

# Student-generated multimedia for supporting learning in an undergraduate physiotherapy course

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Outside the university, rapid authoring tools and ubiquitous technologies have fuelled a rise in user-generated multimedia and participatory culture. The educational equivalent, digital student-generated content, has been heralded as one approach for supporting active and student-centered learning. This is especially relevant in tertiary education, where multimedia is mainly used as a method for transmission of content. Though student-generated multimedia may seem pedagogically ideal, especially for applied areas such as Health Sciences, the diversity of adoptions and limited evidence in the area make broad claims to its efficacy difficult to support. This study uses mixed methods to assess the outcomes of a student-generated multimedia assignment within a third-year university physiotherapy subject. This study found that all students were able to complete the assessment task in a way that demonstrated key disciplinary learning and professional communication skills despite many not having prior experience of this kind of assessment. Student survey data demonstrated that students were able to navigate between new tools and methods to achieve a complex task. While multimedia gave students new and creative ways through which to engage with practitioners, patients and the profession, attitudes varied in accordance with student self-efficacy and confidence. The self-directed nature of the task appears to be both an opportunity and a challenge. These findings further contribute to our understanding of implementing student-generated multimedia projects and extend this knowledge to the health sciences' discipline.

## Introduction

The rise of ubiquitous technologies and Web 2.0 has given rise to user-generated content and participatory culture (Jenkins, Purushotma, Weigel, Clinton, & Robison, 2009). Despite this, topographies between higher education and students' own social-technical worlds remain markedly different. Higher education has, with notable exceptions, primarily adopted video as a vehicle for furthering the transmission of content from instructor to student. Alternative approaches, where students generate this multimedia, place the student at the centre of their own learning (Dyson, Frawley, Tyler, & Wakefield, 2015). The creation and participation that students undertake in using Web 2.0 technologies can be an important part of student learning (Merchant, 2009). Early research on student-generated multimedia assignments suggests that they may afford experiential learning (Dyson, Litchfield, Lawrence, Raban, & Leijdekkers, 2009), graduate attribute development (Frawley et al., 2015), increased engagement (Wakefield, Frawley, Dyson, Tyler, & Litchfield, 2011) and new ways of representing and creating knowledge.

Web 2.0 tools that allow students a voice in online spaces has had some uptake in higher education. For example, discussion boards are now a standard feature in most major Learning Management Systems (LMS). Studies show these kinds of tools can promote social learning via collaboration (Boulos & Wheeler, 2007; Boulos, Maramba, & Wheeler 2006). Currently, as technologies and cultures shift towards placing a greater emphasis on digital multimedia and video, there is an opportunity to extend previous text-centric forms of online participation.

Documented uses of student-generated video content have been found in a wide range of disciplines in higher education. Empirical studies of student-generated multimedia have been found in physiology (Ernst, McGahan, & Harrison, 2015) science education (Hoban & Nielsen, 2012), accounting (Frawley et al., 2015; Wakefield et al., 2011) and information technology (Dyson, 2014; Litchfield, Dyson, Wright, Pradhan, & Courtille, 2010). Like most fields of educational technology, there is also likely to be wider adoption than that which is documented in formal research and evaluation studies (Liu, 2016a, 2016b). Although there is



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evidence of increased uptake, there remains a need for further empirical studies of how student-generated multimedia projects can be effectively implemented, especially within new disciplinary contexts of use.

To date, there has been no published study of digital student-generated multimedia in supporting clinical health sciences students. The authors address this gap through a study of a student video project within a third-year Physiotherapy subject. This paper addresses the gap and contributes to emergent understandings of the role of student-generated multimedia for learning and teaching. The authors begin with an overview of the background literature before describing the learning and teaching context and research methodology. Findings and discussion are presented in tandem. The paper concludes with a summary of the main contributions for researchers and practitioners and suggestions for future work.

## Background

### From user to student-generated content

Much has been written about the socio-technical landscape that today's students inhabit. This world is described as a networked society (Castells, 2000; Castells, Fernández-Ardèvol, Qiu, & Sey, 2007) characterised by new media (Kress, 2003) new literacies (Knobel & Lankshear, 2007; Kress, 2003) and participatory culture (Jenkins et al., 2009). Into this context, screens replace pages (Snyder, 1998) technologies are disruptive (Christensen & Bower, 1995) and old and new media collide (Jenkins, 2006). Such tools and cultures have allowed for the publication and amplification of previously unheard voices. There is now an abundance of opportunity for new media creation and consumption, and a great diversity in how people engage in such cultures. Despite this, evidence has shown that while some individuals may publish blogs, tweets and other forms of user-generated content, the majority may prefer to "like", "comment" or "view" (Nielsen, 2006). The unequal online participation is further exacerbated by the ways in which content, once generated by the user, is placed, diffused and consumed. While problematic, participatory culture and user-generated content cannot be reversed or undone. This world of digital disruption and multiple voices is one that all students have to navigate, whether as active content creators or as purely as readers, listeners or viewers.

In attempting to bridge the gulf between higher education and students' lived experiences, current research has often focused on 'student identity'. Concepts of students as being the 'net generation' (Tapscott, 1998) and 'digital natives' (Prensky, 2001, 2010) presume that students, imbued with technology from an early age, are proficient and sophisticated in its use. Although there is an intuitive appeal to such explanations, it cannot be assumed that the interests,

practices and skills of an entire generation will be uniform. Bennett, Maton and Kervin (2008) suggest that claims of the digital natives constitute an academic form of 'moral panic', while research outside the education sphere problematizes generational stereotypes (e.g. Kowske, Rasch, & Wiley, 2010) and uniform use of participatory technologies (e.g. Nielsen, 2006). There remain grounds for meaningfully considering how parallel forms of existing technology could be adopted within a students' tertiary studies. The authors argue that it is not the disparity between students' identities, inside and outside the university but rather the digital environment that needs to be considered. By shifting our learning and teaching to include student-generated content, educators may increase engagement with this educational paradigm for the 21st century (Dyson, 2012).

### Student-generated multimedia in higher education

While there has been a shift towards the use of video and other forms of multimedia within higher education, this has, with notable exception, been largely used as a vehicle for transmission of content from instructor to student, despite the prevalence of interactive tools and participatory culture outside the class. Approaches where students, instead of lecturers, create the content are rare. Student-generated multimedia is 'highly engaging and motivational', offers the possibility of contextualization in real life settings, provides common externalized representations to support learning conversations and peer-learning, and has an affordance for multiple meaning-making and deep learning' (Dyson, 2012, p. 18). The creation and participation that students undertake with Web 2.0 technologies can be an important part of student learning (Merchant, 2009). Early research on student-generated multimedia assignments in higher education which have used videos (Litchfield et al., 2010), screencasts (Frawley et al., 2015; Wakefield et al., 2011) and slowmation (Hoban & Nielsen, 2012) suggests that this approach may support active and experiential learning (Dyson et al., 2009), graduate attribute development (Frawley et al., 2015), increased engagement (Wakefield et al., 2011) and new ways of representing and creating knowledge. In placing the student and their work at the centre of the learning (Dyson et al., 2015), student-generated multimedia activities align pedagogically with constructive and student-centred approaches.

Despite evidence that such approaches can be gainfully used to support student learning, there remains a shortage of research into this area. Though student digital media align and afford student-centred pedagogies and learning, questions remain as to their wider educational design and implementation. The diversity of modes, media, tools, platforms and genres, coupled with the equally broad contexts for learning within the university

mean that educational design and implementation are especially challenging. Though earlier studies of student-generated projects demonstrated increased student engagement (Dyson, 2014; Wakefield et al., 2011) recent research comparing traditional written assignments with a new digital multimedia alternative has shown implementation to be the area of greatest challenge (Ernst et al., 2015; McGahan, Ernst, & Dyson, 2016). In this case, measures of student performance and satisfaction ratings both declined following the introduction of a mandatory digital multimedia assignment, however improved when the written assignment was re-introduced and students were allowed to choose which form of assignment to undertake (Ernst et al., 2015; McGahan et al., 2016). Studies such as these highlight the need for further research that explore how student-generated multimedia projects are implemented within in range of contexts.

## The role of the digital multimedia within tertiary health sciences education

Hand-drawn or hand-rendered illustration, as well as digital methods have long been a key way of communicating and teaching medical knowledge, with new technologies allowing different image types to be produced (Corl, Garland & Fishman, 2000). Images not only assist in the learning and teaching of medical and clinical knowledge, but are essential to the construction, identity and shape that knowledge in the discipline takes. Due to the physical and tangible nature of disciplines within the health sciences, there has been a long history of using images and video within both the profession and education. With reference to static image, "use of medical illustration is probably as old as medicine itself" (Corl, Garland & Fishman, 2000, p.1519).

Whilst the properties of a static image afford one kind of knowledge representation, the moving images in video can afford different kinds of clinical and educational uses. As video has become more affordable and ubiquitous, educational videos that illustrate a specific aspect of healthcare management have become a core part of health sciences' education (Olson, Bidewell, Dune, Lessey, 2016). More recently, the profession has also turned to using digital resources to communicate with patients and other stakeholders (Majid, Schumann, Doswell, Sutherland, Golden, Stewart, Hill-Briggs, 2012). Within the physiotherapy context, where demonstrations often involve assessment, treatment, patient education and an exercise prescription as part of a home program, there is often a need to support patients doing repeated exercises as part of their rehabilitation. There is an opportunity, therefore, for students in health sciences to create videos as a way of communicating to patients and other stakeholders. To date, documented cases of student-generated multimedia within physiotherapy education has utilised the student sharing of videos within the wider

context of a student-generated wiki activity (see Snodgrass, 2011). The authors of this paper argue that video and multimedia production can be further extended to provide a project that aligns authentically with both the knowledge of the discipline and the direction of the profession.

## Summary

In summary, student-generated multimedia provides opportunities for health sciences education. However, as prior literature demonstrates, though student-generated multimedia affords and aligns with experiential, constructivist and student-centered pedagogies, its educational design and implementation is context dependent. Only with further research and evaluation studies will it be possible to gather a greater body of knowledge on how this might best work.

## Context and implementation

This paper focuses on an implementation of a digital multimedia assignment within a third-year undergraduate physiotherapy unit. This compulsory second semester subject has an average enrolment of 75-90 students per year. The student cohort is predominantly comprised of undergraduate students wishing to enter into the healthcare services as practicing physiotherapists. This unit aims to educate students about multidisciplinary approaches to multisystem disorders, such as management of the aged care sector, amputees, burns, diabetes and facial nerve disorders. The digital multimedia assignment was designed as a group work task in which students planned and produced a resource to educate members of the lay public about the physiotherapy management of a multisystem disorder. Learning and teaching challenges in this subject are that physiotherapy students are not normally examined in this manner, as they are they are generally given practical and written assessment tasks. Therefore, it was a novel way of being assessed for most students, and therefore many had to develop a new skill-base to complete the task, including negotiating the challenges of working as part of a group.

## Digital video assignment

The digital video assignment is a compulsory assessment undertaken by groups of 4-5 students and it was worth 30% of student's final marks. As part of this assignment students attend a showcase event, where their videos are screened to other students, faculty members and those who have mentored students in creating their digital video. The assignment components and marking are illustrated in Figure 1 (Appendix 1).

## Methodology

This paper contributes applied and research based understandings of the use student-generated digital



multimedia assignment within a third-year university physiotherapy subject. As research in this area is new, and the specific variables largely unknown, this study adopts open qualitative methods to facilitate descriptive and exploratory work. Gaps in the literature and questions within praxis are combined and operationalised into the following research question:

**RQ:** What are students' perceptions and attitudes to digital student-generated assignments in learning physiotherapy within a higher education context?

This question was addressed through an anonymous student-survey of a single cohort of students that have experienced this assignment within the semester. The survey was administered at the end of semester and designed to balance the need for open qualitative responses with the problem of managing participant's cognitive load. Categorical data from closed 'tick-box' questions was combined with open 'free-text' responses. Categorical data is summarized through count data, while text responses were be thematically coded (see Saldaña, 2009) using QSR Nvivo software. Analysis of student survey data was further supported with metadata on the video artefacts produced, the number and the technical accuracy of these, as well as instructor reflections. The University of Sydney's Human Research Ethics Committee approved this research in 2016.

## Findings and discussion

Of the 79 students enrolled in the subject, 59 completed the end of semester survey, giving a response rate of 74.7%.

### Student satisfaction

Within the cohort were 17 groups, each comprised of 4-5 students, each group producing a video of their work. Despite 48% of students having never previously created a digital multimedia assignment, the student group, in response to a 10 point Likert scale that ranged from 1 extremely dissatisfied to 10 extremely satisfied, students mean response to the question "How satisfied were you with the final presentation?" was 7.5, just over the 'moderately satisfied' indicator. Out of the total number of respondents, 9 students did not respond to this question. Students written reasons for their degree of satisfaction were largely tied to perceptions about either the process (13 thematic expressions: e.g. "Not enough time to get it good or better") or the final outcome (26 thematic expressions: e.g. "Achieved the intended effect"). While the average response to the question suggests moderate satisfaction, qualitative rationales were found to vary dependent on student interpretation of what satisfaction with such an assignment ought to look like. Generally, students who ranked their satisfaction as <6 typically provided a rationale for dissatisfaction, while those who register >8 provided a

rationale for satisfaction. However, this was not always uniform with some students rating themselves as extremely satisfied (9) only to say that they were not content with the volume. As video assessments are projects are new within clinical education, further research is needed to understand student expectations about video content and how they judge such products.

### Physiotherapy knowledge and the ability to communicate to a lay audience

Due to the anonymous survey design, the authors were unable to tie each video back to the individual student. Despite this shortcoming it is, nevertheless, possible to gauge understandings of the project from the video artefacts themselves. Despite 85% of student videos demonstrating creative ways to communicate physiotherapy knowledge, 25% of all submissions contained either slight or major technical errors in physiotherapy knowledge. What this means is that while the student video project, as a process supports students in learning communication skills and physiotherapy knowledge, that only about half of the final video products could be used as peer learning resources in the future.

### Technology use and multimedia experience of students

#### *Prior experience*

In response to the question 'Prior to this subject have you ever done a digital multimedia assignment?' 52% (n=30) of the 58 responses claimed to have created a digital multimedia assignment. This figure is higher than earlier studies that have asked similar questions (e.g. Wakefield et al., 2011). Though certainly not a high percentage, reasons why almost half of students had created a digital multimedia assignment may be due to both the third-year subject that is the investigation of this study and perhaps the increased popularity of this kind of assignment within higher education. However, within the bounds of this study it is not possible to know where and when those 30 students experienced a digital multimedia assignment within their prior curriculum without any additional follow-up research.

#### *Technology use on the project*

There was a diversity of technical approaches as reflected in the 57 student responses to the closed 'tick-box' question: "What tools or technologies did you use?" (Figure 2.) From this number, the majority of students used their own convergent devices (either laptops or mobile phones), with less prevalent use of specialist external devices such as microphones and devoted video recorders. (Figure 2). Students used an average of 2.9 (mean) devices per person in the creation of the one video. Only 10% (n=6) of respondents used a single device. Within this sub-group, it is possible to see that in 4 out of 6 of those respondents were using animation

software, and so not needing peripheral video recording devices. 2 out of 6 were using editing software such as iMovie – so presumably took up editorial responsibilities for the entire group.

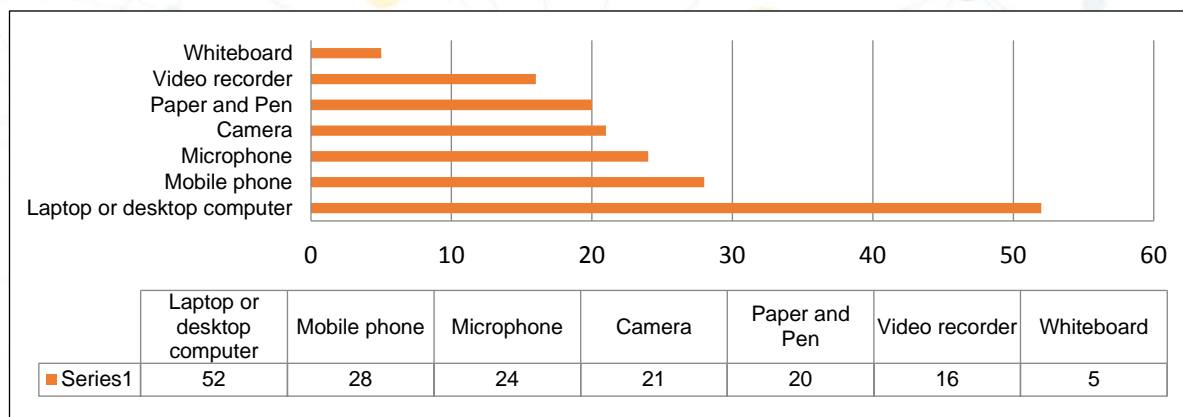


Figure 2: Hardware and tools: What tools or technologies did you use?

In addition to navigating between a range of devices and tools, students were also found to use a variety of different software. This was gauged with the open text-response question: ‘What software did you use?’. Text responses were thematically coded in two ways. The first sought to understand how the software was accessed and run, either as software ran as a native application on either mobile or desktop such as MS Office, iMovie, Windows Movie Maker or Adobe Creative Suite (31 instances) or that within a web browser (25 instances), these were largely for tools that supported animation: Powtoon, Toondoon, Videoscribe, Moovly. Of those students who responded to this question (n=46) 78% (36) largely stuck to *either* native or web based applications (n=36). Ten students (22%) navigated between both kinds of application, for example by using both an online tool such as Moovly as well as iMovie, or Photoshop and Powtoon. In addition to understanding the different kinds of applications being used, the data was also coded (Figure 3).

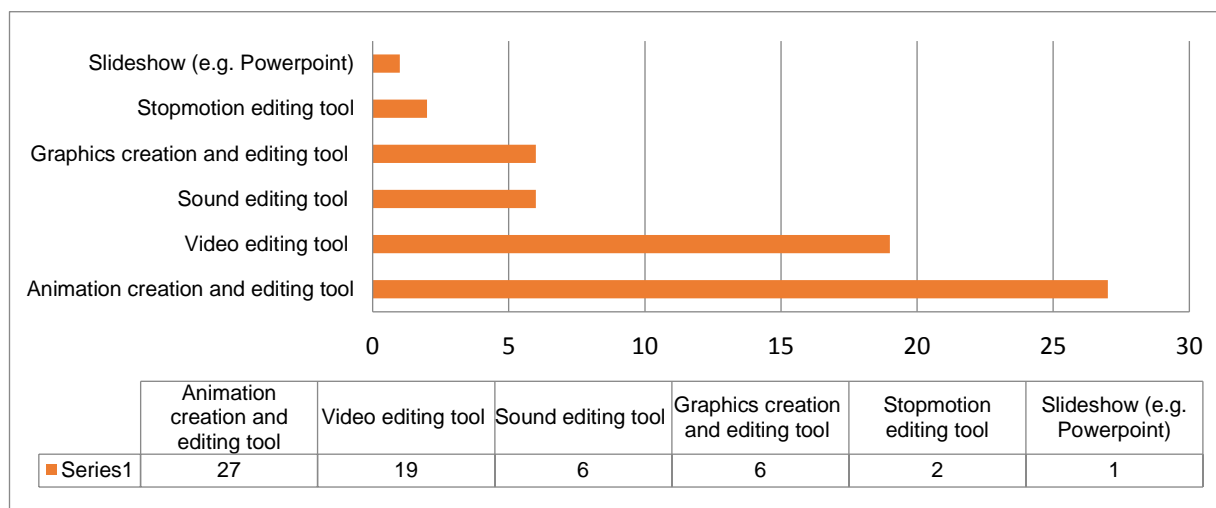


Figure 3: Software use: What software did you use?

Findings from this demonstrate that simple ‘drag and drop’ animation software such as Powtoon were the most popular approach (27), while traditional video editing technologies such as iMovie and Windows Movie Maker followed (19). Advanced specialist tools for editing specific parts of the video, such as the sound (6) and the graphics (6) were less common. These kinds of specialist editing tools (e.g. Audacity, Adobe Photoshop) require specialist knowledge; though not commonly used such specialist tool use demonstrates that a small number of students who are *not* enrolled in graphic design or computer science have skills in advanced and specialist software. Stopmotion was used as an approach by only two individuals, while Powerpoint was used by only one respondent.

#### Rationale for the approach used

Perhaps more interesting than the diversity of approaches taken is the rationale that students provided for this. In summary what this data tells us is that students navigate a complex suite of available tools, software and approaches in a way that accounts for both their beliefs about the purpose of the video artefact for the intended audience as well as their beliefs about what they perceive themselves to be capable of doing. These themes are illustrated in the Table 1 below.

Table 1: Rationale for technology use – Why did you choose this approach?

Thematic category	Theme	No.	Exemplar student response
<i>Beliefs and attitudes about the purpose of the video (44 instances)</i>	Engaging the audience	15	"We chose this approach as another way of engaging the audience. We came up with a melody from scratch and wrote the lyrics for it."
	Best suited the topic	10	"Because our condition was not easy to portray through live footage. So we chose different media to make brief Slowmation"
	Format properties	9	"Best materials to make our topic"
<i>Beliefs and attitudes about the student or the group's own interests and capabilities (44 instances)</i>	Ease of use	12	"Relatively easy to use given the time we have"
	Confidence with tools	8	"Most confident with these tools" "weren't educated or confident in software"
	Access to tools	6	"[...] accessible to us" "Free variety of techniques available"
	Personal preference or interest	6	"[...] we didn't want to be in a video recording" "[...] allowing us to present in a much more interesting manner" "Convenient, rich source of animation and interesting"
	Aims or vision	6	"allows incorporation of animation and attractive presentation"
	Strengths or weaknesses of the group	5	"Group members knew how to use these mediums"
	To be creative	1	"To try to be more creative"

What is visible from the data is that, given the open nature of the assignment that allowed students to pick *any* format for their video that students navigated a complex terrain of hardware, software, genre and formats based so as to design an experience appropriate for their audience, their topic and drawing upon the properties of the media and modes that were used. This suggests that students were engaged in quite complex audio-visual design choices in this assignment while factoring in pragmatic considerations as to what they believed they or their group could do.

### Students' motivations and assessment criteria

In university assessment tasks, the majority of students are motivated by the desire to gain the highest mark they can, therefore close attention is paid to the assessment criteria. Most groups addressed assessment criteria, although there was variation in the marks awarded depending on the quality and thoroughness of the responses. The videos that stood out as being superior were those that incorporated an empathic, patient-centred approach to management, making the viewer's experience a more personal one.

### Students' likes and dislikes

In answer to the question "What did you like about this assignment?" 46 out of 57 students responded. In answer to the question "What did you dislike about this assignment?" 52 out of 57 students responded. These responses were coded for themes that are illustrated below in Table 2. As is evidenced within the exemplar comments, student comments touched on a range of themes.

Table 2: Dominant reasons for liking and disliking the assignment

Thematic category	Theme	No.	Exemplar student response
Likes	Teamwork, group-work and collaboration	14	"It is a group work allowed us to discuss and interact with others"
	Fun or interesting	10	"Is an interesting assignment"
	Creativity	9	"The group work, the artistic aspects, ability to share ideas"
	Access to mentors	7	Getting mentored and visiting RNSH
	Different or novel kind of assignment	7	"Project was something different and we could channel our creative side. It was fun and enriching as we learnt lots about our condition as well"
	Access to external areas of the profession	6	"It provided us a choice in site visits that we did not have many chance to touch with"
	Digital or multimedia skills	6	Interesting learning to use technology. The variety of topics.
	Learning about the topic	4	"Teaches you about the topic given"
Misc.	<3/ theme	*e.g. useful, authentic, autonomy and choice	
Dislikes	Issues related to time	23	Time restraints was difficult to source resources in time especially if communicating with outside personnel
	Issues related to the assignment structure (including group-work)	25	"Weighting of the rationale" "Group project" "assignment guidelines"
	Feelings and emotional responses	19	"fiddly"   "stressed"
	Technology and media use	13	Time consuming, a lot of effort, didn't know anything about video editing  "limited resources i.e. programs, recording devices, money for programs and music"

Student response to the assignment was mixed, with both positive and negative feedback relating to both the

affordances of a multimedia assignment, as well as aspects relating to the wider implementation, such as: teamwork, mentor support, on site visits, and technology use. Despite this being a 'video' assignment, students' dislikes focused more on the assignment design and the time requirements of this, rather than the technology. Collectively, this reinforces what we already know, that the assignment design and implementation may be just as, if not more, important than issues relating specifically to the technology. This feedback also emphasises the need for the assignment guidelines to offer technical support and better recognition of the time and scope relating to video- based assessments. Based on this student feedback, both the power and the risk of the assignment comes from the allowance for creative agency, the challenge for educators will be knowing how to keep such video assignments open to allow for creative practice while sufficiently structured for those students with lower self-efficacy relating to this kind of assignment.

## Conclusions and future work

To date, this particular use of digital multimedia within physiotherapy education is unique. Findings from this study demonstrate that while students produced a highly sophisticated and diverse range of digital video content, that student expectation and interpretation of what counted as a satisfactory varied. In a new non-text medium, where tools and skills may more greatly distinguish one student from another, students may express anxiety over what the standard is and equity concerns regarding access to technology or group members with technical skills. Though this open structure has affordances for learning, it is not without significant hurdles. In differing to typical written assignments, students' self-efficacy and belief systems alter their perception of whether the autonomy, authenticity and choice afforded in the video assignment were a positively or negatively perceived challenge. This in itself is nothing new, and has long been understood by those practicing similarly unstructured assessments such as problem based learning, however it is especially relevant within the continued discourse and narratives around students as 'digital natives'. There is a legitimate issue as to whether we can really assess students in a skill that is not formally taught but assumed of their generation. Based on this concern, the authors reflect that greater choice and support is needed for students who may be anxious or experiencing lower levels of self-efficacy relating to video production. Alternative approaches that extend student choice further may make the entire assignment optional (Frawley et al. 2015, Wakefield et al., 2011), offer a traditional written alternative (Ernst et al. 2015) or allow for a choice of either group or individual work (Wakefield et al. 2011). These approaches may be one way of scaffolding support of learners who are less confident while retaining the open and autonomous



nature of the assignment, seen to be both empowering and enjoyable to other students. Future iterations of this assignment and this study will need to work on the balance between the freedom for creative pursuit and the scaffolding needed for less confident learners. Issues remain about how to accurately measure the impact of the activity on the viewing audience, and the impact of group dynamics on the final product. In this study, we relied on students' attitudes towards the video activity and academics assessment of learning outcomes and critical reflections. Future studies of this will need to build on understanding the relationship the assignment has across a broader range of variables.

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Note: All published papers are refereed, having undergone a double-blind peer-review process.

## Appendix 1

**Title: Creating a Digital Explanation of the Physiotherapy Management of a Multisystem Problem**

**Weighting:** 30%

**Length:** 3.5-4.5 minute Blended Digital Media

Construct a minute blended digital media presentation that is between 3.5-4.5 minutes long to explain **THE PHYSIOTHERAPY MANAGEMENT OF ONE MULTISYSTEM PROBLEM** that you will be allocated from the PT in Multisystems syllabus. The media enables a digital explanation of the management of this problem and can be used as and is as a learning resource. It needs to be at least 50% original material. The digital explanation can be made using Windows Movie Maker (PC) or iMovie (Mac) and should be submitted on a USB drive. Provide a one-page rationale per group (250 words) explaining the design of your resource as well as a storyboard that helps you to plan your resource. See below for examples and resources. Each student will also submit an individual reflection of this blended media assignment.

**Criteria for assessment:** Students will be assessed on these criteria:

**A group mark /23 will be awarded for the following**

- Rationale (one A4 page to justify the design/media, 250 words)
- Storyboard
- Content Accuracy
- Communication/ Explanation
- Presentation / Visual Impact / Professionalism / Technical

**An individual mark /7 will be awarded to each student for the following**

- Individual Student Reflection. Each student will be required to submit a one A4 page individual reflection (300-350 words). Your reflection should include (but is not limited to)
  - 1) brief outline of the management your multisystem problem
  - 2) reflection on what you learnt about the process of communicating a physiotherapy management message (multisystem problem) to educated members of the public.
  - 3) reflection on how this new knowledge can impact on your future professional practice
  - 4) reflection on the process of producing a multimedia product (and what would you do differently next time)
  - 5) reflection on team work within your group

*Figure 1: Assignment design, requirements and weighted marks*