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1. the approach used by the collaborative development team to support the production of multimedia,
2. the practices and process used by the collaborative development team to facilitate the creation of concise multimedia presentations,
3. the impacts of establishing teaching presence through videos created by the course writer and online course facilitator, and
4. the presentation styles used by course writers and the tools they used during multimedia production.

Keywords

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Transformations in contemporary higher education have led to an explosion in the number of degrees delivered online, a significant characteristic of which is the incorporation of multimedia to support learning. Despite the proliferation of multimedia and growing literature about the affordances of various technologies, there are relatively few examples of how judgements are made regarding choosing and actioning multimedia development decisions for educational developers. The case study presented here is framed within an institution-wide project for the development of fully online degrees that utilised a collaborative approach to curriculum and multimedia development. This example focuses on the establishment and operation of a collaborative approach to curriculum development in which multidisciplinary development teams invested considerable resources in researching improvements to their multimedia practices and processes. This article reflects on the collaborative team approach to multimedia design and development by examining the team's experiences and practices through the lens of existing multimedia research, in order to understand the convergence between multimedia theory and the practicalities of developing multimedia within the constraints of large-scale online curriculum development. Through these reflections, four lessons learned will be explicated which will inform those engaged in employing similar approaches in other contexts. These lessons learned identify the benefits and potential issues associated with:

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Introduction

Recent trends in Australian higher education have seen a proliferation in the number of online courses and degrees (Stone 2017). To fuel this explosion, many institutions are turning towards collaborative design approaches for rapidly and economically developing online curriculum. Collaborative course design is an established practice for the development of higher education courses, and refers to a team-based approach to curriculum development that leverages the specialist knowledge that is dispersed among a group of experts (Voogt et al. 2015), and is believed to generate courses of a higher quality than those developed using individualistic curriculum development models (Chao, Saj & Hamilton 2010). The collaborative course design model itself is often structured around a discursive approach to curriculum development (Ziegenfuss & Lawler 2008), where course writers engage in dialogues with a development team to cyclically negotiate curriculum, design learning processes and generate content. When developing online courses, a principal focus of attention for the collaborative development team and course writer is the design and development of high-quality multimedia assets, associated with the need to reimagine traditional teaching methodologies, such as lectures, for the online environment (Laurillard 2002), and to design courses so that they are suitable for the needs of online learners (Stone 2017). However, with a significant increase in the research concerning "video-based learning" (Giannakos 2013) it is evident that the lecture still prospers online in one format or another (Crook & Schofield 2017), most likely due to the benefits of video and multimedia; more broadly, as a means for delivering digital content (Mayer 2017). Despite the increase in the research supporting the use of multimedia in online courses, there are comparatively few published practical methodologies to guide educational developers working in collaborative course development teams in facilitating the transition from traditional lectures towards the design, development, and production of rich online multimedia. Yet, as the involvement of educational developers and multimedia experts becomes further inculcated in course development through the collaborative design model, it is imperative that understandings are developed of the practicalities for large-scale multimedia design and production.

Context

The development of 12 new fully online undergraduate degrees for The University of South Australia Online (UniSA OL) was a component of the University's strategic plan and characterised an institution-wide project to increase the University's national online teaching presence, and to further develop the online capacities of the whole institution. The development of these new degrees required the creation of 189 courses (10-week units of study) over a two-and-a-half-year period, and as such necessitated an intensive curriculum development approach. The course production methodology utilised a collaborative approach to course design and development, leveraging the expertise of a group of educational and technological specialists to support course writers. In this project, subject-matter expert course writers worked collaboratively with a development team that consisted of an associate dean of online education, an academic developer (AD), one or more online educational designers (OEDs), and a language and literacy coordinator. The course writers and development teams were additionally supported by digital curriculum librarians and an audio visual (AV) team. Development teams were generally delineated by the four disciplinary divisions (faculties) of the University: Education, Arts and Social Sciences (EASS); Business; Health Sciences; and Information Technology, Engineering and the Environment. The author worked as an OED within the Division of EASS course development team. Course writers worked with the members of the course development team over a period of 12 weeks and were allocated 75, 100, or 150 hours of development time, spread over a 12-week period, depending on whether the courses that they developed were brand new, currently being taught face-to-face over 13-week semesters, or

already taught fully online in other areas of the University. The academic delivery model meant that although these course writers would be working on the development of course materials, the delivery and teaching would be undertaken by online course facilitators (OCFs) – staff specialising in online teaching.

The course development model for UniSA OL placed a large emphasis on the use of multimedia as a means for content delivery and establishing teaching presence. Early conceptualisations of course design highlighted the importance of professionally produced media to support learning and enhance the student learning experience, with early prototypes of courses envisioning that content would be delivered through a short series of weekly rich media presentations supported by course and weekly introduction videos to overview the content. At the beginning of the course development process there was a minimum cap put on the number of multimedia pieces contained in each course, and examples of high-quality multimedia were provided by the AV team. The institution also invested in new media recording facilities, tools, and technologies throughout the project to support multimedia development and production. This relatively high value that the institution placed on multimedia, in comparison to other aspects of curriculum development, necessitated the development teams to explore the most sustainable practices for the development of multimedia content in terms of time and resources. What follows are some of the key practices and processes used by the course development team when supporting the design and development of multimedia, and the lessons learned from the author's participation as an OED in this process.

Lessons learned

Reflecting on 24 months of intensive online course development, the key lessons learned from this large-scale curriculum development project will be explored by identifying the benefits and potential issues associated with four key questions:

1. How many people does it take to make multimedia? – the approach used by the collaborative development team to support the production of multimedia.
2. How long is too long? – the practices and process used by the collaborative development team to facilitate the creation of concise multimedia presentations.
3. Whose teaching presence is it anyway? – the impacts of establishing teaching presence through videos created by the course writer and the online course facilitator.
4. Which is the right tool for the job? – the presentation styles used by course writers and the tools they used during multimedia production.

How many people does it take to make multimedia?

Historical university practices have utilised individualistic curriculum development models whereby the academic is the teacher, designer, and researcher. In the contemporary university, these practices are changing, with recommendations that academics be supported in course development by teams of experts including educational designers, academic developers, and AV technicians (Stone 2017). Previous studies into collaborative curriculum development have found general affordances of the approach that include ground-up transformations in academic attitudes towards curricula, improved course design, more robust assessment, shared workload and decision-making, and faculty development opportunities (Xu & Morris 2007; Ziegenfuss & Lawler 2008). In contrast, there have been a number of potential negatives of the collaborative course design process, particularly relating to the development of courses as part of an institution-wide project. These include frustration with condensed development timeframes, a focus on rapid production which stifled academic's creativity, communication issues, lack of student feedback on completed courses, conflicts between

project managers and academics from different backgrounds, increased workload for academic staff, and a lack of flexibility in the resulting courses (Torrisi & Davis 2000; Xu & Morris 2007).

For the UniSA OL project, the collaborative approach to the production of multimedia content occurred across a 12-week course production schedule. Typically, the course development process began at the first meetings between the development team and the course writer where the parameters of course and multimedia development were outlined. The course development team would then work with the course writer on the mapping and alignment of the course aims, objectives and content. After these initial meetings, course writers would work discursively with the development team to prepare content for the course and plan the duration, location, substance, and format of the associated multimedia. In the latter half of the 12 week schedule, the course writer would be tasked with actively producing these multimedia presentations. Their options were to go to an AV suite where the AV team would support the technical aspects of recording in a green screen room or in a sound booth, or alternatively, under the guidance of the OED, the course writer could use their own computer and approved software to record audio and video from their office. In both cases, the post-production work and publishing of the media were completed by the AV team. There were a few cases in which specialist multimedia content was created with the support of the AV team, such as animations or on-location interviews. This was done in consultation with the AD and OED, but the process was overseen by the AV team who produced the finished multimedia. Once the multimedia was published it was then worked into the rest of the course materials by the AD and OED in discussions with the course writer. After courses had been finalised they were sent through a Quality Assurance (QA) process, where the key components of the course were scrutinised.

Reflecting on these practices there are three important benefits of the collaborative approach to multimedia development in large-scale curriculum development. Firstly, the collaborative approach provides the necessary supports for rapid and intensive curriculum and multimedia development. The pedagogical support provided by ADs and OEDs and the technical support provided by the AV team, in regard to multimedia, allowed course writers to stay focused on the curriculum content without feeling apprehension over processes and practices with which they may not be familiar. This highly focused support model also provided a measure of adaptability and individual creativity within a larger more rigid framework of strategic plan-driven curriculum development, allowing the development team to adjust their approach to work with the prior multimedia experiences of course writers. This flexible and supportive model of multimedia development provides the efficient and responsive environment necessary for intensive large-scale course production, whilst allowing course writers to feel a sense of ownership over the materials they developed and their presence within the online course which they would not be teaching.

Secondly, working with a range of experts in the collaborative approach allows for capacity-building among course writers, regarding both educational and technical practices. The ratio of educational and multimedia experts to course writers creates a concentrated environment in which the academic capacity building can be personalised to the needs of course writers. In this way, course writers can be upskilled throughout the course development process and then return to their divisions to apply and share their knowledge and skills. However, due to the intensive timescales of this project, the development team were forced to strike a balance between multimedia production and academic capacity building. This tension resulted in some instances where course writers were simply required to produce multimedia content without a specific focus on capacity building, whereas in other cases course writers could be stepped through the process discursively so that they could develop the multimedia skills to apply to their future teaching practice. These limitations imposed by tight production timelines constrained the capacity of educational developers to fully exploit the academic capacity building potential of the collaborative approach.

Thirdly, the collaborative team approach contributed to the production of more high-quality multimedia than could have been realised in an individualist approach. This is not only due to the support provided by the collaborative approach but also due to the combined expertise of team members functioning as a series of inbuilt quality control checks. ADs and OEDs were able to ensure that educational best practices were exercised regarding the number, duration and integration of multimedia, whilst the AV team were able to ensure the audio and visual quality of recordings, with the Quality Assurance process acting as an additional step in quality control. By increasing the range of expertise critically reviewing multimedia content, the collaborative approach contributes to the integration of high-quality multimedia in courses. However, developing multimedia in a collaborative manner is a resource-demanding process and the deadlines of intensive curriculum development can put a strain on the workload of the development team and their ability to critically review every individual piece of multimedia. In addition, the range of experts involved in the collaborative approach to multimedia development requires effective management, communication, and coordination to ensure that team members understand their roles and responsibilities, and that course writers are being given clear and consistent direction from the development team.

Realistically, within the condensed curriculum development timelines of this project, the rapid and intensive development and production of quality multimedia would probably be impossible without the collaborative approach; however, more consideration needs to be devoted to building academic capacity to encourage sustainable multimedia development practices and promote institution-wide benefits.

How long is too long?

Enshrined university culture has normalised the traditional one to two-hour lecture in face-to-face teaching, a culture which influenced the attitudes and teaching practices of many of the course writers involved in the UniSA OL project. The development team identified this potential issue early in the course development process, since lengthy presentations are in direct contradiction to online teaching methodologies which theorise that multimedia content should be concise and chunked (Laurillard 2002). Therefore, the development team decided it was important to integrate discussions about the duration of multimedia materials into early meetings with course writers, thereby forming an integral component of the discourse around course design. This decision was based on the existing literature, such as Guo, Kim, and Rubin's (2014) empirical study of MOOC courses which suggests that the optimal length of video content for student engagement is less than six minutes, as longer videos are less likely to be watched fully by students. However, they note that there may be some resistance to developing concise videos from course writers who are accustom to traditional one-hour lectures. Comparatively, Di Paolo, Wakefield, Mills, and Baker (2017), based on their experience in instructional design, recommend a video length of around three to four minutes, suggesting that videos which are longer should be chunked into short sections to reduce cognitive load, in accordance with the segmentation principle (Mayer 2017). Additionally, Ozan and Ozarslan's (2016) study into students' online video watching habits found that they were most likely to fully watch videos under ten minutes in length, which supports Harrison's (2015) survey of students that found they had a preferred video length of between five and ten minutes.

Applying this research to practice, and based on the development team's processes in the first 24 months of the project, the author has determined four key steps that demonstrate how concise multimedia was enacted in large-scale online course development. Firstly, the most significant step in assisting course writers to reimagine their traditional lectures in an online format was the structural chunking of weekly content. Since the beginning of the project, the development team

recommended that weekly course content should be broken down into a series of subsections, each focusing on discrete topics from the week. These subsections meant that multimedia, readings, and activities could be presented in smaller bite-sized pieces and interspersed with each other to provide a more seamless learning experience. Throughout the course development process, the development team worked discursively with course writers to divide each week's content into, on average, between two and four subsections chunking the content as they went. This segmenting of content provided an overt prompt for course writers to divide their lecture content, by getting them to consider how they would split their weekly content into smaller sections and consequently consider how their traditional lecture could be split up to accommodate this format.

Secondly, the development team broke down the multimedia for each week into two main categories: content and context. Context multimedia was most commonly in the form of course and weekly introduction videos, in which the course writer would discuss the learning outcomes, assessments and other key signposting components of the week. Content multimedia was the online equivalent of traditional lectures in which discipline knowledge is delivered. The course development team instructed course writers that context multimedia should be between two and four minutes in duration, whereas content multimedia was recommended to be less than 10 minutes and no more than 15 minutes. One way the course development team conceptualised these two types of multimedia, was by encouraging course writers to look through their current face-to-face lectures to identify how they could be divided, so that the introductory blurb and learning outcomes formed the context weekly introduction video, then the headings from the lecture outline could be used to split the content of the lecture into shorter sections which would form the content multimedia.

Thirdly, for context multimedia, course writers were encouraged to write scripts as part of the process, which enabled the course development team to check scripts for length. This also meant that after the initial round of courses the team was able to provide course writers with exemplary scripts which they could use as references for length and substance.

Fourthly, after course production was completed, courses were reviewed by the QA team who acted as a checkpoint to ensure concise multimedia presentation by documenting when videos were too long. In some instances, this led to multimedia being rerecorded by the course writer or OCF or, alternatively, the OCF would identify chunking points so that the multimedia could be edited by the AV team.

To ascertain the effectiveness of these practices, all EASS courses that were finalised in the first 24 months of course development have been reviewed by the author, and the duration of the multimedia has been recorded. Only the duration of course writer created content was recorded; any third-party multimedia used within courses was not included in this review. Overall, there were 925 pieces of multimedia across the 29 courses included in the review, Figure 1 shows their distribution by duration. Results from this review show that 65.73% of the 925 pieces of multimedia were under 10 minutes in duration, and 81.59% of this multimedia was under 15 minutes in duration. The mean duration of multimedia in these courses was 8 minutes 11 seconds, with a median duration of 6 minutes 50 seconds. Splitting this into context and content videos shows that the mean duration of context videos was 1 minute 59 seconds, and the mean duration of content videos was 11 minutes 52 seconds.

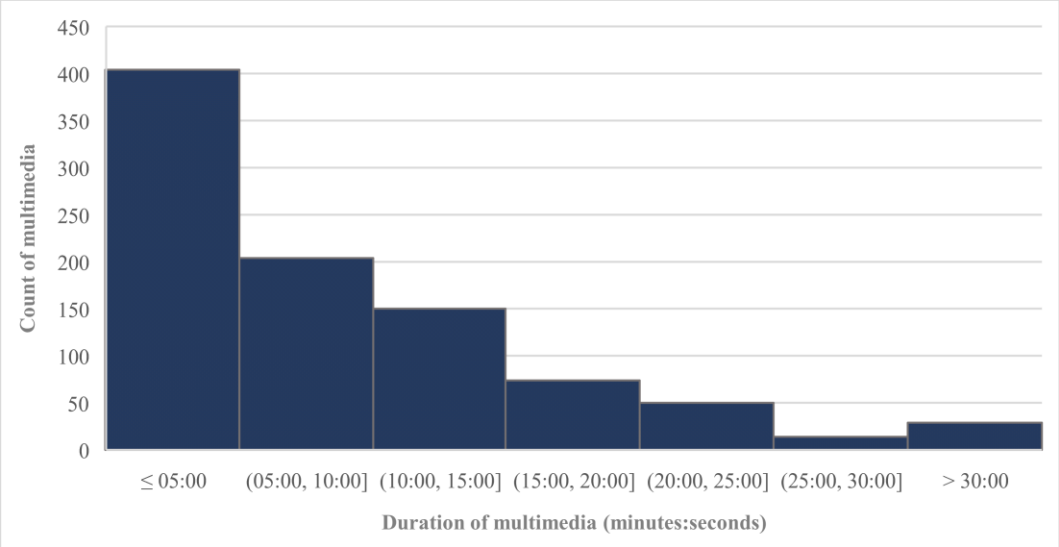

Figure 1: *Distribution of multimedia by duration*

Evaluating these results, it is evident that the development team has been relatively successful in realising concise multimedia creation, particularly when consideration is given to the constraints of intensive large-scale curriculum development. However, with 3% of multimedia exceeding 30 minutes in duration, and 24.14% of courses with mean content multimedia duration over 15 minutes there is clearly still room for improvement.

Reflecting on the process of realising concise multimedia it is evident that there are two main contributing factors: the skills of the course writer to concisely deliver key messages in rich media and the attitudes of the course writer toward concise media as a teaching tool. Based on the data in Figure 1, the deliberate practices used by the development team to foster the course writer's skills have seemingly had some positive impact on the duration of multimedia content created by course writers. This point underscores the importance of setting out expectations for multimedia early in the curriculum development process and developing course writers' skills in breaking down multimedia through tangible methods such as chunking course materials, splitting content-oriented and context-oriented multimedia, writing scripts, viewing exemplars, and reviewing multimedia during the QA process.

When reflecting on the duration of multimedia it is important to contextualise it within existing course writer attitudes and university culture. Many of the course writers that the development team worked with were coming from a face-to-face teaching environment with the centuries-old practice of protracted lectures. Therefore, the process of reducing the duration of multimedia is an attitudinal shift and course development teams must acknowledge how they can take incremental steps to support academic capacity building to transition course writers between quite contrasting teaching methodologies. This incremental capacity building was apparent with course writers who worked with the development team multiple times across the project. The author observed that attitudes of course writers repeating the course development process had changed, as they had witnessed the advantages of concise multimedia in an online course. This initial attitudinal change better positioned them to realise concise multimedia content. It should be acknowledged, however, that the intensive and tight timelines constraining the course development process meant that there was a constant tension between producing courses and developing academic capacities. The provision

of a less intensive course development schedule would allow for time to be spent explicitly developing the capacity of course writers to be concise with content. This intentional and planned academic capacity building would be beneficial to the online courses being created, students' learning, and the wider institution.

The course development team assumed that course writers working on new courses (i.e. not previously taught within the University), would find it easier to develop concise multimedia, given that they would be unencumbered by existing course materials and behaviours. However, reviewing the duration of multimedia content shows that there is no substantial difference between the mean duration of content multimedia in new or existing courses – 11 minutes 42 seconds, and 12 minutes 15 seconds respectively. This relative lack of difference may indicate that course writer's attitudes and skills have a greater influence than is often predicted.

Ultimately, the aim to develop multimedia content of shorter than ten minutes will impact on curriculum design and is an ideal for which we should strive in course design; however, there is a need to strike a balance between the ideals posited by research and the real-world practicalities of developing multimedia as part of an intensive large-scale project. Being flexible in our approach to course design means that we can work within the constraints of institutional resourcing and policy whilst iteratively developing the capacity of course writers as they incrementally work towards realising concise multimedia content.

Whose teaching presence is it anyway?

Feelings of isolation and a lack of immediacy for learners have long been concerns associated with online and distance education, with some methods for allaying these feelings and building an online community of learning focusing on the use of social and teaching presence in courses (Kehrwald 2008; Stone 2017). Teaching presence is broadly defined in two components: course design and development, and course facilitation (Garrison, Anderson & Archer 1999). The effective incorporation of teaching presence into online courses brings with it a number of benefits including increasing student engagement, improving retention rates, and supporting student learning (Crawford 2018; Stone 2017). The use of multimedia as a method for developing teaching presence in online courses has been established in literature, with Di Paolo, Wakefield, Mills, and Baker (2017) recommending video as a medium for building social, cognitive and teaching presence, and Miller and Redman (2010) evidencing that demonstration videos can be used as a means for developing teaching presence in an online course. Furthermore, Crawford (2018) advises that asynchronous video can be used effectively to develop students' perceptions of teaching presence and immediacy.

During UniSA OL course design and development, the primary method through which teaching presence was established using multimedia in the development phase of courses was with the context course and weekly introduction videos. The curriculum design model necessitated that these context introduction videos were positioned so that they would be the first content with which the students would interact, both in the course generally, as well as within each week of the course. The aim of context videos was to allow course writers to discuss the learning outcomes, assessments and other key signposting components of the week. This led to the language used in the context videos often being more conversational than that found in content focused multimedia. Context introductory videos were recorded by the course writer at the end of the course development schedule after all other content was complete. The development team determined that the end of the development process was the best time to record the context videos as the pressures of course writing was mainly complete, course writers had developed confidence and ownership regarding the content, and they

had developed a key understanding of how the whole course fit together and, as a result, they were more relaxed delivering video. The introductory context videos were recorded in a green screen room with the support of the AV team, resulting in the final videos displaying the course writer as the main point in the frame, with simple imagery linked to the weekly or course topic behind. As such, these context videos were the only multimedia in the course in which onscreen course writer presence was guaranteed.

The integration of introductory context videos in the design phase of UniSA OL courses, should, based on existing literature (Di Paolo et al. 2017; Garrison, Anderson & Archer 1999), be successful in building teaching presence. However, during course development, there were some concerns regarding the development of teaching presence using course writer context videos. These concerns were based on the separation between course development and delivery. This separation meant that whilst the course writer designed and produced the course content, they would not be teaching the course: teaching was instead done by the OCF. This split in design and delivery, in some instances, resulted in the course and weekly introduction videos being rerecorded by the OCF prior to delivery so that they could better introduce their own teaching presence in the course. Reflecting on these teaching presence concerns, it is evident that there are complexities surrounding understandings of teaching and teacher presence. The context videos form only one part of the larger course-wide teaching presence which is developed through both the design and facilitation of the online course. It could be suggested, therefore, that it is appropriate that the course writer develops teaching presence through context videos and other elements of course design, with the OCF and tutor(s) acting as "guides on the side", developing teaching and social presences through day-to-day teaching interactions. However, it is difficult to ascertain what effects these multimedia-based teaching presence decisions may have on students without further work investigating the effects of the various methods used to develop teaching presence in UniSA OL courses.

Which is the right tool for the job?

With a diverse array of multimedia technologies being used to create a plethora of presentation styles, it is little wonder that decisions facing multimedia producers can be overwhelming. This is compounded in large-scale intensive curriculum development where indecision on presentation style can impact on student learning, and mid-production changes in technologies can have repercussions on the curriculum development process. The literature on the styles of multimedia for online learning broadly categorises production styles across a range from fully instructor-centric to content-centric (Crook & Schofield 2017). Instructor-centric styles include green screen room or talking head presentations, content-centric styles include voice-over presentations or screen captures, with a middle ground which includes styles such as picture-in-picture. Even though these different styles can be used to present the same content, they each provide their own unique learning experience, which brings with it advantages and disadvantages (Crook & Schofield 2017). There is some literature suggesting that multimedia incorporating the instructor on-screen are more engaging (Guo, Kim & Rubin 2014), increase perceived student learning and satisfaction (Wang & Antonenko 2017), and lead to better learning performance when compared to other presentation styles (Chen & Wu 2015). However, integration of the instructor into multimedia content needs to be carefully considered as picture-in-picture styles have the potential to lead to increases in cognitive load due to the split attention effect (Homer, Plass & Blake 2008; Mayer 2017). Nonetheless, these instructor-centric styles of presentation certainly appear to be preferable to other styles such as voice-over presentation which can increase cognitive load for students (Chen & Wu 2015), and are least likely to be completely watched by students when compared to other presentation styles such as interviews or talking heads (Ozan & Ozarslan 2016). So, in line with the recommendation by Guo, Kim and Rubin (2014), it appears as though the ideal scenario is for multimedia presentations to be mainly

instructor-centric, cutting to content-centric styles for additional information as necessary. Whilst there is research on the acceptance and impact of learning technologies on student learning, there is comparatively less literature on the tools used to produce multimedia and platforms used to host multimedia, possibly due to their highly varied, ever-changing nature, and their dependence on the resources and personnel available at an institution. However, van Rooij and Zirkle (2016) stress the importance of institutions acknowledging the capacity of any technology to support accessibility for students and affirm that decisions need to occur early in the development process so that multimedia does not need to be reproduced or modified as technologies change.

When working with course writers on the production of multimedia content, the first focus for the development team was the style of presentation. This was informed by several factors, including course writers' previous experience developing multimedia and their preference of style; the nuances of the content and disciplinary needs; and the course writer's workload, availability, and willingness to travel between campuses to access recording equipment. These factors were balanced by pedagogical considerations such as the variety of multimedia styles within the course, the suitability of multimedia styles to achieve learning outcomes, and the purpose of the multimedia. Based on these factors a decision would then be made by the course writer and development team as to the most appropriate style for the multimedia. The four most common styles used were voice-over-slides, presence-in-picture, voice-over-screencast, and presence in full screen (using classifications from Crook & Schofield 2017). Once decisions regarding style had been made, focus then switched to determine the most appropriate technologies for facilitating the recording.

Due to curriculum development occurring over the course of two-and-a-half-years, the course development teams had to contend with changing infrastructure and the technologies supported by the University. Initially, the development teams operated within the existing practices of academics at the University, using either iSpring software to create voice-over slides, screen capture or picture-in-picture presentations, or producing videos in the green screen room that were hosted on the University's video repository, UniSA Media Library. However, seven months into course production the decision was made to move video content from the UniSA Media Library to YouTube, a decision influenced by the general technological affordances of YouTube and its capacity to provide automatic closed captions, which could then be edited for accuracy. This was shortly followed, approximately one year into production, by the cessation of iSpring software, in part due to the difficulty of transcriptions and because of the limited number of software licenses. These changes in available technologies initiated the formation of a multimedia working group formulated of ADs, OEDs, and AV technicians, whose focus was to consolidate and make recommendations for the preferred technologies used in the production of multimedia content. After several months of testing software and investigating their benefits and limitations, the working group published a series of recommendations about the available tools for producing multimedia content. This document was then available to be utilised by course development teams as a means of informing their decisions when working with course writers to develop multimedia content. However, at the time of writing, the institution is transitioning towards new software for production and hosting of multimedia content, which has fuelled further discussion around recording tools and hosting platforms.

The style of multimedia content was one of the biggest areas for improvement in the production of multimedia for this project. Within many courses, there was an over-reliance on voice-over slides presentation styles, with limited instructor-centric content, excluding the course and weekly introduction videos. This was likely caused by several interlinked factors, but the primary cause was the course writer's prior skills and attitudes toward multimedia development. Course writers' prior attitudes toward technologies had a significant influence on the style of multimedia presentation

with which they were comfortable, and the seeming complexity of new technologies acted as a barrier to change. The prior familiarity with tools like Microsoft *PowerPoint* from face-to-face teaching limited engagement with alternative styles of multimedia production, due to its ease of use, and that many materials already exist in this format. However, in an intensive curriculum development project where rapid production of content is necessary, this familiarity with existing technologies can be beneficial as it allows for content to be produced in an efficient and timely manner. Fundamentally, there is a compromise between multimedia styles and short timescales which can override pedagogical discussions. The ability to produce instructor-centric multimedia, which cuts together content-centric materials as necessary, is a resource-intensive process which requires a significant amount of planning, time and training. Whilst this is a process that is ideally suited to the supportive nature of the collaborative team approach, it is a complex process and as such the resource constraints of large-scale intensive curriculum development mean that developing instructor-centric styles of multimedia can be difficult. So within these limitations collaborative development teams need to build upon existing course writers' knowledge and skills to encourage and support them to experiment with instructor-centric multimedia styles, exercising caution not to limit multimedia styles into too narrow a field of options.

Throughout this project, there were several significant turning points in the tools and technologies used for producing multimedia content, fuelled by accessibility requirements and institutional technology changes. When working intensively on the large-scale course and multimedia production, these changes have the potential to cause major repercussions across the wider course development process. Changes in technology during this project reinforce the need for decisions to be made early in the course development process, thereby limiting the amount of time and resources spent on transitioning between technology system, modifying existing multimedia, retraining course writers in new technologies, and familiarising students with multiple formats of multimedia with which they will engage. However, despite the importance of institutional commitment to multimedia technologies, there is a need for flexible and agile practices from development teams so that they can work within institutional constraints. One method for achieving this used in the project was the creation of a media development working group which allowed a dedicated team of AD, OED and AV experts to determine the most effective methods for developing multimedia within the constraints of institutional multimedia policy and resourcing. Fundamentally, if course development teams want to influence academics' skills and attitudes towards multimedia then changes and uncertainties surrounding technologies have the potential to inhibit academic capacity building.

Conclusions

This case study examined the convergence between multimedia literature and practice framed within an institution-wide strategic plan-driven curriculum development project. Through explication of the four key lessons learned by the author, benefits and potential issues were identified associated with the approach used by the collaborative development team to support the production of multimedia, the practices and process used by the collaborative development team to facilitate the creation of concise multimedia presentations, the impacts of establishing teaching presence through videos created by the course writer and the online course facilitator, and the presentation styles used by course writers and the tools they used during multimedia production. Throughout these four key lessons learned there are common themes which can be extracted and used to inform future development of multimedia in large-scale online curriculum development, namely:

- The collaborative team approach to multimedia design and development has undeniable strengths, albeit with some limitations. It has the ability to flexibly provide personalised support to course writers assisting them in developing high-quality multimedia within the

constraints of intensive large-scale course development. However, effective management, communication, and coordination are required to ensure that team members understand their roles and responsibilities, and that course writers are being given clear and consistent direction from the development team.

- Development teams working with course writers within large-scale curriculum development projects have the opportunity to translate best practices from multimedia research literature into practice, but in order to achieve this effectively, they need to focus on developing both course writer skills and attitudes.
- There is a tension in large-scale intensive multimedia development between capacity building and the production of courses. Collaborative course development provides multiple high-quality opportunities for personalised academic capacity building; however, there are realities of developing curriculum within time constraints and the finite resource of a large-scale curriculum development project. To realise effective academic capacity building, a sufficiently resourced, intentional and strategic approach is required for capacity building which can drive institution-wide change both for academics and students.
- Institutions need to have a clearly defined strategy for implementing multimedia into the curriculum at scale, which should ideally be established prior to the commencement of curriculum development. However, development teams need to demonstrate a level of agility and flexibility to work within this system and effectively manage changes as they occur.

Ultimately, the development of multimedia for online courses in UniSA OL has demonstrated that collaborative curriculum development teams working within a strategic plan-driven, institution-wide development project have the potential to apply multimedia principles into practice, affecting scalable change. Further research is required to explore the implications of the design decisions, outlined in this paper, on academic capacity building and student learning outcomes. For now, critical reflection and evaluation by development teams will allow us to continually review practices and focus on improvement as we continue to work within this online curriculum development project.

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