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Using Creative Multimedia in Teaching and Learning ICTs: A Case Study

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Abstract

This paper presents a case study based on the experiences surrounding a distance-learning module in the area of Information and Communication Technologies (ICT) that includes a creative multimedia component as an integral part of its teaching and assessment. The module requires that students engage in multimedia production to articulate their ideas and understanding of technology-related concepts, in contrast with the text-based assessment practices that are more commonplace in technological subjects. Open Educational Resources (OER) form an integral part of the module both in its delivery and assessment: whilst open-source software and media are used within the teaching materials, students' multimedia work submitted for assessment has the potential to become resources for their peers. The paper examines the challenges encountered in developing the module and provides a preliminary discussion of views, concerns and potential issues faced by students, drawing upon the experiences of the module development team and the first cohort of students enrolled in the module. Whilst providing an overview of these experiences, the text explores issues pertaining to the integration of creative work into a domain where creativity has not been traditionally seen to play an explicit role. The module sits within an undergraduate ICT degree offered by the UK Open University (UKOU).

Keywords: Creative multimedia, open educational resources, distance learning, assessment, creativity.

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Introduction

Whilst digital technologies such as handheld devices, mobile phones and digital cameras continue to develop into more affordable, more flexible and easier-to-use tools, Internet technologies such as the Web provide the basis for creative activity and sharing that now take place on an unprecedented scale. Developments in the areas of networking and telecommunications have opened up new avenues for multimedia sharing over the Web, with an astounding amount of user-generated multimedia content being negotiated daily over social networking platforms such as YouTube (Wesch, 2008). However, despite the growing adoption of Web 2.0 technologies in educational contexts (Conole & Alevizou, 2011; Lee, 2011), it would seem that the integration of creative multimedia as a communication and assessment medium is only slowly taking place outside the constraints of disciplines traditionally viewed as 'creative' (e.g. Cox et al, 2009; Ferreira, 2010; Kouadri Mostéfaoui et al, 2010).

In suggesting that 'creativity, which has now entered the discourse in higher education alongside other agenda items such as enterprise, entrepreneurship and innovation, is an elusive and complex notion', Kleiman (2008) uncovers a fundamental issue. It appears that, for many Higher Education (HE) professionals, there still remains an unspoken distinction between the notion that 'everyone can be creative', referred to as 'democratic creativity' by NACCCE (1999) and a 'personal anarcho-aesthetics' view

(Peters, 2009), that creativity is some special quality pertaining to certain individuals, groups or indeed curriculum subject areas (Kleiman, 2008), which Craft (2001) labels 'high creativity'. This is perhaps symptomatic of a general 'mystification of creativity' that also affects specialist research and thinking in the area, as Plucker & Makel (2010) put it: 'if creativity is inspired by a muse, then it falls beyond the scope of scientific investigation'. Against this backdrop, the view that 'creativity' falls outside the remit of domains broadly considered 'creative' remains contentious.

Although outside psychological research the assessment of 'creativity' is normally restricted to the assessment of 'something' that is embodied in an artefact (e.g. an art object or, perhaps, the prototype of a design solution), the compartmentalisation remains strong. Indeed, various frameworks have been proposed to enable assessment of creativity specifically within a technical educational context, (Cropley & Cropley, 2010; Jackson, 2005). Nevertheless, for ICT teachers in HE the challenge of assessing creative work still remains a difficult one to address, and indeed many choose to opt out of this aspect of assessment altogether (Jackson, 2005).

This paper presents a case study based on the experiences surrounding a distance-learning module in the area of Information and Communication Technologies (ICT) at the Open University in the UK (UKOU) that includes a creative multimedia component as an integral part of its teaching and assessment. The module requires that students engage in multimedia production to articulate their ideas and understanding of technology-related concepts, in contrast with the text-based assessment practices that are more commonplace in technological subjects. The module has been developed with a view to using and creating OERs (c.f. OECD, 2007, pp.31-31): whilst open-source software and media are used as integral parts of the teaching materials, students' multimedia work submitted for assessment has the potential to become resources for their peers. Drawing upon the experiences of the module development team with the first cohort enrolled in the module, the paper examines the challenges tackled during the design and development of the module materials. Whilst providing an overview of these experiences, the paper explores issues pertaining to the integration of creative work into a domain where creativity has not been traditionally seen to play an explicit role.

Context

The UKOU is the largest provider of distance education in the UK, with over 250,000 undergraduates. Its teaching materials are delivered through a combination of printed books, online web pages, videos, animations and practical activities, brought together into modules ranging in value from 10 to 60 credit points (one credit point is equivalent to 10 study hours). A typical student will be registered on one or more modules totalling up to 120 credit points, studied over a period of nine months.

Teaching at the UKOU is a team effort that consists of two major inter-related stages referred to as module development and module presentation. Module development is carried out centrally by interdisciplinary Module Teams (MTs) that include, in addition to academic subject experts, professionals in the areas of design, programming and rights, amongst others. Direct support for students during module presentation is provided by part-time Associate Lecturers (ALs), who offer tailor-made advice to small groups of learners (typically 15-25) referred to as tutor groups. Further support from the central MT is provided via online forums that use the university's Moodle-based VLE. The combination of learning resources on various media with the support provided to UKOU students is known as the Supported Open Learning (SOL) model (Johnson, 2003, pp. 36-45).

The lifecycle of an UKOU module varies according to its subject area, although, typically, a module will be extensively reviewed within 3 or 4 years of its launch, potentially triggering more significant updates or changes in addition to the normal maintenance activities that take place continuously as module presentation tasks. The typical lifespan of a module raises specific challenges to module developers in rapidly developing technology-related areas. Modules sometimes must include examples that may no longer be considered state-of-the-art by the time the module is launched, which implies that examples must be carefully chosen so that core concepts and techniques can be taught, whilst the need for updates, or, at least, the frequency of such changes, is minimised. The emergence of open content and, more specifically, OER is only slowly beginning to alter this scenario, partially because the notion of 'openness' poses many practical as well as ideological challenges to large-scale distance education with its underlying mass-production structure (Wiley & Hilton III, 2009).

The roles of MTs and ALs differ significantly, but the split of functions between these two groups of teachers within the broader student-support network entailed in the SOL model has been pivotal to the logistics required for the development and presentation of modules to substantial numbers of students. Students are generally supported on a daily basis online through the forums, both at national and tutor-group level. In addition, there might be e-mail exchanges and telephone conversations between the students and their ALs. The majority of modules also include dedicated tutorial provision, either face-to-face or online.

The paper discusses the multimedia-based work carried out in the UKOU module T215 '*Communication and Information Technologies*'. T215 is a compulsory component of a BSc degree in ICT and Computing. T215 is a 60-credit level-2 module (equivalent to 600 hours of student work) consisting of six blocks of

approximately equal workload. The first five of these are themed, each exploring technology topics and issues relevant to its themes. The themes of Block 5, which is the focus of this paper, are 'entertaining' and 'explaining'. Block 6 comprises an examinable project and does not include any teaching material. High expectations of quality in this context make "explaining less and welcoming error", McWilliam & Dawson's (2008) fifth principle for "systematically orchestrating a 'creativity-enhancing' learning environment in HE", a difficult notion to implement.

At the time of writing, T215 is approaching the end of its second year of presentation, but the discussion presented in the remainder of this paper draws upon the first presentation of the module as well as its design and development stage. The first presentation of the module took place between February and October 2010 with a cohort of 713 students.

Remarks on methodology

The discussion presented in this paper is the outcome of a preliminary analysis within a cycle of action research carried out during the module, aimed at understanding and improving the student experience. This preliminary analysis, specifically, has tackled the following areas of questioning, treated as areas of foreshadowed problems (Hammersley & Atkinson, 2003, p. 25):

- Design and development challenges;
- Issues of relevance to students;
- Issues pertaining to the integration of creative work into a domain where creativity has not traditionally been seen to play an explicit role.

A thematic analysis (Adams et al., 2008) has been carried out on the following data sources:

- Records of MT discussions: meeting minutes and notes produced throughout the development of the module;
- Online student forums related specifically to Block 5: 'General discussion' and 'Software support' forums jointly attracting a little over 2000 postings, and a general module-wide discussion forum: 'Coffee Bar';
- 33 videos produced and shared and often commented on (in the Coffee Bar forum) by students;
- Open answers of students to the End-of-Module Survey (a generic institutional data collection tool used in the first presentation of all modules) with responses from 115 students.

On the design and development of the teaching materials

Rationale

Over the past few decades, advances in ICT, and particularly the digitisation of information, have brought about radical changes in the way media can be produced, distributed and consumed. The recent explosion in the availability of video and audio material, makes this one of the fastest expanding areas of ICT. It seemed fitting, therefore, that a new ICT module, should include material that explores this area, and this is the role of Block 5 of the module.

In developing this block, the MT had three key aims: to develop basic multimedia production skills enabling students to improve their communication skills using these media, to provide the opportunity for students to create OERs that have the potential to be shared with the wider learning community and to provide the opportunity for practical engagement with the theoretical concepts of digital media. Such concepts include how sound and images can be converted to and from electrical representations, how these representations can be manipulated, shared and stored in this electrical form, what technical issues are faced during the execution of these tasks and what methods are available for addressing these issues. So, for example the theoretical concept of a sound wave is explored by observing its digital representation and by experimenting with different parameters; the theoretical concept of sampling and quantisation is explored by listening to digital sound sampled at different rates and using different quantisation levels. This leads to concepts of digital encoding, manipulation and compression – concepts common to the digital capture of both sounds and images.

Armed with this theoretical knowledge as well as the tools and practical skills to experiment and demonstrate this knowledge, students are then required to create and manipulate their own digital media resources. Block 5 explicitly aims to link these creative processes to the development of effective communication skills and to enable the integration of learning from previous blocks of the module. Thus the final assessed task of this block is to produce a video to explain a technology-related concept to a novice audience. Students are encouraged to share their videos more widely to create a potential pool of OER for

future cohorts via the Coffee Bar forum.

Selection of software tools

The students' task requires a variety of software tools to enable them to create and edit audio material, edit and manipulate images and combine audio and images to produce video content in a format compatible with popular media players. The MT's initial specification for the software tools was that they should be easy to learn and use, work with common operating systems, be accessible, be low cost or free and possess sufficient functionality to enable students to explore the technical concepts it wanted to teach.

Across the range of professional video editing software available there is extensive functionality via clear and intuitive user interfaces using familiar menu-driven instructions, and while a complete mastery of these packages would be time consuming, some are relatively easy to learn at the level required for this module. However, the cost of professional software was perceived to be a barrier for the majority of potential students. In contrast, free media creation software is designed to be very easy to learn but its functionality tends to be limited and any complexity is hidden from the user. This means that it could not be used to demonstrate many of the technical aspects that the MT wanted to teach. Security of supply is also an issue, with potential implications for future use. There are some excellent and well-established open source software tools for media creation and, like the professional versions; they offer a wide range of functionality. However, these tools are generally aimed at users who already have some expertise, so tend to be difficult for novices to learn and use. Product support is also aimed more towards the expert user and there is a history of open source software developments in this field being bought out and subsequently developed commercially, limiting the potential for future use. These constraints led the MT to select three open source software tools.

Audacity was a clear choice for the audio components. This free, open source software has an extremely large user base so is well proven and likely to be maintained. It offers the functionality that enables the MT to teach the technical concepts of audio creation, it is relatively easy to use, and is supported by Windows, Mac OS X, GNU/Linux and other operating systems, so delivers on each point of the MT's specification. Furthermore, this software had already been used successfully on a number of other modules.

AviSynth was chosen for the video components; again, this software is free and open source and offers the required functionality (although in 2010 AviSynth was only supported by Windows operating systems). Furthermore, instructions for the software are given using text commands called scripts rather than a graphical user interface, and this functionality enables students to acquire some familiarity with a scripting language that has potential relevance to their ICT studies at a higher level. Though it is possible to produce the AviSynth scripts using a standard text editor, the task can be considerably simplified by the use of the script editor AvsP which works in conjunction with AviSynth and includes a video previewer enabling the user to see the results of running a script.

The main software suite used was, therefore, Audacity, AviSynth and AvsP. Between them these three provided the tools needed for students to create and edit audio material and to manipulate still or moving images, combining the audio and images to produce video output. Additional software was needed to compress and encode the video output into a standard file format for viewing in popular media players. All this software is supplied to students on a DVD with an installer program.

Block structure

Students begin their work on Block 5 by learning about audio production through a mix of theory and practice. Students work with Audacity to experiment with and observe the audio concepts that have been introduced in the theory component. They learn how to make their own digital audio recordings, edit and manipulate them and use sound effects. This stage lays the foundation for the work they will do later when preparing the soundtrack for their own video.

The video production section starts by presenting students with an example of a 30-second video with soundtrack that explains a technology-related concept, in this case the concept of 'aliasing'.

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Aliasing is a phenomenon of both digital audio production and digital imaging, and occurs when the sampling rate is too low. In digital audio the result of aliasing is sound distortion and in digital imaging the result is unwanted effects such as jagged rather than smooth lines, as seen in the Aliasing .MP4 video. To simplify the production, the video uses a single still image, which is manipulated by panning and zooming

to produce the effect of movement.

The rest of the video production section takes students, step-by-step, through the creation of the aliasing video, including the storyboard and video plan. At each step students are provided with the relevant AviSynth script, which they import into AvsP. They are encouraged to experiment by altering certain parameters in the script to produce slightly different effects. In this way the cognitive overhead of learning to interface with the software tool is minimised whilst at the same time students can develop their confidence and familiarity with the AviSynth scripting language and learn how to manipulate their images and produce a video of their own.

Using a video to communicate and explain

In choosing to take Block 5 in the direction of hands-on video production, the MT was forced to think through issues related to creativity and its assessment. The overall initial reaction of the team was that 'T215 is a technology module not a creative media module'. Furthermore, it was felt that, although students were being provided with opportunities to be 'creative', the team would make no attempt to teach any 'creativity' skills or indeed, to evaluate 'creativity' in their block-related assignment. The MT explained this to students by clearly stating that this was not the aim of the block, an aim that would have required additional teaching material and hence increased the student workload beyond acceptable limits. However, the team was acutely aware that to embark students on a major piece of creative work would require some guidance. The MT therefore engaged the support of a professional video production company in developing a short video which explains some of the key techniques and concepts used in video production. The creative feel of the video, which includes a bare-footed editor and cutting-edge dance music clips, provides a touch of what the MT felt was authentic 'creativity' to the overall project. This video, together with transcripts, has been made available by the UKOU as an OER.

The module website also provided links to a set of five 'model' videos, already provided as OERs, that closely match the criteria specified for the video that students would be producing for their assessment. These model videos were produced using the same tools that students would be using; they were of limited duration (30 seconds) and were explanations of a technology-related concept. While students were watching these videos they were encouraged to consider how effective each video was at getting its message across and how it used images and sound.

Finally, students were also given access to a further collection of videos (<http://www.storycenter.org/> and <http://www.bbc.co.uk/tellinglives/>), each lasting about 30 seconds. Students were advised to spend about 10 to 15 minutes looking at some of these and to identify any interesting effects that they had not already seen in the earlier video resources. This provided an opportunity to highlight additional video editing techniques such as picture inversion, overlays and framing.

Block assessment

The assessment of Block 5 consists of the production of a 30 second video (and associated planning and self evaluation tasks) that explains a concept taken from an earlier part of the module. The length of the video is restricted to just 30 seconds because of the workload involved in such a production and to maintain parity with other assessed work within the module.

For the first presentation of this module, students could choose technology-related concepts from the following topics, *sharing data*, *digital identity*, *social networking* and *mobile communication*, but new topics are chosen for each presentation. Students were advised to consider that the audience for the video would be novice students who have not studied the module before. Students were provided with a bank of copyright free images and sounds to use in the production of their videos but were also given the freedom to create their own or seek out others, taking into account copyright restrictions. They were asked to make sure they acknowledged the source of any images used that were not taken from the T215 image bank, even if they were their own or copyright-free. Students were also given a set of guidelines and minimum requirements to follow. These included the use of at least one still image taken from the Block 5 image bank (or alternatives which are copyright free); a sound track that included a voice commentary, at least two sound effects and/or background music, and at least three different editing techniques achieved using AviSynth functions.

The assessment was structured around the three main parts: the video plan creation, the video creation (using scripting) and finally the student's own evaluation of their video. The video plan is a means to outline the resources required for each scene of the video, and to identify the proposed image(s), sound(s), duration, transitions and any effects for each scene. Secondly, the video creation (the scripting part) is the main part of the assessment, consisting of the production of a set of AviSynth scripts based on the video plan previously created; and rendering these scripts to create a 30-second video. Finally, there is an evaluation task, where students are asked to evaluate their own videos using the following evaluation model:

- Does the video meet its brief?
- Is the content factually accurate?

- To what extent are the following appropriate, and do they support each other in achieving the purpose for the intended audience: the chosen image(s); the video editing; the narrative; any texts; any audio effects?
- Are the ideas presented in an order that is appropriate for the intended audience, purpose and medium?
- Is the technical level appropriate for the intended audience, purpose and medium?
- Is the narrative clear, understandable by the intended audience and appropriately paced?

There are two important aspects of this evaluation model. Firstly, it relates closely to the actual marking criteria used by the tutors in assessing the students' work, and secondly, similar evaluation models and marking criteria have been used in assessment work on earlier blocks of the module. This means that students are already familiar with the model as a tool to critique written elements such as reports and wiki contributions.

Reflections on students' experience on the module's first presentation

Our initial analysis of the exchanges that took place on the online Block 5 forums suggests that these forums were mostly used to raise technical problems and share solutions. This is consistent with the delivery of a practical module via distance learning, which affords none of the hands-on support and problem solving that would usually occur during a face-to-face training session. In some cases, it was sufficient for the MT to point students to the relevant parts of the module materials for solutions, or, later on in the presentation, simply point students to the corresponding *FAQ*. However, a good deal of the MT's time was taken with helping students to sort out more specific software-related problems as well as debugging elements of individual scripts.

Students varied in their understanding of the rationale underlying the use of multimedia in the block. In the following example of a forum message, this student acknowledges the MT's support and the benefits of the novel assessment method:

I have a lot of sympathy for the course team on this block. Video is a notoriously fickle technology, and as long as the [assignment] marking process is fair, I think it's an interesting subject to delve into. I applaud their efforts in trying to provide us with an interesting [assignment], and I for one think that it's a refreshing change to be asked to present something other than a word.doc file. [Student A]

For another student the assessment format was seen as a welcome change from the report writing format of previous assessments in the module:

I never thought I would say this on this course but I am quite looking forward to this Block as it makes a change from all that RRRprrrrt WwwRR iitttiig. Sorry can't even say it without getting emotional. [Student B]

However, a considerable proportion of students' comments suggest only a partial understanding of the module rationale and software choices. For example this student's view of the block, shared on the forums, focuses on the scripting element:

I think the writing and debugging of code was entirely the point [of the Block] [Student C]

Yet the potential benefit of developing familiarity with scripting does not appear to have been widely appreciated. Indeed, an analysis of the forums together with the feedback collected by the End-of-Module survey suggests that a number of students were frustrated with the scripting element of the block and did not see it as an appropriate tool, as this extract illustrates:

A theme that has been running through this course has been to prepare us for IT jobs in the real world. I happen to work in IT in the real world, as do others on this course, and have done for the past 12 years and can tell you straight that if anyone in my organisation suggested making a video, from still photographs, in such a convoluted manner using scripting I'd be telling them straight to clear off. I'd probably suggest that they use PowerPoint because they'll be able to do something similar in about 1/10th of the time. [Student D]

It is, however, particularly interesting that this student chooses to focus on an alternative piece of software that is broadly considered unsatisfactory for 'creative' purposes. As is sometimes the case in UKOU modules in ICT, a proportion of the student cohort comprises experienced professionals (Kear, 2011, p.22), who enrol in these modules as part of a process leading to the validation or certification of their experience and knowledge acquired in the workplace. In prefacing the critique of the use of scripting for multimedia with professional 'credentials', this student legitimises the criticism with a seemingly authoritative voice, a voice that appears especially concerned with efficiency. Related concerns were voiced by a few other

students, who found the practical activities particularly complex to achieve and time-consuming:

... the practical activities of block 5 took much more time than what we have planned in the beginning [Student E]

A general concern with time and efficiency is also apparent in the comment below, which questions the constraints imposed by the assessment scheme and how these may or not restrict the types of ideas and concepts that can be meaningfully encapsulated:

Er, its 30 seconds, so the Aliasing video shows just one concept. doing a comparison implies putting in twice the information in the same amount of space. can you describe and compare phase modulation in 60 words? while phase modulation sounds an interesting idea i would be worried about the amount of visual manipulation required. [Student F]

The student then proposes a pragmatic 'strategy' for dealing with the constraints of the assessment scheme, and makes a distinction between a creative and technology- focused approach to the task :

Also I think you should choose the subject partially based on the effects that need to be implemented. Not being an art type I tend to think in linear/logical ways so could be totally wrong as your take on this could be totally different from mine. [Student F]

The student clearly identifies as 'not an art type', as someone who 'tend[s] to think in linear/logical ways', as though artistic work were entirely devoid of logic, whilst technical work were devoid of 'non-linear' thinking and, assumedly, 'creativity'. Another student comment also betrays a view that educational media is by nature lacking in creativity and style:

The first thing that popped into my head when reading the block 5 companion, is doing a video in the style of those cheesy old educational videos we used to have to watch at school. [Student G]

As mentioned earlier, the discussion forums were dominated by technical queries and responses. These referred mostly to common scripting problems, as the module was the first experience that the majority of students had with a scripting language. Technical queries were addressed by extra support online from the MT in the shape of script debugging, the creation of a *FAQ* section in the students' forum and through additional support provided by individual tutors. Online script debugging allowed students to share their problem-scripts together with questions, also providing an opportunity for peer support to take place.

In addition, the MT provided further advice on the block's study strategy, as some students tentatively prioritised their work by tackling the assessment before completing the block work. This approach is not uncommon amongst UKOU students, who normally need to fit their studies around busy professional and personal lives. However, in the case of Block 5, this proved problematic and required repeated reassurance from the MT, who had to reiterate the importance of studying the materials according to the Block calendar, in order to progressively build up the theoretical and practical knowledge required for the successful completion of the assessment work.

Despite some practical challenges, it would seem that students were generally able to deliver the block assessment piece. This produced an overall sense of achievement shared amongst students in the forums upon completing and submitting their assignments as this comment illustrates

... [the most positive aspect of the module was] getting 96% for creating a 30 second video – which I found extremely difficult and took a lot of time for me. [Student H]

As described earlier, students had been encouraged to upload their completed videos to the Coffee Bar forum to share with others, with the aim of building towards a repository of OERs for future cohorts of students. Students themselves could see the value of this and indeed, as this student suggested, might benefit from wider distribution on a public video platform such as YouTube

I wonder if we can expect many videos produced from this block assignment on YouTube? Would be interesting to see any made by other students (especially if they end up being high quality ones as well). [Student I]

Further data collection is required to investigate students' views on sharing their work openly on social networking platforms or, as a matter of fact, within the constraints of the institutional VLE itself, given the relatively few number of videos shared on the module forums. Clearly it cannot be assumed that students will simply share their work publicly. The comment above reveals concerns with 'quality' and how this may (or not) be a motivating factor supporting wider sharing of work, and this warrants further data collection and triangulation.

Reflections on students' submitted work

Despite the various constraints, including those posed by the tools and the assignment requirements, submitted work included a variety of interesting and thought-provoking artefacts. A detailed analysis of students' work is underway, but we have selected three examples that illustrate the richness of the work students have presented, albeit produced within strict guidelines, with a focus on technological concepts and, crucially, without overt aspirations of 'creativity'.

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Video 1. Text messaging

In Video 1, the student has chosen to explain the 'Text messaging' aspect of the 'Mobile Communication' concept. The choice of image – a mobile phone displaying an SMS alert message – successfully conveys the convenience and simplicity of this method of asynchronous communication. Using familiar ring tones as sound effects highlights the ubiquity of text messaging and in the final scene, zooming out to reveal a presumably unattended handbag, offers an interesting backdrop.

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Video 2. Social Networking

Video 2, in which the student has chosen to explain the 'privacy' aspect of 'Social Networking', takes the example of Facebook to highlight the potential danger of sharing private data. The use of the atmospheric musical soundtrack gives dramatic momentum to the final scene of the explanation. The student's use of text and graphics, especially the image of the world, convey the global importance of this issue.

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Video 3. Digital identity

Video 3 explains the 'Authentication' aspect of 'Digital Identity'. The use of multiple images in this video together with an upbeat musical soundtrack gives a strong momentum to the video and it maintains relevance for fellow students by the use of a familiar authentication 'Student Home' screen. It is remarkable how much information the student has managed to pack into this 30-second video by judicious choice of images that match the spoken sound track.

In selecting the examples presented above, the authors were looking to illustrate themes emerging from a preliminary analysis of the students' videos. The examples show different ways in which students have been able to successfully combine various media elements (commentary, text, sound effects, images and video editing techniques) to create interesting artefacts that convey explanations of technological concepts.

In all three examples, students have been able to explain complex ideas, making them easily understandable to a novice audience as required by the assessment criteria. It is difficult not to conclude that these are creative pieces of work and yet few of the students would have expected to be able to engage in such a creative activity when they started the module. Indeed, the examples could potentially constitute valuable teaching resources that could be repurposed and reused. More importantly, however, the examples suggest various ways in which students can be highly creative, often by drawing upon skills and personal interests they may consider unrelated to their studies and professional activities in the area of ICT.

As illustrated earlier in the comment by Student F who did not identify as an 'art type', students' perspectives often appear to draw clear boundaries separating activities considered 'creative' from those that are not viewed as such. Indeed, according to one student, ICT could not be considered a creative area of study

*... If you used something more "exciting" then it would be a creative course, not an ICT one
[Student C]*

The student is clearly polarising what they consider to be 'creative' and what they view as the ICT-related

work at hand. Crucially, the student positions ICT as not 'exciting', implying that the background activities involved in scripting (writing and debugging) are not creative.

Another student expressed a similar view in which creativity is juxtaposed against text-based scripting with the two being incompatible:

The video animation section was terrible. You cannot study creativity with video through text-based animation. I know it is difficult to find a cross platform [sic] solution for video editing, but the software used was just awful. I would suggest offering students platform specific [sic] options such as iMovie or MovieMaker. [Student JJ]

This suggests that the student did not regard their handcrafted productions as creative in the same way as if they had been produced by a more generic software application. Some students' views of creativity as opposite to technical skill appear to echo the MT's initial concerns about the assessment of what was viewed as a creative product. During the team discussions focused on the development of the assessment model, the concept of creativity was seen as highly problematic. Indeed, as interdisciplinary and multi-profession groups, MTs often constitute sites of debate, contestation and conflict that highlight different types of divides (Ferreira, 2006). ICT and technology experts in the MT tended to polarise creativity as 'other' and beyond their competencies and comfort zone in terms of assessment. However, multimedia provides an interdisciplinary space in which technology and creativity converge (Comminos et al., 2010), and by entering into this area of curriculum, educators also bring students into precisely the same boundary-crossing misgivings they face. This echoes issues that arise in other interdisciplinary spaces, where perhaps "the main question that should be considered by teaching teams is not how students with different backgrounds will be able to cope with skills across the borders, but how [teaching] team members themselves can do so in the first place" (Ferreira, 2007).

It is clear, however, as evidenced by the examples described above, that the creative efforts of technology students can result in some highly entertaining and informative productions, even though their learning outcomes may not include creativity as an overt aim. The submitted videos suggest that students have developed not only a useful set of technical skills they can apply in other contexts, but also their ability to use alternative media to present ideas and concepts in a concise and engaging way.

Concluding remarks and future work

The examination above raises a number of issues for the T215 MT. It seems important to question whether too many constraints and expectations were placed on students, resulting in, perhaps, unplanned focus on software support and practical advice, to the detriment of more engaging aspects of the teaching materials. On the one hand, a better approach might have been, as some students suggested, to have adopted a different video-making tool that does not require them to 'go under the bonnet'. On the other hand, perhaps objections to scripting, in particular, might have been minimised if the teaching materials were more explicit with respect to the inherent creativity of the handcrafting approach effectively adopted in the block. Whilst the examination presented in this paper integrates the evaluation and maintenance of the module within a culture of action research, further work is underway to capture students' views of their experience with multimedia in the module through follow-up interviews. These are focusing on students' views of the creative process in which they engaged during their work on the module, and investigating their views on the relevance and potential for wider applicability of what the module presents as transferrable skills.

More work is clearly required to shed further light on the processes involved in overtly integrating "creative" elements in ICT teaching and identifying more aspects of good practice that can be discussed and shared with the wider community of practitioners involved in the area. A research project has recently begun that will explore more closely the potential relationship between relevant 'creative' work in ICT education and how digital media is assessed in other disciplines, with a view to identifying or creating a generic assessment model.

The emergence of digital media effectively provides a space for bridging the gap between technology and art, between scientific method and creativity. However, this bridging presents many challenges to accepted ways of assessing progress and learning. In particular, for ICT educators engaged in integrating digital media in their practices, a key issue emerges: how can creativity be successfully brought into their teaching? Indeed as Craft (2003) notes, there may be limits and dilemmas in how educators engage with the concept of creativity that need to be further examined, and these will be of increasing relevance to ICT education as the boundaries between art and technology become more blurred. An examination of the process of developing Block 5 of T215 suggests that it is essential that practitioners in the area engage critically with the concept, moving away from traditionally held views of creativity as a quality that only especially talented people possess, or an ability that only an elite can mobilise. In construing creativity in less exclusive ways, it is possible to legitimately and explicitly bring this into teaching in the area. Accordingly, the experiences of the MT in the first presentation of the module suggest that it is crucial that educators facilitate this same process for students. It seems vital that students are supported in their process of developing the confidence and sense of entitlement required not only to try out and engage in creative activities, but, crucially, to acknowledge the creative aspects of all of their work.

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