

MAKING ASSESSMENT COUNT: USING EFFECTIVE ASSESSMENT PRACTICES TO REINFORCE TEACHING AND LEARNING ACTIVITIES

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ABSTRACT

This study will investigate how assessment works to frame student learning, and, more precisely, it will examine how effective assessment practices support and reinforce teaching and learning activities. Constructive alignment of teaching and learning activities and the assessment items within a teaching unit and, ultimately, a course can work to reinforce the ability of students to achieve superior assessment outcomes and, consequently, enhance student satisfaction with assessment. A high quality assessment framework will depend on these aforementioned characteristics coupled with timely, effective and formative feedback on continuous assessment. This study questions how students engage with their assessment in an interdisciplinary 2nd year level biochemistry teaching unit. A series of student surveys and focus group interviews were used to explore the quality, quantity and efficacy of the assessment framework. The outcomes from this study indicated that the teaching, learning and assessment activities within this teaching unit were effectively aligned, and this framework supported and developed student learning and understanding. Moreover, the evidence suggests that constructive alignment of teaching, learning and assessment motivates students to achieve quality outcomes with respect to grades through authentic assessment experiences, and leads towards improved and more effective learning environments.

KEYWORDS

Formative assessment, Summative assessment, Authentic assessment, Student learning, Authentic learning, Constructive alignment, Feedback, Engagement

BACKGROUND

A good teaching system aligns teaching method and assessment to the learning activities stated in the learning objectives, so that all aspects of this system are in accord in supporting appropriate student learning. This system is called constructive alignment based as it is on the twin principles of constructivism in learning and alignment in teaching. The application of constructivist teaching strategies promotes an authentic learning environment (Herrington & Herrington, 2006), which is motivational, student-centred, and real-world focussed. Furthermore, constructivist or authentic learning is transferable, in that students create organising principles that they can take with them to other learning settings. Biggs (Biggs & Tang, 2007) asserted that "in aligned teaching the assessment reinforces learning. Assessment is the senior partner in learning and teaching. Get it wrong and the rest collapses." Indeed, within the teaching and learning landscape, assessment is probably the component that causes the most anxiety for students, and most consternation for academics. It is possible for students to break away from poor teaching through their own hard work, but students will be trapped by the consequences of poor assessment (Boud, 2000; Boud & Falchikov, 2006).

Authentic assessment directly engages the student with functioning knowledge in its context. For authentic assessment, learning needs to efficiently integrate with the teaching activity and optimise the ability of students to perform and achieve (Herrington & Herrington, 2006). Accordingly, Boud (2000) has advanced that the more we engage students in effective and authentic, and even sustainable assessment activities that contribute to their learning, the more satisfying will be their higher education experiences. The design of effective assessment is a complex and challenging undertaking, since assessment serves multiple purposes (Harris *et al.*, 2007), which can be summarised by the following points:

- determination of students' preparedness for further study,
- grading and ranking of students, relative to one another, for the purposes of awards, competitive scholarships, entry to graduate programs etc.,
- giving feedback on student learning for both students and staff,
- providing feedback on teaching for staff,
- defining, maintaining and protecting academic standards,
- directing students' learning.

Generally, effective assessment within a unit of study in higher education will incorporate a mix of assessment types that are designed and selected to meet the demands highlighted above. In designing assessment tasks there are several considerations that are paramount. Clear assessment criteria or rubrics need to be established for each assessment task or for the intended learning outcomes that each assessment task is meant to address. Assessment is classified as being formative, summative or both, and this terminology is applied to the function that the assessment item serves (Biggs & Tang, 2007). Formative assessment works to provide feedback during learning and this formative feedback aims to enable improved performance on current or subsequent assessment tasks. Typically, the objective of formative assessment is the development of understanding or skills. An assessment task that is described as formative may be unmarked or marked and, hence, contribute to the overall grade in a unit of study. Summative assessment provides an index of how successfully the student has learned when the teaching activities have been completed. Assessment tasks are described as summative if they are awarded a mark or a grade and those marks or grades contribute to the overall grade for the unit of study. Importantly, many assessment tasks serve both formative and summative purposes (Biggs & Tang, 2007).

It is unequivocal that the literature acknowledges that assessment practices and implementation needs to be improved, but accumulated evidence suggests that feedback may be the worst aspect of assessment (Rust, 2007). To address these discrepancies and advance improvements a number of high-profile educational research projects have recently focused on the subject of improving the quality of assessment and feedback practice. These projects include the Formative Assessment in Science Teaching (FAST) project (<http://www.open.ac.uk/fast/>), the Re-engineering Assessment Practices (REAP) project, and the Assessment 2020 project (<http://www.iml.uts.edu.au/assessment-futures/>). Each of these projects has developed frameworks and sets of principles of effective assessment and feedback practice (see Gibbs & Simpson, 2004-5; Nicol, 2007; Boud & Associates, 2010). Overall, a synthesis of the assessment practice and reform recommendations emanating from these projects can be distilled down to three key focal points:

1. Assessment activities should be designed to focus students on the creation of productive learning opportunities.
2. Assessment practices need to engage and motivate both students and staff.
3. Feedback needs to actively and decisively support student learning.

This study aims to investigate how students engage with the assessment framework within a 2nd year interdisciplinary biochemistry teaching unit. Students were surveyed about their perceptions relating to assessment quality, assessment quantity, the quality, timeliness and efficacy of feedback on assessment, and the overall effectiveness of the assessment items in developing the students' ability to realise the stated intended learning outcomes for the teaching unit. It is hypothesised that the outcomes of this research will provide evidence of how assessment works to frame student learning, as well as providing evidence of how assessment can be changed to improve student learning.

METHODS

The research methods investigated and questioned student experiences with assessment through a series of surveys and focus group interviews.

The survey-based research instrument was modelled on an investigative tool developed by Gibbs & Simpson (2003), which was developed to examine how students' formative assessment experiences affect their learning. This survey (Assessment Experience Survey) was comprised of targeted questions on a 5-point Lickert scale, and the questions were subdivided into six sections that evaluate the amount and distribution of study effort, assignments and learning, quantity and timing of feedback, quality of feedback, what the student does with the feedback, and the examinations and learning. The assessment experience survey was completed by 83 students (total number of students enrolled in the teaching unit was 143) and this number represents 58% of the enrolled students.

The focus group interview involved a group of students (8-10) in an active and open-ended discussion which probed perceptions of their assessment experiences and the alignment of assessment with teaching activities and learning outcomes further. This focus group interview was conducted after the final lecture in the teaching unit.

RESULTS & DISCUSSION

The first part of the assessment experience survey investigated students' preferences between continuous and examination modes of assessment. The data (Table 1) overwhelmingly endorses the students' preferences for a continuous assessment framework spread across the study period in contrast to examinations, which in the case of this teaching unit were placed as a progress examination in the middle of the study period and a final exam at the conclusion of the study period. To compound these preferences, students strongly perceived (84.3%) that they achieve superior marks and grades in continuous assessment, and less than 5% of the surveyed students expressed that they achieve better marks in examinations.

Table 1. Outcomes from the Assessment Experience Survey Addressing Assessment Preferences (total number of surveys returned = 83).

Assessment Preference	% of Total Respondents
I prefer continuous assessment	78.3
I prefer examinations	3.6
I score better marks with continuous assessment	84.3
I score better marks in examination	3.6

In the second part of the survey students were questioned about their levels of confidence to achieve either passing grades or distinction grades within the unit. The students were asked to reflect on their levels of confidence at the commencement of study period, and then indicate their levels of confidence at the time of the survey in the final week of semester. At this point of the study period the students had completed 55% of the assessment and the only remaining assessment item was the final examination (45%). Student responses were estimated using a 5-point Lickert scale in which a score of 5 is strongly confident and a score of 1 is strongly unsure. The results (Table 2) revealed that the level of student confidence markedly increases between the commencement of the study period and the final week of semester. At the start of the semester the level of confidence to pass the unit is only moderately positive (mean score = 3.6), however this confidence level is reinforced by the teaching, learning and assessment activities, so that at the end of the teaching period the mean score increased to 4.3. Similarly, at the commencement of the study period, the level of confidence to excel (achieve a grade of 6 or 7, where a 6 grade = 75-84% and a 7 grade = >85%) in the assessment activities embedded in the unit were neutral (mean score = 2.9), however at the conclusion of the teaching period, when students had completed 55% of the assessment, the level of confidence to excel had increased (mean score = 3.4). Importantly though, this increase in confidence level is not striking, suggesting that students gain a strong level of confidence in their ability to pass, but do not become overconfident in their ability to achieve distinction (6 or 7) grades. Essentially, these observations contrast to the actual results that the student cohort achieves in this unit, since 50.4% of the students achieved grades of either 6 or 7, 35.7% of the students achieved a grade of 5 (65-74%), and 10.5% of the students achieved a passing grade of 4 (50-64%), and only 3.5 % of the students actually scored less than 50% and failed the unit.

In the third part of the assessment experience survey students were asked to complete a set of 36 targeted questions subdivided into 6 sections. The survey asked students to respond to these statements by indicating their level of agreement or disagreement, which were measured using 5-point Lickert scales. The questions were developed as an evaluation tool by the Formative Assessment in Science Teaching (FAST) project (<http://www.open.ac.uk/fast/>). The six sections evaluate the amount and distribution of study effort, assignments and learning, quantity and timing of feedback, quality of feedback, what the student does with the feedback, and the examinations and learning. Moreover, the survey can be used by academics to quickly monitor evidence about the extent to which students' experiences of assessment and feedback meet the conditions under which assessment best supports their learning.

Table 2. Prognostic levels of confidence to achieve grade outcomes from the unit.

Student responses were determined from a 5-point Lickert scale and presented as mean scores (n = 83). A score of 5 means strongly confident, a score of 3 is neutral, and a score of 1 means strongly unsure.

Statement	Mean Score (max. score = 5)
Reflect back to week 1-2 of semester. Indicate the level of confidence you had in your ability to pass this unit.	3.6
Indicate the <u>current (end of semester) level of confidence</u> you have in your ability to pass this unit.	4.3
Reflect back to week 1-2 of semester. Indicate the level of confidence you had in your ability to excel (score a grade of 6 or 7) in this unit.	2.9
Indicate the <u>current (end of semester) level of confidence</u> you have in your ability to excel (score a grade of 6 or 7) in this unit.	3.4

The first section evaluated the amount and distribution of study effort. The responses indicated that students disagreed with the statements *'I do the same amount of study each week, regardless of whether an assignment is due or not'* and *'In this unit, it is possible to do quite well without studying much'*, but conversely agreed with the statement *'In weeks when the assignments are due I put in many more hours'*. These responses were in line with expectations, and indicated that students do need to apply themselves to achieve creditable outcomes in assessment items.

The second section addressed assignments and learning and the responses confirmed that students agreed that *'Tackling the assignments really makes me think'*, *'I learn more from the doing the assignments than from studying the unit learning materials'* and *'The assignments give very clear instructions about what you are expected to do'*, but disagreed with the statement that *'When I tackle an assignment it is not clear what would count as a successful answer'*. Importantly, these responses indicated that students have to apply higher-level cognitive learning skills to the assessment associated with this unit, and that the alignment of their learning activities, in all likelihood, contributes to development of their knowledge and skills acquisition in this subject area.

In the third section students were asked to respond to statements about the quantity and timing of feedback. The results showed that students agreed that *'In this unit I get plenty of feedback on how I am going'* and *'The feedback comes back very quickly'*, and disagreed with the statement *'Whatever feedback I get comes too late to be useful'*. These reactions emphasise that feedback on assessment is appropriate, timely and effective. As a consequence, it is proposed that students will be able to productively use feedback in this unit to develop their learning and improve their understanding.

The fourth section ties in closely with the previous section and focuses on the quality of feedback. The students agreed that *'The feedback shows me how to do better next time'* and disagreed with the statement *'I can seldom see from the feedback what I need to do to improve'*. These outcomes reinforce the proposal that feedback in this unit was appropriate, timely and effective, and clarified that students productively use the feedback to support their learning and ability to improve in future assessment tasks.

The fifth section addressed issues related to how the students utilise the feedback. Students agreed with the statement *'I read the feedback carefully and try to understand what the feedback is saying'* and disagreed with the statements *'The feedback does not help me with any subsequent assignments'* and *'I tend only to read the marks'*. These findings again reinforced the outcomes from section four regarding feedback and the way in which feedback is used in this unit. In addition, these findings suggest that the teaching activities are constructively aligned with the learning activities in this unit, so that students are focussed on demonstrating the intended learning outcomes (Biggs & Tang, 2007).

In the final section the survey attempted to explore students' perceptions about the examination and their learning. The results indicated that students agreed with the statements *'I learnt new things while preparing for the exam'* and *'I understand things better as a result of the exam'* and disagreed that *'In the exam you can get away with not understanding and still get good marks'*. These responses suggest that the examinations may indeed reinforce and build learning and knowledge acquisition, and indicate that superior levels of achievement in the examinations depends on a

deep-learning approach and application of advanced cognitive skills, which may be central to success in biochemistry since it is a conceptually demanding subject area. However, it should be pointed out that the student responses and perceptions in this section may be limited by the fact that at the time of the survey students had only completed a progress multiple choice question examination (worth 15%) in the middle of the study period; the final examination (worth 45%) had not taken place at the time of this survey.

The assessment experiences of students were further explored by gathering a small group of students (8-10) together to discuss assessment, feedback and learning. The objective of the focus group was to investigate student observations and perceptions of how assessment and feedback integrate with the teaching and learning framework within the unit. The focus group was presented with 8 broad questions and the discussion lasted approximately 1 hour. The proceedings in the focus group were recorded using an MP3 recorder, transcribed and subjected to further review and analysis. The results from the focus group are presented in Table 3 as a summary of key words, descriptive phrases and comments given by the participants. Importantly, this data agreed strongly with the Assessment Experience Survey and persuasively demonstrates that students feel that the teaching and learning activities are aligned with the assessment activities and that feedback on assessment is appropriate and effective and given promptly, so that the feedback is authentic, can be acted on and used to improve future performance in assessment. Overall, it is satisfying to observe that students notice clarity in instruction and guidance within the teaching and learning activities, enjoy the assessment activities and find that these activities motivate and encourage confidence and the ability to excel. In addition, few comments were advanced about non-enjoyable aspects relating to assessment, and proposed improvements to the learning and assessment activities were largely focused on tutorial-based sessions to deliver assessment feedback.

In conclusion, I believe that this study provides a set of compelling and instructive outcomes demonstrating that the alignment of teaching, learning and assessment assists with the development of student learning and understanding, motivates students to achieve quality outcomes with respect to grades through authentic assessment experiences, and provides coherent benefit for students through a set of productive and enjoyable learning experiences as they proceed along an educational pathway that effectively facilitates their acquisition of conceptual knowledge and development of practical competencies and skills.

Table 3. Analysis of assessment experience focus group interview.

The outcomes from the focus group questions are presented as a summary of key words and phrases used by the students to answer the questions.

Focus Group Questions	Summary of responses presented as sets of key words, descriptive phrases and brief comments
Generally, in what way does your learning (with respect to your course) benefit the most from assessment in your units/ course?	<ul style="list-style-type: none"> • Comprehensive and clear instruction • Deep learning encourages information retention • Continuous assessment reinforces learning material • Multiple lower-risk assessment items reduces stress • Multiple assessment items and prompt feedback keeps progress on track
How did the assessment in this unit help you to achieve the learning objectives of this unit?	<ul style="list-style-type: none"> • Practicing basics • Multiple items of continuous assessment • Development of practical writing skills and clearly detailed criteria referenced assessment
How has the assessment integrated or aligned the conceptual theory and practicals to the intended learning outcomes.	<ul style="list-style-type: none"> • Strong reinforcement between practical and theory. • Added benefit comes from clear links to other study areas in course.
What did you enjoy most about the assessment?	<ul style="list-style-type: none"> • Assessment is enjoyable when good marks can be achieved. • Good assessment outcomes motivate and encourage, reinforces and builds confidence. • High levels of organisation in unit coordination.
What did you enjoy least about the assessment?	<ul style="list-style-type: none"> • Repetition in assessment can become tedious. • Deep learning takes too much time.
What improvements could be made to the assessment?	<ul style="list-style-type: none"> • Tutorials for assessment feedback and integration of learning and knowledge development
How did feedback assist with your learning and improvement of future performance?	<ul style="list-style-type: none"> • Assessment marked quickly. • Feedback given promptly • Sufficient and appropriate feedback to reinforce and improve future performance in assessment. • Feedback reinforced learning and development of knowledge.
How has the assessment structure assisted your progress and achievement in this unit?	<ul style="list-style-type: none"> • Assessment positively reinforces learning • Builds confidence and competency to pass the unit • Limits intimidation and stress of the subject. • Excellent learning management system support resources.

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