Changing teaching through formative assessment: A Review

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Abstract

The existence of a plethora of empirical evidence documenting the improvement of educational outcomes through the use of formative assessment is conventional wisdom within education. In reality, a limited body of scientifically based empirical evidence exists to support that formative assessment directly contributes to positive educational outcomes. The use of formative assessments, or other diagnostic efforts within classrooms, provides information that should help facilitate improved pedagogical practices and instructional outcomes. However, a review of the formative assessment literature revealed that there is no agreed upon lexicon with regard to formative assessment and suspect methodological approaches in the efforts to demonstrate positive effects that could be attributed to formative assessments. Thus, the purpose of this article was two-fold. First, the authors set out to clarify the terminology related to formative assessment and its usage. Finally, the article provides a critical analysis of the seminal literature on formative assessment.

Key words : Formative assessment, teaching and research practice, summative assessment

Introduction

One of the most salient factors of recent changes in postgraduate assessment is probably the shift of emphasis from summative assessment in the form of certifying exams at the end of training towards formative assessment, aiming at steering and fostering trainee learning over the training period[1]. Driving forces behind this shift are the fragmentation of postgraduate training that it is the result of reduced working hours, increase part-time staff and subspecialisation[2] together with increased pressures for certification and professional regulation.[3] These changes have led to an appeal for more efficient postgraduate training and for transparent, credible assessment. Consequentially, the role of purely summative assessment, or assessment of learning, at the end of the training period is waning, and formative assessment, or assessment directed at steering and fostering learning of the trainee, is gaining ground, resulting in formative assessment being currently implemented in many postgraduate training curricula worldwide.[4] Though fairly new to medical training[5], a growing body of evidence on the validity and the reliability of formative assessment instruments is emerging.[6] However, whereas in summative assessment validity and reliability are seen as dominant determinants of utility, in formative assessment, utility, defined as learning that results from the assessment process, is much more dependent on how stakeholders (trainees and clinical supervisors) employ the instrument in practice.[7] So far, few to none studies have addressed the issue of the effect of formative assessment on doctors learning and performance.[8] Moreover, it is becoming increasingly clear that, even though formative assessment is theoretically well suited to postgraduate medical training, engaging both trainees and supervisors in meaningful formative assessment is quite complex.[9]

Aim of the review

The main aim of the review was to produce an information resource for assisting faculty members in their teaching and research practice. In this instance the review was conducted to determine how formative assessment is currently used in higher education to inform staff about practices in providing formative assessment to students. The literature review was guided by the following 4 questions:

1.   What is formative assessment?

2.   What is the difference between formative assessment and summative assessment?

3.   What is the difference between formative assessment and feedback?

4.   What is the range of formative assessment practices and models available in educational literature?

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Methodology

The literature search for the review was conducted using mainly standard procedures for a systematic search. This involved selecting suitable sources of data, and formulating search and inclusion/exclusion criteria to identify potential publications. These publications would then be included in the review.

Sources of data

Due to time constraints only an electronic search was carried out. Hand searching was not undertaken. Sources of data were the Google search engine, the HEA Academy website, and a number of academic electronic databases.

Search and inclusion/exclusion criteria

To avoid a large number of "hits" usually generated from a search, the search criteria was limited to key terms and to year of publication. The search terms used were: "formative Assessment" & "Higher Education"

The search was also limited by date (1998-2007). The rationale for this was due to a comprehensive review paper by Black & Wiliam[10] identified in a preliminary Google search. The work focuses on formative assessment in the wider educational system, from primary school to university, but was felt to be directly relevant to this review and a good baseline to work from.

Results

The initial search generated over 150 hits. After screening abstracts and/or fulltexts, the number of publications for inclusion in this review was reduced to 23.

What is formative assessment?

Formative assessment is seen by Black & Wiliam as at the heart of effective teaching - an essential feature for good teaching as well as efficient learning. It is a form of assessment to help students develop as learners and teachers develop as teachers to both produce effective learning. In their seminal review paper, Black & Wiliam[10] provide a commonly used definition of formative assessment as: "encompassing all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged".

The central role of formative assessment in teaching and learning in Higher Education is also espoused by Juwah et al [11]. As a process for providing information to teachers about the difficulties students may be experiencing so they can refocus their teaching efforts, the authors argue that formative assessment "should be an integral part of teaching and learning in HE".[11]

They also argue that feedback and 'feed-forward' (i.e. focusing on solutions rather than mistakes and how to tackle future assigned tasks) as central tenets of formative assessment should be "systematically embedded in curriculum practices". Feedback on performance would enable the student to "restructure their understanding/skills to build more powerful ideas and capabilities".[11]

Juwah et al (2004) also explain that formative assessment can be carried out by peers as well as teachers, a point made by Yorke [12] who adds that formative assessment can be provided formally or informally. (Table-I)

Where the student is acting self-critically, Yorke believes that formal formative assessment is a more complex construct than it might appear[12]. In his paper, Yorke cites his earlier book by arguing that formal formative assessment is a "complex system of signaling between academics and students, in which there is plenty of scope for misinterpretation".[13]

Table-I: Formally and informal formative assessment

Feedback	Formal	Informal
From teachers	Probably the main approach in HE; feedback from computerised packages might be included here.	Where circumstances permit, such as in a studio or laboratory; or during fieldwork.
From peers	For example, via peer assessment activities.	Perhaps over coffee or a stronger beverage.
From others	This can be problematic if the "other" is also a mentor or supervisor, as might be the case during work experience.	Probably the main approach in work-based learning contexts
From self	Only if it is an assessment requirement – in some assessment regimes it is.	Where the student is acting self-critically.

Stage signaling system

Stage 1: The assessment task and criteria are specified by the tutor, who takes into account the structure of the subject discipline, the programme specification, and the point in the programme that the students are expected to have reached.

Stage 2: The task is interpreted by the student in the light of the stated assessment criteria. The interpretation is influenced by the student's general intellectual development and also the beliefs that they hold about their capability.

Stage 3: The student undertakes the task.

Stage 4: The student's performance is graded by the tutor with reference to the stated criteria. The grade is ideally accompanied by comments on the performance and on how improvements might be made.

Stage 5: The feedback is received by the student and interpreted. The student (again, ideally) learns from the feedback, and hence develops. In addition, the tutor/assessor may gain an appreciation of how the students have responded to the task, and can make inferences about the effectiveness of their teaching. This could lead to revision of the assigned task and possibly to their teaching approach.

What is the difference between formative assessment and summative assessment?

Useful, but perhaps extreme, examples of formative and summative assessment is given by Gibbs & Simpson[14] in their conceptual overview of how assessment influences student learning. They describe an "archetypal" method of formative assessment at Oxford and Cambridge Universities, where both institutions provided detailed personalised feedback on assignments. Students were required to write a weekly essay and read it out in a one-to-one tutorial to the tutor who then gave immediate and detailed oral feedback. This was also often the only teaching some students experienced in which teaching meant feedback on essay writing. On the other hand, summative assessment was a consisted of final examinations at the end of three years study. In his conference paper, Crooks [15] offers this brief explanation of distinguishing between summative and formative assessment: "Summative assessment is intended to summarise student attainment at a particular time, whereas formative assessment is intended to promote further improvement of student attainment".

Although the distinction between both assessment practices appears quite straight forward, Taras argues in her theoretical paper that the line between summative and formative assessment isn't so clear. Taras [16] believes that "formative assessment is in fact summative assessment plus feedback which is used by the learner" Her discussion on the relationship between formative and summative assessment (rather than the distinction) provides a useful discourse on how the perceived differences between the two can lead to tensions in the assessment process. She argues that they should not be viewed as separate processes (and functions) as this would create a dichotomy, and in fact this separation has been "self-destructive and self-defeating".[16]

Taras also comments on the concern that formative assessment means additional work for teachers as they have to provide both a 'summative function' and a 'formative function'. She counters this with the observation: "Therefore, perhaps the most useful consequence of clarifying the relationship between SA and FA, as stated in this paper, is that teachers are no longer required to duplicate an assessment process in order to obtain the information required for both SA and FA. Most SA for formal assessment purposes requires feedback; therefore the only real requirement in order to integrate FA into practice is to engage the learners with using this feedback for learning in future work".[16]

What is the difference between formative assessment and feedback?

It would seem clear from previous references to feedback in this review, that rather than being separate processes formative assessment and feedback are interlinked. Feedback should be a process to aid learning by generating information beneficial to students, but for assessment to be formative the information generated by the feedback has to be used.[10] This indicates that feedback itself is central to formative assessment. Black & Wiliam define feedback as: "…any information that is provided to the performer of any action about that performance".[10]

When feedback is used in formative assessment, it can be called 'formative feedback'. This then places emphasis on the recipient's role in processing the feedback and then *using* it constructively. This point is raised by Taras[16] when she quotes a definition of feedback by Ramasprasad (1983): "Feedback is information about the gap between the actual level and the reference level of a system parameter which is used to alter the gap in some way".[17]

Rushton [18] provides a short but thought provoking narrative on the pedagogical implications of formative assessment for deep learning, and in doing so discusses the centrality of feedback to formative assessment. She supports her argument by referring to a synthesis of meta-analyses of student learning that found feedback produces "the most powerful single effect on achievement"

Rushton also takes a broader view of feedback than Black & Wiliam's [10] "narrow" definition, particularly when it comes to enhancing learning. Referring to further work by Hattie[19], Rushton considers that the duality of feedback, i.e. the teacher *provides* feedback and the student *receives* feedback [19], necessarily means the active involvement of the teacher and the student. This in turn is dependent upon each individual's capacity to provide or receive.

According to Sadler[20], there are three conditions that must be satisfied for students to benefit from feedback. These are:

1.   Possessing a concept of the goal/standard or reference level being aimed at;

2.   Comparing the actual (or current) level of performance with that goal or standard;

3.   Engaging in appropriate action which leads to some closure of the gap.[11]

What formative assessment models and practices are available in educational literature?

As mentioned in the introduction, this review is not a critical appraisal of the literature on formative assessment and does not therefore examine the evidence base for its effectiveness. Subsequently, this section on formative

assessment and/or feedback models, principles and practices describes theoretical constructs and/or practical strategies that may or may not have been examined empirically. The section begins by presenting a number of contemporary models and principles, and then goes on to describe a range of formative assessment and feedback strategies currently being practiced in higher education settings.

Models and principles

A conceptual model of formative assessment and feedback

The previous section shows that effective feedback is integral to successful formative assessment, and this is represented graphically in Figure 1, which shows a conceptual model of formative assessment and feedback.[11,21] (Figure-1)

This model of feedback practice has been developed from the current thinking of key researchers in this area [10,11, 20] and is based on Butler & Winne's[22] original model of feedback and self-regulated learning.

A full explanation of the model is beyond the scope of this review but the key pathways and processes are clear. Putting it simply, the teacher sets a task; the student engages with task with prior knowledge and motivations to construct a response, and then produces an outcome. Throughout these
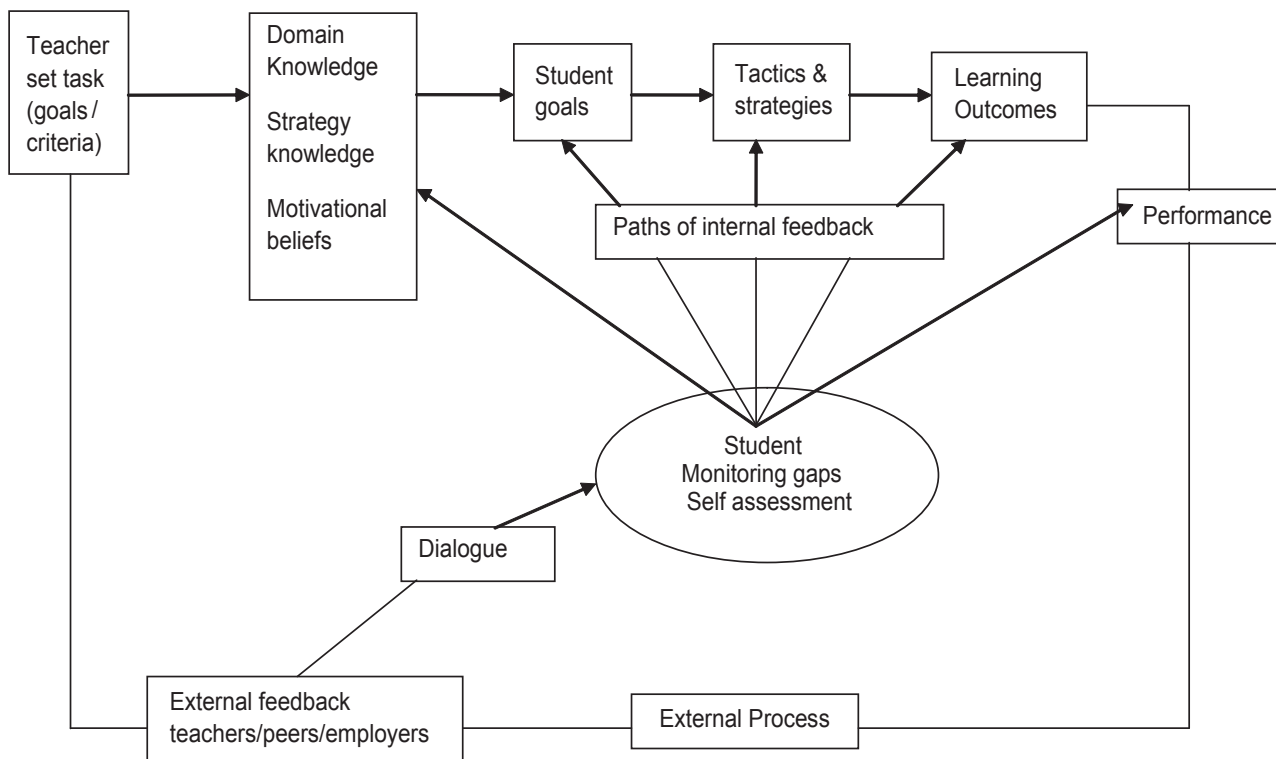

Figure-1: *A model of formative assessment and feedback*

stages the student engages in internal feedback to monitor their progress and performance, and if external feedback is provided it may "augment, concur or conflict with the student's interpretation of the task and the path of learning" [11] The student's engagement in feedback processes is discussed by Yorke [12] who provides an extensive dialogue on formative assessment and pedagogic practice. As pointed out by Juwah et al[11]

"If students are always involved in monitoring and assessing their own work, then rather than thinking of ways to enhance the teacher's ability to deliver high quality feedback we should be devising ways of building upon this capacity for self-regulation."

Seven principles of good feedback practice

Following on from their conceptual model, Juwah et al[11] have derived seven broad principles of good feedback practice:

1. Practice that facilitates the development of self-assessment (reflection) in learning;

2. Practice that encourages teacher and peer dialogue around learning;

3. Practice that helps clarify what good performance is (goals, criteria, standards expected);

4. Practice that provides opportunities to close the gap between current and desired performance;

5. Practice that delivers high quality information to students about their learning;

6. Practice that encourages positive motivational beliefs and self-esteem;

7. Practice that provides information to teachers that can be used to help shape the teaching.

Again, a full description of these principles is not covered here so please refer to the original text, which provides a rational for each principle, covers associated research literature and gives examples of how they may be applied by way of case studies.

Another set of principles or conditions are offered by Gibbs & Simpson[14] who identify 11 conditions that they believe influences assessment on the volume, focus and quality of studying. Their set of conditions was developed following an overview of assessment practice, which they found to be "not a pretty picture".

Basing their argument on most university's lack of financial and staffing resources in providing frequent assignments and on research findings, the authors claim that formative assessment (i.e. feedback) is sometimes "enormously expensive, disliked by both students and teachers, and largely ineffective in supporting learning" [14] Given these problems, Gibbs & Simpson have developed 4 conditions for the influence of the design of assessment systems and their influence on study; and 7 conditions for the influence of feedback on learning. All 11 conditions are presented here.

Conditions under which assessment supports learning (Gibbs & Simpson 2004)

A. Influence of assessment systems and assignments on study

1. Sufficient assessed tasks are provided to capture sufficient study time-given existing competition for student time, including paid employment. The authors note that long hours of study do not always correlate with productive study;

2. The tasks are engaged with by the student, orienting them to allocate appropriate time and effort to the most important aspects of the course. The authors note an existing lack of knowledge about the distribution of student time and effort;

3. Tackling the assessed task engages the student in a productive learning activity; most specifically the student is orientated towards deep rather than surface or strategic learning;

4. Assessment communicates clear and high expectations.

B. Influence of feedback on learning

5. Sufficient feedback is provided often enough and in enough detail - Feedback may need to be quite regular, and on relatively small chunks of course content, to be useful

6. Feedback should focus on performance rather than on the student's character - Literature on formative assessment distinguishes between feedback which tells students they are hopeless and feedback which tells students exactly where they have gone wrong and what they can do about it

7. Feedback is timely-received when it still matters and when there is time to apply it - If students do not receive feedback fast enough then they will have moved on to new content and the feedback is irrelevant to their ongoing studies and is extremely unlikely to result in additional appropriate learning activity, directed by the feedback

8. Feedback is appropriate to the purpose of the assignment and its criteria of success.

9. Feedback takes into account students understanding of the task - Students have to make sense of what kind

of a task they have been set when they tackle an assignment and what would count as a 'good' attempt at it.

10. Feedback is received and attended to - A number of studies have described students receiving their assignment back, glancing at the mark at the bottom, and then simply throwing it in the bin, including all the feedback

11. Feedback is acted upon -This issue concerns the impact of feedback on future learning. Feedback may accurately correct errors but still lead to no change in the way a student goes about the next assignment.

The authors justify each condition with references to theory, empirical evidence and practical experience. They also state that the conditions are in the process of being tested out in a large scale project with a checklist to help teachers review the effectiveness of their own courses' assessment systems an expected product.

It should be noted that both 'frameworks' outlined above are covered in a literature review on 'Engaging Students with Assessment Feedback' by Millar. Millar[23] argues that although there is some overlap both frameworks come from different perspectives. She suggests that Juwah and his colleagues focus more on the student's engagement with the assessment process, whereas Gibbs & Simpson[14] concentrate less on student involvement and more on the assessment environment used to support learning.

Limitations of the Review

Due to limited resources and time only an electronic search was carried out. A possible consequence of this is that the number of publications identified in the search may not reflect the range of relevant published and non-published literature that exists. In addition, the selection and categorisation of the retrieved literature was made independently from the University. Consequently, given the practical nature of the review, some of the collected publications may not meet the needs of the target audience.

Recommendations

It is recommended that the educational impact of formative assessment is multi-dimensional and actively engaging in assessment for learning is quite a challenge to both trainees and supervisors. Individual perspectives on feedback of trainees and supervisors, a supportive learning environment and credible feedback are important determinants in this process. Every one of these factors should be taken into account when the utility of formative assessment in higher educational training is assessed.

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