Enhancing Learning Through Technology
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Technology, Feedback, Action!: The impact of learning technology upon students' engagement with their feedback

Stuart Hepplestone, Helen Parkin,
Graham Holden, Brian Irwin and Louise Thorpe

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Executive Summary

Sheffield Hallam University explored the potential of technology-enabled feedback to improve student learning. This project aimed to evaluate how a range of technical interventions might encourage students to engage with feedback and formulate actions to improve future learning.

The research project began with a detailed desk-based review of current literature regarding good feedback practice, with specific regard to the application of technology to support both delivery and use of feedback. This literature review has been published via a wiki and is available for comments and contributions from across the sector at http://tinyurl.com/c8uolj.

The study used qualitative methods and worked in partnership with 23 undergraduate students to explore their experiences of receiving different forms of feedback with varying degrees of technical intervention including, but not limited to, electronic feedback with marks withheld, online grade publication, criteria-based feedback and zero-technical intervention. Through a series of unstructured interviews student participants were encouraged to articulate their experiences of feedback.

The online publication of grades and feedback and the adaptive release of grades were found to significantly enhance students' engagement with their feedback. Often, logistical benefits such as online storage of feedback, led to greater learning benefits such as repeated viewing of feedback. Linking feedback to assessment criteria, while effective in enabling students to identify strengths and weaknesses at a glance and helping to identify learning targets, was less effective in terms of enhancing engagement with feedback. This approach does have limitations and there was a competing preference for 'in context' feedback suggesting that a mixed model would provide the most comprehensive feedback.

The study identified a series of recommendations around the use of technology to enhance student engagement with their feedback. These evidence-based recommendations will be published as a series of good practice guides aimed at academic staff, students and senior managers. We believe that technology has the potential to significantly enhance learning. These guides will show how technology can be used to its full advantage to help students make the most of their feedback.

Literature Review

Sheffield Hallam University explored the potential of technology-enabled feedback to improve student learning. This project aimed to evaluate how a range of technical interventions might encourage students to engage with feedback and formulate actions to improve future learning.

The focus of this literature review is current publications and research regarding the importance of feedback and good feedback practice, with a specific regard to the application of technology to support both delivery and use of feedback.

The importance of feedback

Feedback is an integral feature of effective and efficient teaching and learning, and can be one of the most powerful ways in which to enhance and strengthen student learning. Feedback enables learning by providing information that can be used to improve and enhance performance. There has been clear evidence (Black & Wiliam, 1998; Gibbs & Simpson, 2004) that changes to assessment practice that strengthen the formative use of feedback, such as peer assessment (Falchikov, 2001) and 'feed-forward' techniques (Hounsell et al, 2007a) can produce significant and substantial learning gains.

Current issues

Traditional and current practices of providing feedback are no longer effective (Bloxham & Boyd, 2007; Hounsell, 2008; Race, no date; Rowe & Wood, 2007; Rust et al, 2005). Students do not exploit assessment to improve their learning (Maclellan, 2001), and current pressures in the HE sector (DfES, 2003) resulting in modularisation and semesterisation have seen the 'bunching' of assessment tasks limiting the scope for assessment practices that feed-forward (Price & O'Donovan, 2008; Race, no date), and the writing of feedback under tight time constraints (Chanock, 2000). This also has the effect of reducing opportunities for students to carry forward and build-on what they have learned from feedback from previous to future tasks (Higgins et al., 2002; Yorke, 2001), and that assessment does not take place at the beginning of the module or when students themselves feel ready (Maclellan, 2001). The result has been a negative impact on the student experience of feedback. This has been further supported by responses to the National Student Survey (HEFCE, 2007) in which students have expressed dissatisfaction with the adequacy of the feedback they receive both in terms of timing and usefulness (Mutch, 2003), echoed further by recent large (Hounsell & Entwistle, 2007b) and small scale (Crook et al, 2006) studies into the student experience of assessment and feedback. There is evidence that students view late feedback as 'disrespectful' (Rowe & Wood, 2007), and the use of 'implicit criteria' means that students do not view feedback on their learning as helpful (Maclellan, 2001).

Staff complain that feedback does not work (Weaver, 2006) and that students do not act on feedback (Mutch, 2003), only being concerned with their marks (Wojtas, 1998) or seeing feedback as a means to justify the grade (Price & O'Donovan, 2008). Some authors have claimed that student disengagement with feedback is based on sceptical or 'anecdotal evidence' from tutors (Carless, 2006; Higgins et al, 2002; Weaver, 2006). Higgins et al (2002), in their research into the impact of feedback, questioned whether students are driven by the 'extrinsic motivation' of their mark and only engage with feedback if it is 'perceived to provide correct answers'. Rust et al (2005) have reported on two studies (Hounsell, 1987; Lea & Street, 1998) in that students may not read their feedback as a result of not

understanding it. This is echoed by Winter & Dye (2005) who researched the reasons for uncollected student work and Chanock (2000) who claimed students often misunderstand their tutors' comments or are too agitated to take in exactly what the tutor is saying ('emotional static').Carless (2006) and Higgins et al (2002) also found that problems with understanding academic language can inhibit students' engagement with feedback. Handwritten feedback comments are problematic as they are time-consuming to write and can be a daunting process for staff, in particular for large class sizes, and it can be difficult for students to decipher (Bloxham & Boyd, 2007; Higgins et al, 2002; Race, no date).

Despite arguments that feedback is currently ineffective, Price & O'Donovan (2008) claimed that there is still a strong belief among staff that feedback supports student learning, and they found that students respond to their feedback in different ways and at different times, yet there is no attempt to measure the extent of student engagement. Furthermore, Higgins et al (2002), Rowe & Wood (2007) and Weaver (2006) declared that students' perceptions of the value of feedback in higher education are under-researched, and there are further calls to research further exactly how students receive and respond feedback (Higgins et al, 2002; Mutch, 2003).

Improving student engagement with feedback

Price & O'Donovan (2008) argued that feedback should be incorporated into the learning and teaching process to both improve student engagement with feedback and to enable the effectiveness to be measured. Maclellan (2001) argued that students should be monitoring their own performance in order to make effective use of feedback to generate improvement in learning, and this has been supported by Carless (2006) who suggested that students should be provided with the 'means to distinguish accurately their achievements in different assignments'.

Several authors have indicated that disengaging the mark from feedback promotes student learning (Carless, 2006). Research by Potts (1992) claimed that withholding grades encourages students to engage with feedback, as they are 'obliged to find for themselves value in what they did'. This is further echoed through the work of Black & Wiliam (1998) who argued that the 'effects of feedback were reduced if students had access to the answers before the feedback was conveyed', and Butler (1998) who found that students performed better on tasks when they received comments rather than grades. This practice has been endorsed by Race (no date) and Rust et al (2005), as well as the Re-Engineering Assessment Practices in Scottish Education (REAP) project (Nichol, 2007) who suggested giving 'feedback before marks to encourage students to concentrate on the feedback first', and Boud & Falchikov (2006) in that marks should be 'subordinated' to qualitative feedback to promote long-term learning. Further research (Winter & Dye, 2004) has found that students do not collect marked work when they know the mark in advance. In an internal review of feedback in the Faculty of Development and Society at Sheffield Hallam University (Garner, 2006), it has been suggested that there are benefits from uncoupling the processes of providing grades, comments and return of scripts in speeding up response and quality of feedback.

Such practice resolves an issue raised by an action research project at University of Sunderland (Ecclestone & Swann, 1999), of how to encourage students to read feedback and use it to improve their subsequent work. This practice reflects the widely held view that feedback can only support learning if it involves both the production of evidence and a response to that evidence by using it in some way to improve learning. Higgins et al (2002) believed in a more reflective approach and the development of reflective skills to encourage student engagement with feedback, and there have been suggestions that such reflective

activity is built into personal development planning (Bloxham & Boyd, 2007; Mutch, 2003; Race, no date; Rust et al, 2005).

Feedback grids tailored to the assignment can speed up the provision of feedback (Bloxham & Boyd, 2007), though McDowell, et al. (2005) have highlighted that students may find it difficult to interpret 'checkbox' feedback. Race (no date) suggested linking feedback directly to the achievement of learning outcomes to help students make 'better use of the learning outcomes as targets'.

Technology-enabled feedback

The most popular use of technology to provide students with formative feedback is through computer-based testing or assessment using multiple-choice or similar objective question types (Denton et al, 2008). Such software can deliver detailed formative feedback for each individual question more efficiently than is possible with traditional assessment (Brown et al, 1999; Gipps, 2005), and it has been reported that students favour the immediacy of such feedback as it keeps the activity and result closely connected (Charman, 1999; Denton et al, 2008). However the validity of automated formative assessment has been queried by Gipps (2005).

It has been claimed that sending tutors' comments electronically by email (Bloxham & Boyd, 2007; Denton, 2001a, 2001b, 2003; Price & Petre, 1997; Race, no date), via the internet or virtual learning environment (Denton et al, 2008; Gipps, 2005) can enhance the way in which students receive and engage with feedback. Students receive their individual feedback in privacy, enabling them to respond to their feedback in different ways and at different times (Price & O'Donovan, 2008). A number of other studies have reported on the greater impact of electronic or online feedback (van den Boom et al, 2004; Guardado & Shi, 2007; Tuzi, 2004). However Rowe & Wood (2007) have suggested that further examination of how students receive and respond to electronically redelivered feedback is required.

Examples of producing feedback electronically include the use of track changes and comments to alter and annotate the student's original word-processed work (Race, no date), comments typed in a separate document or digital ink using a tablet PC (Plimmer & Mason, 2006) providing individual feedback on student work. Race (no date) has claimed that the benefits of technology-enabled feedback include editing before returning to students, tracking what feedback has been given to which students, and building up evidence relatively quickly for external review. Additional benefits discussed by Bridge & Appleyard (2005), Denton et al (2008), Jones & Behrens (2003) and Price & Petre (1997) have included the legibility of electronic feedback, reduction in assignment turnaround time, efficiency in administration and reduction in paper used.

Some institutions have developed their own in-house systems to producing and returning feedback, including electronic marksheets (Joy & Luck, 1998) and the use of MS Office applications, templates and the computer supported generation of feedback statements from a bank of comments developed to improve quality in response to increased student numbers (Denton, 2001a, 2001b, 2003; Denton et al, 2008; Hepplestone & Mather, 2007; Price & Petre, 2007). However, Denton (2001a, 2001b) reported that despite their potential value, marking assistants are not widely used in higher education.

Case context

A central theme of the University's Learning, Teaching and Assessment Strategy (2006-2010) is to enhance the students' learning experience, making assessment activities, support and feedback a powerful integrated feature of learning. This will be achieved by providing timely and effective feedback and encouraging students to recognise and reflect on all forms of feedback to enhance their ongoing learner development.

This research project builds on firm foundations within Sheffield Hallam University with regard to assessment and e-learning innovations. The University has a strong track record in researching into the impact of learning technologies and placing the student voice at the heart of future developments (Thorpe & Lyons, 2008; Aspden et al., 2003). This approach was recognised and commended in the University's recent participation in the HEA/JISC e-learning benchmarking exercise.

Since 2001, there has been rapid uptake in the use of e-learning at Sheffield Hallam University, driven by a combination of academic ownership and enthusiasm, and the growing demand and expectations of students. The use of e-learning is characterised as a mainstream feature of the student experience, with approximately 96% of students enrolled on at least one Blackboard site and 75% of modules supported (2008/09).

The Assessment for Learning Initiative was established at Sheffield Hallam University in 2006 in response to comments in the National Student Survey on the timeliness and usefulness of feedback and with the aim of actively transforming and promoting assessment practices that are learner-focussed. A close collaboration between the University's Assessment for Learning Initiative and e-learning development team has focused upon developing a deeper understanding of the appropriate use of learning technologies to support efficient and effective assessment and feedback strategies. From the outset a key focus has been to promote the role of technology not just in improving the efficiency of assessment practice, but also in encouraging student engagement with feedback.

Aims

Sheffield Hallam University is keen to explore the potential of technology-enabled feedback to improve student learning. The aim of this research project is to evaluate how a range of technical interventions might encourage students to engage with feedback and formulate actions to improve future learning. The interventions that are explored in this research study will be:

1. **Online publication of grades and feedback**
   Sheffield Hallam is promoting the widespread and consistent adoption of the Blackboard Grade Centre (previously Blackboard Gradebook) as the primary tool for publication of grades and feedback in order to:
   - enable students to easily track progress and see how performance on different assessment tasks builds to an overall profile for module;
   - present marks and feedback alongside learning materials enabling 'in context' feedback, linking directly to materials to review;
   - return feedback directly and efficiently to the students.

2. **Adaptive release of grades**
   Integral to adoption of the Blackboard Grade Centre, a customised Assignment Handler extension has been developed to support effective feedback online. One of the key features of Assignment Handler is the adaptive release of grades, encouraging students to engage with their written feedback and identify key learning points in order to activate the release of their mark. The key learning points can then be linked into their personal development planning.

3. **Linking feedback to assessment criteria**
   As one approach to presenting feedback to students, Sheffield Hallam University is exploring the use of an electronic Feedback Wizard that generates feedback aligned with assessment criteria. This tool allows tutors to generate individual feedback documents for an entire student cohort. Each document includes an assignment-specific feedback template containing a matrix of assessment criteria and feedback comments, and other remarks individually written for that student.

We aim to explore which elements of the particular interventions add most value, e.g. the extent to which the timely delivery of feedback supports effective forward planning, and whether withholding marks and aligning feedback to explicit assessment criteria does encourage deeper reflection upon the written feedback given.

Methods

The research project began with a detailed desk-based review of current literature regarding good feedback practice, with specific regard to the application of technology to support both delivery and use of feedback. This literature review has been published via a wiki and is available for comments and contributions from across the sector at http://tinyurl.com/c8uolj.

The main study used qualitative methods and worked in partnership with 23 undergraduate students, 14 females and 9 males aged between 18 and 42, to undertake a comparative study of their experiences of receiving different forms of feedback with varying degrees of technical intervention including, but not limited to, electronic feedback with marks withheld, online grade publication, criteria-based feedback and zero-technical intervention.

Participants were drawn from each of the four Faculties, and from a particular subject group within each Faculty:

- Arts, Computing, Engineering and Sciences - Computer Networks (n = 6)
- Development and Society - Psychology (n = 5)
- Health and Wellbeing - Diagnostic Radiography (n = 8)
- Organisation and Management - Events Management (n = 4)

Through a series of semi-structured interviews student participants were encouraged to articulate their experiences of feedback, taking an inductive approach to evaluation and enabling the research team to work closely with the students to unpack their understanding of their own experiences to analyse the complex and diverse elements of technology-enabled feedback. During interviews students were encouraged to: identify how their feedback was provided; how useful they found the feedback both in terms of content and timeliness; and what they had done or intended to do with their feedback. This approach provided an insight into the effectiveness of feedback and how students engage with it.

One section of the interview followed an 'interview plus' approach, a term coined in the JISC LEX project (Creanor et al, 2006), referring to a methodology used extensively at Sheffield Hallam University during the evaluation of the impact of e-learning on the holistic student experience (Aspden & Helm, 2004). Here the interviews were accompanied by examples of feedback grids produced by the Feedback Wizard to encourage students to think about the benefits and drawbacks of this approach to feedback.

Sheffield Hallam University has established Research Ethics Policies and Procedures in place to ensure good practice. Consent was obtained from all participants, who were fully informed about the nature of the study and were made aware of their right to withdraw. Participants were also offered information about the Education Guidance Service at Sheffield Hallam University.

Evidence-based results

This project explored students' perceptions of the potential of technology-enabled feedback to improve their learning. It aimed to evaluate how a range of technical interventions might encourage students to engage with feedback and formulate actions to improve future learning.

Online publication of grades and feedback

Sheffield Hallam University promotes the use of the Blackboard Grade Centre as the primary tool for the publication of grades and feedback to students in each of their modules. The project looked at what students' value most about having their grades and feedback published online and the extent to which this approach encourages them to engage with and use their feedback.

Online publication of grades and feedback through the Grade Centre enables students to access their grades and feedback at a time and place of their choosing. In common with the use of technology to support learning more generally (Parkin & Thorpe, 2009), the students appreciated the flexibility and convenience that this offers, providing support for much of the existing literature in the area (Bloxham & Boyd, 2007; Denton, 2001a, 2001b, 2003; Denton et al, 2008; Gipps, 2005; Price & Petre, 1997; Race, no date). The study found that the online publication of grades and feedback can offer students the flexibility to receive and read their feedback in private surroundings. This provides support for earlier research, for example Price & O'Donovan (2008) suggest that receiving feedback in privacy enables students to engage with and respond to their feedback when they are emotionally ready to do so. Students in the current study appreciated this aspect.

> "…you don't have to share it with everyone whereas if you in a seminar and everyone's talking about what they got you kind of have to feel the pressure to join in whereas if you get in on Blackboard you can see it at your own leisure."

Students perceived that the ability to publish grades and feedback online enabled staff to return their feedback more quickly, keeping the feedback and grades in close proximity to the assessment activity. The importance of the timeliness of feedback is often mentioned in the literature but this tends to be anecdotal (HEFCE, 2007; Mutch, 2003). Clearly if students do not receive feedback in time for it to be meaningful, either in relation to the task assessed (a delay reduces the currency and relevance of the feedback) or to facilitate additional learning that can be taken into future assessments i.e. feed forward, then they are less likely to engage with their feedback.

Whilst students responded positively to the quick turnaround possible in receiving grades and feedback online, this did not follow when grades were made available online prior to feedback being made available elsewhere for collection, and in some cases after some considerable time had passed. In these circumstances students were less likely to engage with, or even collect, feedback (Winter & Dye, 2004). When grades are given before feedback, i.e. adaptive release[1] in reverse, it was found to be counter-productive; that is to say that when grades are given before feedback, the feedback is seen as less valuable than when feedback is given first.

The study found that students value the ability to monitor their own progression and to see how they are achieving on each assignment during, rather than following, the module

[1] See next section of results for adaptive release

(Carless, 2006; Maclellan, 2001). The Grade Centre collates grades enabling students to easily track progress and see how their performance on different assessment tasks builds to an overall profile for the module. This has been promoted internally as a key benefit of using the Grade Centre to publish grades and student in the study certainly reinforced the value of this approach. However, some students demonstrated a strategic approach to future assessments by focussing on the number of marks needed and using this to determine the degree of effort (Entwistle & Ramsden, 1983).

> "…it keeps them [grades] all in one place; it means you can see how you're progressing throughout the course of the year and how well you need to do maybe in your next piece of coursework."

When delivered through the Grade Centre, feedback is automatically stored online and alongside other learning resources, and students commented on the value of this as they see the virtual learning environment as a learning hub. The study indicated a strong preference for the use of the Grade Centre as it has enabled staff to present grades and feedback alongside learning materials placing it 'in context' and providing a direct connection.

Students valued the perceived permanence of access to their online feedback. The study revealed that they frequently refer back to it to support future learning and assessments. This was different from the way in which students engaged with feedback when it was delivered hard copy. Students did value hardcopy feedback, many stating that they would never throw it away, but few had a logical storage system for such feedback and the majority rarely referred back to it after an initial read through and so its value was transitory.

The study highlighted conflicting views regarding handwritten and typed feedback. There are three key issues here; personalisation, thoughtfulness and legibility. A small number of students perceived handwritten feedback to be more personal as the tutor had taken time to write comments specifically for them. Although this perception suggested that electronic feedback was impersonal, this depended upon the way in which comments were presented. Electronic feedback can easily be made more personal through the use of the student's name and making reference to their previous assignments for example. Electronic feedback was, in some cases, perceived to be more thoughtful than handwritten feedback (Race, no date). Students recognised that tutors could more easily edit and revise their feedback as they read through assignments thus presenting a more cohesive and considered response. A large number of students claimed that they were more likely to engage with feedback when returned in a typed, and therefore legible, format (Bridge & Appleyard, 2005; Denton et al, 2008; Jones & Behrens, 2003; Price & Petre, 1997). While there were conflicting views, overall there was a strong preference for typed feedback.

> "It obviously makes it a lot more beneficial to me as a student to receive that in a much more legible form … typed feedback is much better than written feedback, because you can read it, normally. Lecturers have a tendency to scrawl."

Summary Findings

Overall, students expressed a strong preference for the publishing of feedback and grades online. It provides greater flexibility of access to feedback, enabling students to read and respond to feedback when they are emotionally ready and in relative privacy. The prompt return of feedback and grades also means students will be more inclined act on it because it is current, relevant and meaningful in terms of the original assessment. The storage of feedback alongside their learning offers a sense of permanence and students are more likely

to refer back to it when working on future assignments. Access to grades in a single place enables students to monitor their progression and see how their performance on different assessment tasks contributes to the overall assessment profile. The use of technology pushes the feedback to the students removing the burden to seek out feedback from tutors and makes it easier for students to engage with their feedback as they have ultimate control over how, where and when they receive their feedback. Additionally, typed feedback is more legible and readable, which counters the perception that handwritten feedback can be more difficult to read and understand.

Adaptive release of grades

The adaptive release of grades is facilitated at Sheffield Hallam University through the use of Assignment Handler. This enabled the project to explore students' perceptions of how adaptive release encourages them to engage with their feedback. Adaptive release through Assignment Handler allows tutors to release feedback to their students, but withholds the grade until the student has produced a reflective account on their feedback. Once this reflective account has been submitted, the grade is released automatically into the Blackboard Grade Centre without further intervention from the tutor.

Broadly, the project found that students understand the educational value of separating the grade from the feedback as a means of encouraging them to read and reflect on their feedback.

> "It makes you think about your feedback because it's very easy just to read feedback and think 'oh, I did alright' or 'oh, that's not so good' but if it actually makes you think about it and you have to write about it because that's how you're going to get your grade then I think that's good for yourself."

Students acknowledged the benefits of reflecting on their feedback and recognised that this was important to improve future learning. However, the purpose of reflection and action planning needs to be made explicit in order to prevent students from taking an instrumentalist approach.

The project provides evidence to support Nichols (2007) recommendation of putting 'feedback before marks to encourage students to concentrate on the feedback first'. The students involved in the study clearly articulated the benefits of this process and the way in which it facilitates reflection not simply on the grade achieved but on the feedback received.

> "If I have to reflect on the feedback before receiving the grade then it sticks in my mind a bit longer, the feedback I receive, the points that I'm going to use and it's a little bit easier to remember when I'm working on my next assignment."

However, a strong theme emerged in that students felt they had fulfilled the assessment task by completing their assignment. Writing a reflection was seen as an additional requirement and in some cases this need to engage with their feedback was negatively perceived as 'enforced' reflection. It emerged that adaptive release changes the boundaries of the assessment process and in order for students to fully engage with this approach, the importance of reflecting on their feedback must be identified as a key step in the process right from the start.

While the findings of the study support the notion that disengaging the grade from the feedback enhances student engagement with their feedback (Potts, 1992; Black & Wiliam, 1998; Carless, 2006), the process can cause frustrations and anxieties when not fully explained. The study found that students were more likely to engage with the process of

reflection when they had been told explicitly a) that they would be required to reflect on their feedback before receiving their grade and b) why this would be of value to them.

As a new intervention, many of the students have never encountered the process before and this contributed to the importance of explaining it adequately. The study also highlighted uncertainty around the practice of reflection. Where students were required to reflect on their feedback with little guidance around what to write, who they were writing for and what would happen to their reflections, the intervention was much less effective in terms of encouraging reflection than for those students who fully understood the process.

Interestingly, some students believed that the key purpose of the reflection was to offer a response to the tutor regarding the quality of their feedback or the validity of the grade. This had the effect of inhibiting their engagement with the process. Others in the study correctly believed that the reflection was for their own benefit, and should be used for action planning.

It is also interesting to note that very few students involved in the study had written formal action plans prior to the introduction of the adaptive release mechanism. During the interviews, many of the responses suggested a tacit, almost sub-conscious, approach to action planning. Ding (1998) suggests that when students read feedback comments, they do little with them. The current study would argue that while students may not demonstrate doing anything 'formal' with their feedback comments, they do in fact digest the comments and seek to remember them for future assignments.

> "Yeah it's just stored in my memory. I don't tend to write action plans down. I tend to retain things in my memory and then if I need to look something up I can usually remember where it is that I found it before."

This, however, is very difficult to monitor as the process is largely private and unknown. The introduction of the adaptive release mechanism has given students space to formalise this process and one cohort of students in particular are using the reflective accounts to feed in to Personal Development Portfolios.

Whilst students articulated the benefits of receiving feedback first, the study also highlighted their desire to receive their grade as soon as possible. Many perceived the reflective process as a burden or extra work, as discussed earlier. These students tended to be instrumental in their approach, choosing to ignore or rush the reflection on their feedback by submitting blank or surface level reflections.

The use of technology allows the immediate release of grades following the submission of the reflective account. Though the process of adaptive release may be possible without technology, the logistics of this would most likely result in a delay in receiving the grade. The immediacy allowed by the technology provides a practical solution.

Summary Findings

Overall, the benefits of the adaptive release mechanism were acknowledged by students when they fully understood the process. The use of Assignment Handler enables the adaptive release of grades to occur with large cohorts of students and releases the grades immediately on submission of the reflective account. This would be difficult to achieve without a technical intervention and helps to reduce frustrations experienced as a result of withholding grades. The study also found that students are able to produce action plans from their feedback but this is often a subconscious process and Assignment Handler provides a space for students to formalise this process. However, the study acknowledges that this is a

new approach and therefore not many students will have encountered before and therefore emphasises the importance of explaining the process in order for students to fully engage with the reflective process and action planning.

Linking feedback to assessment criteria

One approach to presenting feedback to students is to provide feedback comments that are aligned directly with assessment criteria. This can be done paper-based but the opportunity to use electronically generated feedback from pre-populated comment banks has seen growth in this approach. There are a range of different tools that can be used to facilitate this linking and Sheffield Hallam University has been exploring the use of an internally-developed electronic Feedback Wizard, which allows tutors to generate individual feedback documents for an entire student cohort. Each document includes an assignment-specific feedback template containing a matrix of assessment criteria and feedback comments, and other remarks individually written for that student. This method is designed to offer detailed feedback to students in a consistent and equitable way.

At the time of this study, the Feedback Wizard was only in limited use across the institution and therefore few students involved in the study had experience of this tool, although a large number had received feedback, electronically or hardcopy that linked feedback comments to assessment criteria. Participants were shown examples of feedback grids generated by the Feedback Wizard and, coupled with their experience of receiving other forms of feedback grids, they were able to articulate the potential benefits of this approach.

Students suggested that they could understand feedback better when aligned to the original assessment criteria. The provision of this level of detail in an accessible format with explicit links to the assessment criteria was identified as a valuable approach to providing feedback (Maclellan, 2001). Students could easily identify their strengths and weaknesses against specific areas in a structured way that could lead to the development of action plans.

> "You could really clearly see what you had to do for the next one and where you could actually improve."

Interestingly, given some students' earlier concerns that typed feedback was impersonal, none of the participants perceived the output generated by the Feedback Wizard to be so. This is even after the students were informed that the Feedback Wizard automatically populates the feedback grid from a bank of pre-populated comments, although individual comments can be written for each student.

On each feedback document, the Feedback Wizard provides an indicative weighted grade for every assessment criterion. Participants in the study perceived this approach to provide transparency in how tutors calculate the final grade for their work.

> "If you just get … a percentage for a mark out of 20 or whatever then it doesn't really give you anything. Whereas if you understand maybe the process that the lecturer has gone through with regards to how he's got to that figure … it gives you a bit more of a basis of understanding as to how or why they've got to that point."

In order for this type of feedback to be effective, the study found that providing details of the assessment criteria with the assignment task was essential. This enables students to make connections between what they were hoping to attain and what they actually attained, and identify personal targets.

Interesting points were raised about how feedback should be presented. Students acknowledged that aligning feedback to assessment criteria and presenting this in a grid

form summarised the comments clearly and cohesively. However, there was a competing preference for feedback to be positioned against the specific point in their original work, so they are able to identify easily the context of the feedback.

> "It's quite interesting because you see exactly which bits have got their attention, especially if they've crossed something out which usually means a big no-no. It makes it easy to see how you can improve next time because you know what they're looking for, which is an ideal way of doing it."

Summary findings

Overall, the study found that students liked linking feedback and grades to original assessment criteria as it enables them to identify their strengths and weaknesses at a glance. This can help students to reflect as they are able to use the assessment criteria to identify learning targets. Feedback presented in this manner also offers a level of transparency as students can see how their grades have been calculated. Technology enables this process to occur at scale, facilitating the generation of comment banks which can be used to create consistent but individual feedback. Without tools such as the Feedback Wizard, this is possible, but it would require greater effort and significantly more time on the part of the tutor. It would entail a great deal of repetition, which the technology eliminates. However, this approach does have limitations and there was a competing preference for 'in context' feedback suggesting that a mixed model would provide the most comprehensive feedback.

Other outcomes

The study brought to light a number of other issues surrounding feedback that were outside the scope of the study and may merit further investigation:

1. Students assigned greater value to feedback by tutors they felt also demonstrated respect for the students' work, their time and their commitment to learning (Rowe & Wood, 2007).

2. Although students expressed a preference for as much feedback as possible, including the option to go over their feedback verbally with the marker, students were realistic about the time constraints that tutors are under and recognised the value in discussing feedback with others including peers, friends, parents and work colleagues.

3. The timing of releasing feedback and grades to students and the availability of tutors to discuss any misunderstandings or misconceptions around that feedback, for example the release of feedback late on Fridays or immediately prior to university holidays.

4. Logistical issues when accessing feedback that had been returned online in audio format, and differing preferences for audio or written feedback.

5. A mismatch between reflection and action planning as part of students' courses and professional practice and approach to reflection on their feedback.

6. Students expressed difficulty in feeding forward comments made on their work to future assignments or between modules when, for example, the curriculum design bunched the assessments towards the end of the module, or where the feedback was subject-laden in context.

7. Students were more likely to seek further clarification or support on their feedback where the feedback was transferable between assignments, where they received the repeated feedback across several assignments (e.g. referencing problems) or where the grade was lower than desired/expected.

Conclusions

This study has explored the use of technology to support students' engagement with their feedback. Three interventions were explored; the online publication of grades and feedback through the Blackboard Grade Centre; the adaptive release of grades through Assignment Handler; and linking feedback to assessment criteria using the Feedback Wizard. Whilst the study looked at the use of these three tools, the findings are transferable to the interventions more generally, regardless of the tool used to achieve it.

The study concludes that the availability of feedback stored online for future reference augmented by the opportunity for, and expectation of, further dialogue provides the greatest benefit to future learning. The flexibility afforded by publishing feedback online enables students to read and respond to feedback when they are emotionally ready, and in relative privacy. It also enables them to store their feedback alongside the rest of their online learning materials and activities, and unlike hardcopy feedback they are more likely to go back to this when completing future assignments.

The study also found that under normal circumstances, students read their feedback and do attempt to retain the information for future assignments, although not formally. The process of adaptive release encourages students to read their feedback and reflect on it before obtaining their grade and the students' interviewed appreciated the potential benefits of disengaging the grade from the feedback. However many were unfamiliar with this adaptive release approach highlighting the importance of explaining the process fully. The most benefit was gained where students understood the process and the purpose. The study noted that whilst students liked to get their feedback and grade at the same time or very close together, they valued the learning benefits of having to engage with the feedback before the grade was released. Where grades were made available before the feedback, the feedback itself was not valued as having additional learning benefit.

The online publication of grades and feedback and the adaptive release of grades were found to significantly enhance students' engagement with their feedback. Often, logistical benefits such as online storage of feedback, led to greater learning benefits such as repeated viewing of feedback. Linking feedback to assessment criteria, while effective in enabling students to identify strengths and weaknesses at a glance and helping to identify learning targets, was less effective in terms of enhancing engagement with feedback. Students also expressed a competing preference for 'in context' feedback so feedback grids were seen as most useful when presented alongside annotated transcripts.

The study identified a series of recommendations around the use of technology to enhance student engagement with their feedback. These evidence-based recommendations will be published as a series of good practice guides aimed at academic staff, students and senior managers. We believe that technology has the potential to significantly enhance learning. These guides will show how technology can be used to its full advantage to help students make the most of their feedback.

Recommendations

Recommendations from this study will be published separately through a series of good practice guides for the application of technology to deliver actionable feedback aimed at academic staff, students and senior managers. These guides are intended to provide information and support change.

Note: The guides are currently in production and will be circulated hard copy to all higher education institutions in the UK, as well as provided electronically via the Higher Education Academy EvidenceNet wiki.

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Appendix 1: Outcomes arising from the project[2]

Hepplestone, S. (2009). 'Technology, Feedback, Action!: The impact of learning technology upon students' engagement with their feedback'. Presentation at Assessment Matters: New and Creative Forms of Assessment and Feedback (Higher Education Academy), Leeds, 21 April

Hepplestone, S. (2009). 'Technology, Feedback, Action!: The impact of learning technology upon students' engagement with their feedback'. Presentation at the Welsh Assessment and Feedback Practitioners Event (Higher Education Academy), Cardiff, 5 May

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Hepplestone, S., Parkin, H., Holden, G. and Thorpe, L. (2009). 'Emerging findings from Technology, Feedback, Action!: Exploring technical interventions to encourage student engagement with feedback'. Paper presented at BbWorld Europe 08, 6-8 April, Barcelona

Hepplestone, S., Parkin, H., Holden, G., Irwin, B. and Thorpe, L. (2009). 'Exploring Technology, Feedback, Action!: The impact of technology-enhanced feedback on student learning'. Paper presented at e-Assessment Live, 8 July, Loughborough

Hepplestone, S., Parkin, H., Holden, G., Irwin, B. and Thorpe, L. (2009). 'Findings from 'Technology, Feedback, Action!': the impact of technology on student engagement with feedback'. Paper presented at ALT-C 2009, 8-10 September, Manchester

Hepplestone, S., Parkin, H., Holden, G., Irwin, B. and Thorpe, L. (2009). 'Sharing findings from 'Technology, Feedback, Action!': An investigation into the impact of technology on students' engagement with their feedback'. Paper presented at Assessment in Higher Education Conference, 8 July, Carlisle

Hepplestone, S., Parkin, H., Holden, G., Irwin, B. and Thorpe, L. (2009). 'Technology, Feedback, Action!: Emerging findings from the impact of learning technology upon students' engagement with their feedback'. Paper presented at the Higher Education Academy Conference, 30 June - 2 July, Manchester

Hepplestone, S., Parkin, H., Holden, G., Irwin, B. and Thorpe, L. (forthcoming). 'Technology, Feedback, Action! How learning technology impacts upon students' engagement with their feedback'. Paper to be presented at the Higher Education Academy Hospitality, Leisure, Sport and Tourism Network Annual Conference, Assessment and Feedback – What's the Answer?, 12 November, St Hugh's College, Oxford

[2] Each output will be linked directly to the corresponding abstract, paper or presentation where it exists when the report is published online