevant to program objectives. For example, the mentioned map can be prepared as a table on which the goals of the program will be written vertically, and the program learning outcomes will be written horizontally. After that, we should mark which learning outcome on the table ensures the achievement of which goal.

Program objectives/program learning outcomes	Program learning outcomes 1	Program learning outcomes 2	Program learning outcomes 3	Program learning outcomes 4	Program learning outcomes 5	Program learning outcomes 6
Program objective 1	√	√	√			√
Program objective 2	√	√	√	√		
Program objective 3			√		√	√
Program objective 4		√	√	√		

In formulating the learning outcomes of the program, we should consider the following requirements:

- The program's learning outcomes should be directly related to the qualification awarded by the program (see [classifier of fields of study](#)).
- The complexity of the program's learning outcomes should vary across the degree level (bachelor's, master's, doctoral) and must respond to the qualification level given in the National Qualifications Framework descriptors (see [National Qualifications Framework](#)); It should be noted here that the framework describes program learning outcomes across three

categories - knowledge and awareness, ability, and/or responsibility and autonomy and three educational levels (bachelor, Master's, Doctoral) in very broad and general terms. Under no circumstances can we bring descriptors directly into program learning outcomes. Rather qualifications framework should be used as a means of translation. We should customize the teaching level descriptors for a specific field and program;

- In case of shaping learning outcomes of regulated professions such as Medicine, Veterinary Medicine, Law, Teacher Education, and Marine Sciences, we must be guided by the sectoral benchmarks created for the programs (see [sectoral characteristics](#)); It should also be noted that different countries developed sectoral benchmarks for almost all industries, which can serve as a reference for determining the learning outcomes of the program and the content; For example, you can see the sectoral characteristics developed by the United Kingdom's Quality Assurance Agency for Higher Education at the following link <https://www.qaa.ac.uk/quality-code/subject-benchmark-statements>
- Learning outcomes of the program should reflect local and international labor market requirements;
- The learning outcomes of the program should indicate the knowledge and skills that students take from core/compulsory courses because the learning outcomes of the program imply that all students in the program must achieve these learning outcomes;
- Learning outcomes should be observable and measurable, which means that the learning outcome should be written in a way that with the assessment/assignment, we should be able to determine whether students have achieved or not specific (or written) learning outcome;
- Learning outcomes should not be presented in one long paragraph and must not combine several learning outcomes; they should be formulated shortly, concisely, and simply. Try to make one learning outcome written in one sentence and use one or at most two verbs;
- Learning outcomes should be realistic and achievable. Therefore, when we formulate the program's learning outcomes, we must ensure that the program's content enables students to achieve the mentioned learning outcome;
- Learning outcomes of the program convey the knowledge and skills that the student should have at the end of the program. In the program's learning outcomes, there is no need for a detailed description of everything the program provides to the student. Rather, we should focus on those central issues which are the most important for the mentioned field. In addition, the learning outcomes should reflect the most complex level of knowledge and skills that the student should eventually possess;
- Learning outcomes of the program should not include learning outcomes of individual study courses; It is also worth noting that program learning outcomes are not a mechanical summation of the learning outcomes of the program's courses or other components. The program's learning outcomes are much more significant. The student's ability to connect the knowledge gained from the program's various components must be seen here and

demonstrate the knowledge, skills, and attitudes required for the qualification to be awarded. That is why it is necessary to evaluate the program's learning outcomes. We cannot determine whether students have achieved the learning outcomes of the program by assessing only the courses and other components of the program;

- The program should have no more than 12 learning outcomes;
- Learning outcomes should be formulated in the present tense;
- We must use action verbs when formulating learning outcomes. The learning outcome is written according to the following principle: after completing the program, students can + active verb(s) + object and phrase (what students will know/skills/emotional waxing); e.g., After completing the program, students can analyze statistical data in the decision-making process of the organization; Learning outcomes can also be formulated as follows: After completing the program, students + active verb(s) + (what students will know/skills/emotional waxing). For example, after completing the program, students analyze statistical data in the decision-making process in an organization;
- Bloom's revised taxonomy (see Appendix 1) will help you in the formulation of learning outcomes of the program, both in the selection of assessable verbs and in determining the level of difficulty of the learning outcome;
- It is challenging to assess what students know and understand because the verbs "know" and "understand" can mean many things and are ambiguous and vague. However, it is possible to assess how students demonstrate knowledge and understanding. Accordingly, instead of the phrases "students know," "students understand," "students realize," "students evaluate," we should think about what students will be able to do with this knowledge and understanding, how they will demonstrate their knowledge and understanding, e.g.:
 - Upon completing the program, the student can demonstrate an understanding of a current issue in marine biology (Bad example);
 - After completing the program, the student can analyze a current issue in marine biology (better example);
 - After completing the program, the student can analyze a current ecosystem issue using the principles of scientific inquiry (good example)
- It is desirable to involve stakeholders in developing and improving learning outcomes. To clearly and comprehensively reflect the specifics of the field, as well as labor market requirements and modern trends in the learning outcomes. It is desirable that the program leader(s), the academic and invited staff implementing the program, relevant field employers, students, graduates, and other stakeholders are involved in the process of establishing learning outcomes;

Curriculum Analysis

Once you have established the program's learning outcomes, you must ensure that the program's content ensures that students achieve these learning outcomes. When a new educational program is created, first, the learning outcomes are written, and then the program content is designed to ensure that these learning outcomes are achieved. When updating the learning outcomes of an existing program, the content of the current program is analyzed and determined to what extent the content of the said program enables students to achieve the learning outcomes. In any case, to investigate the mentioned issue, a curriculum map is created. A curriculum map is a table on one side of which the program's learning outcomes are presented and, on the other - mandatory courses, activities, and research components offered by the educational program. Suppose there is a block of elective subjects in the given educational program, which consists of several elective subjects. Regardless of which elective subject(s) the student chooses, they will still go to one or more of the learning outcome(s). In that case, the said block of elective courses should also be reflected on the curriculum map. After that, it should be noted which course ensures the development of which learning outcome with three progressive levels - 1. Introduction; 2. deepening; 3. reinforcement. It is essential that all learning outcomes are developed at all three levels. The syllabi of the mentioned training courses should depict this compliance;

Curriculum map;

Educational Course/program learning outcome	1	2	3	4	5	6
A			1	2		3
B	1			2	3	
C	1		2		2/3	3
D						
E	1		2	2	3	3
F			1/2	2	2	3

After developing the curriculum map, we should analyze it and determine whether it develops the program's learning outcomes in the students. On the map, we should pay attention to how many courses develop each learning outcome of the program and determine how adequate this number of courses is. We should consider whether too many courses are developing the same learning outcome or, conversely, whether only a small number of courses produce the program's learning outcome(s) and whether this number of subjects is insufficient to achieve that learning outcome. Additionally, we should check whether we have such a mandatory course in the program (for example, course "D")

that does not develop any of the learning outcomes of the program; or if there is a learning outcome in the program that is not produced by any course or other activity (for example learning outcome 2). Each learning outcome of the program must be developed at all three levels. One study course may also introduce and deepen (1/2) or deepen and reinforce (2/3) any learning outcomes.

The head of each course should be involved in developing and analyzing the curriculum map along with the head(s) of the program. The lecturer of each study course must know what role his subject has in the overall program. However, many important issues are analyzed when the academic staff reviews the program's learning outcomes and curriculum map. For example, what learning outcomes do we want the students to achieve at the end of the program; what study courses teach these learning outcomes and at what level; are there overlaps in the study courses, or are there any issues missing from the program that are important to teach to achieve the learning outcomes of the program; in what order are the subjects taught in the program;

Evaluation of Learning Outcomes of the Educational Program

Evaluation of an educational program is an ongoing process that determines how well students have achieved the program's learning outcomes and how the program can be improved. All program learning outcomes must be assessed at the end of the program. Therefore, after ensuring that the curriculum is designed to ensure that students achieve the program's learning outcomes, a plan for evaluating the program's learning outcomes must be established.

The learning outcomes assessment plan should outline how the program's learning outcomes will be assessed at the end of the program. It is essential that the learning outcomes of the program are evaluated in the course(s) or activities in which the learning outcome(s) of the program are reinforced according to the curriculum map. It is possible to evaluate several program learning outcomes in one study course. Also, if the learning outcomes of master's and doctoral programs are assessed, it is good practice to evaluate the program's learning outcomes predominantly in master's or dissertation theses. In the case of a bachelor's program, a capstone course is often used to evaluate the program's learning outcomes. If the number of students involved in the program is vast, a part of the students can be assessed by random sampling. The evaluation must be valid, reliable, and transparent.

The program's learning outcomes should be assessed using direct and indirect methods. Direct assessment is a method through which it is checked whether the student has achieved the learning outcome of the program through the completed task. It can be a test, an exam, an essay, a portfolio, a presentation, a topic defence, a simulation, a licensure exam, a practical clinical evaluation, a certification exam, a practice evaluation, a publication, a master's or dissertation, a field experience supervisor's evaluation, and more.

As for the indirect method of assessment, this is the assessment by which you can conclude the student's knowledge, skills, responsibility and autonomy. However, you do not have direct evidence of this. Indirect assessment methods include student self-assessment, employer student assessment, student, graduate, and employer surveys, focus group discussions, interviews, employment rate, course grades, program completion rate, etc. However, it is essential not to confuse this assessment with the student's course evaluation or satisfaction survey results. To assess the program's learning outcomes, a questionnaire can be prepared in which the program's learning outcomes are listed, and students indicate their opinion on the level at which they have achieved this or that learning outcome. The same questionnaire can be sent to employers.

There are evaluation methods that can be used for both indirect and direct evaluation methods depending on how the said method is evaluated. For example, an article published by a student can be both a direct and indirect assessment method. If we simply mention publication, then this will be indirect evidence of the achievement of the learning outcome(s). But if this article is assessed against specific criteria that are directly related to the learning outcome(s) of the program - then it will be a direct assessment. The same can be said for certification exams;

The following principles should guide the selection of the method of evaluation of the learning outcome(s) of the program:

- Assessment should be directly related to the learning outcome;
- It is considered a good practice to use an evaluation rubric;
 - For example, if we want to evaluate the three learning outcomes of the program in one writing assignment, we can prepare a corresponding rubric. For each learning outcome, we must define the criteria that must be met to achieve the said outcome. Each learning outcome can cover approximately 2 to 8 criteria. It is also possible that we do not need to write down criteria and can directly evaluate the learning outcome. Once we have established the criteria for achieving the learning outcome(s), we need to determine each criterion's maximum and minimum assessment points. It can be 1 to 3, 1 to 4, 1 to 5, etc. It is also desirable to define the characteristics of the points (a brief description of what point is written in which case) (see Appendix 2). It is also worth noting that before we start using the newly created rubric, it is preferable to pilot it, which involves evaluating the same work with the same rubric by several lecturers and comparing the obtained results. If the obtained results are very different, the rubric is refined;
- It is preferable to use the evaluation methods that already exist in the training course;
- We must have a written assessment for each learning outcome;
- The grade obtained in a course/examination/project is not a direct method of evaluating learning outcomes. A course score reflects how the student met the course requirements and does not reflect the level of achievement of the program's learning outcome(s). Typically,

course requirements include several course learning outcomes linked to one or more program learning outcomes. Additionally, course grades often have assessments of attendance, activity, or other activities that are not directly related to the program's learning outcomes. The successful completion of the training course cannot be used to evaluate the learning outcome of the program either. However, scores for components of courses, exams, and assignments that are directly related to only one specific learning outcome of the program may be considered adequate evidence of the level of achievement of the outcome;

For each learning outcome of the program, a target benchmark should be established, which reflects our expectation of the level at which students will achieve each learning outcome. Not all students can pass the study result with the highest score. Therefore, program managers must determine the threshold at which they will be satisfied and consider that a program graduate has the knowledge and skills defined by the learning outcome. For example, 60% of students will receive a grade of 15 to 20 on the first learning outcome of the program (if we assess this learning outcome through an essay with a maximum score of 20), or 80% or more of students will receive a grade of B or higher on the exam. Or 75% or more of the students will be rated a three on the rubric (scale of 1-5) by which the research paper is evaluated. To set targets, it is first appropriate to determine how the learning outcomes will be measured.

Targets should be set before assessing learning outcomes. The target benchmark should not be unreasonably high or, conversely, low. Students' previous results can help you develop realistic target marks.

The mechanism for evaluating the program's learning outcomes should be described in the learning outcomes evaluation plan. The latter should show which task, when, and by whom will be used for assessment, and for what number of students each learning outcome of the program will be evaluated. In addition, if rubric/rubrics are used to assess the assignment (considered best practice), it should also be included in the assessment plan.

When a new educational program is created, it must have a plan for evaluating the program's learning outcomes. Naturally, the program's learning outcomes will not be yet evaluated to a new program and it will be possible to evaluate the program's learning outcomes only a few years after the program's start. However, the academic staff implementing the program must know the program's learning outcomes and have an evaluation plan since the program was created. It is also essential that the staff implementing the program know through which training courses or other activities the learning outcomes of the program are introduced, deepened, and reinforced.

Using Evaluation Results to Improve the Program

The primary purpose of evaluating program learning outcomes is to use the evaluation results to improve the program, not just to improve a particular course of study or to assess a particular student. Therefore, when we have the results of the evaluation of the program's learning outcomes, these data will be analyzed and compared with the target marks. At this stage, program staff consider whether students have achieved the learning outcomes at the level they expected; Is there one or more learning outcomes of the program that most students achieved poorly or failed to achieve? If so, refer to the curriculum map and review the courses that develop the learning outcome(s). It is also essential to provide feedback to students on how they have achieved the program's learning outcomes and what their strengths and weaknesses are. However, it should be clarified here that, unlike student evaluation, the primary purpose of program learning outcomes evaluation is program evaluation and its continuous improvement.

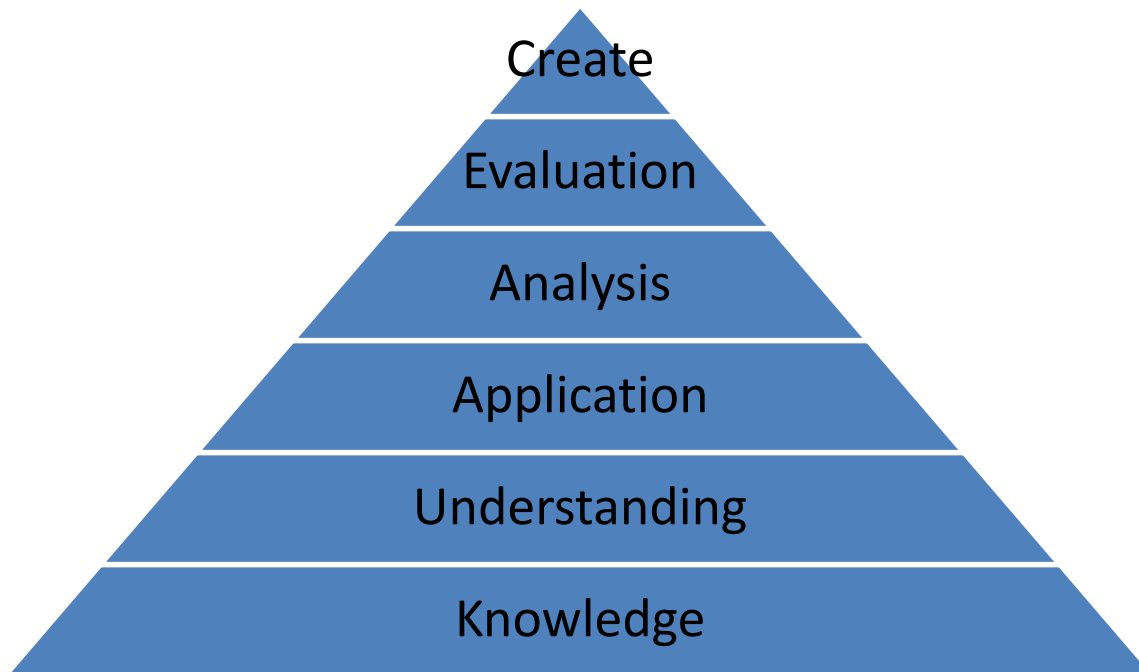
After analyzing the evaluation results, the program-implementing staff may consider implementing specific changes. For example, they may decide to change the content of the training course(s) or its prerequisites, the sequence of the training courses may be changed, the training course(s) may be added, or vice versa. Program learning outcomes can be reviewed as well as the evaluation mechanism.

After carrying out all of the above, a program learning outcomes evaluation report is written, which reflects the results obtained, their analysis, and the changes made as a result of the analysis (if any);

Appendix 1: Revised Bloom's Taxonomy

According to Bloom's updated taxonomy, cognition is divided into six progressive levels. These are knowledge, understanding, application, analysis, evaluation, and creation. A description of each level and corresponding verbs is given below. Given that when formulating learning outcomes, it is essential to determine the difficulty of the learning outcome and then use a verb appropriate to this complexity, when composing a learning outcome, using Bloom's updated taxonomy simplifies this process. Since the latter gives us the structure of the complexity of knowledge and the corresponding verbs, it is widely used in many countries and universities;

The program's learning outcomes should include the most challenging level the student passes at the end of the program. For example, when a student can do something at the third application level, the student also has a knowledge and understanding level. Therefore, it is not necessary to write learning outcomes at all levels. The latter will help us avoid writing overly detailed learning and will also help us reduce the number of learning outcomes. As a rule, when formulating the learning outcomes of the program, nouns from the third, fourth, fifth, and sixth levels of the taxonomy are used;



1. **Knowledge** - recognition, and recall of facts and basic concepts. **Key verbs:** identify, list, select, find, name, recall, connect, display, depict, select, tell, tag, find, identify, recognize, and other;
2. **Understanding** - explaining ideas and concepts, different theories, issue, event; explaining, summarizing, and classifying the same information differently. **Key verbs:** describe, discuss, classify, compare, contrast, contrast, explain, illustrate, select, translate, interpret, review, outline, Relating, paraphrasing, summarizing, explaining, modifying, referencing, and other.
3. **Application** - application of information/learned material in a new situation. Applying ideas and concepts to problem-solving; **key verbs:** use, implement, experiment, model, organize, select, demonstrate, solve, calculate, change, compute, illustrate, modify, operate, practice, predict, produce, and others.
4. **Analysis** - seeing the connection between ideas. Different concepts compare characteristics, processes, or events to express opinions without reasoning. Decomposition of information into constituent components to understand the relationship and structure. **Key verbs:** distinguish, organize, contrast, compare, analyze, classify, detect, isolate, condition, divide, check, inspect, examine, simplifying, ranking, classifying, dividing, contrasting, differentiating, distinguish, divide, connect, separate, categorize, and other.
5. **Evaluation** - justification of decisions, positions, and concepts. Discussing the complexities and limitations of processes and ideas and forming an opinion about an event, theory, criticism, or support. **Key verbs:** Argumentative reasoning, praise, definition, summary/reconciliation,

Reconcile, resolve, defend, deny, support, criticize, evaluate, account for, Conclusion, assurance, preparation of recommendations, validation, measurement, give preference to, and other.

6. **Create** - create a new or original work. Creating a different new concept from the learned concepts or applying a learned concept to create something new. **key verbs:** building, assembling, designing, developing, formulating, investigating, author, modify, compose, construct, create, invent, maximize, minimize, modify, plan, initiate, conjecture, solve, test and other.

Appendix 2: Sample Rubric for Evaluation of Program Learning Outcome(s).

Task name					
	4 points Excellent	3 points good	2 points average	1 point week	Accepted score
Program Learning outcome 1					
Criterion 1.1.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 1.2.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 1.3.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 1.4.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Program Learning outcome 2					
Criterion 2.1.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 2.2.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 2.3	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Programme Learning outcome 3					
Criterion 3.1.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 3.2.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 3.3.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 3.4.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Criterion 3.5.	<i>Description</i>	<i>Description</i>	<i>Description</i>	<i>Description</i>	
Final score					

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