Alternative and Online Assessment in the Context of Outcome Based Education: A Practical Guide

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ARTICLE INFO	ABSTRACT
	Alternative assessment measures the learner's ability and proficiency in performing complex tasks that are related to the intended learning outcomes and relies on direct measures of target skills in a specific knowledge or skill-domain. Meanwhile, online assessment is an assessment conducted in an online environment on a fully automated platform. Both types of assessments are getting a substantial attention worldwide due to their many advantages. However, several factors must be taken into consideration in implementing the alternative and online assessment in an outcome-based education (OBE) system. Thus, this paper provides a practical guide to alternative and online assessment in the context of OBE - including the constructive alignment, student learning time and development of assessment rubrics. Other considerations are also discussed, namely the validity and reliability of the alternative and online assessment, and deterring plagiarism and cheating.

1. Introduction

Assessment is as an integral part of the teaching and learning process that captures a learner's progress through active participation of the learner himself; whether the goals of learning are being met or not. The traditional or conventional practice for evaluating outcomes is an assessment of learning [1]. However, new perspective proposes that assessment should not only include assessment of learning, but also to include both assessment for learning and assessment as learning.

Hence, a holistic assessment can be viewed from three different perspectives: assessment of learning, assessment for learning, and assessment as learning. Assessment of learning is potentially summative and its purpose is to ascertain what the learners know in relation to curriculum outcomes. It is for instructors to make infallible and reasonable decisions [2]. Meanwhile, assessment for

learning regards learners as unique individuals who learn in idiosyncratic ways. This kind of assessment provides feedback to learners and offers a helping hand to instructors to benefit from the information available to streamline instruction. Assessment for learning offers a number of opportunities for learners to develop their own skills by making evaluations about their own performances. Finally, assessment as learning is a way of intensifying learners' metacognition. It has an eye on the role of each learner as an active connector between assessment and learning. The learners are critical assessors as they make sense of information provided and consume it for learning new concepts. It is not possible unless the learners make adjustments from what they have monitored. This process is accompanied by a critical and reflective analysis of their own learning.

As a reciprocal process of teaching and learning, assessment deals with what is taught and what is learned throughout the academic years [3,20]. Assessment should be meticulously designed to measure both knowledge and skills in order to enhance the learner's learning. As proposed by Nasab [4], a high quality and well-designed assessment should "engage learners with their own learning, setting aside the obvious advantages of its being a tool of measurement" as well as provide meaningful learning experience to the learners. Assessment, hence, should be seen as a central to the learning experience that determines how much time should be allocated on what is considered important—for both learners and instructors. Assessment should prepare learners to deal with ambiguous real-life problems that requires higher-order thinking abilities.

According to Tangdhanakanond [5], assessment reform has shifted its attention from the mere use of traditional tests to more authentic methods of testing which are holistically performed by the active participation of the learners, their peers and their instructors. This shift is "an attempt to distance from the rigid and static tests and to approach more towards real-life tasks implemented in complex real-life situations". Subsequently, the assessment must be aligned with the Course Learning Outcomes (CLO) through multiple strategies that best for learner's learning. To put it in a nutshell, no single strategy of assessment is sufficient to measure specific knowledge and skills—as each has its own advantages and disadvantages. However, the fundamental principle of any kind of assessment is fairness. The reliability and validity are more likely to be guaranteed if the assessment strategy is fair and well-designed.

2. Methodology
2.1 Continuous and Final Assessments

Continuous assessment is a regular assessment of the learning performance related to a course module that is separate from examinations and often accompanied by regular feedback throughout the semester [2,4,5]. It is a form of formative assessments when tasks or activities are integrated with the class practice as the part of instructional process and followed by the constructive feedback. Hence, it is a well-designed plan to adjust the ongoing learning process that serves as a core to improve learners' achievement. Continuous assessment can be viewed as "a diagnostic approach which aims at providing meaningful feedback to facilitate learners' learning and improve teachers' teaching" [6]. Meaningful feedback informs learners' current level of performance and the way forward to progress. Relatively, it offers immediate evidence in order to accelerate learner's learning to achieve better outcomes. Example of the continuous assessment are, and not limited to: portfolio, fieldwork report, drama-script and performance, poster presentation and project pitching, quiz, mid-term examination, and test.

Final assessment is carried out at the end of the semester in order to grade learner's performance. Feedback, in most cases, is optional for this kind of assessment. "Assessment of learning is potentially summative" when learners are asked to ascertain what they know in relation

to curriculum outcomes [4]. Hence, often times the final assessment is associated with the summative assessment. It mainly tests what the learners know at a specified point of time with regard to content standards. Example for the final assessment are, and not limited to final examination, final project exhibition, and poster presentation.

2.2 Conventional vs Alternative Assessment

Conventional, or traditional assessment is referred to as standardized testing to measure what skill or knowledge learners can perform with success within a restricted time period. The assessment typically includes traditional types of testing such as multiple-choices, short answer essays or constructed responses, matching, true-or-false, fill in the blank, and others [4]. The fundamental assumption is that all learners should learn the same thing and rely on rote memorization of facts and rewrite what has been told. Thus, the conventional assessment is generally instructor-centered and only focuses on certain subjects or topics that will be covered in the examinations.

Alternative assessment is in contrast with the conventional assessment. It refers to all types of assessments that measure the learner's ability and proficiency in performing complex tasks that are related to the intended learning outcomes [7]. Alternative assessment is a form of learner performance grading that allows for a more holistic approach to learner assessment [4,8]. Generally, alternative assessment (AA) promotes an integration of various written and performance measures. It relies on direct measures of target skills in a specific knowledge or skill-domain. The alternative assessment encourages divergent thinking in generating possible answers in order to enhance meaningful skills among the learners.

Alternative assessments can be categorized into authentic assessment and performance-based assessment. According to Mueller [10], authentic assessment is a form of assessment in which students are asked to carry out real world situations that show meaningful application of essential knowledge and skill. Usually, all the performance task will be evaluated using rubric. Performance based assessment is used to measure the students' ability to apply the skills and knowledge learned from a unit or units of study. Typically, the students use their higher-order thinking skills to create a product or complete a process as the task challenge. It requires more subjective judgement on part of the evaluator based on criteria and rubric development prior to students' assignment [11].

The alternative assessment is, in general, a holistic assessment of the outcomes as well as the learning processes. It is an assessment that emphasizes on what the learners can and are not able to do, rather than merely focusing on the mastery of knowledge. In addition, it is an assessment that supports the future-ready curriculum initiatives to produce dynamic, balance, and holistic graduates in various domains.

Table 1 indicates the differences between the conventional and alternative assessment.

Table 1
Conventional assessment versus alternative assessment

Conventional assessment	Alternative assessment
Usually depends on the forced choice and written measures	Promotes integration of various written and performance measures
Depends on the learner's learning proxy measures to represent target skills	Depends on the direct measures of target skill
Encourages memorization of correct answers	Encourages divergent thinking in generating possible answers
Aims to measure the acquisition of knowledge	Aims to enhance development of meaningful skills
A non-interactive performance	An interactive performance
Fosters extrinsic motivation	Fosters intrinsic motivation

2.3 Online Assessment

Online assessment involves the use of technology and modern devices incorporated in the teaching and learning to assess learners' performance and progress [7]. It uses digital technologies to create, distribute, assess, and to give feedback for any type of assessments such as formative and summative assessments. It can be used to assess the learners' performance individually as well as a group. This type of assessment encourages the learners to participate and collaborate in online learning and outside the classroom. Some examples of assessment tools that the instructor can use are Kahoot!, Quizizz, Socrative, YouTube, Wix, Edpuzzle, Microsoft Teams, Google Classroom, Padlet, Microsoft Form, Google Form, Flipgrid, Formative, Poll-Everywhere, Goggle, and Mentimeter.

The instructor can choose to conduct the online assessment as a synchronous and an asynchronous learning method and to provide immediate feedback to the learners at different places. Both instructor and learners would need a good internet access in order to implement the online assessment. Just like conventional assessments, the instructor should ensure that the online assessment given must be aligned with the course learning outcome, and appropriate to assess the skills. The instructor should also give an immediate feedback to the learners to ensure the whole assessment process is valid and fruitful.

3. Results
3.1 Alternative and Online Assessment

In the context of outcome-based education (OBE), there are three important considerations in designing alternative assessment, namely the constructive alignment, student's learning time (SLT), and development of rubrics [9].

3.1.1 Constructive alignment

Constructive alignment refers to the principles used to design teaching and learning activities as well as assessment tasks that relate directly to the desired learning outcomes achieved through nonconventional methods that cannot be attained from traditional lectures, tutorials, and examinations [12]. Through the mechanisms of constructive alignment in an academic programme, the assessments will be formed objectively, and the teaching and learning activities will yield a significant course learning outcome.

The purpose of the constructive alignment is to drive the process of designing the curriculum, delivery, and assessment at the program and course level and to adapt a teaching and learning practice that matches with the learner's academic experiences. In short, constructive alignment means that all assessment tasks, and learning and teaching experiences must be linked to the desired unit of course learning outcomes as shown in Figure 1. Example on how constructive alignment looks like in a course is shown in Table 2, while Table 3 is an example of how alternative assessments can be "mapped" to the same course learning outcomes as the originally-planned, conventional assessments. Instructors are recommended to use alternative assessment as it may also provide similar learning outcome achievement to as the conventional assessment. In addition, we provide some examples of online teaching and learning activities that can be used when a change from conventional to online assessment takes place, especially when assessment as learning is used in a course as shown in Table 4.
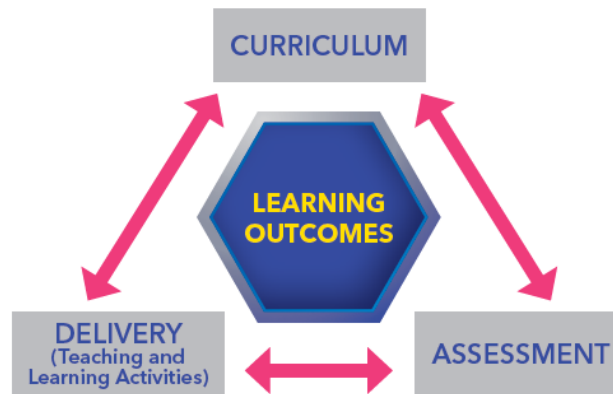
Fig. 1. Constructive alignment [18]

Table 2
Example of constructive alignment for a course: Universal Values

Course Learning Outcome	Assessment	Teaching and Learning Activities
Demonstrate social responsibilities towards community	Group Project	Team building activity with teenagers
Discuss problems related to ethics and humanities	Case Study Presentation	Case study discussion on a specific ethical issue in humanity
Describe the importance of universal values in religion	Short Video	Interview, Literature review study

Table 3
Example of constructive alignment change from conventional to alternative assessment in a course: Ethics and Legality in Counselling

Course Learning Outcome	Conventional Assessment	Alternative Assessment
Discuss theories and concepts in counselling ethics	Written examination	Learning reflections
Apply ethics and legal aspects in counselling process	Quiz	Case-based examination
Demonstrate knowledge of ethics and legal aspects in counselling process	Presentation	Oral examination

Table 4
Example of conventional face-to-face teaching and learning change to online teaching and learning activities

Teaching and Learning Delivery (T & L)	
F2F T & L	Examples of Online T &L
Lecture	• Pre-recorded lecture post in eLEAP (asynchronous) • Live online lecture using MS Teams or Zoom or Webex (synchronous)
Tutorial	• Live online tutorial using MS Teams or Zoom or Webex (synchronous)
Discussion	• Post solution in eLEAP and Q&A session using online forum (asynchronous) • Online forum in eLEAP (asynchronous)
Problem-Based Learning	• Collaborative digital content creation (synchronous OR asynchronous) • Chat (synchronous)
Case Study	• Collaborative digital content creation (synchronous OR asynchronous) • Discussion forum (asynchronous) • Mindmap (synchronous OR asynchronous)
Laboratory	• Virtual simulation (synchronous OR asynchronous) • Pre-recorded practical demonstration (asynchronous) • e-laboratory (synchronous OR asynchronous) • Simulation-based laboratory experiment (asynchronous)

Note: eLEAP is learning management system use for teaching and learning activity

3.1.2 Student learning time (SLT)

Student Learning Time is defined as time that students spend for total time spent on the implementation of learning teaching activities to achieve the intended learning outcome, involving three main components: guided learning time, non-guided learning time, and time allocated for assessment. The general guideline on SLT allocation and suggestion for self-learning time based on the guided learning time for common teaching and learning activities is depicted in Table 5. Meanwhile, Table 6 shows examples of converting SLT from face-to-face (F2F) assessment into online and/or alternative assessment. Generally, the calculation of SLT for learning activities and assessment should consider the following factors: (i) requirement/conditions of discipline/courses, (ii) complexity of the discipline/course or activity/assessment, and (iii) marks allocated for the assessment.

Table 5
Guidelines on SLT allocation and suggestion for self-learning time based on the guided learning time for common teaching and learning activities

Learning Teaching Activities	Description	Example
Guided learning	Face-to-face interaction (guided F2F), AND/OR	Lecture, tutorial, laboratory practical
	Non face-to-face learning time (guided NF2F)	Guided online learning activities
Independent learning (IL)	Self-learning time (non-guided/independent learning NF2F)	Preparation for assessment, revision
Assessment	Time spent for formal assessment	Continuous assessment, final assessment

Table 6
SLT conversion from face-to-face (F2F) to online and/or alternative assessment in a course: Analytical Chemistry 1

Assessment Module: Continuous Assessment
Initial Allocated Mark: 60%

Assessment Component	CLO	Teaching Methods	Mark (%)	F2F	NF2F	Total SLT	Remarks
F2F: Assignment	CLO 1 CLO 2	Lecture, tutorial	25	0	EL: 0 IL: 8	8	No SLT conversion from F2F to NF2F is required.
Option 1 (Online Assessment): Assignment	CLO 3			0	EL: 0 IL: 8		
Option 2 (Alternative Assessment): e-Portfolio				0	EL: 0 IL: 8		
F2F: Mid semester exam	CLO 1 CLO 2	Lecture, tutorial	30	2	EL: 0 IL: 6	8	SLT for F2F is replaced with NF2F (EL)
Option 1 (Online Assessment): Online mid-semester exam	CLO 3			0	EL: 2 IL: 6		EL can be used for instructor feedback
Option 2(Alternative Assessment): Case-based examination				0	EL: 2 IL: 6 OR EL: 0 IL: 8		
F2F: Quiz	CLO 3	Lecture, tutorial	5	1	EL: 0 IL: 2	3	SLT for F2F is replaced with NF2F (EL)

Option 1 (Online/Alternative Assessment): Quiz via eLeap/Kahoot/Clicker etc.			0	EL: 1 IL: 2		
Option 2 (Alternative Assessment): Chain Notes			0	EL: 1 IL: 2		
Subtotal			60		19	

Course Learning Outcomes (CLO):
CLO1: Infer analytical chemistry principles to solve problems associated with chemical analysis [C4]
CLO2: Relate the analytical chemistry principles to its application [A4]
CLO3: Select appropriate techniques in solving chemistry related problems [C4]

Assessment Module: Final Assessment
Initial Allocated Mark: 40%

Assessment Component	CLO	Teaching Methods	Mark (%)	F2F	NF2F	Total SLT	Remarks
F2F: Final Exam	CLO 1 CLO 2	Lecture, tutorial	40	3	EL: 0 IL: 8	11	
Option 1 (Online Assessment): Online Final Examination	CLO 3			0	EL: 3 IL: 8		Option 1: SLT for F2F is replaced with NF2F (EL)
Option 2(Alternative Assessment): Individual Project*[2]				0	EL: 0 IL: 11		Option 2: SLT for F2F is replaced with NF2F (IL)
Subtotal			40			11	

Note: EL: E-learning, IL: Independent Learning; NF2F: non-face-to-face

3.1.3 Developing rubrics

A rubric is an evaluation tool to measure and describe learner performance at various levels in relation. Rubrics can be used to examine whether the learners have achieved the learning outcomes. It should include descriptors that are specific, observable, and measurable and define expectations at each level of performance. Therefore, a well-designed rubric consists of clear definitions of each characteristic to be assessed for a given learning outcome, and clear descriptions of the different levels of achievement for each characteristic.

Basically, there are two types of rubrics, namely the holistic rubric and analytic rubric. A holistic rubric presents a description of each level of achievement and provides a single score based on an overall impression of a learner's performance on a task [13]. The advantages of the holistic rubrics are that they provide quick scoring and highlight an overview of learner achievement, and they are efficient for large group scoring. An analytic rubric, on the other hand, presents a description of each level of achievement for each criterion and provides a separate score for each criterion. The benefits of the analytic rubric are that they provide more detailed feedback on learner performance and generate scores that are more consistent across learners and raters. The analytic rubric is useful for identifying learner's strengths and weaknesses. Table 7 summarizes the steps that are recommended in creating a rubric.

Table 7
Steps in creating rubric

F2F T & L	Examples of Online T & L
Step 1	Review your course learning outcome and your assessment mapping
Step 2	Define the purpose and goals of your assignment in relation to the course learning outcome
Step 3	using online forum (asynchronous) Establish the criteria by identifying the performance dimensions associated with the course learning outcome
Step 4	Identify any appropriate scale for measuring each learner's performance on these dimensions (i.e.; whether you choose a holistic scale where it provides an overall evaluation or an analytic scale where it provides detailed description of each performance level
Step 5	Determine the range of performance levels by designing the rating scale. The number of performance levels may vary. Example; using a 3-point scale (e.g. Exceeds Expectation/Meet Expectation/Below Expectation), or 4-point scale (e.g. Outstanding/Good/ Average/Poor), or 5-point scale (e.g. Advanced/Proficient/Developing/Emerging/Beginning) or you can create any other descriptive labels and assign a number /score to those label
Step 6	Write descriptions for each level of the rating scale. These descriptions help the learners to understand your expectations and their performance in regard to those expectations. The descriptions should include observable and measurable behaviour and indicate the degree to which the standards are met. Use parallel language across the scale
Step 7	Pilot your rubric and test the rubric on samples of learner work
Step 8	Consider the effectiveness of your rubric and revise accordingly by asking feedback from your colleagues and learners. When you develop rubrics, it should promote shared expectations and grading practices which benefit faculty members and learners in the program

Note: eLEAP is learning management system use for teaching and learning activity

3.1.4 Validity and reliability of alternative assessment

Two important features of a good assessment are the validity and reliability of the instrument used to assess learners' knowledge and skills in any particular domains. Sullivan [14] defines validity and reliability in assessment as "validity refers to how accurately an assessment tool measures the intended outcome of interest". However, it is not an inherent property of the tool itself, but rather dependent on the specific purpose and interpretation of the assessment tool, as well as the particular settings and learners in which it is used.

On the other hand, reliability refers to the consistency and dependability of results produced by an assessment instrument when used in the same setting with the same type of subjects. In essence, reliability means that the same results will be obtained each time the assessment tool is used under the same conditions. It is important to note that reliability is a component of the overall assessment of validity.

Hence, these two processes are highly integrated through peer-to-peer vetting process. Note that the alternative assessments (for both continuous assessment and final examination) should have the same weightage and CLO as the originally-planned in the course plan. It is recommended that if there is an application to make changes to the weightage of continuous assessment and final examination which differs from the original course outline, then approval must be obtained from the Senate, for monitoring of good practices.

To ensure the validity and reliability of the alternative assessment, vetting or moderation should be implemented. The vetting committee at the faculty level must ensure that the assessment methods, questions and procedures are constructively aligned to the course learning outcomes and

meets the appropriate taxonomy level. The vetting procedures and approval must be administrated (either in the written or online forms) and must be kept confidential. The faculty's examination unit is fully responsible for keeping all questions, marking schemes, rubrics, and all vetting forms, accordingly.

At any circumstances when physical meeting is not allowed, the vetting committee can initiate an online vetting meeting, either synchronously or asynchronously. For the asynchronously online vetting meeting, all the transmission of all documents via email, or online must use password or by invitation to avoid any leakage of questions and answers. For the synchronous online vetting meeting, vetting or moderation can be conducted via MS-Team, Zoom, Skype, or Webex by making sure all invited members are in a secure and safe environment [19]. The discussion must be kept confidential and cannot be heard by people outside the room.

In summary, validity and reliability are meaningful measurements that should be taken into account when attempting to assess learner's progress and performance toward any learning outcome. An understanding of validity and reliability allows the instructors to make decisions that improve the learner's learning experiences—both academically and socially. Assessment, therefore, is a process to understand learning complexities through exploring a relationship between knowledge, skills, and social interaction [15,16].

3.1.5 Deterring plagiarism and cheating

In conventional setting of examination, candidates are required to comply with the academic ethics as stated in the academic quality manual or regulations of their respective institution. However, alternative assessment may involve take home examination. If take-home examination must be used, there are few measures that should be made by the course instructor to prevent plagiarism or cheating, such as (i) setting clear examination rules, (ii) limiting and tracking examination time, and (iii) plagiarism check. For online examination, the following suggestions can be taken into consideration by the instructor to avoid cheating among the candidates: (i) online identification, (ii) limiting examination time, (iii) limiting learner's access to resources, (iii) changing test characteristics, and (iv) usage of proctoring software.

Setting clear examination rules is important to ensure that both instructor and learners are clear about the rules for the take-home exam, including collaboration policies and what sources may be used. It is crucial for the instructor to explain reasons for the rules set so that the student can prepare and have clear view on the rules. It is also important to remind learners about the academic ethics and that any examination is an act of trust between the instructor and students as well as between them and their classmates.

Limiting and tracking exam time may also help in deterring plagiarism and cheating in take-home examination. Setting the time limits for the examination in such a way that it must be checked out and returned to limit cheating and help-seeking. In order to prevent plagiarism for any take-home assessment especially for essay-type or report assessment, instructor can use plagiarism check software such as Turnitin to check the similarity of the candidates' work. Instructor must ensure that the candidates are informed on the similarity (percentage) allowed in advanced. Candidates are required to fill in and submit the Declaration of Original Work form together with their work submission.

When an online examination is carried out for a course with a small number of candidates, online identification is one way to prevent cheating. The instructor can ask the candidates to turn on their webcam throughout the exam duration so that the instructor can monitor them. Among the example of online proctoring softwares are ProctorU, ProctorCam, Webassessor, BioSig-ID, and Securexam.

An online examination should also be scheduled for a specific date and time. If some of the candidates are from different time zone (huge time difference), prepare two sets of questions for two different sessions with similar learning outcomes. Instructor should conduct the exam not more than two sessions, with the first session for the main group in which majority of candidates can attend it, and the second session for the remaining candidates. The exam should close when the allotted period for work expires.

Limiting learner's access to resources can also be helpful to prevent cheating. Instructor may want to open the internet access to students for a limited time, for instance, 15 minutes. Candidates can work only one question at a time and cannot access completed questions. Another way of doing it is to ensure that candidates can access the online examination only one time.

Changing test characteristics for an online examination is another method which can be done by instructor. For example, the examination questions can be set up in a randomised (scrambled) sequence and answer choices. Instructor can also ensure that about one-third of the objective type of questions should be modified on each examination for every term. Another option is to conduct an open-book examination in which the question assesses higher-order thinking (HOT) and critical thinking skills. Candidates are required to analyse, synthesize, evaluate, and create their responses.

In addition to prevent cheating and academic dishonesty, proctoring system can be used during online examination with the help of a webcam, microphone, and access to the screen of the student [17]. There are a few types of proctoring such as live online proctoring, recorded proctoring, and advanced automated proctoring. The lecturer can choose which type of the proctoring system suitable for their online examination.

4. Conclusions

In conclusion, there are several factors that must be taken into consideration in implementing the alternative and online assessment in an outcome-based education (OBE) system - including the constructive alignment, student learning time, and development of assessment rubrics. The institution and instructors should also consider suitable methods for ensuring the validity and reliability of the alternative and online assessment, and deterring plagiarism and cheating.

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