

Literature Overview on Summative Quizzes and Continuous Assessment

Using summative online assignments as part of your assessment

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Continuous Assessment

Hernández (2012) presented a literature review that outlines the distinction between assessment (“about grading and reporting student achievements and about supporting students in their learning”) and feedback: and how continuous assessment generally combines both formative and summative functions: and confusion in definitions of these two forms of assessment were investigated by who suggested that lecturers are “more conversant with good practice than with producing accurate definitions”(Taras 2008). The key difference between summative and formative assessment is not when they are used but their *purpose*, and the *effect* that these practices have on students’ learning. Assessment tasks that provide feedback that students learn from, and provide part of the grade would meet both definitions. The learning-oriented assessment approaches assessment in ways to encourage and support students’ learning. Carless (2007) argues that students’ learning is supported by setting appropriate tasks to assess students’ learning, focusing on the learning process and providing effective feedback, and promoting students’ autonomy and responsibility for monitoring and managing their own learning. The focus, now, is on effective - and timely - feedback to support students’ learning: and how eLearning techniques can facilitate this for lecturers - in this case in the context of a very large undergraduate first year cohort. Brown (1999) suggests effective feedback requires:

1. A clear statement of what will be assessed
2. A judgement of the students’ work
3. A provision of feedback that should help to address the gap between what they know and what’s expected of them – this description of advice and support to improve learning may be missing or mistimed: best described by the term feed-forward: how learners respond to feedback.

Definitions of feedback (JISC)

“Feedback provides information to learners about where they are in relation to their learning goals. This enables them to evaluate their progress, identify gaps or misconceptions in their knowledge and take remedial action. Generated by tutors, peers, mentors, supervisors, a computer, or as a result of self-assessment, feedback is a vital component of effective learning

Feed forward is equally important to learners’ progress. While feedback focuses on current performance (and may simply justify the grade awarded), feed forward looks ahead to the next assignment. Feed forward offers constructive guidance on how to improve. A combination of feedback and feed forward ensures that assessment has an effective developmental impact on learning (provided the student has the opportunity and support to develop their own evaluative skills in order to use the feedback effectively)” Source: [JISC](#)

A JISC study of the assessment and feedback landscape (Ferrell 2012) found that amongst other aspects:

- the academic structure of degrees (12 week “semesterised” modules), contributes to assessment of learning and diminishes opportunities for assessment for learning;
- there continues to be heavy reliance on traditional types of assessment such as essays and examinations in some disciplines
- lack of sequencing different varieties of assessment, timing of feedback in relation to the next task, and a culture of ‘ticking off’ modules all prevent feedback from feeding forward

Relevant to BBD Quizzes: Timeliness of feedback in relation to informing future assignments (i.e. longitudinal development): ‘Some of my modules, especially at stage three and PGT, are *assessed by only one piece of assessment, in line with widespread practice in the School. Therefore, my feedback on those pieces obviously does not reach students in time to be used for future assessment on this module.*’

Some methods to close the feedback loop are described here:

<https://www.jisc.ac.uk/guides/feedback-and-feed-forward>. Basic methods that we can use right now are:

- Promotion of Discussion Board on individual issues resulting from the assessment
- Second attempt at quiz
- Retesting elements in a different context (as part of the final, high stakes, exam)

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JISC Project on assessment design: relevant to continuous assessment

<http://jiscdesignstudio.pbworks.com/w/page/12458419/ESCAPE%20Project>

Effecting Sustainable Change in Assessment Practice and Experience

See also: <https://www.heacademy.ac.uk/blog/re-assessing-innovative-assessment>

Gaytan and McEwen (2007) investigated online assessment strategies, suggesting they should “include having a wide variety of clearly explained assignments on a regular basis and providing **meaningful and timely feedback** to students regarding the quality of their work. Effective assessment techniques include projects, portfolios, self-assessments, peer evaluations, and **weekly assignments with immediate feedback**. The **role of meaningful feedback cannot be overemphasized**”.

Russell, Elton et al. (2006) present a critical review of summative assessment neglecting formative aspects: “It is possible for an assessment to have both formative and summative aspects (as in some forms of coursework assessment), but when the summative aspects are dominant (as is the case in most examinations), formative aspects frequently get neglected. Although there is increasing recognition of the limitations of summative assessment, to the point that some have argued summative assessment practices in higher education are in a state of ‘disarray’ (Knight, 2002), and there is strong evidence of the value of formative assessment (Gibbs & Simpson, 2004), summative assessment—at least in the UK—continues to be the focus of most resources in higher education.” They also emphasise the importance of continuous assessment because it allows instructors to become familiar with students' work and to ensure student understanding

Feedback and Cognitive load: Experts v Beginners

Halabi (2006) applied the cognitive load theories of Sweller, van Merriënboer et al. (1998) to test various hypotheses relating to the quality of feedback. The impact of providing *basic feedback* (a simple “correct or incorrect” announcement, ie: *verification*) and *rich feedback* (including *elaboration* – cues to guide the learner toward the correct answer – in addition to verification). In the context of cognitive load theory, the results showed that the rich feedback was significantly more useful for students with no prior knowledge, and that there was no significant difference between the rich and basic feedback for students with a prior knowledge.

Other examples of research into quality of feedback:

The effect of providing multiple-try feedback on later success in solving similar maths problems (Attali 2015). Participants solved mathematics problems presented as either multiple-choice or open-ended questions, and were provided with one of four types of feedback:

1. No feedback (NF),
2. Immediate knowledge of the correct response (KCR),
3. Multiple-try feedback with knowledge of the correct response (MTC), or
4. Multiple-try feedback with hints after an initial incorrect response (MTH).

Results: Solving open-ended problems resulted in larger transfer than multiple-choice. No feedback showed similar transfer effect as “correct response”. Multiple try feedback showed larger transfer effect than single try feedback. Hint feedback showed largest transfer effect.

Attali and van der Kleij (2017) compared effects of feedback elaboration and timing in mathematics practice tests, focusing on learner performance on pairs of isomorphic items embedded in tests: elaborated feedback was more effective only for *incorrect* first responses, and immediate feedback was more effective than delayed. For correct first responses, delayed feedback was more effective than immediate.

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Question Design

Farrell and Rushby (2016) touches on reliability of MCQs in pages 109-110:

“They offer an **objectivity** that is difficult to achieve with the scoring of short answer or essay questions. Because learners can answer the questions more quickly, the number of questions and the **coverage of the curriculum can be increased**. This has the **effect of increasing the reliability and validity of the assessment**”

Comments on discrimination: “An effective MCQ will always be answered correctly by those who know the subject material, and incorrectly by those who do not and **will therefore discriminate between them effectively.**”

Common problems include stems that are ambiguous, and alternative responses where the correct choice is obvious. This leads to candidate strategies for answering MCQs that include eliminating alternatives that are clearly incorrect or that are overlong, and then guessing the correct answer from the remainder.

Use of Analytics: Fortunately, the technology that is used to mark the questions can facilitate the analysis of the performance of the overall assessment as well as producing individual scores and rankings. By looking at how individuals answered each question, it is possible to determine whether some of the distractors (incorrect responses) are so unattractive that no one chose them. A disproportionate number of individuals choosing one specific distractor may indicate a systematic misunderstanding that could be attributable to a problem with the learning materials. If a question is repeatedly answered incorrectly by individuals who otherwise have high scores in the whole test, then we can infer that it is ambiguous.

However, the skills required to design good MCQs were not made redundant by the technology. **A poor MCQ remains a poor MCQ** whether it is administered on paper and marked by hand, or delivered and marked on a computer!

Some sources for how to design questions for quizzes, and aspects of accessibility:

http://www.caacentre.ac.uk/resources/objective_tests/index.shtml - excellent resource - the basis for the slides on MCQ design at this presentation

<https://www.jisc.ac.uk/guides/making-assessments-accessible>

Guide on how to use Blackboard's analytics on your online test questions:

https://help.blackboard.com/Learn/Instructor/Tests_Pools_Surveys/Item_Analysis

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Research into quizzes in various disciplines:

Accounting and Finance education:

Marriott and Lau (2008) produced a qualitative study on a series of online summative assessments introduced into a first-year financial accounting course. Student feedback (an evaluative survey and focus group interviews) suggested that students perceived a beneficial impact on learning, motivation, and engagement.

Fuertes, Noguer et al. (2015) combined online quizzes and midterm face-to-face exams with a traditional final exam, and investigated the effect of online quizzes on the academic performance compared to midterm exams. Online quiz performance was positively and significantly related to final exam, although the marginal effect is lower than that of the performance in the midterm face-to-face exams. This relation is found only in the group of students who pass the final exam, and in the parts of the exam that contain identical type of questions to online quizzes. Interestingly, the results of a survey reveal that students perceive the online quizzes as the element of the course that enhances most to their learning.

The "individualised accounting questions" (IAQ) technique described by Nnadi and Rosser (2014) enables tutors to set individualised accounting questions and construct an answer grid that can be used for any number of students, with numerical values for each student's answers based on their student enrolment number. The individualised questions reduce the risk of collusion and thus allow tutors to set accounting coursework assessments that contribute to final grades in a manner that incentivises students to do them in their own time, drawing on teaching materials and helping them to develop competency. The method also allows specific individualised feedback, and has been used successfully by the authors and found to encourage students to work independently.

Einig (2013) reviewed the impact of online MCQs on students' learning in an undergraduate Accounting module at Oxford Brookes, analysing how students use MCQs, students' perceptions via questionnaire, and investigated the correlation between MCQ usage and final exam performance. Students used the MCQs in different ways, indicating suitability for different learning styles. MCQs were perceived as useful by virtually all students, and a statistically significant correlation was found between regular MCQ usage and higher examination performance while controlling for a number of other confounding variables (past subject experience, gender, nationality), although being aware of the limitations of self-selection. Kibble (2007) found a statistically significant performance improvement for students using optional MCQs, but this effect disappeared when significant incentives were offered and nearly all students completed them.

Where MCQs were used as compulsory assessment, research suggests improved performance in the final examination for the whole group when compared to:

- the previous year's grade results:
 - psychology: Buchanan (2000)
 - geography: Charman (1998)
- a parallel control group:
 - mathematics: McSweeney and Weiss (2003)
 - natural sciences: Klecker (2007)

Such studies remove self-selection bias, but in comparing different student groups, they create alternative biases (e.g. cohort ability, or changes in delivery or staff) that should be considered.

Nursing:

Brady (2005) examined the importance of setting multiple-choice questions (MCQ's) that are consistent with outcomes in nursing education, to effectively assess aspects of student performance and can facilitate timely feedback and contribute to the process of self-learning. Appropriately constructed MCQs should be efficient, objective, capable of discrimination and able to be combined with other assessment strategies to contribute to a comprehensive student assessment strategy.

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Economics

Self (2013) examined how incorporating an online learning tool affected student outcome (test grade) in a traditionally taught Principles of Macroeconomics class. Student effort was measured using participation in online learning. Doing online homework assignments is seen as mandatory effort while accessing a website to voluntarily practice non-grade-bearing problems is seen as voluntary effort. The results show that doing well on online homework assignments does not impact test grades. On the other hand students that voluntarily access the website to practice on additional problems are found to do better on tests. While the results imply that increased effort is linked with better outcome it does not definitely show that adding the online component made a significant difference to student outcome.

Rhodes and Sarbaum (2013) considered student behaviour under single and dual attempt homework settings using an online homework management system, to see whether multiple attempts lead to more effort and improved performance, and whether less desirable behaviours may potentially be incentivized. They found that multiple attempts leads to "gaming" behaviour leading to grade inflation, potentially demotivating students in their final exam. However: a student would receive information on their score and an indication of which questions they specifically missed, then re-take the same assignment in full with each question appearing one at a time in exactly the same order. The randomisation of pooled questions would mitigate the risk of "gaming".

Domenech, Blazquez et al. (2015) Concluded that frequent testing provides opportunities for students to receive regular feedback and to increase their motivation. It also provides the instructor with valuable information on how course progresses, thus making it possible to solve the problems encountered before it is too late. Frequent tests with noncumulative contents have been widely analysed in the literature with inconclusive results. However, cumulative testing methods have hardly been reported in higher education courses. This paper analyses the effect of applying an assessment method based on frequent and cumulative tests on student performance. Our results show that, when applied to a microeconomics course, students who were assessed by a frequent, cumulative testing approach largely outperformed those assessed with a single final exam.

Engineering

Rho and Masson (2013) compared students in three courses, one where written homework was submitted, another online, and a third without an online homework system. Each used the same final exam for direct comparison. A concept analysis was run using Concept Assessment Tool for Statics (Steif, 2010). Students using the online system showed an improvement of 0.7 (± 0.2) in effect size on the final exam when compared to written homework. Students who used the online system scored 79 percent (SD= 8 percent; N= 69) on average on the final exam. In comparison, students prepared via written homework scored 70 percent (SD= 16 percent; N= 64) on average on the same final exam. These results held for the subsequent mechanics course where students previously prepared via online statics homework scored 79 percent (SD= 8 percent; N= 66), and students prepared via written homework scored 63 percent (SD= 18 percent; N= 79) on the same final. Furthermore, an independent instructor taught the mechanics course from the statics course, removing potential bias. Results were statistically significant. Independent of the historical analysis, another analysis was run on students in the online homework statics course. Students were given pre / post tests to measure understanding on nine concepts, with friction being the only topic yielding an inadequate learning gain (difficulty change of friction 0.04 ± 0.28). In conclusion, the online homework intervention showed an improvement of 0.7 effect size when all other elements in the course remained unchanged.

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