Original Article

Assessment at program-level in higher education: A case study in the University of Da Nang

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ABSTRACT

This article discusses student assessment, course learning outcomes (CLOs), and program learning outcomes (PLOs) in Advanced Program in Electronic and Communication Engineering (AP-ECE) in the University of Da Nang, University of Science and Technology. Primary purpose of assessment to test and measure the knowledge and skills of students has become a somewhat outdated concept. There has been a gradual shift toward balanced-assessment from formative to summative. This reflects changes in student assessment in higher education. Attention is paid to evaluate the learning progress of students toward meeting standards. In addition, qualitative method is adopted in this study to analyze and interpret the data. The study reveals that there are three types of assessment, namely, (i) admission assessment, (ii) in-course assessment, and (iii) graduation assessment. Finally, it points out the measurement of assessment from direct and indirect assessment tools as well as the attainment of CLOs and PLOs in AP-ECE.

Keywords: Course learning outcomes, program learning outcomes, student assessment

INTRODUCTION

The Faculty of Advanced Science and Technology (FAST) was founded by the Director of The University of Da Nang (UDN) pursuant to Decision No. 585/QD-HN dated February 8, 2018, to administer, facilitate, and develop Advanced Program in Electronic and Communication Engineering (AP-ECE) in 2006 in accordance with the national Project "Development of Advanced Programs at universities in the period of 2008-2015" of Ministry of Education and Training (MoET) that aims to "create conditions for the formation and development of several training disciplines, faculties, and universities to meet regional and international standards; to contribute to raising the quality and implementing programs on the fundamental and comprehensive renovation of Vietnam's tertiary education". The AP-ECE program was originally based on the curriculum from Department of Electrical Engineering, University of Washington, Seattle, USA and has been carefully tailored to specific needs and requirements in Vietnam. The objective of AP-ECE is to provide advanced engineers for the national and international labor market in the areas of Electronic and Communication Engineering.

The end of the first decade of 21st century has witnessed a growing trend toward quality assessment in higher education in Vietnam because it is widely agreed that program assessment has become a cornerstone for accrediting and fostering the quality of universities and institutions and AP-ECE assessment is no exception. It is periodically examined, evaluated, and checked to seek for the continuous improvement. Within the internal quality assessment, the AP-ECE program has policies and mechanisms in place to make sure that it is meeting its own objectives and standards. While external quality assessment of the program is evaluated by Asean University Network Quality Assessment (AUN-QA) within the Plan-Do-Check-Act process. Version 4.0 of the AUN-QA model[1] for program level assessment consists of eight criteria [Figure 1].

1. Expected Learning Outcomes
2. Program Structure and Content
3. Teaching and Learning Approach

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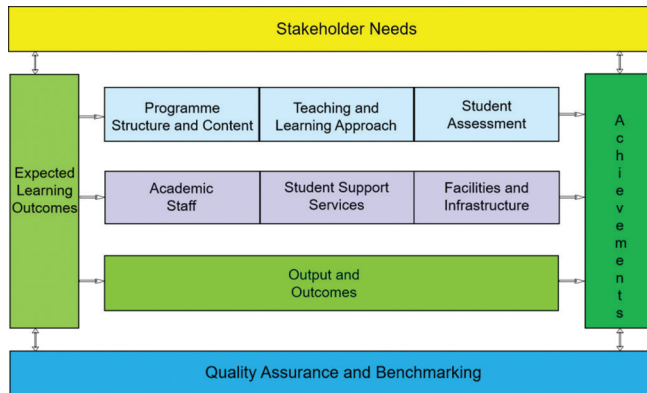
Figure 1: AUN-QA Assessment Model at the Program Level (Version 4.0)[2]

4. Student Assessment
5. Academic Staff
6. Student Support Services
7. Facilities and Infrastructure
8. Output and Outcomes.

At program level assessment, there are eight criteria to be considered to analyze and intepret within AUN-QA Model Version 4.0.[2] The model initially work with understanding the needs of an academic program's internal and external stakeholders. These needs are formulated into the expected learning outcomes which drive everything that the program wishes to achieve three rows are presented in the middle of the model. The first row addresses the issues of program structure and content (hierarchy of courses throughout the degree program), the teaching and learning approach used, and how students are assessed. The second row deals with the resources including academic staff, student support services and facilities, and infrastructure to run the program. The third row mentions the output of the program such as the quality of the graduates, employment information, research output, stakeholder satisfaction and others.

In Vietnam, there are some research on program assessment[7,12] and numerous studies are conducted to make in-depth analysis in higher education.[4,6,9,10,13-16]

The concept of student assessment is viewed from perspectives and approaches. Miller *et al.*[11] stated that "assessment is seen as the means by which students' progress and achievement are measured, recorded and communicated to students and relevant university authorities". There are numerous reasons why student assessment must be taken. First and foremost, it provides systemic indications of the learning ability of students for both teachers and students. Second, it sets the quality standard in professional educations and in higher education and finally it drives students through their learning.

Burke[5] defined that "assessment is the process of gathering evidence of students learning to inform instructional decision while evaluation is the procedure for collecting information and making a judgment about it." In other words, assessment is ongoing and continuous process that occurs daily but evaluation takes place at the end of assessment cycle. Burke also makes a distinction between formative and summative assessment. Formative and summative are crucially necessary and they are also the two fundamental categories in assessment. To some extent, they are distinctive but they complement each other. Formative assessment enables students reflect their own learning and adjust their learning strategies accordingly in order to meet the standards as well as well prepare for the summative assessment.

According to Allen[1], "While classroom assessment examines learning in the day-to-day classroom, program assessment systematically examines student attainment in the entire curriculum." Principally, classroom assessment is done regularly to help teachers to adjust their classroom activities to improve student attainment. Nevertheless, it is much more challenging and complicated to get the program periodically internally and externally assessed in timely and systematic manner.

METHODOLOGY AND DATA COLLECTION

Qualitative is adopted in this study because our attention is paid to interpret how student assessment is made in the AP-ECE program. Qualitative best suits the requirements since in general, qualitative study is inclined to the description of phenomena. Denzin and Lincoln[8] state that qualitative research involves studying "things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them." Therefore, this qualitative study is linked to in-depth exploration and analysis of student assessment.

With the population of 95, fifty undergraduate students in the AP-ECE program, all participants are voluntary, and there is no compensation for taking part. The questionnaires in English were developed based on research aims and objectives. All participants were invited to fill out the questionnaire by exploiting Google Forms. In total 95 questionnaires were filled out during online survey, resulting in a response rate of proximately 100%.

DISCUSSION

Student Assessment
The procedures of assessing learners' learning outcomes are closely based on regulations of UDN-the University of Science

and Technology (DUT). The assessment methods are diversified and well-structured in accordance with the training program. The process [Figure 2] is carried out periodically and continuously during the training process including (i) admission assessment, (ii) in-course assessment, and (iii) graduation assessment.

Admission Assessment

Admission assessment of learners in the AP-ECE program is primarily based on the DUT's enrolment plans which are open to public on the website http://dut.udn.vn/TuyenSinh2022. In particular, the candidates are selected depending on (i) the results of the national high school graduation exam; (ii) on DUT's direct enrolment decision; and (iii) on candidates' GPA of high school.

On admission, all AP-ECE students are required to take an English language entry test to place English classes according to their English ability.

In-course Assessment

It for all syllabuses, rubrics and types of examination and other assessment methods are well-informed to students from the very beginning of courses. Particularly, designed assessment methods are well-aligned with course learning outcomes (CLOs) and program learning outcomes (PLOs).

The assessment procedures including formative and summative assessment are carried out periodically with a specific well-announced plan using a wide variety of assessment methods which are designed in accordance with the application of bloom taxonomy[3] to cover the CLOs and PLOs [Table 1]. Based on the levels of cognitive domains that bloom suggests, the first two levels "Remember" and "Understand" are moderately used while the last four levels "Apply," "Analyze," "Evaluate," and "Create" are exploited to assess learners' knowledge and skills and ability to manipulate the knowledge in a new situation in real life.

The assessment methods are well-informed and explicit to learners by giving them the course syllabus with clear

Figure 2: Process of student assessment in the AP-ECE program

assessment components, assessment methods, rubrics, percentages of components (%) and CLOs. Assessment components are comprised of on-going assessment, midterm and final assessment to ensure the continuity of the student assessment process. In particular, the course evaluation exploits rubrics to support the assessment to ensure the reliability and objectivity, and to properly assess the students' knowledge, skills, and attitudes. Rubric assessment includes: (i) Evaluation criteria (criteria); description (descriptors); and performance levels.

Students are provided with assessment forms to have the opportunity to peer assessment of their presentations as well as their progress against learning goals or self-assessment of their own learning outcomes. Learners, therefore, self-regulate their individual learning activities. In response, the teachers provide assessment criteria, well-written guide to help students how to self-assess and evaluate each other, thereby promoting students' self-learning. In particular, DUT has promulgated regulations course assessment, regulations on construction, management, and use of exam banks.

It is noted that learners are well-informed about the regulations and procedures for appealing before each course via the student handbook issued at the beginning of the academic year and during 1 week-orientation of the University. Appeal procedures are accessible and friendly to all students by registering online through student information system http://sv.dut.udn.vn/, so the appealing is resolved in a timely manner. The appealing results are gathered and processed by the department of student affairs and department of educational testing and quality assurance within 30 working days and the results must be represented in academic reports.

The number of AP-ECE students appealing over the past 5 years is extremely limited and updated at http://dut.udn.vn/Phong/QualityAssurance/Gioithieu/id/1755 and is presented in Table 2.

Graduation Assessment

DUT promulgates regulations on the implementation of graduation projects between the university and the enterprises. Final year students are well-informed about the regulations on schedules, procedures, requirements, and assessment methods of the Capstone Project. The faculty actively invites enterprises to coordinate the Capstone Project," plans for enterprises to organize seminars, introduce projects, short-term internships, make a list of selected students and projects and DUT issues a decision to send students to the enterprises thus giving students a chance to apply what they have studied about creativity, innovation in, and also to develop the entrepreneurial mindset. Furthermore, when working in a company, students can receive guidance and advice from both an engineer from the company and lecturers from university and thus can develop
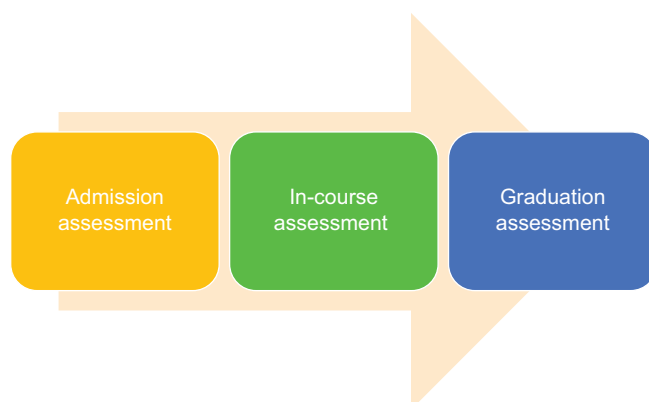
Table 1: Matrix of assessment methods and bloom taxonomy

Bloom taxonomy/ assessment types	MCQs	Written test	Oral presentation	Field trip	Project report	Capstone project	Lab test
Create					Intelligent Robotics Microprocessor System design 1 Circuit theory	Capstone Project	
Evaluate			PBL 2 PBL 3	PBL 2 PBL 3		Capstone Project	
Analyze			Advanced Technical Writing and Oral Presentation			Capstone Project	Electric Circuits 2
Apply	Electric Circuits 1	Electric Circuits 1 Electric Circuits 2 English Composition Project management Circuit theory	Communication in Small Groups	PBL 1			Electric Circuits 1 Lab for PH 223
Understand	Electric Circuits 1	Feedback and Control Micro Economics Micro Economics					Lab for PH 221 Lab for PH 222
Remember	General law	Physics 1 General Chemistry					

Table 2: Number of AP-ECE students appealing over the past 5 years 2016–2021

2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
2	0	0	0	1

AP-ECE: Advanced Program in Electronic and Communication Engineering

both theoretical and technical knowledge as well as the practical skills. Before defense, a decision is made to establish the defense council and the faculty announces the evaluation criteria for students.

Measurement of Student Assessment
CLOs assessment
To measure the achievement of the expected learning outcomes of the courses, both direct (e.g., project, term paper, final and midterm exam embedded questions, quizzes, and lab reports), and indirect (e.g., instructor observation, student satisfaction survey, and student self-evaluation) assessment tools are exploited. CLOs are utilized to assess the attainment of each course.

Tables 3 and 4 are examples of mapping of CLOs of direct assessment tools, assessment components and methods as well as weighted average student performance in Group Communication course. It can be seen that four CLOs need to be met to successfully achieve that outcome at a minimum target performance level for this course. In particular, project rubric, oral presentation rubric and written test are used to measure the performance of student to cover 4 CLOs. It is recommended that 65% of the students score above 65% is considered to get the attainment level of CLOs and the average of this course is over 80% so it is safe to say that the students could achieve the learning outcomes of this course. In addition, the survey of CLOs attainment reveals that 89% of students attending this course believe that the CLOs are obtained.

For indirect assessment tool, DUT periodically surveys faculty, students, and graduates about assessment methods. The 2021 survey reveals that 59% of surveyed graduates are satisfied and 20% are very satisfied with the assessment methods. In addition, the survey data of Advanced Technical
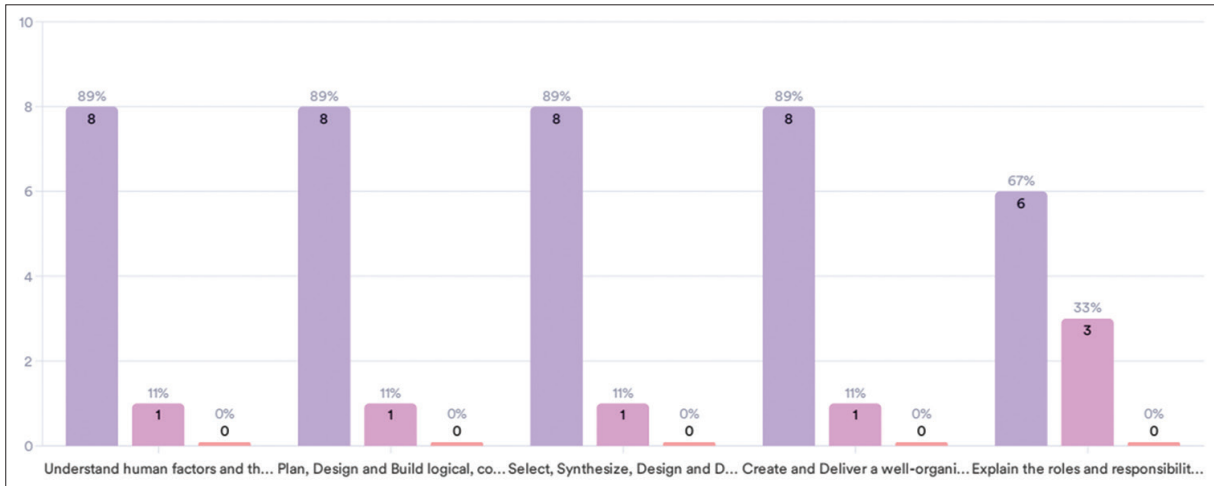
Figure 3: Students' satisfaction survey of course learning outcomes achievement in Advanced Technical Writing and Presentation

Table 3: A mapping of CLOs, assessment components and methods in Advanced Technical Writing and Presentation

Course assessment plan			
Assessment components	CLO1	CLO2	CLO3
Exercise (30%)	Oral presentation Q1	Oral presentation Q2	Project rubric Oral presentation Q1
Mid-term test (35%)	Written Test Q1	Written Test Q2	Written Test Q3
Final test (35%)	Oral presentation rubric Criteria 2	Oral presentation rubric Criteria 1	Oral presentation rubric Criteria 3

CLOs: Course learning outcomes

Table 4: Weighted average student performance for CLOs of Advanced Technical Writing and Presentation

Assessment components	CLO1	CLO2	CLO3
Exercise (30%)	70	50	85 70
Mid-term test (35%)	79	100	93
Final test (35%)	86	100	100
Overall	83	85	91

CLOs: Course learning outcomes

Writing and Presentation course in 2021 [Figure 3] show that 89% of students are very satisfied and approximately 11% are very satisfied with the assessment that is done fairly and properly. In particular, the subjective assessment for the CLO is used by the instructors to compare with the results of the corresponding objective assessment of the CLO to make appropriate improvements and adjustments. It is strongly believed that student assessment and their feedback are crucial to empower students and boost their learning.

PLOs assessment

In response to revised regulations of the Vietnamese Ministry of Education and Training that requires learners to achieve PLOs, DUT has added this requirement to the training regulations for the enrolment in 2021. To public this revised policy, the university has also organized numerous seminars, workshops and short training courses to guide lecturers, staff, and learners how to teach, learn and assess to cover CLOs and PLOs. Particularly, the assessment of the PLOs has been regulated by the MOET for all higher education institutions. At UD-DUT, the measurement of PLO achievement is conducted in two approaches: Objective assessment, and subjective assessment. FAST has detailed guidelines for the assessment and measurement of CLOs and PLOs. It is suggested that PLOs with evaluation results below 65% are considered unsatisfactory and should be further analyzed.

Measurement of achievement outcomes by subjective assessment is conducted through program surveys by final year students when they have just completed all courses and through CLOs survey. Regarding to PLOs subjective

Table 5: Achievement of PLOs for 5 cohorts (in %)-exit survey

AP-ECE	Rate your achievement of the following program learning outcomes										
Exit year	PLO1	PLO2	PLO3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
2017	92.3	76.9	100.0	73.1	69.2	73.1	96.2	100.0	100.0	88.5	96.2
2018	70.0	75.0	75.0	75.0	47.5	70.0	97.5	100.0	95.0	87.5	97.5
2019	67.9	71.4	78.6	60.7	60.7	64.3	92.9	85.7	89.3	78.6	85.7
2020	64.3	64.3	75.0	60.7	57.1	64.3	82.1	89.3	78.6	71.4	82.1
2021	60.0	75.0	85.0	75.0	60.0	85.0	95.0	90.0	95.0	85.0	90.0
2022	66.7	57.4	63.0	61.1	51.9	55.6	70.4	64.8	66.7	59.3	53.7
Overall	70.2	70.0	79.4	67.6	57.7	68.7	89.0	88.3	87.4	78.4	84.2

PLOs: Program learning outcomes

assessment, Table 5 shows the results for past cohorts. The faculty summarized results of PLOs achievements for every year to easily monitor, compare, analyze, and take measures to improve.

CONCLUSION

This work has discussed student assessment and measurement of student assessment in AP-ECE. The discussion is in particular involved in offering three types of assessment: (i) Admission assessment, (ii) in-course assessment, and (iii) graduation assessment. In addition, this section has shown how to measure CLOs and PLOs. It can be seen that At UDN-DUT, the measurement of CLOs and PLOs achievement is conducted in two approaches: Objective assessment and subjective assessment tools. CLOs and PLOs with evaluation results over 65% are considered satisfactory attained. In addition, the research was based on mainly qualitative and quantitative research methods. Feedback from students is the heart and soul of assessment in higher education. Therefore, it is highly recommended that student survey of assessment should be made regularly and FAST should have incentives and policies to promote student's proactive engagement in feedback to adjust and improve the student assessment in timely manner.

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