Combining screencasting and a tablet PC to deliver personalised student feedback

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Effective feedback is an essential part of the learning process allowing students to assess their comprehension and grasp of a particular topic and providing expert constructive advice on how to improve their performance.

Abstract
In many large research intensive universities in the UK the ability to provide a personalised university learning experience for their students is providing a serious challenge. Based on the National Student Survey (NSS) data, the absence of focused personalised feedback is often a concern of students. Here we describe how we use the combination of modern technologies encompassing a Tablet PC and screencasting to provide a personalised feedback to our students on submitted coursework and tutorial example classes. The fundamentals and practicalities of this approach, in particular with regard to the physical sciences, are described and data from student attitudinal and informational surveys are presented.

Introduction
Effective feedback is an essential part of the learning process allowing students to assess their comprehension and grasp of a particular topic and providing expert constructive advice on how to improve their performance[1]. To be effective, feedback needs to satisfy the following four criteria: it should be (a) timely, (b) meaningful, (c) constructive and (d) personal. The effectiveness of feedback in UK higher education has been questioned in recent years due to the low scores achieved by questions relating to feedback in the National Student Survey (NSS). Of the twenty one questions raised in the main questionnaire, feedback-related questions regularly achieve the lowest score. It is of interest to point out what specific questions concerning feedback are asked. Questions 7,8 and 9 relate to feedback and are given below:

7. Feedback on *my* work has been prompt.
8. *I* have received detailed comments on *my* work.
9. Feedback on *my* work has helped *me* clarify things *I* did not understand.

These questions in essence query directly three of the criteria for effective feedback described above. Question 7 addresses timeliness. Question 8 addresses the meaningfulness of the feedback given and question 9 addresses the constructive nature of the feedback. The other criterion, personal, is implicit in each question with the use of "I", "me" and " my" throughout.

Universities throughout the UK have been actively engaged in finding out student attitudes to feedback and trying to find ways to improve and adapt feedback to these student needs. An informative UK-wide survey of student attitudes to feedback is given by the Higher Education Academy at: <www.heacademy.ac.uk/resources/audioandvideo/assessment>. From such surveys and the author's own discussions with students at the University of Manchester a significant student-perceived failure of feedback at university is the lack of the "personal touch" where the student needs their own particular problem to be addressed rather than general ones. In school students are used to a more personal relationship with their teacher and feel their personal development is being monitored. For a variety of reasons such one to one student-tutor teaching is no longer feasible in UK higher education. To address such problems others have looked at the feasibility of using technological advances in communication to facilitate more effective feedback. Of direct relevance to the topic of this report is the use of audio feedback[2,3] as reviewed recently by Middleton and Nortcliffe[4]. These studies have shown that use of the voice can significantly improve the effectiveness of feedback. Intonations in the voice can often be much clearer in emphasising key messages to the student and are also perceived by the student as being more personal and supportive than just written comments. In this report we present our findings from a pilot study conducted by the author on the use of screencasting to provide feedback to chemistry students on project reports and tutorial/workshop questions. This approach is shown to lead to feedback which is perceived by the students to be effective and highly personal. Based on our experience we also demonstrate an effective method of constructing and

delivering such screencasts that requires no significant extra work from the tutor as compared with more traditional approaches.

Methodology
Tablet PC
The Tablet PC contains a pen that can be used to write or draw on the laptop screen using digital ink. The Tablet PC used by the author is a convertible Tablet where the screen can be rotated to convert from a normal laptop to a flat screen for writing purposes. Digital ink is available in a variety of colours and it can be easily modified or erased. While initially it can be difficult to write clearly on a computer screen, it is similar to writing on an overhead projector and with practice the author has found that he can write more clearly on the

recorded. You can also record a web camera image of yourself to accompany your presentation. There are a number of software products, both freeware and commercial, which allow you to record screencasts. The most popular, and the one used in this work was Camtasia Studio. Screencasts should be distinguished from Podcasts which generally refer to audio-only files which can be downloaded in a variety of formats. As mentioned in the introduction audio feedback using podcasts has been reviewed by Middleton and Nortcliffe[4]. In a physical science subject such as chemistry, where illustration and visualisation plays such a significant part, audio-only podcasting has limited potential for feedback, whereas a screencast combining graphic and dynamical illustration abilities in addition to audio commentary is ideally suited to the subject.
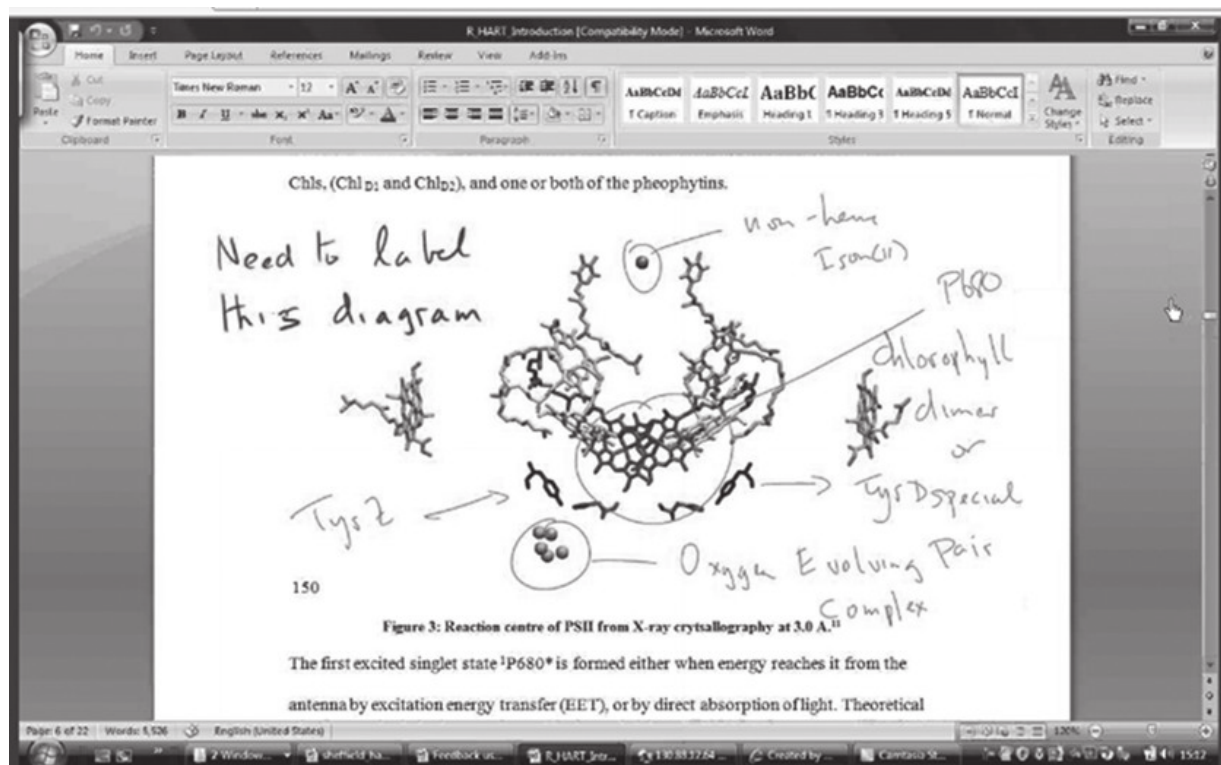

Figure 1: Snapshot of screencast feedback on a project report illustrating annotations inserted using Tablet PC. The document was submitted by the student as a Word document. Audio explaining annotations would accompany visual

Tablet than on paper. In addition a variety of writing styles and colours are available simply by clicking on an icon. Microsoft Word has an inking option available for Tablet PCs allowing text to be written anywhere on the document and saved for future reference.

Screencasting
Screencasts are a digital video recording of your computer screen activity and usually include synchronised audio commentary. Essentially they are equivalent to letting somebody look over your shoulder to view your on-screen activity while you provide a running commentary. You can limit the recording to a specific program e.g a Word document or you can define the part of the screen that you wish to be

Results
The use of screencasting feedback was piloted by the author on two main feedback areas of the chemistry curriculum at the University of Manchester. As part of their final year, MChem students are required to complete a final year research project and write an interim and final report. A group of students is assigned to each supervisor at the start of the final academic year. The interim project reports midway through the project are examined by the supervisor. Feedback is traditionally given in the form of a written proforma report on the submitted work. The report is submitted both electronically and in paper format. In the last academic year the author has returned screencast feedback on these reports to his students. The electronically submitted document is read onscreen and using

the inking facility provided by Microsoft Word the document is annotated with specific corrections or suggested changes using a Tablet PC. After this initial reading of the document a screencast is recorded where the document and the suggested changes/improvements are summarised by the author. The student reports can be up to 40 pages long so this procedure of first reading and initially correcting the report permits the tutor to provide a short specific screencast report to the student usually lasting no longer than 5-10 minutes. The author saves the screencast in an Adobe Flash format (.swf) which can be viewed in any web browser. A wide range of other video formats are available but this has been found to be suitable for this current project. A screenshot from such a report is illustrated in Figure 1. The screencast and the annotated report are then returned by e-mail to the student.

students to complete prior to the tutorial meeting. The answers are submitted prior to the tutorial meeting where they are marked by the tutor and returned with comments to the students at the tutorial. The tutorial time is usually used to review the answers to the problems and discuss generic problems raised. Although students can supply word-processed answers, this is not a requirement and answers are usually handwritten. In the pilot project students were asked to scan their handwritten answers and insert them as image files into a word-processing document such as Word. Most were quite adept at this and for anybody who was unable to do this I agreed to scan their handwritten answers if submitted by the given deadline. For a larger cohort of students this, if necessary, could be done using secretarial help. The number of questions to be completed by the
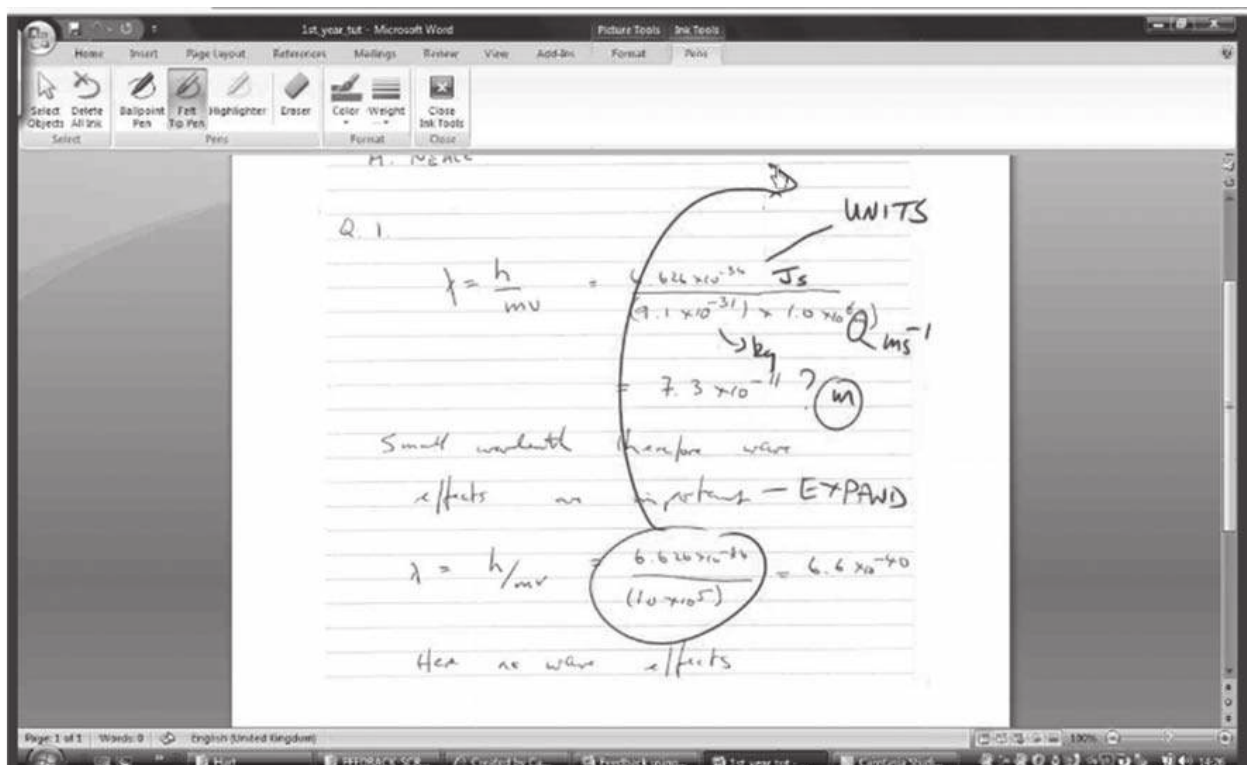

Figure 2: Snapshot of screencast feedback to student answer to tutorial question in physical chemistry. Student has handwritten answer and pasted scanned image into a Word document which is submitted electronically. Tutor annotations using a Tablet PC are shown and are accompanied by an audio commentary on the screencast

The work involved for the tutor is essentially the same as that involved for a more traditional feedback using a proforma. For the students this sort of feedback was very popular and preferred to the more traditional approach. Typical comments were:

" I really found the screencast useful. It was much better than reading a form where I often feel the same comments are made to all students"
"Ideal way to return feedback. It feels very specific to my needs and I can view it when or as often as I like"

The second use of feedback screencasting using a Tablet PC was for a 1st Year tutorial group. Traditionally, example questions are supplied each week by the unit lecturer for the

students is generally 4-5 so in this case the screencast was usually ran on opening the file received by e-mail from the student. As illustrated for the coursework example above, annotations and suggestions can be inserted on the answers using the inking facility of the Tablet PC, all being synchronised with audio commentary. A screenshot of such feedback is shown in Figure 2. The screencast was saved in Adobe Flash format and returned to the student using e-mail. At the tutorial meeting time the students had already received screencast feedback on their work individually and the tutorial time could be used to cover other areas of the course or specific difficulties raised by the students. In many cases students questioned even the need for a full-length tutorial as they had already received individual, personalised feedback

on their submitted answers. As for the first example, no significant extra time was expended in using screencast feedback compared with the traditional format, indeed as most of the face to face tutorials were shorter in duration the tutor time required was actually less. Students were universally favourable in their reaction:

"quite a nice way of marking instead of just red ink comments and talking explanations are so much better and encouraging"

"simple things like commenting on how I put my answers together and how my untidiness in presentation can lose me marks are so useful"

"sometimes its difficult to get what is meant by written comments, having the voice as well makes it so much more understandable"

Often written comments, either on the student work or in a form, can be misinterpreted... The accompanying voice can be used to ensure that corrections and suggestions for improvement are constructive in nature and lead to enhanced future performance.

Discussion

As mentioned in the introduction it is often a lack of the personal or individualised "feel" that students most dislike about university feedback. Advances in communication need to be exploited by tutors to provide a personalised aspect to student feedback. Here we have shown how screencasting feedback can be effectively used to achieve this. On-screen annotation synchronised with the audio commentary is facilitated by use of a Tablet PC. An alternative approach would be the use of Word's review and comments facility with typewritten annotations. This is much less flexible than pen annotation and it would be difficult to achieve the annotation produced in Figures 1 or 2 with this facility. Many lecturers are traditionally used to writing comments in ink and the Tablet PC allows this. In the author's opinion pen annotation feels more natural and quicker to perform in particular while providing commentary at the same time. In some cases it may well be of benefit to combine both methods.

The power of the voice to convey the emotion of the tutor is quite important in our approach. Often written comments, either on the student work or in a form, can be misinterpreted and have negative connotations for the student. The accompanying voice can be used to ensure that corrections and suggestions for improvement are constructive in nature and lead to enhanced future performance. In addition the screencast provides the student with a unique opportunity to hear the tutor reflect on his/her work and make suggestions for improvements. Even compared to meeting each student on a one-to-one basis, there are some unique benefits for screencast feedback. Part of this arises from the opportunity for the student to hear the tutor reflect on the submitted work. This type of reflection is more difficult in a face to face meeting. In addition students often find one to one meetings with tutors quite daunting and can be very nervous as their work is discussed. As such they may find it difficult to relax and concentrate on the comments of the tutor. The screencast approach where the student can listen and see the tutor's comments in their own time and as many times as necessary alleviates this. Of course the screencast is a one way interaction and the student cannot question or ask for clarification of the tutor's remarks. However is always possible for the student to contact the tutor via e-mail or personally to clarify anything covered in the screecast feedback.

It is important to point out, from the tutor viewpoint, that once the technological aspects are mastered, the time taken to deliver feedback in this manner is not any different to that expended in more traditional approaches. Learning to record a screencast is in the author's opinion no more difficult than mastering a presentation package such as PowerPoint. Screencasting is used by the author in other areas of teaching such as lecture capture[5] and molecular modelling demonstrations[6]. The author has also found it useful in providing advice and feedback to postgraduate students conducting research projects. It is also possible to use this approach to provide more generic feedback to a whole cohort of students perhaps in addition to the personal approach focussed on in this report.

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