

Putting the 'me' into media: Exploring different strategies to embed the integration of streaming media with cognitive tools, into learning activities

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Abstract

The use of streaming media is becoming more prominent in the higher education sector as a tool for implementing learning and teaching strategies. Learning activities with high degrees of interactivity and engagement are suggested to be more effective in fostering higher order thinking and learning (Oliver & Omari 1999). To assist teaching staff in developing highly engaging and interactive learning activities Software, Multimedia and Internet Learning Environments (SMILE) developed an Integrated Media Enriched Teaching tool, IMET. The tool was designed to cater to the range of diverse teaching and learning philosophies that underpin learning activities. The intended versatility, personalisation and community participation are evidenced by the diverse range of trial participants' use of the tool. The IMET resource facilitated the use of a broad number of Internet learning activities, including concept checking, multiple-choice quizzes, reflection, communication and collaboration, exam revision, pre-testing prior to practical activities (lab and fieldwork), and provision of case studies. This paper examines the use of IMET through several case studies outlining the implications of integrating various media items; if juxtaposing media with cognitive tools media it can facilitate increased interactivity, engagement and ownership among student cohorts.

Keywords

Streaming media, integration, interactivity, video, reflection, collaboration, communication

Introduction

The remarkable thing about television is that it permits several million people to laugh at the same joke and still feel lonely. — T. S. Eliot

One of the main challenges in creating meaningful Internet learning environments is catering to a wide range of learning styles and teaching philosophies. Additional difficulties lie not only in the technical development of Internet learning environments but the development of constructivist activities which actively promote student engagement in learning. To cater to the demand and growing expectations among the student body, universities have adopted numerous Learning Management Systems (LMS) which allow teaching staff to easily manage individual online resources (Donald, et al. 2002). However, LMS can be seen to promote ease of use above pedagogic integrity (Carswell 1998). Consequently, large numbers of online learning environments are designed around an information dissemination model as opposed to active engagement and student-managed learning. Compounding this model of information dissemination is the abundance of off-the-shelf products that purport to rapidly and conveniently transform presentation artefacts to online learning activities (for example, Macromedia Breeze).

Over recent years, bandwidth improvements, the cheaper availability of digital cameras and increased useability of media editing programs has seen an increase in web-delivered streaming media being used for educational purposes. In many ways the method of delivering the media has mirrored the tendency of teaching staff to upload lecture PowerPoint presentations as isolated and independent learning resources (Oliver & Omari 1999). This does respond to flexible delivery requirements, but does not offer a rich interactive learning environment whereby students are immersed in the content and associated learning activities. Walsh and Reese (1995) conclude that the combination of video with other media is an effective means of obtaining student attention 'so real learning can take place'. Similarly, Branch and Tonkin (1997), reporting on the delivery of video on demand in an Australian university, note that students were inclined to utilise word processing software in conjunction with digital video. It is proposed that the ability to combine additional resources in conjunction with media allows for a deeper learner engagement within the online learning environment.

This paper firstly discusses the broader implications of media use in learning and teaching leading to an identification of the design implications for developing and producing an Integrated Media Enriched Teaching (IMET) resource. Finally, findings derived from a Flashlight evaluation (Ehrmann 2000) of staff perceptions of the use of the designed resource will be presented.

Streaming media: the whats and whys

Nearly 80% of teens spend one to five hours each week on email. 75% spend a similar chunk of time doing homework or research online, and 66% spend as many hours Web surfing. Half of all teens still find time to watch more than six hours of TV a week. Nearly half of teens say they go online and watch TV simultaneously at least some of the time.

Source: Digital Resource Online Survey, conducted for and reported in *FamilyPC*, Feb. 2001

Streaming media provides a rapid method of delivering large file sizes via the Internet. An important aspect of streaming is that the media file is not required to be copied to the local machine for access. Users are able to access the media as soon as the request is made, as the computer 'buffers' data into the memory in advance of it being utilised. The proliferation of high-end commercial web sites incorporating vast quantities of streaming media, animation, and interactivity has resulted in high student expectations of media in the online learning environment (Looms 2002).

Content delivered via streaming media provides a convenient means of responding to and catering for the generational learning characteristics of: the millennial student cohort (Oblinger 2003); distributed education students (Walsh 1995); and on-campus students, who have expectations that all subjects have a minimum accessible online presence (Looms 2002). Additionally, streaming media also assists in the resolution of some technical and legislative requirements, such as:

- disruption to access when downloading large files that require extended periods of time in an environment that can be subjected to spontaneous and erratic periods of connectivity; and
- current copyright legislation, as the file is not downloaded to the user's computer.

For the above reasons, universities are investing in the ability to capture and stream lecture content to students (Lord 1998). Care must be taken in this practice to ensure that the learning needs of the student cohort are met. Clarification of why the media is being provided is critical, that is, as a supplement to exam revision resources, as a replacement for attending face-to-face lectures or as an engaging media-rich resource.

The use of video in education has been widely researched with authors noting that the use of video in short segments maximises learner concentration (Shephard 2003). Additionally, the ability to immerse learners through interaction and guidance is recommended (Shephard 2003). Oliver and Omari (1999) note that learning activities with high degrees of interactivity and engagement are suggested to be more effective in fostering higher-order thinking and learning. Through advances in streaming media technologies and software developments the ability to incorporate visual media with text narratives, synchronous and asynchronous discussions and online testing is readily available (Shephard 2003). This allows the use of media to extend beyond the information dissemination model and become a more immersive and learner-managed resource. The problem, however, lies in the specialist technical skills and workload required to design and deliver media-enriched resources, which often exceed the capabilities of higher education teachers.

Design of IMET

The Software, Multimedia and Internet Learning Environments section (SMILE) at Queensland University of Technology embarked on the development of an integrated media resource that combined streaming media with additional cognitive resources. The Integrated Media Enriched Teaching (IMET) resource supports higher levels of customisation within an Online Learning and Teaching (OLT) page—allowing users to ‘bundle’ OLT resources by selecting from a predetermined range of layout options. The media resource can be co-located in the one OLT page with additional resources, such as:

- Discussion forum
- Notepad
- Multiple-choice questions
- Additional text and images
- Uploaded files.

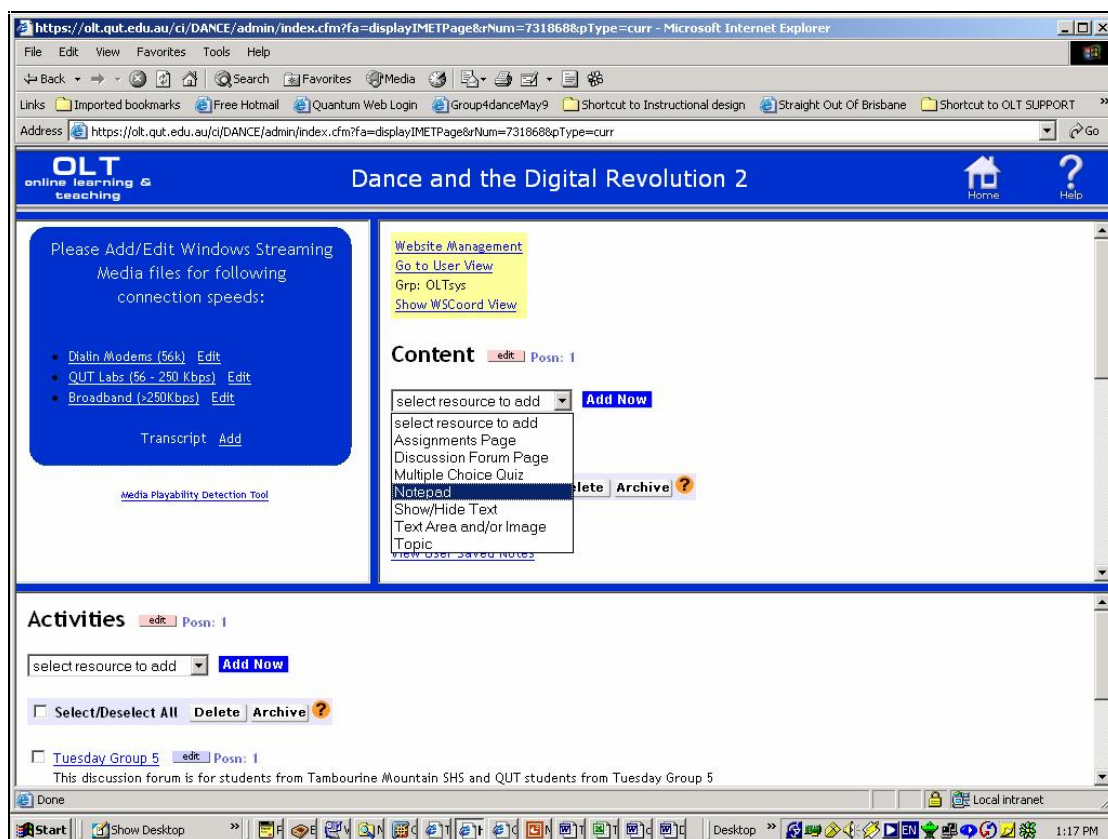


Diagram 1: Illustration of the various additional resources that can be integrated with the associated media into the one OLT page

By integrating multiple resources into the one OLT page the instructional design of IMET attempted to address issues of cognitive load (as created when users are required to navigate between multiple OLT pages when undertaking tasks) and encourage higher levels of interaction and engagement with the learning content.

IMET was designed to cater to the broad range of teaching philosophies and learning requirements of a diverse body of students and teaching staff, through a choice of templates and combinations of tools. The ability to provide an avenue for personalisation, and create opportunities for reflection, communication and submission of learning artefacts was paramount in the overall design intent. Additionally, IMET was designed with a view to minimising the requirement for high technical skills to deliver media-rich resources and drew upon the established familiarisation with current OLT developed resources. The ability to provide a resource which requires a minimum of technical literacy skills is more likely to be incorporated in learning and teaching practices, and is more likely to allow the teaching practitioner and student to concentrate on the activity's learning outcomes.

Table 1 illustrates how the above requirements shaped our design decisions (see diagrams 2 and 3 for an example of the administrator interface and user screen).

Requirement	Design response
Customisation of layout	<ul style="list-style-type: none"> Provision of three layout types which allow the lecturer to choose from three cells or two cells (split horizontally or vertically).
Customisation of delivery	<ul style="list-style-type: none"> Asynchronous delivery—students are able to access the IMET resource at any time. Synchronous delivery—in which the media file triggers display of static content (for example, PowerPoint slides and text) and cognitive tools (for example, discussion forums and quizzes). Lecturers identify items to be displayed during the playing of the media file via a storyboarding interface. Real-time delivery—allows the IMET resource to include real-time webcasts.
Facilitation of reflection type activities	<ul style="list-style-type: none"> Provision of a 'Notepad' resource that allows students to enter personalised notes within the IMET page. This resource saves their entries, which are accessible each time they return to the resource. Teaching teams are able to collate entries made by the entire student cohort, and have the option of allowing this facility to be available for students.
Accessibility	<ul style="list-style-type: none"> Provision of a 'transcript' page linked from the media cell which allows lecturers to include text versions of the media file.
Technical support for students	<ul style="list-style-type: none"> Provision of the 'Media Playability Detection' software linked from the media cell. This software detects whether or not the user's computer is able to play the media file based on browser, operating system, screen resolution and installed media software.
Range of file types	<ul style="list-style-type: none"> The IMET resource supports streaming of all Windows media file types, Flash animations and static media, such as text or images.

Table 1: Design considerations for the development of the IMET resource

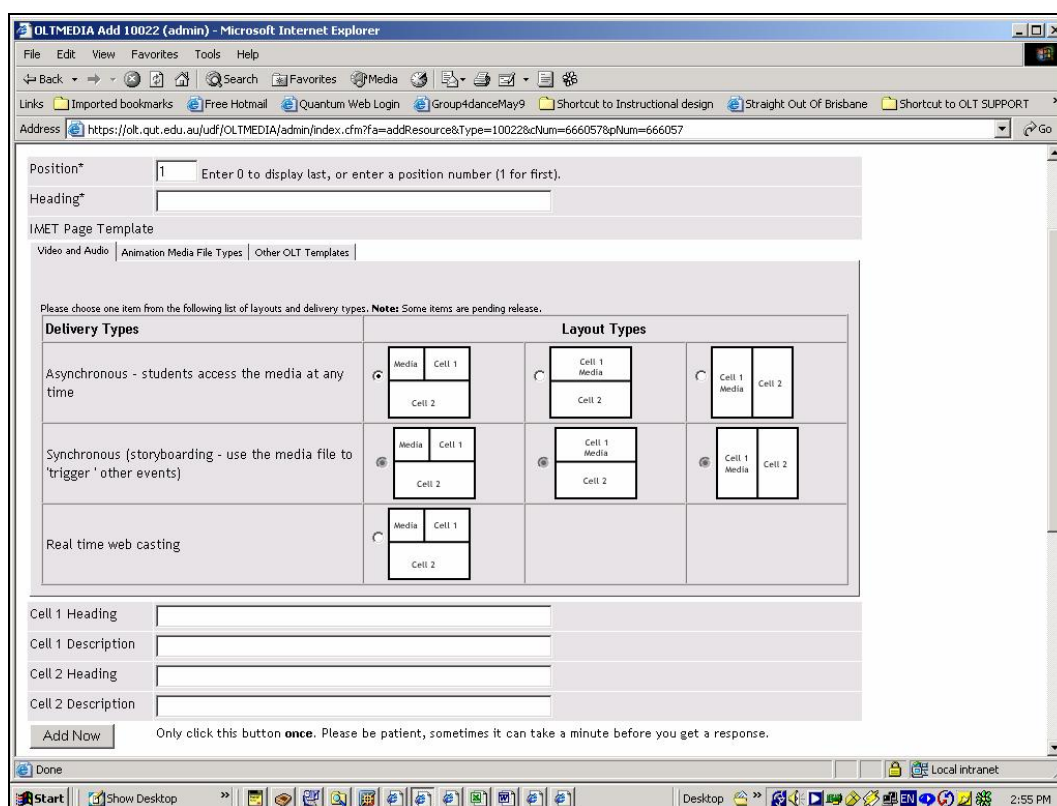


Diagram 2: The administration view of the IMET tool allows a selection of numerous design layouts to which a variety of learning resources can be integrated.

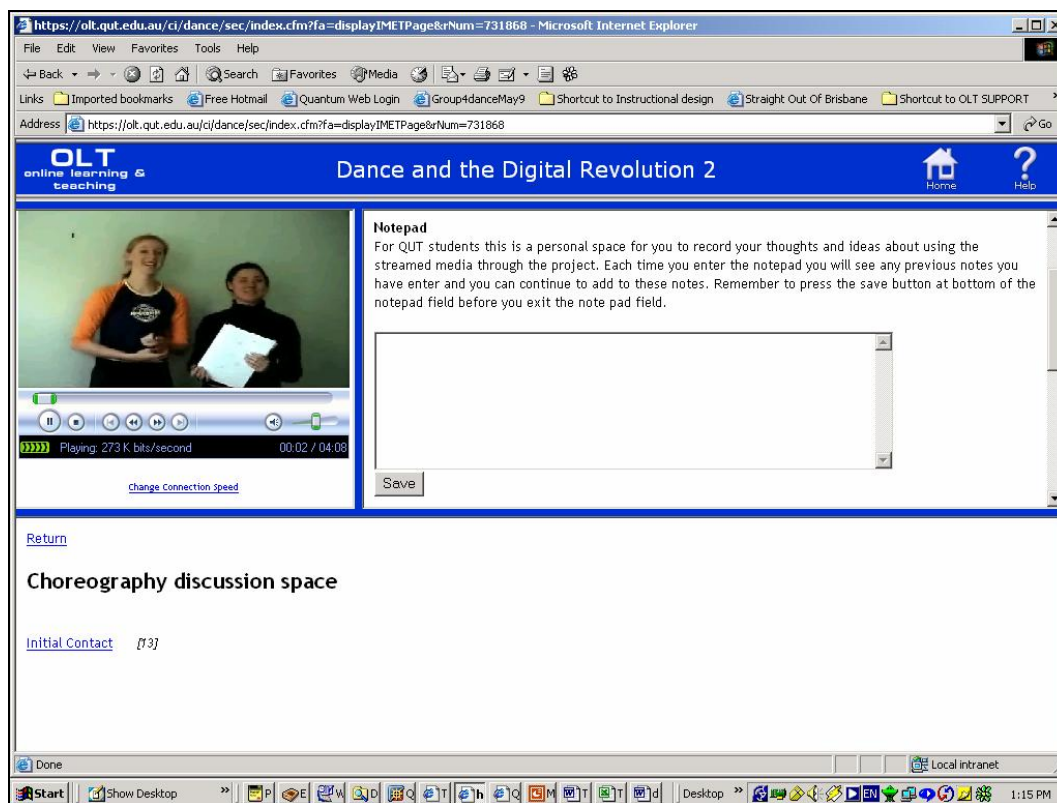


Diagram 3: The IMET resource allows for multiple resources to be ‘bundled’ into the one OLT page. In the above diagram the teaching team has integrated video with a Notepad for personalised reflections and annotations, and a discussion forum for additional group communication and collaboration.

Methodology and case studies

The project team included collaboration from instructional designers, media production experts, programmers and a wide range of teaching teams across the faculties. The ‘pioneers’ among the faculties were identified from teaching teams who had previously incorporated media objects into their online learning environments. These pioneers were enlisted to participate in the formative evaluation of the IMET tool. Twenty teaching teams trialled the prototype of the resource for Semester 1, 2003. This paper presents four distinct case studies to illustrate the diverse application of the IMET resource in learning and teaching. Additional recommendations derived from the Flashlight evaluation of the IMET resource in a learning and teaching context will also be discussed.

The Flashlight ‘technology/intervention – activity – learning outcome’ triad model provides a structural framework for identifying focal instructional points for investigating (Ehrmann 2000). For the purposes of the formative evaluation of the IMET tool the following evaluation framework was developed:

- **Technology:** defined as the IMET resource, a tool which allows QUT teaching teams to bundle media items with other cognitive tools on the one OLT page.
- **Activity:** defined as utilising the IMET tool to incorporate different media with other available OLT cognitive tools in order to implement pedagogically sound learning and teaching practices.
- **Outcomes:** defined as the ability of the IMET resource to respond to a range of learning and teaching strategies and activities.

For the initial phase of the trial evaluation data was collected from a series of focus group sessions conducted with the teaching teams who were either utilising IMET in their teaching practice or had commenced preliminary ‘proofs of concept’ to investigate how the resource could be used to enhance teaching practice. Ongoing evaluation of this resource will be framed within the Flashlight framework, but will expand in scope to examine student perceptions and created assessment artefacts.

As this was the first phase of the trial the evaluation was designed to validate whether the ‘proof of concept’ aligned to the expectations of the teaching teams. In following phases, a more rigorous evaluation of student-created learning artefacts within IMET and student perceptions of the resource will be conducted.

Case study 1: Communication and collaboration

The IMET resource was used to respond to the need of providing an environment for preservice dance teachers to engage in critically reflective conversations on their choreographic works in progress. Small groups of preservice dance teachers were paired up with small groups of high school students for mentoring in the production of a choreographic piece. Using the IMET resource, preservice dance teachers uploaded a dance segment that they'd created which helped to illustrate a particular aspect of the choreographic process. The IMET resource was bundled with a Notepad where students entered personalised reflections regarding the video segment, and a discussion forum in which the high school students received further guidance and opportunities for collaboration. The outcome was the collaborative creation of a 10-minute choreographic piece.

Case study 2: Examination revision and reflection

The IMET resource was used in an engineering subject to provide additional instructional materials regarding key concepts in culvert design. During exposure to video examples of water flow rates in a variety of contexts, students were able to prepare for examination by making personalized annotations via the Notepad resource. The intention of the teaching team is to allow for group reflections, with a view to identifying the areas that students require additional clarification of the key learning concept.

Case study 3: Developing requisite skills prior to action/field/lab work

Preparation for fieldwork and practicum placement can be reduced through dissemination of preliminary information relating to expectations, protocols and use of discipline-specific equipment. Consequently, the IMET resource was used to illustrate practical and fieldwork methodologies prior to actual student involvement. This provided greater opportunities in the allotted time during face-to-face contact for students to rapidly engage in learner-centred activities that focus on the practical application of key concepts.

Case study 4: Dissemination of information and collaboration

A concern among teaching staff relating to collaboration and information dissemination for distributed education students led to the development of IMET as an archive of tele-tutorial sessions. The inclusion of a discussion forum transformed what was initially a static archive of the session transcripts into an ongoing dynamic resource that helped learners to achieve the multi-structural understandings critical to professional practitioners.

Evaluation

Evaluation of the IMET tool illustrated the wide pedagogical use of the resource and the issues that may impact on the development and implementation of the tool within learning and teaching practices. Trial participants noted that the IMET resource facilitated the achievement of designated learning outcomes. However, some areas for improved design development were proposed by the participants. The following section codifies the evaluation data into various components of the Flashlight triad. Each component of the Flashlight triad (Ehrmann 2000) is discussed with respect to the proposed developmental improvements.

Technology per se

Evaluation of the technology involved questions relating to the useability and practicality of the resource itself independent of the learning outcome and associated activity. Trial participants noted the following developmental changes to the IMET resource:

- ability to change the title of individual cells;
- ability to upload and archive multiple media items within the one IMET page;
- ability to print personal annotations and reflections within the IMET resource;
- ability to stream different media file types other than Windows media compatible files (.asf, .wmv, .wma). Of particular interest was the ability to stream QuickTime and Real Player media files due to the availability of commercial digital repositories that provide media files in these formats.

Technology facilitating the activities

Trial participants noted that the IMET resource facilitated the use of a broad number of Internet learning activities, including concept checking multiple-choice quizzes, reflective practices, communication and collaboration, exam revision, pre-testing prior to practical activities (lab and fieldwork), and provision of case studies.

The wide incorporation of activities illustrates the broad applicability of the IMET tool to address a range of learning and teaching strategies. Consequently, the design intent of providing a versatile resource able to cater to a diverse range of learning styles and teaching philosophies was met.

Activities per se

The activities implemented address a wide range of learning and teaching strategies, including reflection, fostering communities of practice, flexible information dissemination, fostering written communication skills, and development of higher cognitive skills.

As previously discussed in the case studies the aim of supporting a wide variety of learning activities was achieved with trial participants utilising a range of IMET and OLT cognitive tools. The integration of learning activities with the IMET resource requires further investigation and staff development recommendations to ensure that its use does not compromise the accomplishment of the intended learning outcomes.

Activities facilitating outcomes

The perceptions of the evaluated teaching teams were that the activities implemented using the IMET resource facilitated the learning outcomes as described in their respective unit outlines.

Learning outcomes

Overall, the teaching teams perceive the IMET resource to create a broad range of Internet learning tasks for their students. Consequently, the trial participants view IMET as a valued resource that will effectively contribute to the facilitation of learning outcomes. Validating this perception would involve comparative analysis of created assessment artefacts with the establishment of sound evaluative methodologies.

Recommendations

As a result of the data gleaned from this evaluation the following recommendations are suggested with respect to resource modifications and improvements and staff development.

IMET modifications

It is recommended that:

1. the feasibility of procuring hardware licensing agreements that will enable the streaming of additional media file types be revisited regularly by the IMET project team; and
2. ongoing evaluation be conducted on IMET functionality in consultation with the broader academic community.

Staff development

It is recommended that:

1. IMET workshops be conducted on an ongoing basis and that specific workshops cover both the pedagogical and technical use of media in learning and teaching;
2. a symposium be conducted regarding the design of reuseable media learning objects;
3. teaching teams have flexible and comprehensive access to self-directed and self-paced resources surrounding the use of media in general with an emphasis on the IMET resource as an information enabler and as a conduit for the formation of learning communities; and
4. ongoing formative and summative evaluation be conducted to examine the support mechanisms surrounding the IMET resource and the manner in which the resource has been utilised in learning and teaching.

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