

## EFFECTIVE USE OF MOBILE DEVICES FOR MARKING STUDENT WORK

There are a number of distinct ways in which computer systems are being used in support of the assessment of student learning. Computerised tests, such as multiple choice quizzes, provide students with questions and predefined answer options; 'online marking' refers to using computer systems, such as learning management systems, to handle submissions of student work and provide the teacher with an interface for entering feedback and marks; ePortfolio approaches focus on helping students with gathering evidence of learning and writing reflections, building up a collection of artefacts presented to teachers for assessment. In our work, we build on online marking and investigate how mobile devices can be used effectively to extend this approach.

Online marking is not a clearly defined, yet commonly used, term to describe assessment displaying the following characteristics. Student work consists of 'supply items'. This is work constructed by students in forms such as essays or reports. This work needs to be assessed by a human marker, as complexity and variety of the work make it difficult to impossible to automatically assess. The assessment usually contains both summative and formative elements. A mark or grade is given to indicate the level of competence portrait by the work, feedback comments explain the marks and point the student towards pathways for improvement. Such marking, as has been part of teaching and learning for a long time, becomes 'online', when computer systems are used in support. This changes little about the principles of the assessment, yet has a large impact on practicalities, to the extent of opening up opportunities of better applying well-understood pedagogies in practice (Heinrich, Milne, Granshaw, 2012).

A central aspect of online marking is that student work is submitted in electronic form to a central computer system. From the perspective of the teacher, the student work arrives at their desktop (or possibly notebook) computer. The teacher uses a large-sized monitor to look at the work and uses a keyboard to type feedback. Yet, there are also assessment contexts where it is not feasible or even impossible for the student work to be submitted in electronic form. One example for this is where students undertake work in a laboratory setting and the assessment focuses on physical artefacts students produce or on the procedures students carry out. Another example is where students, in their own time, create artefacts, such as engineering prototypes or works of art, that need to be assessed as physical objects to fully appreciate form and functionality. In these contexts the roles are reversed: Instead of the student work arriving at the teachers desktop, the teacher needs to move to the student work housed in a laboratory

or exhibition hall. It is for situations like these that we are looking towards the use of mobile technologies in support of assessment.

In this work we are setting ourselves a number of directions that help us working towards effective use of mobile technologies in support of pedagogically sound assessment. First, we consider practicalities as important. Tools must be easy to use, integrate well with other systems and should save time. Second, the solutions must support sound assessment practices, such as assisting with integrity of marking and with the provision of well-founded feedback that is transparent to the student. Third, mobile devices need to be used according to their strengths. In particular, mobile devices should not be used as portable desktop replacements. Of particular importance is the integration with institutional learning management systems. These systems already hold the base data about students and courses, provide the interface for communication with students, and give teachers the tools required for thoughtful compilation of marking results. Connecting to these systems is the key, if we want to use mobile devices effectively.

Expanding on the previously used examples of laboratory settings and the construction of physical artefacts, we can provide more details on mobile marking options. In typical laboratory settings, several tutors support students in carrying out tasks. Assessment is low stakes and on the spot, with tutors checking for a limited number of key aspects during or towards the end of the laboratory session. From a practical consideration, the recording of marks must be quick, possible from a variety of locations and available to all tutors. In terms of educational soundness it helps if the marking criteria are easily accessible. While a substantial amount of feedback will be given verbally as part of engaging with the students directly, reference to material for revision would be helpful. A well-designed system based on a mobile device can address these issues. In a simple implementation, the mobile device displays lists of students and marking criteria for selection. Immediate synchronisation via the learning management system provides all tutors with up-to-date data. Students can access the marking via their traditional interface to the learning management system. A more sophisticated implementation can add face recognition based on student profile pictures stored centrally, or can show links to learning resources that can be added easily by the tutors in response to the needs of individual students as part of the marking process. Besides the advantages of time savings and better transparency of marking, instant verification of student identities could be an advantage.

Where students construct physical artefacts, the teacher will visit a workshop or an exhibition hall to conduct the assessment. This type of assessment will typically be high stakes, acknowledging that students would have invested considerable effort into creating their artefacts. The challenge for the teacher is to examine an artefact in detail and to carefully assess it against criteria set for the underlying task. A particular challenge for the teacher is to clearly formulate feedback that explains any marks given and points to areas for improvement. In written student work this is often done by highlighting passages and creating direct links between student work and feedback. Also, the teacher will engage with the student work and its assessment for a considerable period of time. Again, a well-designed mobile marking system can help with these tasks. Standing by the artefact the teacher can take images with their mobile device showcasing particular aspects of the work. The teacher can audio record their thoughts, addressing the criteria of a pre-defined marking rubric. Images and recordings are transferred via the mobile device to the institutional learning management system. On return to their office, the teacher will have a solid basis for finalising marks and feedback, a task that is better completed using desktop facilities and a comfortable environment conducive to careful consideration and reflection.

Our current implementation provides a technical proof of concept. We are implementing for the Moodle learning management system, building on the mobile Moodle application that utilises HTML5, CCS3, JQuery, REST web services and Phonegap technologies (<http://moodle.org/mod/forum/discuss.php?d=206758>). A full implementation is dependent on the release of the (new) official mobile Moodle application and the completion of Moodle web services, both of which are scheduled for Moodle 2.4, expected early 2013.

#### References

Heinrich, E., Milne, J., Granshaw, B. (2012). Pathways for improving support for the electronic management and marking of assignments, *Australasian Journal of Educational Technology*, 2012, 28(2).

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