

Program Outcomes Assessment and Evaluation for Continuous Improvements

Saleh M. Altowaijri, Atiq Ur Rahman, Hejab M. Alfawareh,

Faculty of Computing and Information Technology, Northern Border University, Rafha, Kingdom of Saudi Arabia

Abstract:

Assessment and Evaluation of the program outcomes are the two major part in continuous improvement. Assessment is one or more processes that identify, collect, and prepare data to evaluate the achievement of Student/ Program outcomes and program educational objectives. Evaluation is one or more processes for interpreting the data and evidence accumulated through assessment practices. Evaluation determines the extent to which Student Outcomes and Program Educational Objectives are being achieved, and results in decisions and actions to improve the program. Continuous improvements state that there must be a documented and effectively implemented Continuous Improvement process. To demonstrate that an academic program's continuous improvement process is effective, there must be a plan for assessing all student outcomes. Usually that "plan" means having a plan to assess all the student outcomes every two years, that is, half of them every year. To demonstrate that the process is effective, at least some of the student outcomes must have completed a full cycle of the assessment process. In this Paper we present an assessment and evaluation model to complete the "full cycle" of an assessment and evaluation. Completing a full cycle means that First, create the assessment with a goal of achievement. Second, collect and evaluate the student data. Third, do analysis and provide feedback. Fourth, Action and Implementation, means that design necessary changes and implement it to close the loop. Fifth, Re- assessment, the student outcome is assessed again to see whether the changes improved the student achievement as intended.

Key words:

Accreditations, Student outcome, Program educational objectives, Assessment, Evaluation, Continuous Improvement

1. Introduction

The continuous improvement criterion composed of two parts i.e., assessment and evaluation. The assessment states that there must be a documented and effectively implemented Continuous Improvement process. To demonstrate that an academic program's continuous improvement process is effective, there must be a plan for assessing all student outcomes. Usually that "plan" means having a plan to assess all of them every three years, that is, one third cover in a year. To demonstrate that the process is effective, at least some of the student outcomes must have completed a full cycle of the assessment process. This is how programs can purposefully be improved over the

assessment cycle. Some of the student outcome should be completed assessment and the other student outcome assessments, they need to be somewhere in their continuous improvement cycle with a clear plan of how they are about to be completed within a reasonable time.

It is fine if the program has a couple assessments that have completed. Some assessments may not need to be improved and so would not need to be changed. But if all the assessments need no improvement, it must not be a very good assessment plan. So, the program needs to have at least a couple of the assessments where it can demonstrate the full cycle of the continuous improvement plan that show that the program can effectively be improving [13]

There are many established technique and model in literature for assessing the program, but it does not imply for some specific domain. E.g., Due to the cultural issues, one bachelor program running separately in boys' and girls' section which affects the facets of the requirements of the accreditation of the global academic in terms of:

- Measuring the output of the student.
- Measuring the outputs of the program.
- Continuity and improvement.
- Complete the full cycle of assessment.

The specific objective of this paper are as follows,

- To develop program assessment and evaluation model for continuous improvements.
- To define the process for review and evaluate the program curriculum.

This section also presents the problem faced during the process of assessment and evaluation in continuous improvement. It is worth reading to review the assessment and evaluation which recently highlighted of many researches. The authors proposed the process development of program assessment and evaluation and heighted the problems and challenges [15, 16, 17, 18, 19, 20]. As per the country economical needs that affect the related profession and industry, every program needs to review continuously based on the current qualifications. The following Research Questions (RQ) are formulated to achieve the goals.

- How to involve the constituencies in the assessment and evaluation process.

- What is the process of assessment and evaluation in continuous improvement.
- What action need to be taken as a feedback during completion of cycle.
- What is course-based assessment.
- What is rubric-based assessment.

2. Assessment and Evaluation Model

Our Assessment and Evaluations model composed of mainly five phases which present "how to complete the full cycle and close the loop". Completing a "full cycle" of an assessment and evaluation as shown in Figure 1 and the assessment plan as shown in Table 1.

Table 1: Assessment Plan

SO	Course Based			Rubric			Exit Survey			Course Evaluation			Alumni Survey		
	16/17	17/18	18/19	16/17	17/18	18/19	16/17	17/18	18/19	16/17	17/18	18/19	16/17	17/18	18/19
a	x			x			x	x	x	x	x	x	x	x	x
b	x			x			x	x	x	x	x	x	x	x	x
c	x			x			x	x	x	x	x	x	x	x	x
d		x			X		x	x	x	x	x	x	x	x	x
e		x			X		x	x	x	x	x	x	x	x	x
f		x			X		x	x	x	x	x	x	x	x	x
g		x			X		x	x	x	x	x	x	x	x	x
h			x			x	x	x	x	x	x	x	x	x	x
i			x			x	x	x	x	x	x	x	x	x	x
j	x			x			x	x	x	x	x	x	x	x	x
k	x			x			x	x	x	x	x	x	x	x	x
l		x			X		x	x	x	x	x	x	x	x	x
m			x			x	x	x	x	x	X	x	x	x	x
n			x			x	x	x	x	x	X	x	x	x	x

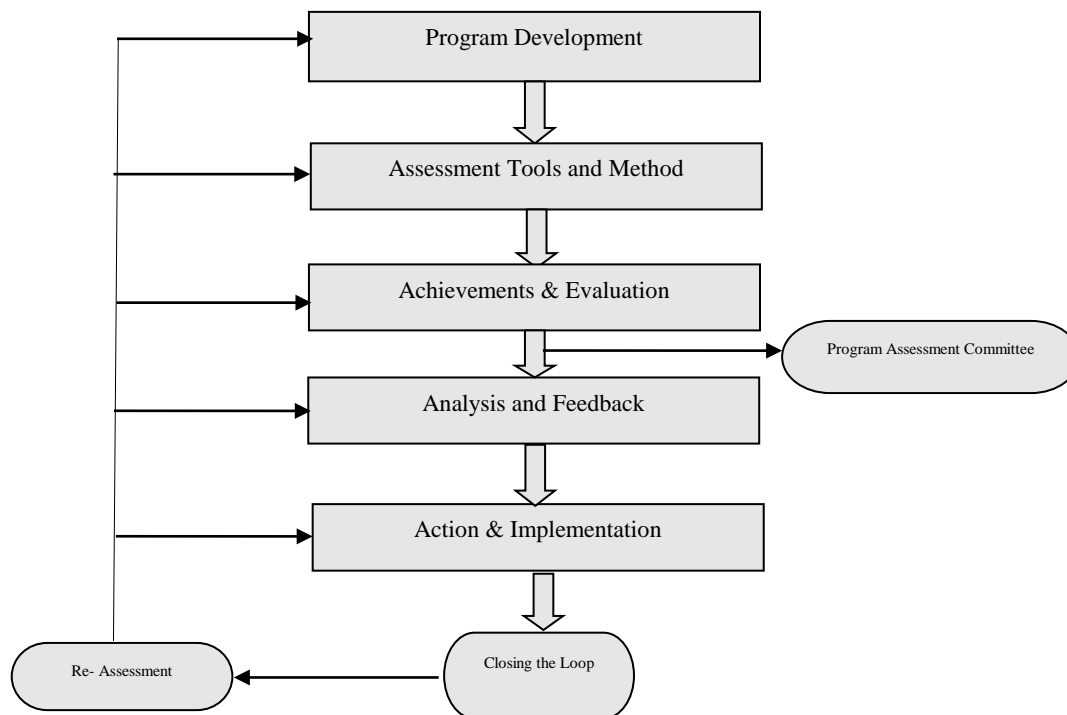


Fig. 1 Assessment and Evaluation Model

2.1 Define Assessment:

Assessment is defined as one or more processes that identify, collect, and prepare the data necessary for evaluation. Define assessment based on Student Outcome 3d (students work effectively in teams) that evaluates students in a course where teams are used. The measurement might be based on how students resolve disagreements (just something that is measurable), with an achievement goal of 80 percent of students effectively resolve disagreements. For the assessment and evaluation of student outcomes used the following direct and indirect assessment processes [1, 2, 3, 4, 6, 13, 14, 21]: CLOs based, Exit Survey, Alumni Survey, Course Evaluation Survey, and Faculty Survey [7, 8, 9, 11]. Various assessment processes are used for the assessment and evaluation of student outcomes for the Bachelor Program. These assessment methods along with its frequency are listed In addition, the program constituents responsible for providing the feedback are also shown in Table 2.

Table 2: Frequency of Data Collection for Assessment.

Constituent Providing Feedback	Assessment Process	Direct/Indirect Assessment	Frequency
Faculty	Course Based Assessment	Direct	Once per Semester
Faculty	Rubric Based Assessment	Direct	Once per Semester
Graduating Students	Senior Exit Survey	Indirect	Once per Year
Alumni	Alumni Survey	Indirect	Once per Year
Faculty	Course Evaluation Survey	Indirect	Once per Semester

Each assessment methods addresses one or more student learning outcomes and is recorded as given in Table 3.

Table 3: Assessment Methods alignment with Course Learning Outcomes

Assessment Methods	CLO 1	CLO 2	CLO 3	CLO 4	CLO 5
Quiz 1(2%)	X				
Quiz 2(3%)					X
First Assignment (2%)		X			
Second Assignment (3%)				X	
Mid-Term (20%)	X	X	X		
Group discussion (5%)	X		X	X	X
Participation (5%)	X		X	X	X
Lab Assignment (20%)	X	X	X	X	X
Final Exam (40%)	X	X	X	X	X

2.2 Evaluation Process:

Evaluation is defined as one or more processes for interpreting the data acquired though the assessment processes to determine how well the student outcomes are being attained. The evaluation of student learning is present [5, 10, 12, 13].

In the section, we interpret the data acquired though the assessment processes to determine how well the student outcomes are being attained. We consider a student outcome as achieved if its Weighted Average Percentage is above 70%. The course-based assessment data is perhaps the more reliable source of outcome evaluation. The CLO are mapped to one or more student outcomes (SOs). For example, a CLO-1 of Computer Graphics is “To understand various hardware and software required for computer graphics applications” is mapped to student outcome “a”. Table 4 shows the questions targeting CLO1 in different assessment tools.

This was an important consideration as the girls and the boys study their courses at separate locations, and in most of the cases, by different instructors. Due to the separate sections most of the program have separated assessment results for the girls’ section and the boys’ section. To solve this issue, the program needs to have course coordinator and to define the same contents of assessment for both the sections and do combine assessment.

Table 4: Questions related to CLO-1 in Different Assessment Methods.

Assessment Methods	Questions	Weight
Quiz1	Question 1	2
	MCQs	4
Mid Term Exam	True or False	1
	Question 1 and 2	4
Class Participation		1
Group Discussion		1
Lab Activities 1+2		3
Final Exam	True or False	4
	MCQs	5
Total		25
Achievement Grade		0.7*25= 17.5

The achievement grade for CLO-1 is 17.5 with a threshold of 70%. Now in order to evaluate whether CLO 1 is achieved by students, each student questions related to CLO 1 in different assessment methods are accumulated and compared as follows.

If students accumulated grades for CLO1 \geq
 $0.7 * \text{Acheivement Grade}$
 CLO1 is achieved
 Else
 Not achieved.

Each student grades are accumulated in different assessment methods for CLO-1 as shown in Table 5

Table 5: Attainment of CLO-1.

Student ID	Assignment 1 Question 1, 2	Mid Term Exam MCQs + T/F+Q5 and 6	Lab Activities 4+5	Class participation	Group discussion	Final Exam T/F + MCQs	Total /17.5	CLO Achievement Grade (0.7*17.5=12.25). [A] Achieved, [N] Not Achieved
xxx	2	3	3	1	1	6	16	A
xxx	2	2	1	1	0	4	10	N

The percentage is computed that how many students in the course registered achieved each CLOs and is shown in Table 6.

Table 6: Percentage of CLOs Attainment by all students.

Evaluation	CLO 1	CLO 2	CLO 3	CLO 4	CLO 5
xxxxx	A	A	A	A	A
xxxxx	N	A	A	A	A
xxxxx	A	A	A	A	A
Students Achieved	2 66.66%	3 100%	3 100%	3 100%	3 100%
Students Not Achieved	1 33.34%	0 0%	0 0%	0 0%	0 0%

Once the percentage of students achieved a particular CLO is obtained, it is mapped with the Student Outcome. If the percentage is greater than 70% then that particular student outcome is achieved otherwise not achieved. This is shown in Table 7.

Table 7: Student Outcomes attainment.

CLOs	Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
CLO_1	66.66%										
CLO_2		100%									
CLO_3										100%	
CLO_4									100%		
CLO_5										100%	
AVG	66.66%	100%							100%	100%	

The course targeted student outcomes "a, b, i, and j" in Table 7. Student outcome "a" is not achieved because its average is less than the threshold value (70%).

This is how programs can methodically and purposefully be improved over time. (It's a scientific method of doing things.) we must complete a cycle at least on some of the assessments and provide examples of those assessments where the full cycle has been completed.

2.3 Analysis and Feedback:

In summary, the Assessment and Evaluation Committee is to identify and implement the required forms for direct

and indirect assessment to collect the data as a part of continuous improvement. The key components of assessment and evaluation presented have contributed to the following modifications.

Task 1: Review Program Educational Objectives (PEO)

Task 2: Review student Outcomes

Task 3: Review student outcomes with PEO

Task 4: Review Constituents

Task 5: Review Course Outcomes to Student Outcomes

Task 6: Review Performance Indicators

Task 7: Review Assessment Tools/Methods

Task 8: Review Assessment Plan

Task 9: Review Data Collection and Evaluation

Task 10: Review Surveys process and Feedback

The following feedback can be received during the review of the above tasks in the analysis process.

- Revision in pre-requisite as inadequate pre-requisite knowledge.
 - Revision in course or course material or provide more helping material, modification in text or reference material.
 - Revision in course assessment methods.
 - Revision of the learning accomplishments of a course.
 - The student outcomes are weakly evaluated in the assessment summary for the terms.
 - The graduation project addresses most of the Computer Science Student Outcomes and missing in the presented evaluation. It is the terminal comprehensive activity and provides students with the opportunity to exhibit the acquired skills and knowledge during the program.
 - Revision of the survey process and student responses.
- The following suggestions can be submitted to the department council for approval.
- The course learning outcomes-based survey is suggested.
 - Frequent workshops and lectures, seminars are planned to be organized. This will make our faculty and administration more aware and helpful in implementing the detail procedures and improvements in the program.
 - Process of conducting surveys needs to be improved in order to ensure that the maximum number of respondents fill the survey.
 - The assessment committee is looking into the CLO based assessment method for the student outcomes and determines the reasons of non-achievements. The trigger is initiated with not achievement of SO in a particular course. Later, details analysis of course file to assess the achievement of CLO is performed. Then, the Assessment and

Evaluation Committee requires from the instructor to provide Continuous Improvement Plan and Strategies.

We need to show that we have assessed the program in the areas of the particular SOs in question. So, you would identify a course or workshop, etc., where you want to assess an element of SO (g). Let's say CPIT201 as a hypothetical example, where you teach ethics. We need to develop an objective for that SO that would demonstrate student attainment of part of that SO and would make an objective like "Students should be able to identify ethical and unethical practices regarding handling of proprietary software" This should be achieved for 90% of students. The measure would be the questions that can ask the students regarding ethical and unethical practices regarding proprietary software then grad the questions and group students for each program to see how many understand the ethics involved or not. If fewer students than the number of your goal knew the correct answer, then it would need to change your teaching so that students would know the material matter the next tie you give the questionnaire. At the end, implement any changes to the appropriate courses and give the same questions after teaching the class again.

2.4 Action & Implementation:

The feedback provided by Assessment and Evaluation Committee to the department council. The department council further will highlight the necessary changes to design and approve. we have divided the actions into two level i.e., at the program level and the course level as presented below.

2.5 Action at Program Level:

- Further improve the process to conduct Exit Survey by highlighting the importance of the survey to the students before the conduct of the survey and by giving them more time to record their responses.
- The threshold value can be increased to 75% or 80% if this pattern of high attainment levels for SOs continues.
- More refinement is needed at the initial levels so that this gap between good students and weak students can be decreased.
- There are not many courses that target outcome h. Identify ways to address this outcome in more courses. If not possible then, remove this SO.
- Changes the pre-requisite as inadequate pre-requisite knowledge.
- approve the course syllabus using a standard format. If any changes in the course descriptions, course learning outcomes and/or text books are required, report it department.

2.6 On at Course Level:

- Modify course material or provide more helping material, modification reference material.
- Modifications in course assessment methods.
- Modify the survey process.
- Make sure that the same course syllabus are followed in case of more than one sections are opened (e.g. Male and Female campuses or multiples sections at a campus).
- Design in coordination and approve assessment instruments (Assessment Method) that will be used to measure each course learning outcome.
- Maintain a close collaboration with other instructors of a course during the semester to maintain consistency of above mentioned.

In short, at this level the program level or course actions is taken and implemented in coming assessment cycle (Re-assessment) and the loop is closed at the level.

2.7 assessment:

A re-assessment refers to a periodic reevaluation of the program or student outcomes. The ideal case in the process of assessment and evaluation is again to see whether the changes improved the student achievement as intended or not. As per our model, the re-assessment phase (Reengineering) identifies the issues in the following phases.

- i. Review the action to be taken
- ii. Review the Analysis and feedback
- iii. Review the Achievements and Evaluations
- iv. Review the Assessment tools and Methods.

3. Conclusion

The Assessment and Evaluation model is presented which contains of five main phases to complete the cycle. The Assessment processes identify, collect, and prepare data to evaluate the program outcomes as per the assessment plan. Evaluation is interpreting the data and determines the extent to which Student Outcomes are being achieved. The Analysis and feedback section provide the suggestions to department council to take action and implement it. The action and implementation phase specify the action where to implement. At this the full cycle completed and the loop is closed. In ideal case the student outcome is reassessed to see the intended changes of the student achievements.

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Dr. Saleh M. Altowajjri received his Ph.D. degree from Swansea University in the area of cloud computing. He is currently the Dean of the Faculty of Computing and Information Technology, Rafha, Northern Border University. He has over eight years of research experience and has published several book chapters, conference, and journal papers. His research interests include grid and cloud computing, database management systems, data mining, information systems, information technology risk management, and emerging ICT systems in healthcare and transportation sectors. He is a Reviewer of several international conferences and journals.



Dr. Atiq-Ur-Rahman received his BS degree in computer science from University of Peshawar and MS degree in computer system engineering from GIK Institute of Engineering Sciences and Technology, Pakistan in 2004 and 2008, respectively. He completed his PhD in Information Technology from Universiti Teknologi PETRONAS, Malaysia in 2013. He worked as a System Engineer in National database and registration authority Pakistan from 2004 to 2006. Currently, he is working as an Assistant Professor, Head of computer science department and Head of Quality and Academic Accreditation Unit in Northern Border University, Kingdom of Saudi Arabia. His research interest focuses on the energy-efficient design, routing, deployment, coverage and Quality of service in wireless sensor networks and Under Water Sensor Networks. He is also senior member of the Universal Association of Computer and Electronics Engineers (UACEE), Institute of Research Engineers and Doctors (IRED) and American Society for Engineering

Education (ASEE). He has a significant number of research publication in the renowned journals and conferences. He is a reviewer in several journals and a technical program committee member in international conferences. He attended ABET "fundamental and Advanced Assessment Workshop" in USA.



Dr. Hejab M. Alfawareh received his BS degree in and MS degree in computer science in 2003 and 2004, respectively. He completed his PhD in Information Technology from Universiti Utara Malaysia in 2010. He worked as Assistant Professor in Zarqa University, Jordan, Nijran University Saudi Arabia. Currently, he is working is an Assistant Professor

and a member of Quality and Academic Accreditation Unit in Northern Border University, Kingdom of Saudi Arabia. His research interest focuses on Artificial Intelligence and social computing. He is also senior member of the Engineering Electronics Jordan and IACSIT. He has a significant number of research publication in the renowned journals and conferences. He is a reviewer in several journals and a technical program committee member in international conferences. He also attended ABET "fundamental and Advanced Assessment Workshop".