WORRIED ABOUT ENGAGEMENT? HAVE STUDENTS CREATE 'NEW MEDIA'

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ABSTRACT

Science lecturers are assigning students to create blogs, wikis, video, and podcasts based on course content. Are such assignments a gimmick or a portent of things to come, where the laboratory notebook surrenders to the laptop and video camera? A number of the dozen 'pioneers' whom we have interviewed have stated that they are driven by a concern about student engagement, particularly in service subjects. They seem willing to take a risk on 'new media' assignments because more conventional assignments often appear to lack the ability to 'engage the disengaged'. Others suggest that they have been painted into a corner by a decline in laboratory space or a lack of funding for the desired number of laboratory sessions They are not blind to the many challenges imagined by the hundred or so lecturers whom we have had in focus groups. Nor are these pioneers daunted. They have been drawn by the attractions identified by these focus groups – engagement, creativity, developing students' new media skills and insights, and providing students with practice in teamwork. This paper captures a work in progress by an emerging community of practice. It covers the promise, examples of assignments, inferred impacts, and challenges noted in the authors' experiences and by lecturers whom they have asked.

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A PROMISE OF ENGAGEMENT AND AUTHENTICITY

Experiments with new media assignments are the focus of our New Media for Science project, which has been supported by a grant from the Australian Learning and Teaching Council (ALTC). We have been identifying numerous strategies in current use and characterising, evaluating, developing, and assembling pathways to disseminate them. The assignments are meant to get students more engaged with course content. As well, students will be learning key graduate attributes through group work, peer review, and composing for the web. Some are also publishing on the web for classmates or public audiences. This last element lends such assignments the characteristic of authenticity, as students' products are not just seen by the lecturer. They can potentially be seen by classmates, friends within the university, students at other universities, and audiences outside the university setting, such as high school students or citizens concerned about environmental issues. Through such authenticity and engagement, new media can represent a Trojan horse, one that embeds in core science subjects the development of what have been variously called graduate attributes or graduate capabilities.

Student publication on the web, we have argued (Rifkin, Longnecker, Leach, Davis, & Orthia, 2010), exploits a medium of learning and viewing that students find engaging, staff increasingly see as practical, and employers value as relevant. This paper presents a range of preliminary evidence that is beginning to respond to eight hypotheses that we posed (Rifkin, et al., 2010).

> Can you engage and motivate science students in simultaneous development of their content knowledge and graduate attributes via science communication, specifically through student publication on the web? This question rests on eight hypotheses concerning: (1) what engages students' interest; (2) effective ways to develop graduate attributes; (3) the link between learning science content and learning to communicate about that content; (4) scalability from small classes to large classes; (5) implications of engaging science lecturers in development in order to foster their adoption of new teaching approaches; (6) similarities in how to teach the ability to create different forms of 'new media', a blog and a video, for example; (7) issues of privacy and intellectual property in making student work publicly visible; and (8) the appeal to a youth audience of media created by their peers. (p.43)

The rapid pace with which web publication is being simplified presents a lecturer with the challenge of having to assign students who are prepared or nearly prepared to do something that the lecturer may

not be confident in doing. The lecturer may have to lead from behind, much as one might guide a dogsled, setting directions but not running in front one's self. Some students will know how to create a better podcast than the lecturer. However many, if not most, students will face the task as a hesitant novice or even a complete neophyte, or so our experience and recent surveys suggest (Bartle, Longnecker and Pegrum, in press; Kennedy, Dalgarno, Gray, Judd, Waycott, Bennett, Maton, Krause, Bishop, Chang, & Churchwood, 2007).

New media productions by university students have the potential to impress an audience of high school or university students or nonscientific citizens with their authenticity and accessibility. The university students who create a video on geoengineering, for example, may have just cleared a hurdle to understand aspects of a phenomenon that their audience may have heard about but are struggling to understand. Having assignments that focus on concerns shared by the learner and community were championed by Paulo Freire (2007). Freire is known for developing programs to teach peasants how to read by having them create newsletters on community issues. His programs have proven highly effective in Brazil and Cuba, with the literacy rate in Cuba now among the highest for countries with its modest level of economic development.

For the past decade, we – four project principals -- have developed teaching strategies and resources for our classes. We have assigned students to blog, create videos and podcasts, assemble wikis, and complete web write ups of interviews of professionals. Students record audio or video using their mobile phone, laptop, or still camera. Some of these student creations are shared just within the class through peer review exercises. Others are made visible to the outside world, garnering dozens, sometimes hundreds and even thousands of views. We have not been alone in these endeavours, as investigations carried out under our current ALTC project have shown, and we will discuss examples below. Precedents, the state of the art (in 2010), and underlying theory in the relevant literature are described in a previous article (Rifkin et al., 2010). Current examples employed by lecturers around Australia are listed on our project wiki (http://newmediaforscience-research.wikispaces.com/Project+information).

TYPES OF EDUCATIONAL IMPACTS

After students have completed their new media productions, we have scrutinised their reflective essays and their written assessment of classmates' contributions to a group effort. These materials indicate that students have developed abilities and insights in teamwork, oral and written communication, critical thinking, and ethics.

Lessons in teamwork evolve from co-production of a wiki or video with students taking on different responsibilities. Oral communication can emerge in scripting and recording a podcast or the 'voice over' for a video. Written communication insights have been noted when students reflect on the effectiveness of e-mails within their team, requests for scientists to act as 'talent' for their video, drafting of a script, or composing reports on their creation and reflection on how the project management process went.

Critical thinking is engaged in when team members jointly develop plans, negotiate a teamwork contract with one another, or discuss what to do when a problem arises. It also occurs during evaluation of one's peers' contributions. Critical thinking is required to assess one's target audience for a video, for example, and then in testing aspects of that creation on people who are representative of that target audience, as students must learn to see their creation through the eyes of others. Ethics emerges through negotiation of a team contract, undertaking to be fair in assessment of new media products created by other teams, and determination of how to award marks within a project team. It also arises in consideration of copyright and intellectual property for words, images, and music that are so easy to copy on the web. In addition, there are ethical elements in gaining permission to publish the words and images of people whom the students have interviewed.

Beyond these more generic qualities that we want our graduates to develop, there is the potential that deeper knowledge of science content may be gained through projects to create new media. Students engage with content to express concepts in their own words (and images). They go through material several times in order to determine what to include, to assure that what they have is correct (because it will be seen by others aside from the lecturer), and to step through planning, scripting, recording, and editing. This repetition afforded by the processes of creating new media may be a key to increased depth of understanding of scientific concepts. Educational theory underlying this notion is

currently being explored by Hoban and colleagues in relation to the *Slowmation* (2011) approach to creation of educational animations (Garry Hoban, University of Wollongong, personal communication).

Our interviews of lecturers who assign students to create new media reveal that at least some students invest additional hours in class work to create a video, for example. Evidence is still being collected and analysed, at more than one site, to identify whether this engagement with content is followed by a corresponding boost in exam marks. One pioneering lecturer who has not yet noted a boost suggested that the fault may be a condemnation of exams as a measuring instrument rather than evidence of a lack of additional learning (Louise Kuchel, University of Queensland, personal communication). Evaluation of impact a podcasting assignment in first-year chemistry is currently underway, indicating that students doing a podcast on a topic can improve their exam mark for questions on that topic (Bartle, Longnecker, & Pegrum; unpublished data).

The opportunities and challenges offered by having students publish in 'new media' hinge on the notion of students taking the lead in creating a range of different representations of scientific content and contextual information. That is in contrast to a tradition where the lecturer creates all material seen by the class. So, there is promise for a possible shift in the centre of knowledge development and representation, a power-related progression explored by Belenky, Clinchy, Goldberger, and Tarule (1997) in characterising how women grow as university learners.

This shift in power from lecturer to student is also evident in the process of learning to produce a video, podcast, wiki, or blog. The lecturer's familiarity with the technology and software can become secondary, as so much effective instructional material is freely available on the web. Not only can students find instructional material, they can refer one another to what is useful, thereby limiting the lecturer's role. Though the lecturer does not need to be the class's expert in technical aspects of creating or uploading a podcast, for example, the lecturer's ability is nonetheless a factor to consider. Our interviews suggest that many science lecturers are unwilling to assign students to do something that the lecturer cannot do.

Beyond these questions of technology, there is also the eternal question, if one lecturer can find a clever and effective way for students to learn, how will other lecturers learn to employ such approaches more broadly? That is, how does one move from invention (creation of something novel) to innovation (its dissemination)? The hurdles to dissemination appear manifold, as attested to by the focus of the ALTC and its predecessors on grants to improve university science teaching (The Carrick Institute, 2007). Such hurdles have also been documented in literature that has revealed that strategies that work in one discipline of science can often be readily transferred to other scientific disciplines (Fairweather, 2008). For new media assignments to be employed more broadly in university science teaching, one might conclude that documentation of positive educational impacts on students of new media assignments may be a necessary -- but not a sufficient -- condition.

PEDAGOGY AND NEW MEDIA

We have identified over two-dozen types of new media assignments or extensions of existing assignments that can be completed in new media formats. We originally categorised these assignments according to which new media technology the lecturer was asking the students to employ. That is, were students assigned to make a podcast or assigned to create a wiki?

Surveys of lecturers at our conference workshops helped to invert that categorisation. The technological medium seemed to be a secondary consideration in identifying the types of assignments that lecturers would be interested in employing. So, we re-categorised assignments into more conventional types. Within these types, the medium of submission could be paper or new media, though we have argued that the new media option offers pedagogical advantages. Here are the categories along with examples that we have identified as being used by science lecturers in Australia.

TYPES AND EXAMPLES OF ASSIGNMENTS

1. Explaining science concepts in a student's own words. Students in a service subject in chemistry in first year at the University of Western Australia (UWA) worked in small teams to create podcasts on key concepts – acids and bases or oxidation and reduction (Emma Bartle & Nancy Longnecker, UWA, personal communication). Chemistry students at Curtin University

created wikis on elements in the periodic table (Daniel Southam, Curtin University, personal communication).

2. Documenting a process, such as a laboratory or fieldwork exercise or a site visit. First-year biology students at the University of Western Sydney (UWS) have been creating animations of fieldwork techniques (Pauline Ross, UWS, personal communication). Students studying molecular and cell biology at the University of New South Wales have been working in teams to create a website on a laboratory technique (Louise Lutze-Mann, UNSW, personal communication).
3. Commenting / reflecting on topics relevant to class for classmates or a broader audience. Students at UWS who are studying environmental issues have been making podcasts about site visits (James Arvanitakis, UWS, personal communication). First-year biology students at the University of Queensland (UQ) have been working in teams to film videos on environmental topics (Louise Kuchel, UQ, personal communication). Science communication postgraduates at UQ are tracking and commenting on science issues in print and online media via their own blogs (author, J. Leach).
4. Peer assessment of teamwork / self-assessment. First-year chemistry students at UQ are writing blogs to reflect on their learning processes (Gwen Lawrie, UQ, personal communication). Chemistry students at UWA are employing a wiki or online quiz to assess project teammates (Emma Bartle & Nancy Longnecker, UWA, personal communication).
5. Report on research or for consultancy. An ALTC project has students at the University of Sydney using open laboratory notebooks for sharing data and analysis (Rosanne Quinnell & Matthew Todd, University of Sydney, personal communication). Analysis in forensic science is presented by student teams in a blended learning subject (mixed local and distance-learning students) at Charles Sturt University (Andrea Crampton, CSU, personal communication).
6. Report for public consumption. Food chemistry students at the University of South Australia created videos of themselves explaining a basic chemistry concept to a lay person (Karma Pearce, UniSA, personal communication). Science communication undergraduates at the University of New South Wales (UNSW) have created websites for school students on topics such as the solar system (author, W. Rifkin). Doctoral students at UNSW have created a website representing their research for potential sponsors from the business community (author, W. Rifkin).

PREFERRED APPROACHES

Which of the two-dozen or more approaches that we have identified are preferred? Surveys from a small sample of lecturers suggest possible trends. There is a concentration of preferences despite respondents being spread across different fields -- biology, physics, and chemistry. Thirteen science lecturers submitted completed surveys at the 2010 UniServe Science conference (the largest Australian gathering of teaching-focused science lecturers, with attendance of up to 200 academics).

Eleven of the thirteen respondents nominated two exercises that they might like to try: (1) student use of a blog to reflect and peer assess group work activities in the laboratory or fieldwork; and (2) a student team creating a lab report video. Nine of the thirteen respondents expressed a preference for students creating a short video of a person, place, or item that is relevant to the subject that they are studying. Eight of the thirteen wanted to assign students to create an online *PowerPoint* presentation with an opportunity for peer review. Eight also nominated to have students blog regularly on a controversial topic. Half of the lecturers who responded wanted students to collaborate online with science students at other universities using wikis or *Facebook* sites. Similarly, half were interested in students creating a performance, such as a science show for children on *You Tube* or a radio show on a science topic.

Again, the number of respondents is small, and these lecturers are likely to be self-selected as being more interested in new media. Plus, they were attending a teaching-focused conference. Nonetheless, their preferences can be seen to be indicative even if not generally representative. Their responses highlighted a mix of (1) assignments that could readily be done on paper, such as a lab report or fieldwork report, and (2) assignments with a definite ‘new media’ flavour, such as a radio show or *PowerPoint* presentation.

PERCEIVED HURDLES

What do lecturers see as challenges in assigning students to work in new media? We asked focus groups of lecturers from biology, chemistry, and physics. The groups ranged from a half-dozen across

a range of disciplines to a collection of thirty physicists and a group of thirty biologists and chemists. The lecturers were asked to discuss in groups and then brainstorm together as a larger group what they saw as hurdles.

All three audiences identified as challenges the time and effort needed to learn how to use the technology as well as the time needed to create and mark assignments. Two of the three groups expressed concerns about how to assess the assignments, about equity in access to technology, about whether a one-off new media assignment scaffolds learning appropriately, and about the traditional trade-offs of group work versus individual work. The following topics were raised by just one focus group each: originality and copyright; showing work publicly versus keeping it private; assuring that the assignment is appropriate to the discipline; and addressing graduate attributes.

WHAT IF SCIENCE IN A VIDEO OR PODCAST IS WRONG?

Some science lecturers have expressed concern about scientific inaccuracies in samples of student work that they have been shown at presentations on new media assignments over the past nine months. A salient example arose in a 96-second animation on geoengineering (http://www.youtube.com/user/SCOM2021#p/u/4/l1-nVLzVIZY). The animation provided a brief overview of climate change and strategies to combat its effects through creation of artificial trees to convert carbon dioxide to oxygen or sending millions of mirrors into space to deflect sunlight. The students who created the animation could be seen to employ artistic license when represented carbon dioxide as a dark cloud. They also referred to the carbon dioxide cloud as 'reflecting' heat rays back toward earth.

Some lecturers noted that carbon dioxide is colourless, not dark. Others alluded to the fact that the term 'reflect' should more appropriately be 'absorb and re-emit'. Some lecturers expressed concern that such misinformation could propagate throughout a class and it could mislead audiences outside the university. Other lecturers stated that they did not see such inaccuracies as an issue of concern.

A similar issue about student accuracy has been faced by developer of the web application, *Peerwise (http://peerwise.cs.auckland.ac.nz/)*, Paul Denny (personal communication). In the *Peerwise* application, students in a class create multiple-choice questions on class content. The author of each question indicates which answer is to be used as the correct one. Students then respond to questions created by their classmates, selecting which ones to respond to, then rating and writing comments on the quality of the questions and answers. In two classes using *Peerwise* that have been investigated, eleven-percent of the designated correct answers were wrong. Denny now warns students that a fraction of the 'right' answers might not be correct. One can presume that such a warning promotes critical thinking, as students learn to question someone posing as an authority on a topic. A similar approach could be applied to peer reviews of students' new media creations, where students can be directed to investigate the veracity of scientific information provided.

Misconceptions that persist or propagate are not the sole domain of new media. A typical final mark for a science subject is about 65 percent. That suggests that one in every three of the important concepts with which an average student leaves a class is wrong. Put another way, of the concepts that are sufficiently important to be on a quiz or examination, one in three is not correctly understood by students with an average mark. Furthermore, students who leave a final examination with one-third of their content knowledge being mistaken may not know which third it is. They typically do not receive feedback question-by-question, and post-exam reviews are almost unheard of.

It would be useful to have a debate about whether it makes sense to leave such misconceptions to the individual student to retain or propagate. Alternatively, should students make their understandings more public within a class so that misconceptions can be addressed? Bartle et al. (*in press*) found that students who made podcasts about acids and bases or oxidation and reduction made no mistakes in identifying these concepts in subsequent assessment.

One could conclude that new media assignments ought to be peer reviewed in class for quality and accuracy of expression before being made more public. Such an assessment should ascertain whether the information is sufficiently accurate for use by the intended audience. Carbon dioxide depicted as a dark cloud, some would argue, is indeed sufficiently accurate for the intended audience, as 90-second animations created by university students are rarely used in policymaking discussions in government or industry, and they are even less frequently employed in scientific research.

Furthermore, it is not clear how one depicts a colourless gas in an animation in a way that is unambiguous to non-scientist viewers.

Debate about students' use of artistic license in addressing scientific concepts seems likely to be a focus of debate in this new media arena. What might be required are: (1) a two-level publishing platform – inside class and beyond a class; (2) disclaimers or cautions about accuracy; and (3) discussions facilitated by lecturers about accuracy to help students to become critical consumers of old and new media as well as reflective creators.

HOW TO MAKE A VIDEO?

Instructions on how to make one's first video, podcast, wiki, or blog are readily available on the web in written and video format. *Commoncraft* (2011) makes simple and clear animations about the basics, both concepts and mechanics; however, *Commoncraft* have just (August 2011) started charging for viewing videos in their library. *Vimeo* (2011) provides an extensive set of videos on various aspects of how to make and upload your first video, having just launched their 'VideoSchool'. Some lecturers have created nicely detailed guidelines (e.g., see Kuchel's materials on the project wiki). These guidelines assist students in focusing on the academic content of their production. For example, they warn students about putting too much energy into creating special effects. We have been adding these materials to our project wiki – http://newmediaforscience-research.wikispaces.com.

WEB PLATFORMS FOR PUBLISHING STUDENT WORK

Students can upload videos to *YouTube*, for example, tick a box to restrict viewing to a selected audience, and e-mail the URL of their video to their lecturer. *YouTube* provides guidelines and instructions for translating the format of a student video into one that can be viewed online. *YouTube*'s flexibility in receiving a range of video formats can save the lecturer from technical challenges, such as Pearce (2010) experienced in receiving videos in nine different formats.

Podcasts can be published privately on a range of free sites. Experience among the four authors consistently indicates that a sufficient number of students in any class is now sufficiently familiar with this process that little guidance from the lecturer is needed. Students in our classes have established accounts in *YouTube* and *Twitter* during class within five minutes. They have also established *Facebook* accounts for their tutorial group on their own volition. The use of such existing platforms circumvents the need to ask for server space within the university bureaucracy. As we have experienced, life is too short for tilting at such windmills.

Technical developments are needed to address privacy for creators and access for different types of viewers of online student submissions. That is, how can a student make their podcast available within their project team or across their tutorial before sending it to the lecturer for submission? If their lecturer likes the podcast, and classmates vote it to be one of the best, how is it made available for either the following year's class or broader audiences across the campus? What about public audiences beyond the campus?

Here intellectual property and copyright issues arise, as students often employ music and images found on the web without asking for copyright clearance. They will note the source in the 'credits', when reminded, but permission for public use has, in our experience, rarely been gained. A 'copyright amnesty' declared soon after submission of student team projects in one author's class had seven out of eight student teams confessing that they may have used images or music, or even slabs of text, without permission. Such experiences suggest that student compositions should initially have restricted access until the copyright status of their content has been determined. However, the 'fair use' doctrine is expanding in the web domain for universities. Universities in the US and UK, and some in Australia, are entering into agreements to share access to such materials. That would enable publishing online a lecturer's slide show that contains images for which no copyright permission was obtained (Patrick Stoddart, UNSW, personal communication).

Options for sharing new media creations are not rocket science, but they do require development. In the near term, lecturers may need to pay for use of desired features on suitable platforms, such as *Omnium* (2011), where basic service is free but special features cost. Alternatively, lecturers may arrange to display student work only within content management systems, such as *Blackboard* or *Moodle*. We have assessed available publishing platforms, such as *YouTube*, *PodBean*, *Vimeo*, *Ning*,

and *Omnium*, every few months since the launch of our ALTC project in late 2009. Each platform presents attractive features and aspects that are unsuitable.

Even when a suitable, online, publishing platform presents itself, one wonders how many lecturers are accustomed to budgeting several hundred dollars a year for web space. Furthermore, it is not clear how readily lecturers will adapt to administering that web space – not to mention learning to administer it – within their increasing workloads. These questions of platform management remain on the horizon for many, just beyond the issues related to creating, employing, and assessing new media assignments.

ASSESSMENT

Some lecturers in our interviews, workshops, and presentations have expressed concern about how to assess a video or podcast, a wiki or blog. Some have forged ahead in working with new media, though they have created their own videos or podcasts and have yet to assign their students to do the same. In these instances, the lecturer can become familiar with the new technology, but she or he has not released control to students. Some lecturers assign students to create a podcast, for example, but they do not assess it, thereby bypassing the question of how to assess it. Despite this hesitance on some fronts, science students have begun adding videos to project reports when they are not requested to, according to our experience and anecdotal evidence. One imagines that some impact on their marks has resulted even though criteria for assessing videos on science, for example, are not widely recognized, according to our web searches.

Despite such a seemingly radical shift in medium, from paper to multi-media, the authors as well as pioneers and early adopters whom we have interviewed have not found it to be difficult to assess new media assignments. Mitigating any challenge is that new media assignments in science tend not to count for many marks, typically ten-percent of a final mark or less. Reducing the assignment's impact on a final mark limits the impact of uncertainty in how a mark is determined.

We have found that apparent consternation about how to mark a video, for example, tends to evaporate when we propose counting eighty-percent for content and twenty-percent for presentation. Lecturers who are presented with this 80-20 balance have tended to shift it readily toward greater credit for content, or less, once an option is placed before them. So, the question of how to assess new media seems to present as a fog that can be moved through rather than as a brick wall that necessarily halts one in one's tracks.

We have been adding marking rubrics to our project wiki as examples. We have also been asking participants in conference workshops to critique these rubrics. These initial rubrics are sometimes quite detailed. That level of detail may be an attraction for some and a deterrent to other lecturers who are considering adopting new media approaches.

EDUCATIONAL EVALUATION

Measuring learning impact has not seemed to be the highest priority for innovators, we have found. They express a faith in the pedagogical theories that they are implementing in such assignments. Pioneering lecturers report having been buoyed by (1) the enthused engagement of students, (2) the technical accuracy of students' content, (3) the general lack of condemnation of the new media exercises in student evaluations, (4) anecdotally positive impacts on learning (with definitive data still being gathered), and (5) occasional accolades from previously sceptical colleagues.

Theory-supported evaluation, which is being pursued by Hoban (personal communication), should provide reasonably convincing measures of whether the impact is indeed positive. Hoban reports that he and educational theorists with whom he works suspect that students learn in these production processes because they need to revisit science content from several different perspectives. Students see these perspectives, respectively, through scripting, production, and evaluation of the impact of an animation that they create. Production processes, such as scripting, require repeated reading of scientific material and a sufficiently thorough understanding to reproduce that conceptual understanding in simpler terms for a viewing audience.

Such repetition for performance could be seen to relate to the Western image of traditional Chinese learning processes, which are seen to rely on memorisation through repetition. The need for performance (i.e., public performance in the sense of reciting for class or an oral exam, where issues

of face and esteem are involved) can make pursuing repetition and memorisation a more compelling strategy than memorisation merely for regurgitation on an exam paper that only the lecturer sees. So, new media could be understood to replace the oral recitation in classrooms of a bygone era.

These thoughts remain speculation until they can be substantiated via exploration of the literature and evaluation of students at work, which is being proposed by Hoban. Theoretical explanation for educational impact – positive, negative, or null -- is awaited.

Another conceptual challenge is discriminating impacts on learning of science content as well as impacts on the uptake of graduate attributes. The latter is a moving target, as assessment of graduate attributes in mainstream science subjects, which could yield a baseline for our purposes, appears to remain in its infancy. Students' perceptions of their capabilities once they graduate have been surveyed (Australian Council of Deans of Science, 2001), and this sort of data continues to suggest that they are lacking in development of their graduate attributes (The Higher Education Academy, UK Physical Sciences Centre, 2011). Lecturers can cite qualitative and anecdotal evidence about their students' abilities to write coherently or present orally, and they can recount marks on assignments. However, the predominant weight of a mark in a science subject remains in content knowledge, which may be because that is where the expertise and confidence of the lecturer lies (Radloff, de la Harpe, Scoufis, Dalton, Thomas, Lawson, David, & Girdardi, 2009).

CONCLUSION

These open questions about educational impact return us to the focus of our earlier article (Rifkin et al., 2010), which identified a set of eight hypotheses needing examination to determine the impact – and potential -- of new media assignments:

1. What aspects of these assignments are essential to engage students' interest;
2. What is needed to effectively develop graduate attributes through such assignments;
3. How well do students link their learning of science content with their learning to communicate about that content;
4. How well do such assignments scale from small classes to large classes;
5. To what extent can science lecturers be engaged in development and evaluation of these assignments in order to foster the adoption of effective, new media, teaching approaches;
6. What insights in how to teach the ability to create one form of new media, a blog, for example, can be employed to teach another form, such as creation of a video;
7. What are effective ways to address issues of privacy and intellectual property in making student work publicly visible; and
8. To what extent does media created by university students appeal to a youth audience, and how can the promise of such appeal be leveraged for pedagogical purposes?

These questions have not yet been answered. This domain remains fertile ground for experimentation, evaluation, and documentation.

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