SUPPORTING TUTORS WITH THEIR FEEDBACK USING *OPENMENTOR* IN THREE DIFFERENT UK UNIVERSITIES

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ABSTRACT
Assessment has been identified as one of the major challenges faced by Higher Education Institutions (Whitelock, et al, 2007). As a response to the challenge, in a project funded by the Joint Information Systems Committee (JISC) the Open University developed Open Mentor (OM), a learning support tool for tutors to help them reflect on the quality of feedback given to their students on assignments submitted electronically. It was developed on the fundamental theory that there was convincing evidence of systematic connections between different types of tutor comments and the level of attainment in an assignment (Whitelock et al 2004).
The work initiated by the Open University is being continued at the University of Southampton and King's College London through the JISC-funded Open Mentor technology transfer (OMtetra) project. OMtetra aims at taking up OM and extend its uses by developing the system further and ultimately offer better support to tutors and students in the assessment process.
The findings to date from the preliminary testing suggest that changes are required to the algorithm used in the analysis of feedback comments together with the introduction of a module for user authentication that would facilitate integration within any university system. In addition, changes to the types of assignments processed by OM have been also suggested by tutors who assess marked assignments as well as essays written by post-graduate students which do not necessarily need to have a mark but require complex feedback that allow students to enhance academic writing skills.
OMtetra is an on-going project with high potential. We believe that the tools that result from the development and trial implementations of OM will contribute highly to the area of assessment and feedback in Higher Education Institutions (HEIs) since it is an open source tool that will have wider applicability through the customisation process that is currently being undertaken.

KEYWORDS
e-feedback, technologies for Education, assessment, tutors' feedback, Bales Categories

BACKGROUND

One of the major challenges for Higher Education today is that of assessment. This is due to a tension between the demand for institutional reliability and accountability on the one hand and a move towards a more social constructivist approach to learning on the other (Whitelock & Watt, 2007). The main thrust of this latter work has come from the cultural historical perspective (Cole, 1990; Vygotsky, 1978). Within this socio cultural perspective one of the most important premises is the recognition that individuals shape the cultural setting which in turn alters and shapes the development of individual minds (Wells & Claxton, 2002). This is an important consideration when tutors are trying to shape students' learning behaviours through the use of pertinent and salient constructive feedback.

Technology has a role to play in enhancing the assessment feedback cycle but only if it has been designed to improve the effectiveness of the assessment from a learner's point of view. The call for a pedagogically driven model for e-assessment was acknowledged as part of a vision for teaching and learning in 2014 by Whitelock and Brasher (2006). Experts believe that such a model will allow students in Higher Education to take more control of their learning and hence become more reflective,

but how can this be supported with tutor feedback? One of the problems with tutor feedback to students is that a balanced combination of socio-emotive and cognitive support is required from the teaching staff. One approach adopted by Whitelock et al (2004) to solving this problem was to build an electronic tool to support tutors with the feedback process. This tool, known as OpenMentor (OM), analyses and displays the different types of comments provided by the tutor as feedback to the students. It then provides reflective comments to the tutors about their feedback practice. This tool was designed by and used within the Open University. However, there is interest in improving the feedback given to students in Higher Education (HE) throughout the UK. This interest was prompted by the annual Student Survey and has led to an awareness of how OM might assist other institutions in supporting tutors with their feedback to students.

In response to the interest, a project was set up to transfer OM to external institutions, the University of Southampton and King's College London. This paper reports the OpenMentor Technology Transfer (OMtetra) project's progress to date and addresses the following research questions:

- Would tutors who were not trained by the Open University accept the comments given to them about their feedback to students produced by OpenMentor based on Bales taxonomy? And if so, how would tutors incorporate their learning experiences after using Open Mentor?
- What changes would be needed to facilitate cross institutional use of OpenMentor?
- What would be the strengths and limitations of OpenMentor as a tool used for training purposes?

The findings should assist the project in producing an open source tool to enable the software to be easily deployed and freely used without licensing costs.

THE IMPACT OF FEEDBACK ON STUDENTS' LEARNING

In discussing the impact and importance of feedback on learning, it is useful to outline a view of education, learning, and teaching in which feedback plays a central part. Education may be characterised as the alignment of learning with intended outcomes or objectives, and the role of a teacher (which includes the learner when their activities involve self-study, self-teaching, or self-evaluation) as comprising three components: providing materials to support learning; asking learners to undertake learning activities; and providing feedback. This produces a model which has the potential to change student's behaviour. In this model, feedback is characterised as the consequences of behaviour which lead to learning. This conceptualisation of feedback places it at the centre of education, learning, and teaching; and assumes that without effective feedback, the learner is most unlikely to achieve their intended outcomes or objectives.

This model of education and the essence of the learning and teaching situation as shown in Figure 1 has been called the "learning transaction" (Gilbert, Sim, & Wang, 2005; Gilbert & Gale, 2008). Draper (2002) and others emphasise the role of the learner in providing their own, internal, feedback about their performance, and this view is entirely consistent with the learning transaction and the model of education which contextualises our discussion.

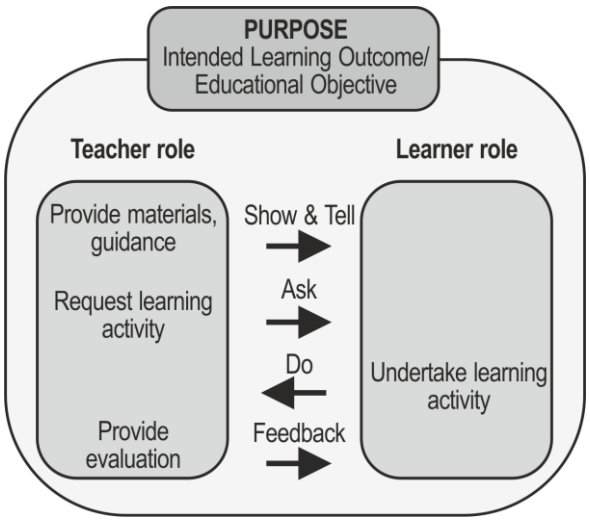

Figure 1. The learning transaction (adapted from Gilbert & Gale, 2008)

A useful distinction is often made between formative and summative assessment (Bloom, Hastings & Madaus, 1971). In this distinction it is important to note that feedback is not a necessary component of summative assessment, but an essential component of formative assessment. Nicol and Macfarlane-Dick (2006) have identified seven features of effective formative feedback (see Table 1). These features have to be in tutors' minds when constructing their feedback in order to provide a balanced view of the students' performance on a given assignment.

Table 1. Nicol & Macfarlane-Dick's features of effective formative feedback

1. Facilitates the development of self-assessment (reflection) in learning.
2. Encourages teacher and peer dialogue around learning.
3. Helps clarify what good performance is (goals, criteria, expected standards).
4. Provides opportunities to close the gap between current and desired performance.
5. Delivers high quality information to students about their learning.
6. Encourages positive motivational beliefs and self-esteem.
7. Provides information to teachers that can be used to help shape the teaching.

Turning to the provision of feedback within an e-learning and e-assessment environment, it is useful to note the recent reports of Szwelnik (2010) and Gilbert, Whitelock, and Gale (2011) which explore the use of technology in the provision of what we might call e-feedback. These reports emphasise the fact that successful e-feedback lies with the pedagogy rather than the technology itself. The technology is an enabler and it is the pedagogically-informed design of appropriate and constructive feedback which underlies the success of e-assessment. Additionally, Gilbert, Whitelock and Gale (2011) emphasise that staff development and support are vital when introducing and developing e-assessment and e-feedback. These findings form the basis of the Open Mentor application and of the OMtetra project.

OPEN MENTOR

The Open University developed OM (Figure 2) as a response to the challenge of delivering meaningful and learning-conducive assessment to students. Under such premise, OM was created as a learning support tool for tutors to help them reflect on the quality of the feedback they give their students on assignments submitted electronically. Underlying the construction of the tool is the fundamental notion that there is convincing evidence of systematic connections between different types of tutor comment and the level of attainment in an assignment (Whitelock et al., 2003).

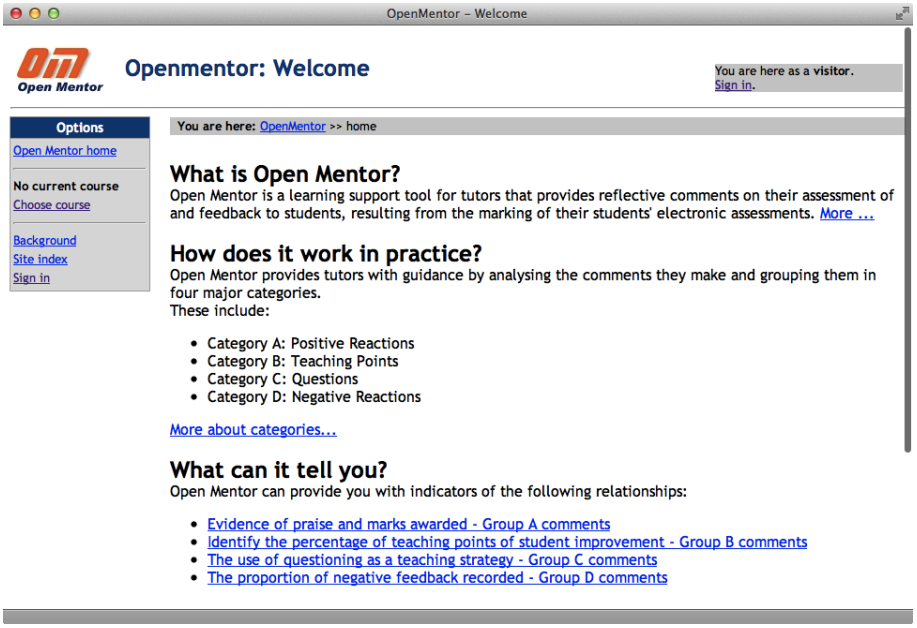

Figure 2. Open Mentor welcome screen

BALES FRAMEWORK FOR FEEDBACK CATEGORISATION

OpenMentor is based on Bales (1950) interactional categories which provide four main types of interaction, namely positive reactions, negative reactions, questions and attempted answers. These interactional categories illustrate the balance of socio-emotional comments that support the student. Table 2 provides examples of classified feedback following the main interaction categories. The algorithm of OM analyses tutors' feedback under Bales categorisation and produces graphic reports using the four interaction types. These reports can be studied by tutors to understand and potentially enhance tutors' feedback styles.

Table 2. Bales categorisation of interaction

Categories	Feedback structure	Feedback comments examples
Positive reactions		
A1 – Shows solidarity	Jokes, gives help, rewards others	Very Good section, applying Rowntree's Table 1.3.
A2 – Shows tension release	Laughs, shows satisfaction	Conflicting ideas that have been resolved elegantly, well done.
A3 – Shows agreement	Understands, concurs, complies, passively accepts	Yes. They often also have a conflicting interest.
Teaching points		
B1 – Gives suggestions	Directs, proposes, controls	You need a date here to link it to the reference list.
B2 – Gives opinions	Evaluates analyses, expresses feelings or wishes	I like the way you've used footnotes to explain your acronyms. Good idea.
B3 – Gives information	Orients, repeats, clarifies, confirms	Page 10 of the Assignment Guide shows how to write out these kinds of references.
Questions		
C1 – Asks for information	Requests orientation, repetition, confirmation, clarification	Here you should have a citation. Did you get this from a particular report?
C2 – Asks for opinion	Requests evaluation, analysis, expression of	If you hadn't specified computers, would it have been clear what you were asking?

	feelings or wishes	What other facilities might there be?
C3 – Asks for suggestions	Requests directions, proposals	What do you think you should do about that?
Negative reactions		
D1 – Shows disagreement	Passively rejects, resorts to formality, withholds help	It is not too clear to me that you addressed the second part of the question.
D2 – Shows tension	Asks for help, withdraws	I might not agree entirely with your argument. Perhaps you can elaborate on it further?
D3 – Shows antagonism	Deflates others, defends or asserts self	Adding more evidence to support your view will strengthen your argument, regardless its rather controversial nature that some would point out

Whitelock et al. (2003) found that tutors use different types of question in different ways, both to stimulate reflection, and to point out, in a supportive way, that there are problems with parts of an essay. These results showed that about half of the Bales interactional categories strongly correlated with assessment grades in different ways, while others were rarely used in feedback to learners. This evidence of systematic connections between different types of tutor comment and the level of attainment in assessment was the platform for the current work.

The advantage of the Bales model is that the classes used are discipline-independent. Whitelock et al. used this model to classify feedback in a range of academic disciplines and it proved successful in all of them. An automatic classification system, therefore, can be used in all fields, without needing a new set of example comments and training for each discipline.

Others (see for example Brown and Glover, 2006) have looked at a range of classification systems, including Bales. From these systems, Brown and Glover developed their own classification system to bring out additional aspects of the tutor feedback, specific to science training. In practice, no (useful) classification system can incorporate all comments given by all tutors. Whitelock et al. selected and still prefer Bales system because of its relative simplicity, its intuitive grasp by both students and tutors, and because it brings out the socio-emotive aspects of the dialogue, which is the one aspect tutors are often unaware of.

The following sections report on the pilot studies that have taken place in the participating institutions and how these were organised. The aim was to evaluate the use of OM by local tutors, to document the user experience, and to establish whether any development work would need to be carried out for the next phase of the OMtetra project.

TRANSFERRING OPEN MENTOR

Open Mentor was introduced to tutors of the three participating institutions of the OMtetra project in October 2011. Tutors were invited to use the system to analyse the feedback provided in their assignments and report their experiences. In order to collect their views on the system a questionnaire (See Appendix A) was prepared and used across the three institutions (including the Open University as the system was re-adopted within a module of technologies for learning and teaching). In order to accommodate the particular working patterns of each department the questionnaire was slightly modified by members of the research teams.

The number of tutors involved in the first stage of the project varied per institution. Also, the system was presented to tutors in various ways, including face to face short training sessions and/or use of materials and resources available from the webpage for on-line training, with continuous support via email or chat.

RESULTS

This section presents details of the participants and results from the analysis of the data collected through the questionnaire and interview study. This is followed by the features identified by all participants as recommendations for an improved version of OM[1].

King's College London

The original version of OM was used by three tutors (two academic developers from King's Learning Institute and a lecturer from the Department of Education and Professional Studies).Two of them were interviewed (on average one hour length) and gave feedback and discussed their generated reports. Feedback was received from twenty five e-learning experts during the college Technology Enhanced Learning forum who gave feedback on the functionality of the system together with tutor and student requirements of OM, after a demonstration of the system.

Tutors at King's were very positive about the opportunity they were given to receive comments about their feedback practice, as they had not received this type of feedback before in a structured fashion. Feedback on assessment practices which is given to assignments is received at tutor team meetings and sometimes at programme exam boards but not consistently.

The tutors did not experience usability issues and they appreciated the induction that was offered to them, however one of them pointed out that uploading the assignments was laborious and potentially time consuming for which they thought it would be useful to have administrative support to complete this task. This task however may be integrated into the marking exercise which will ultimately streamline the process, counteracting the seemingly laborious task of uploading assignments with the benefits of providing quality feedback to students.

They were appreciative of the multidisciplinary aspect of the system, however one of them commented on the particular idiosyncrasies of disciplines that might make evaluating feedback across different disciplines difficult. They would like the system to have a purely formative function, which they claimed would be useful for feedback on draft assignments and where the summative aspect could be 'switched off' (e.g. in feedback given to PhD students). Only one tutor thought that some of the system classifications were inaccurate, e.g. in teaching points and questions. She also pointed out that she would like to see the system advise whether the comments are synchronous with the grade[2].

Tutors were happy with sharing the feedback from the system and the Bales' categorisation outcomes with their students and colleagues. They thought that in both cases this would lead to useful discussions that would allow establishing common views about what constitutes constructive and supportive feedback. One of the tutors (who is the Programme leader of the Postgraduate Certificate in Academic practice, a King's programme, whose target audience is probationary lecturers and inexperienced tutors) highlighted that a system such as Open Mentor could be a very useful peer review tool in face to face workshops. She also recommended the tool for novice tutors who would appreciate feedback on their assessment practice.

Overall, improvements in the system tutors would like to see included:

- accessfrom everywhere (inside and outside the College, not the case for King's when the pilot study took place, so there needs to be implemented before further tutor engagement)

[1] The features and overall feedback were used to plan a further development of the system which is now being implemented and trialled as the second stage of the OMtetra project.

2 In order to facilitate understanding of reports generated by OM, the results tables were slightly modified during the development stage of the project.

- Enhancement of narrative in reports as quite often the graphs were not easy to interpret, without supporting explanations.
- Renaming 'negative' comments to 'areas for improvement' or similar, as they thought current trends in assessment avoided terminology of this kind and the term might alienate students. It must be noted that an alternative name for the category was not proposed, as a result, a decision was made to preserve the labels under Bales taxonomy and discuss this issue in further work.
- A purely formative function to be used in commenting on drafts.
- Developing the route that would help tutors to move towards the ideal 'state', which they thought was not explicit in current version.

Southampton
The original version was used by three tutors. The three participant tutors were sent a questionnaire regarding OM. Two of the tutors who responded the questionnaire were also interviewed.

The evaluation of OM by the ECS lecturers involved in OMTetra resulted in the realisation that the framework used to analyse tutors' feedback was only able to offer a partial perspective of the qualitative value of tutors' comments given to a student in a particular assignment. Tutors in ECS focus their feedback in two major aspects including the structure of an essay and the skills associated with the subject under study, like for instance, programming skills, mathematics analytical skills or reasoning skills underlying the creation of algorithms and software design. Lecturers found that Bale's approach as implemented in OM was extremely useful in the assessment of students' academic writing but less helpful for the analysis of feedback regarding how a programming language was used in the development of a system (e.g. for a student to develop programming skills in a particular language, all syntax errors in a program need to be marked as *errors*. In programmes written by undergraduate students who are in the process of developing programming skills will present cases where a single programme may have a large number of errors. Tutors evaluating assignments which include the writing of a programme would comment those mistakes as errors only. As a result, OM reports would show an imbalance between the ideal number of comments classified as negative and those actually given by the tutor, however, in this case, the imbalances do not need to be corrected).
The conclusion of the tutors was that the algorithm used to evaluate tutors' feedback is appropriate for determined situations but not generalisable to other contexts or subjects.

The Open University
OM was evaluated by three distance education tutors using the questionnaire prepared for all three sites. Feedback and discussions took place by email. OM was implemented within a module of 113 students in a Masters course focussing on Innovation in eLearning and 5 tutors.
Student enrolled in the course sent feedback on OM by email. These contributions were spontaneous and were not initiated by the researchers. The feedback received centred on technological issues found whist interacting with OM. These were considered during the development of the enhanced version of OM.

ENHANCING Open Mentor

A feature we identified for improvement of OM was the analysis algorithm. Originally, OM classified tutors' comments into four categories by applying a naïve text-matching algorithm. This involved building a substantial collection of comments, manually categorizing them, verifying inter-coder reliability, and then generalizing to a set of static patterns – implemented as regular expressions. The analysis algorithm simply works through the patterns to find the best category match. This is technically complex to maintain, and fragile. The ideal analysis algorithm should require minimal maintenance, and where possible, any maintenance should be implemented to take place automatically through the tutors' use of the system.

Classifying comments is a challenge because there is a comment genre – comments have a form that is distinct from their topic. Positive comments on philosophy essays are similarly structured to positive

comments on business essays. It is this aspect of form that allowed the pattern-based approach to work as well as did. A successful analysis algorithm will need to be sensitive to the form of the comments, without being confused by changes in topic. In practice, this means it needs to use structural features (e.g., word orderings, punctuation) as well as linguistic ones (Dewdney et al., 2001; Watt, 2009). A simple 'bag of words' classifier is not sufficient. Genre-based classifiers typically require more complex feature identification – and this is a strength of the pattern-based approach.

Allowing tutors to provide feedback to the classifier through the OMtetra interface would also be a significant improvement. Then, as the number of users grows, so will the quality of the analysis process, making it more comprehensive and intelligent as the precision of the classification improves. However, this is a challenge – it is important that as tutor feedback is incorporated, any changes to the classification still comply with Bales Interaction Process model.

There are a number of classification algorithms that are amenable to this approach, and that can incorporate feedback through manually classified exemplars. Support vector machines generally perform well in text categorization, as do case-based classifiers (Watt, 2009). Both approaches typically offer better accuracy than a pattern-based approach, and are more maintainable. Some empirical work will be required to provide a definitive recommendation – and it is possible that both approaches are made available, with the option to select configurable by a local administrator.

One important enhancement to OM was identified as its capability to integrate with existing information management systems in different academic institutions. OM has already utilised a built-in database where students, tutors and course information are saved. But the user management component in the backend of OM is left open, which allows OM to integrate with existing user management systems in different academic institutions, where data sources for student, staff, course lists and assignment content are provided. However, these functions still require a lot of further development under the current implementation. Grails builds on Spring Framework and many functions mentioned above are supported out-of-the-box. Under Spring Framework we can divide the input resources of into a number of individual components. One institution could integrate its own resource of users and courses into OM. We also use Spring Security Framework to provide support of various authentication systems with some configuration, such as Lightweight directory Access Protocol (LDAP) and Shibboleth . In this case, OM only refers the authentication information in existing systems and the users and course information in other management system will not be duplicated in OM's own database. In this way, the modules in OM can reuse the existing resources from external systems.

CONCLUSION: TOWARDS AN ENHANCED OPEN MENTOR

Innovative use of ICT tools and technologies can facilitate the provision of timely instant feedback to students in tertiary education. It can also help students to evaluate the quality of such feedback. The pilot testing has revealed that tried and tested pedagogical strategies in a number of disciplines can be enhanced by the use of automated feedback. The main findings from the pilot study addressed the research questions as follows:

- Open Mentor's theoretical framework was robust enough to facilitate and encourage dialogue and reflective activities for the participating tutors. Tutors from the partner institutions were positive about the system's functions to support provision of feedback.
- The changes needed to facilitate cross institutional use of Open Mentor included the development of a module for user authentication and management; enhancement of the user interface to allow some level of customisation to the look of the system; and most importantly, the development of OM reports to help tutors to progress towards the ideal 'state' of feedback provided.
- There was agreement that Open Mentor could be used for training purposes as an academic development tool. The project needs to explore ways of how to support this type of activity.

There is a growing consensus in the field of assessment that times are changing and that assessment needs to become more embedded/central in the teaching learning cycle (Hatzipanagos & Rochon 2011). However the provision of feedback that students will actually respond to and is timely and pertinent is indeed a challenge. This project provides another phase in this type of research where the balance of socio emotive content contained in feedback cannot be ignored (Draper, 2009). Feedback that encourages the student to actively change their ideas and ways of organising their answers and discourse within a given subject domain is what is required and advocated by Whitelock (2011) as "advice for action". There is still much work to be done but if the tools are under-pinned with appropriate learning and assessment strategies we are on the way.

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Appendix A

Tutor interview

Part 1: Open Mentor interface

1. Is Open Mentor easy to use?
2. Approximately, how much time did it take to 'learn how to use the system' to upload and analyse assignments?
3. Was the guide provided in the project website (or emailed/given to you) useful?
4. Is it easy to enter course information, lists of students, tutors and/or uploading assignments into Open Mentor?
5. What features would you change/add?
6. On a scale of 1 to 10 (1 the least, 10 the most) how would you rate Open Mentor:
7. design quality?

Part 2: Open Mentor usability

1. Did you find the reports the system gave you useful?
2. Were the points the report made relevant to your assessment practice and module. Did the reports have an impact on your feedback?
3. On a scale of 1 to 10 (1 the least, 10 the most) how would you rate Open Mentor:
   a. Usefulness?
   b. Appropriateness of criteria used to analyse the feedback considering your students and the module you teach?
4. Open Mentor makes some assumptions about what is good feedback and its comments point towards these directions. Did you find those comments useful and relevant to the assessment for this module?
5. Open Mentor made some assumptions about generic principles of feedback that might also be applied to the King's College generic marking criteria? Were these assumptions true?
6. How would you feel about discussing the reports on the analysis of your feedback with colleagues, other students?

Student questionnaire

Your tutor's participation in a research study to analyse the feedback given in assignments has ended, and we would like to know your opinion and perceptions on the usefulness of the feedback received in the module _____ compared to feedback you receive in other modules or that you have received in the past.

Did you find the feedback that you received from the tutor participating in the research study
   a. more/equal/less useful than feedback received in other modules/in the past?
   b. more/equal/less structured?
   c. more/equal/less clear and easy to understand and follow?
   d. more/equal/less conducive to improvement?

Would you recommend the use of feedback analysis tools?