Blended Feedback II:

Video feedback for individual students is the norm,

on an undergraduate computer programming unit

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Abstract

The use of video feedback is popular, even usual, in fields involving social behaviour and interaction or physical performance. In other academic subject areas, the use of video as feedback is, as yet, uncommon. The work of others in this field covers group work, generic feedback, small numbers of students, samples and trials. We believe this may be one of the first studies on returning individual personalised feedback to a sizeable number of first year undergraduate students taking Computer Programming, or any other academic subject, for every assessment submitted on the unit.

Student engagement with feedback is often lacking and in that case, a valuable learning opportunity is missed. Previous work using audio as feedback showed 80% of students would prefer audio to written feedback. However, the separation of submitted programming code from audio comments still limits ease of reference to the work. The next natural step was to use video screen capture to augment the student experience by improving easy reference to work by simultaneously providing contextually relevant narrative and visually referring to elements of the work.

1. Introduction

Professionals in Higher Education (HE) are always chasing the ultimate learning experience for students. Empirical evidence elicited from previous cohorts of our students, showed that when receiving written feedback, students frequently claim they cannot understand the message conveyed in feedback; they understand where the errors lie but not how to correct them; or they pass over feedback completely in favour of instant validation from the grade.

It became clear that the marking team were writing the same comments, for the same students, week after week, as students were not engaging with feedback. Other studies recorded similar observations (Ackerman & Gross, 2010), and that students only cared about the mark given, (Mutch, 2003; Starbuck & Craddock, 2012) or indeed that students didn't even collect their assignment (Carless, 2006; Handley et al., 2007; Mutch, 2003). The question of the extent to which students were reading and engaging with the feedback, and how to inspire them to do so, naturally arose.

Why Programming?

Programming, like many other domains, has a language all of its own. It is common, for example when learning a foreign language, to associate words with pictures of objects referrenced. When learning programming the objects are virtual and represented only in code. A student learning to program may not have a grasp of what an object is in code, so when referring to 'that attribute', 'the class for that object' or the 'scope of that method', to clarify student understanding, there must be a means of referencing the code. It is that facility that makes video feedback potentially, such a powerful enabler for programming students in particular.

Objectives

The objectives for this work became to 1) improve student engagement and learning from feedback and thereby 2) improve the likelihood of application of learning from feedback to future work, on a

Computer Programming unit. We are focussing on objective 1) improving student engagement and learning from feedback

2. Background of Video and Screen Casting Feedback

Previous work by authors included a study of the use of audio feedback (Atfield-Cutts & Jeary, 2013). The publication included a thorough review of written feedback and current work on audio feedback. Therefore, neither of these areas are covered in depth here, but they are augmented here with a review of research in the use of video feedback and screen casting. Only work applicable to non-performance, or social interaction based assessments is included since our interest lies in assessment of academic subjects, in particular, computer programming.

Case Studies

Case studies in the use of video as feedback are rare. Amongst the few the variety is wide ranging and no one seems to have exactly repeated a previous exercise, not even where there was intention to do so, such as in the ASSET Project at Plymouth, UK (Gomez, 2010), which was an attempt to replicate the original ASSET Project work (Crook et al., 2012) completed at Reading, UK.

The majority of studies done in non-performance based contexts are on the use of generic feedback, that is the same piece of media returned for review to entire cohorts or classes of students covering common aspects without reference to individual student work. Generic feedback has the advantage of reuse, unlike feedback of an individual nature. Certainly from a staff perspective that advantage may have the potential to be outweighed by the benefits of individual feedback. These studies generally agree that the use of video improves the communication of feedback by providing greater clarity, and a more positive message.

The ASSET Project at Reading University, UK (Crook et al., 2012) created a system for the sustainable management of videos created for feedback on assessments. Plymouth also adopted ASSET (Gomez, 2010) with the intention of replicating the positive results but circumstances caused the two projects to diverge over time. These studies involve a variety of academic subjects however, our study focuses on a single unit in Computer Programming.

The approach at Reading was to create generic feedback and not for individual students. Even though, by nature, the feedback could not hold the personalised element students often claim to desire, the response was still very positive. Which raises the question of whether perceived personalisation comes from demonstration of the student's individual work, or the presence, albeit virtual and asynchronous, of the staff discussing the assignment with the student?

Most studies begin cautiously and partially replacing written feedback with video feedback. Prior to our work on video feedback we used a set of written headings designed to enable consistency across markers, and our written notes were made under each heading along with a grade for that section e.g. Professionalism, Structure, Functionality, Testing. Whilst we only delivered video feedback to random samples of students these notes accompanied the video feedback. This measure ensured marking consistency, from the student perspective, across the cohort. Jones (2014) used a rubric highlighting the sections that applied to the work and this accompanied the video as feedback. Parton et al (2010) made a gradual switch, as the first assessment feedback was written, the second written plus a video and finally a video on its own. Similarly, Henderson and Phillips (2015) also began with written feedback on student's first assignment and introduced video later.

Jones' (2014) and Borup et al's (2014) students were distance learners, with potential increased need for social contact with their tutor (Borup et al., 2014; Palloff & Pratt, 2007). Our full time, with-attendance students who see the staff all week, have many opportunities for interaction, and potentially less need for social contact with tutors through video feedback.

Often studies only involve small numbers of students, as we did at first. Parton et al (2010) used a flip camcorder to return feedback to 12 graduate level students over a summer short course on research methods, delivered by email. Their positive response may in part be due to student interest as they studied learning and teaching based subjects. Moore and Filling's (2012) study is possibly the closest

to our own, with individual recordings made for a single academic subject, in this case English Literature, but again numbers are only 45 students.

With student numbers of only 26, Henderson and Phillips (2015) delivered individual feedback as a tutor talking head discussing their work, making their feedback the closest to a face to face conversation. This decision was driven by a belief in the greater social connection (Borup et al., 2014) Students invested in the relationship with staff are more likely to engage and consequentially learn at deeper levels (Thompson & Lee, 2012). However, initial anxiety on the part of students was observed when facing their tutor, especially if they expected a poor result. Similar to our situation, students already knew their grades before viewing feedback.

Another reason for disregarding screen casting was that there were concerns that markers might become bogged down in the minutiae of low priority errors if viewing the detail of the work. The negative aspect of this is that students found it difficult to find examples being referred to in the work (Henderson & Phillips, 2014; Thompson & Lee, 2012). However, screen casts make reference to the work easy (Rodway-Dyer, Knight, & Dunne, 2011) and it may be that to maximise the potential benefits of video feedback, future work could consider recording a screen cast including the face of the tutor on screen.

With so many variables involved, and so many studies still at the trial stage, we have not found a study with a strong correspondence to our own.

3. Context

In the UK national context, since before our studies began to the present day, the National Student Survey (NSS, 2015) has shown a significant difference, across the Higher Education (HE) sector, in students' satisfaction with both a) the course (average 85.7%), and b) the teaching (average 86.5%), versus c) the feedback on assessments (average 71.20 %). This potentially shows a lower satisfaction with assessment feedback received than other aspects of the course and teaching. HE staff continuously take initiatives to improve student satisfaction in assessment and feedback, however, the data demonstrates a lack of impact so far, which has also been highlighted by other authors (Hyde, 2013; King, McGugan, & Bunyan, 2008; Yelland, 2011).

Local Context

All 300+ first year Computing students at Bournemouth University enrol on a Computing framework, including degree titles such as, Business Information Technology, Forensic Computing, Computing and Information Technology Management. These students study the same six first year units, including Programming. Our students are a mix of male and female, native English and those for whom English is a foreign language, and those with and without additional learning needs. A very small number of students may be repeating the unit for the second time. Whether there is correlation between any category and the results of student perspective of video feedback have not yet been analysed, although the data is available for future work.

During the first semester students upload three exercises per week. Each week, half of the students are marked on one of the exercises submitted, which is selected at random. Therefore, from the student perspective, one in six exercises uploaded is randomly selected for marking. To ensure students don't miss out on being marked they must submit all exercises.

When students collect feedback they look at their individual 'gradebook' inside the virtual learning environment (VLE). The students journey to the VLE gradebook means they see the grade achieved first, and then must make a further click to view feedback. Informal observation determined that students were not engaging with feedback. Thompson and Lee (2012) explain that, lack of engagement with feedback may be a strategic move to balance home, work and study. Therefore, for there to be a perceptible improvement, the process must require less time and /or effort, or it must be deemed more pleasant and/or useful by students.

Thus our objective became to encourage students to look beyond the grade for the submission and to 1) engage with feedback so that 2) their learning could feedforward to the next piece of work.

4. Case Study

For this empirical study the unit of analysis is a first year undergraduate student on a computer programming unit in a British university carrying out assignments for formal assessment. The aim is to determine the perceived efficiency and effectiveness of student engagement with formal feedback delivered as video screen capture of a review of the work with audio narrative by the marking tutor. The case study was carried out using the work of Yin (2008) as a guideline.

During the first two years of study a random selection of one third of the students in each cohort, received video feedback on each submission. Therefore, some students never received feedback in this mode, some may receive feedback by video several times. During this period all students were receiving written feedback, including those who additionally received video feedback. In the third year of study all students are receiving video feedback for every piece of work they submit for assessment, and no written feedback is supplied.

Delivery

Students access feedback via the VLE, where previously storage of media had been an issue, as it was for Thompson and Lee (2012). Originally advice was taken to upload videos to YouTube, and set them to be unlisted so that only a unique link could locate the video (i.e.: it cannot be found by searching). The link was embedded into the student's area of the VLE. Concerns regarding information about student work being stored externally to the institution were a moot point, and deemed to be an acceptable risk at the time. By the third year of study the University provision for media storage had improved dramatically and now all feedback videos are stored in house via Panopto, thus reducing risk of access from external sources. To connect Panopto to the VLE links are embedded into each student feedback area, and permissions are set to allow only the relevant individual to access the video.

Recording

Originally the simplest way of recording the videos was to use SnagIt - software with basic editing facilities and the ability to choose a section of the screen to record, similar to Screencastomatic used by Jones (2014). This enabled e.g. only the programming code to be shown without unnecessary clutter of other parts of the screen. Panopto negated the need for a separate delivery and recording software, but currently has no function to focus on a section of the screen and now the screen is included in the recording in its entirety. There were no editing facilities built in although the menu item was in place ready for the addition. This was not considered a problem since editing was rarely used previously.

5. Benefits of Screen Cast Feedback

The propositions for using screen cast video as the 'norm' are the same commonly recognised benefits of video screen cast feedback in small scale case studies.

1. Students will perceive a benefit arising from the ability to reference their work
2. Students will perceive a benefit from the audio, as previous work shows (Atfield-Cutts & Jeary, 2013), due to the a) additional nonverbal element, b) the increase in volume of information and c) perceived personal and friendly tone.
3. These benefits will (Objective 1) increase engagement with feedback as screen cast video thus potentially (Objective 2) increasing the chances of learning being fed forward to future work.

6. Student perspective

During the period 2013-2015 students selected to receive video feedback were given a link to a Survey Monkey survey to record their responses if they wished to. During the 2015-2016 academic year, students were asked to fill out a similar survey during December of 2015 and a new version was deployed via Mentimeter in March 2016. The following results are all based on the results of those surveys.

Percentage of 2015-2016 cohort only	Vastly improved or Improved	No different	Not as good or Much worse	Percentage of all students 2013-2016	Vastly improved or Improved	No different	Not as good or Much worse
Personal	86.30	8.22	5.48	Friendly	92.16	5.23	2.61
Friendly	86.30	9.59	4.11	Personal	90.20	7.19	2.61
Clear	86.11	8.33	5.56	Helpful	89.54	7.19	3.27
Helpful	84.93	8.22	6.85	Engaging	88.89	7.19	3.92
Useful	84.72	8.33	6.94	Useful	88.82	7.89	3.29
Engaging	82.19	9.59	8.22	Clear	88.16	8.55	3.29
Encouraging	76.71	16.44	6.85	Encouraging	84.97	11.76	3.27
Fair	76.71	17.81	5.48	Enjoyable	78.29	19.08	2.63
Enjoyable	72.22	22.22	5.56	Entertaining	76.32	17.11	6.58
Entertaining	66.67	23.61	9.72	Fair	75.82	21.57	2.61
Time Consuming	60.27	20.55	19.18	Time Consuming	60.13	28.10	11.76

Table 1- How do you feel about your video feedback compared to traditional written feedback?

For the majority of students, receiving feedback by video is a new experience and across all cohorts (2013-2016) only 2 students had ever received video feedback regularly before from prior educational institutions. The students' positive attitude towards the new style feedback is demonstrated when asked how they feel about video feedback versus written feedback.

Proposition 1

More than 74% of students receiving video feedback as the norm (2015-2016 only) claim it is easier to identify their errors and 72% find them easier to understand (Table 2). That figure increases to over 84% when the results from earlier cohorts are taken into account. Whilst more than 77% of the cohort believe they benefit from improved learning opportunities over written feedback. The perceived improvement in usefulness and helpfulness, are also likely indicators of ease of reference to work at over 84% each (Table 1).

Proposition 2

Students consider video feedback to be more personal and friendly with over 86% (Table 1) finding some improvement over written feedback. This may validate Parton et al's (2010) results that students felt a closer connection to staff after the second assessment with video feedback (83%) than the first assessment with written feedback (25%). When aggregated with results from previous cohorts the result is over 90% (Table 1). One would not expect the fairness of marking to change just because of the media used, but certainly the student perception is that there is a significant improvement, possibly the result of improved clarity or improved rapport with staff. Thompson and Lee (2012) claim the auditory element is the most important reason screen casting was successful for them.

Proposition 3 - Objective 1

All students from across all cohorts who responded, accessed feedback successfully. Over 74% believe it will improve the chances of them reviewing the feedback more thoroughly than if the feedback was written. Student perception was sought to ascertain whether the improved engagement could facilitate improved learning (Table 2). Indeed, when in receipt of video feedback as a matter of course 77% of students believe they find it easier to learn from video feedback. This may be, at least in part, because the task of identifying errors and understanding them are regarded as significantly easier.

For 82% of students, our first objective has been fulfilled; that is improved engagement with feedback when receiving video feedback for all submissions (Table 1). The notion that it is also more helpful and useful may be related to engagement. The whole student experience is recognised as more enjoyable and entertaining. Many even find it less time consuming to review feedback.

Percentage of students (%)	Much Easier or Easier		Neutral		Harder or Much Harder	
	2015-16 only	2013-16	2015-16 only	2013-16	2015-16 only	2013-16
To understand	72.97	84.42	14.86	9.74	12.16	5.84
To identify errors	74.32	85.71	9.46	6.49	16.22	7.79
To revise from	79.73	81.82	8.11	10.39	12.16	7.79
To watch (v reading)	81.08	87.66	5.41	5.19	13.51	7.14
To identify future improvements	55.41	75.97	27.03	15.58	17.57	8.44
To understand errors	71.62	84.42	10.81	7.14	17.57	8.44
To revisit	56.76	69.48	25.68	21.43	17.57	9.09
To learn from	77.03	86.36	10.81	7.79	12.16	5.84

Table 2- How easy do you find it to make use your video feedback, compared to traditional written feedback?

Proposition 3 - Objective 2

In concordance with our second objective (to encourage the application of learning from video feedback to future work) 55% of the current cohort believe it is easier to identify future improvements (Table 2). That figure rises to more than 75% of students when data from earlier years are included. Over 84% believe it will improve the chances of them improving future work with recommended changes. Whether or not this occurs in reality requires analysis of individual videos in conjunction with subsequent work.

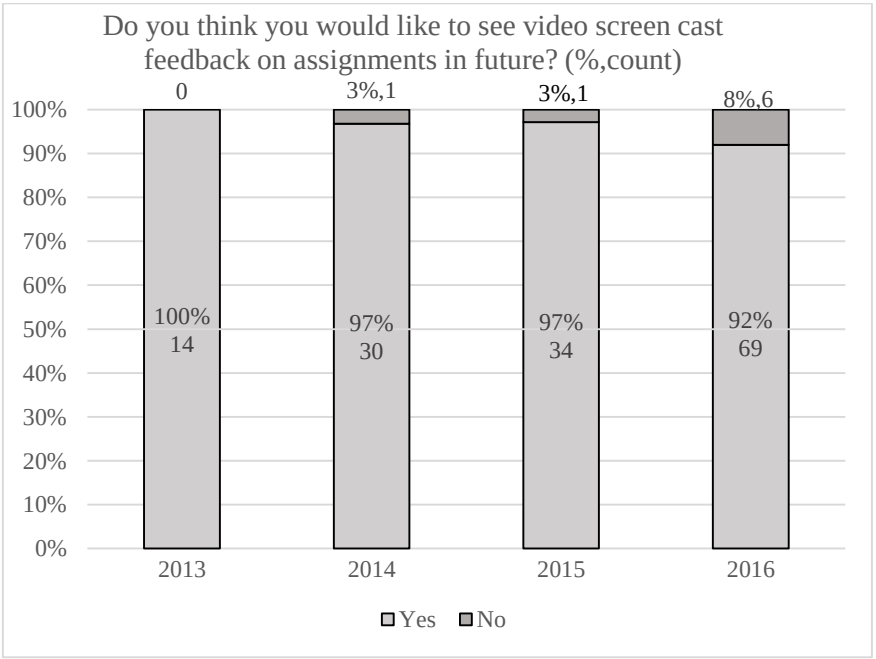

Figure 1- Do you think you would like to see video screen cast feedback on assignments in future? – survey results

Student Perspective Conclusion

Students, past and present, would like to see video feedback used again in future (Figure 1). There is a decrease in percentage of students giving positive reactions in all aspects, when regarding the cohort receiving video feedback as the norm (2015-16 only) against the results aggregated across all cohorts. This may just be

a) the result of larger numbers

b) an anomaly of the 2015-16 cohort

c) the result of students receiving feedback by video screen cast many times over i.e.: this may be an indicator of the novelty factor having a positive influence in previous years.

Future results needs to be monitored in case it is the beginning of a downward trend. These conclusions are drawn entirely from quantitative data. There is much qualitative data still to be analysed.

7. Staff Perspective

Trials began with one member of staff which later increased to two. Since the start of the academic year 2015 the whole programming teaching team have been involved (4 staff), as well as other staff brought in to assist with assessment of the largest and final piece of work.

Some staff experienced initial anxieties regarding recording their own voice. One described it as 'stage fright'. For most, these anxieties dissipated through experience over varying amounts of time. In addition to the new regime this emotional response may contribute to the slow start most staff find (Hyde, 2013; Thompson & Lee, 2012), but on the whole the process sped up with practise to the point where generation of feedback was the same, or faster, than the written version.

Most staff did not concern themselves too much with the 'performance' aspect and did not worry about the recording being perfect. However, for those that did, the burden of marking was vastly increased. There became a need to go through the student work first and to make notes before recording, thus effectively going through the submitted programming code twice. Sometimes the replaying of videos to check content, was also felt necessary.

Finding somewhere quiet to work is a well acknowledged issue (Henderson & Phillips, 2014; Thompson & Lee, 2012). On the whole our staff share offices and often take marking elsewhere to complete. As a result, birds tweeting and clanging of doors and chatter, are common soundtracks to our recordings. Apologies for colleagues walking in noisily, or a pet walking across the keyboard when working from home, become part of the conversation and indeed, is thought to add to the friendly style. After a while the voice needs a rest but as one member of staff pointed out, by the time that happens it is time to move away from the computer for a while anyway.

Some positive aspects noted by other authors were also echoed by some of our staff. These included that it was less tiring, easy, enjoyable and faster (Henderson & Phillips, 2015; Hyde, 2013). You can be more specific and show students how to fix their own code or use a better technique, directly, without having to direct them to a generic example. Video feedback is an opportunity to communicate with students about their own work and to build rapport (Thompson & Lee, 2012).

Certainly staff attitudes were more positive when marking smaller assignments e.g. just code, rather than the final and largest assignment which involved code, plus design and testing documentation.

8. Conclusions

We have learned that our students are happy to engage with video as feedback the norm and feel that the common practise of precautionary supplemental written notes are no longer necessary. The majority of students, across all cohorts involved in the study, believe it is easier to engage with, and identify potential future improvements, from video feedback than from traditional written feedback.

Of the original propositions, 1) Students do perceive a benefit arising from the ability to reference their work, such as ease of identity of errors and understanding of them, 2) Students do perceive the benefits of the audio, 3) Students do believe their engagement with feedback will be improved compared to written feedback, thus also increasing the chances of learning being fed forward to future work.

Since students are likely to lack the knowledge of how to maximise the potential with video feedback for a number of years to come it is important that staff encourage interaction, such as rewinding and note taking, and alteration of a copy of the work whilst viewing (Thompson & Lee, 2012). As academics, it is our responsibility to encourage experimentation to facilitate finding the best strategies for them. We may wish to offer suggestions, but explaining this is a new realm for everyone may embolden students to take the lead.

Rotherham (2008) even claims that giving students richer feedback will save time in the long term. Students will take more notice of feedback; need less repeated feedback; and require less critical feedback, in future as their work improves. Video feedback should therefore be viewed by staff as a long term investment.

9. Future Work

The conclusions here are drawn entirely from quantitative data. There is much qualitative data still to be analysed. In addition, there are many other aspects to be examined.

Working out how students watch their feedback might be both insightful and influential. Not only where and when do they watch, but who they share their videos with, and who do they discuss them with. It is possible that they don't watch the video to the end or perhaps they view videos multiple times. We also have the data to pursue analysis of categories of student, such as gender, prior qualifications, English language proficiency, additional learning needs and interests as indicated by the chosen degree title.

We can attempt to optimise the content of the videos by looking at styles of presentation, structure, duration, levels of detail and examine whether the intended message is conveyed successfully to the student (Henderson & Phillips, 2015).

Enabling the student side of the conversation is not a mechanism we have considered to date. Would there be additional benefit by making that possible as was done in Reading with their new communities of learning (Crook et al., 2012), or have we already maximised potential by creating feedback on an individual basis versus their generic version? We may wish to include the assessors face on screen and determine if there really is benefit to bringing the feedback closer to the face to face meeting desired by students (Henderson & Phillips, 2015). This relies on the willingness of staff to take part in such a study.

Studies have had positive results using generic videos. Does personalisation come from demonstration of the student's individual work, or the presence, albeit virtual, of the staff discussing the assignment? When supplying written feedback staff kept lists of common comments to save retyping, making efficiency savings by virtue of the copy and paste facility. There is the potential for technology to enable assessors to record a video explaining a problem with individual work, and then to select a generic video on how to fix it, automatically dropping it into the timeline of the recording in a similar way.

However, with all these potential areas to follow up, there are two likely next steps.

1. Analysis of the quantitative data already collected with regard to objective 1.

2. A study into whether screen cast video as assessment feedback provides improved opportunities for students to use learning gained during feedback review, in future work (objective 2).

Students have often moved their whole lives to begin their HE program, or are managing additional stress on top of a previously full life. Due to their age and maturity, change of lifestyle, and/or displacement from home, students are at a point in their lives when even the most level headed is emotionally vulnerable. Students believe, trust, and indeed expect, that staff know how to construct useful feedback, which also leaves their self-esteem at least intact, if not lifted. We must continue to strive to deserve their faith in us. Positive results means progress towards enabling students to fulfil their potential, and a step closer to the ultimate learning experience for our students.

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