YOUTUBE FOR MILLENNIAL NURSING STUDENTS; USING INTERNET TECHNOLOGY TO SUPPORT STUDENT ENGAGEMENT WITH BIOSCIENCE

Johnston, Amy NB^{c,d,e} Barton, Matthew J^{a,b,c}; Williams-Pritchard, Grant A^{b,c} and Todorovic, Michael^{a,b,c};

- a. Clem Jones Centre for Neurobiology and Stem Cell Research, Griffith University, Brisbane Innovation Park, Nathan, QLD, 4111, Australia.
- b. Menzies Health Institute Queensland, Griffith University, Gold Coast, QLD 4111, Australia.
- c. School of Nursing and Midwifery, Griffith University, QLD, 4111, Australia.
- d. Department of Emergency Medicine, Princess Alexandra Hospital 199 Ipswich Rd, QLD 4102 Australia.
- e. School of Nursing, Midwifery and Social Work, St Lucia QLD 4072 Australia.

m.todorovic@griffith.edu.au

m.barton@griffith.edu.au

grant.pritchard@griffith.edu.au

#. Corresponding author: amy.johnston@uq.edu.au; Conjoint senior lecturer Department of Emergency Medicine, Princess Alexandra Hospital 199 Ipswich Rd, Woolloongabba QLD 4102 Australia. +61 431 216 771

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Undergraduate nursing programs typically include students with limited 'on-campus' time who need learning resources that are flexible, technologically appropriate, remotely-accessible (mobile smart devices), and above all, engaging. This has presented academics with challenges surrounding institutional security firewalls, password-access requirements, intellectual property/ownership and staff/student privacy. To overcome these challenges a collection of evidence-based YouTube videos, posted on the Biological Sciences YouTube Channel, supported by the Biosciences in Nurse Education, and underpinned by Benner's pedagogical framework, were developed with the intention of moving students from novice to competent clinical bioscience users. The videos are highly successful; with over 310,000 views, 1.5 million minutes of viewing and more than 5,000 subscribers since its inception (<20 months). Spontaneous comments as well as evidence from students identified their usefulness, suggesting the videos enrich student experience and performance with perceivably difficult biosciences content. Student confidence and subsequent access of the YouTube videos was enhanced by their familiarity with the presenter and the breadth of information available in small portions, creating a solid basis for the development of bioscience-competent nursing graduates. Moreover, these open source videos provide a free resource for continual revision and professional development informed by an international minimum bioscience standard for nurses post registration.

Introduction

Undergraduate nursing students typically have a different demographic to those in other tertiary programs, with a relatively large proportion of mature-age students, who have significant paid work and carer responsibilities (Wray, Barrett et al. 2012). While some authors suggest that non-traditional students are an increasing proportion of University students in nursing programs internationally (Bye, Pushkar et al. 2007, Bloomfield, Cornish et al. 2013, Natan 2016), it is clear that students who are training in a 24 hour a day, 7 day a week profession are less likely to be bounded by traditional methods of content delivery. Many universities include distant/off campus components in their tertiary programs to enable them to study (and manage their work/carer responsibilities) and, while distance students are highly motivated and engaged independent learners (Elison-Bowers, Snelson et al. 2008), their lack of prior tertiary education, coupled with limitations in peer and teacher-support, can challenge students and staff. This is particularly the case with clinical bioscience courses (e.g.

Anatomy & Physiology, Pathophysiology and Pharmacology), where the difficulty, density and speed of bioscience content delivery (Andrew, Salamonson et al. 2008) contribute to academic stresses, potentiating existing 'science-phobias' (Stecker 2004, Craft, Hudson et al. 2013, Johnston, Hamill et al. 2015, McVicar, Andrew et al. 2015). Thus it is imperative that bioscience curricula in clinical programs such as nursing is delivered in an innovative, evidence-based and above all, engaging manner to limit student disengagement and withdrawal from formal tertiary education (Elison-Bowers, Snelson et al. 2008, Van Horn, Hyde et al. 2014). Previous research has identified that 'research involving the use of web-based interventions to support nursing students' learning in bioscience appears to be limited' (Koch, Andrew et al. 2010).

Online learning has witnessed an exponential growth within health science tertiary education (Skiba 2007, Crookes, Crookes et al. 2013, May, Wedgeworth et al. 2013, Barry, Marzouk et al. 2016, El Hussein, Salyers et al. 2016), due to its apparent convenience, flexibility and ease of accessibility (Kala, Isaramalai et al. 2010, Clifton and Mann 2011, Johnston, Massa et al. 2013). Even for this generation of 'digital native' learners, innovative technologically-driven learning does not necessarily mean effective, active, student-centred learning. Ongoing focus on content rather than engagement (Glen 2005, Andrew, Salamonson et al. 2008), and inflexible capacity to access content off campus (Koch, Andrew et al. 2010), seems to contribute to a lack of student use of available resources and associated decrements in academic performance (Johnston, Massa et al. 2013). This has required instructors to look more closely at how and what resources students engage with, to consider their future development and incorporation into tertiary programs (Van Horn, Hyde et al. 2014).

Social media is an alternative route by which academic staff are attempting to actively engage students with tertiary study and university course content (Skiba 2007, Burke and Snyder 2008, Potomkova, Mihal et al. 2012, Van Horn, Hyde et al. 2014). Increasingly students of all ages regularly interact with social media as part of their university experiences (Burke and Snyder 2008). Recent studies suggest that many health/bioscience students use open access online content such as YouTube as their primary source of video resource information (Barry, Marzouk et al. 2016). This may be problematic as many of these sources have limited academic oversight (Azer 2012, Barry, Tierney et al. 2016). The benefits, however, of a widely used and re-use resource, that are open to a range of consumer and peer-review, value-adding to the resource are appreciable (Skiba 2007). Thus, the aim of this study was for our clinical bioscience team to develop a series of YouTube videos for use by undergraduate nursing and paramedicine students that are separate from, but integrated into, several large

(~1000 students) undergraduate level bioscience courses and evaluate the utility of these videos. Access and use of social media development guidelines and a sound educational pedagogy underpinning assisted the YouTube videos development prior to their release to students and the wider internet community (Krauskopf, Zahn et al. 2012, May, Wedgeworth et al. 2013, ten Hove and van der Meij 2015). While such resources have been used in undergraduate nursing education (Clifton and Mann 2011, Sharoff 2011, Crookes, Crookes et al. 2013), like many educational interventions, there is little objective quantitative evidence of their effectiveness (Snelson 2011, May, Wedgeworth et al. 2013, McVicar, Andrew et al. 2015, Jaggars and Xu 2016). The primary outcomes of the study, as measures of learning resource utility, were access (number of views) and duration of watching time; as time engaging with tertiary learning has been shown to be the most valuable contributor to academic success (Lizzio and Wilson 2013).

Methods

Site, sample and recruitment strategies

The study was undertaken in an Australian tertiary education facility, across three regional campuses. Engagement is a somewhat nebulous measure and, thus we adopted a pragmatic approach and encouraged the entire nursing and paramedicine student population to use the site via email and in tutorial classes. Approximately 2500 students had access to the YouTube page in its first two years. The YouTube link is <https://www.youtube.com/channel/UCH6Oc4MAJzzmK0SM805ZnjQ?reload=9>

Resource development

YouTube videos, like any learning resource, needed to be developed using evidence-based pragmatic and conceptual guidelines (Barry, Tierney et al. 2016, Jaggars and Xu 2016). Literature suggests that engaging YouTube videos need to have high quality resolution, inclusion of a combination of many static (iconic and analytic) and dynamic pictures, limited on-screen text, limited background noise and reasonably fast speaking rate (words per minute) (Berk 2009, ten Hove and van der Meij 2015). The teams' experience in developing and publishing bioscience resources helped ensure quality content, as well as constructive alignment between content and student learning outcomes. The application of principles of short educational video development, each only 5-7minutes long and covering a single key bioscience concept with clear links to clinical relevance, ensured a simple engaging design and guaranteed interaction usability (Todorovic, Johnston et al. 2017). The open access

ensured the YouTube videos were widely accessible and reusable (Leacock and Nesbit 2007). As effective educational resources, they must also be based on sound educational pedagogy (Barry, Tierney et al. 2016). Constructivism, the learning theory that underpins these resources, emphasises the construction of new knowledge upon the basis of existing knowledge and so focuses on student experiences to create self-constructed meaning (Ertmer and Newby 2013), which accords well with student-centred learning such as via YouTube (Kala, Isaramalai et al. 2010). For online learning activities using constructivism to be successful, they should contain applied or relevant knowledge and appropriate context (Brown, Collins et al. 1989). They should also be motivating, according well with the team's aims to engage students and support active knowledge-seeking (Berk 2009, Snelson 2011, Krauskopf, Zahn et al. 2012). Using these underpinning principles the YouTube channel 'Biological Sciences' was created and 149 short YouTube videos were created and uploaded.

Data collection and analysis

Access data was collected directly from the Biological Sciences YouTube channel. This included identifying the number of channel subscribers, the number of views and the comments (requested) from students. Data were also collected from standardized university student evaluations of course (SEC) over four semesters, amended to include one question specifically focused around students' perceptions of the YouTube videos.

Qualitative data was drawn directly from the feedback and queries posted on the YouTube site, to help ensure student anonymity and limit perceived impact on curriculum assessment. These spontaneous responses were analysed using manual theme identification and concept grouping (Hsieh and Shannon 2005). These were then synthesised with the qualitative themes drawn from the University course evaluation documents to enhance interpretative rigour, based on an established framework for evaluation of a multimedia learning resource (Leacock and Nesbit 2007). The YouTube videos were open access therefore some responses drawn from the YouTube channel feedback may have been from other nursing faculties, enhancing possible transferability of the findings. Developed themes were discussed and agreed amongst the researchers to gain interrater confirmability and manage reflexivity (O'Brien, Harris et al. 2014). These processes contributed to the dependability of the data (O'Brien, Harris et al. 2014).

Ethics

The associated tertiary HREC office deemed this work a part of curriculum evaluation and thus exempt from ethical committee consideration. However, the authors ensured that the work described herein was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans (WMA 1964).

Results

Quantitative

The 'Biological Sciences' YouTube channel has, as of the 7th December 2017, 5,135 subscribers doubling from the previous year. The gender of viewers was relatively evenly distributed, with approximately 53% being female. These subscribers logged more than 318,626 views of the 149 videos. The average view duration was 4 min and 56 seconds, aligning well with the average duration of the videos (approx. 10 minutes). Data suggests that approximately 30% of the videos are watched. The total 'watch' time for the videos was more than 1,577, 200 minutes.

Numerical responses to the videos were primarily positive, with approx. 4000 recorded likes against only 60 dislikes and more than 2000 (2,187) shares. In-house university student evaluation responses were equally positive with over 90% (2016, 90.2%; 2017, 94.6%; response rate 41-47% of student cohort) of students agreeing or strongly agreeing with the notion that the videos in the course assisted their bioscience learning. Viewer qualitative responses were also largely positive (see below).

Viewers were internationally distributed, and included access from sites in over 60 countries. The top five response sites in terms of total viewing time were Australia - 35%, United States - 22%, India - 8.9%, United Kingdom - 5.2%, and Canada - 3.3%. Videos were accessed over the entire 24hr period, although there were small peaks around mid-morning (~11am) and early evening (~6pm) Australian times.

Qualitative.

The qualitative comments aligned well with many of the nine dimensions of the learning object review instrument established by Leacock and Nesbit (Leacock and Nesbit 2007). Content quality, learning goal alignment, motivation, presentation design, interaction

usability, accessibility, reusability, and standards compliance were all included in the viewer feedback. Some quotes are provided below to illustrate the tenor of student responses.

Content quality

“Great video! it's nice to learn pharm with clear concepts and simple examples”

“the most useful and simplest way I had ever watched”

Learning goal alignment

“Thank you for this video! Very clear and slow paced. If one had no background information about the CNS, they would still understand it!”

“[academic lead] made sure we had the appropriate tools to be able to improve our learning and made YouTube videos to briefly run over topics we needed to understand”

Motivation

“Complex subject made simple to understand; well structured and penetrating presentation. Well done! I can keep going”

Presentation design

“delivered in a clear and concise format”

“Shorter YouTube clips were great - easy to listen to in shorter bursts”

Interaction usability

“Thank you! Amazing and helpful explanation :)”

“thanks for the clarification – makes it even more relevant”

Accessibility,

“Great to watch anytime after the lecture and again before the exam”

Reusability,

“I used it last course and again this one – its great”

“The YouTube clips are a life saver and I've often referred back to them for further understanding”

Feedback and adaptation

“thanks – that makes it clearer, I get how it fits in now”

Standards compliance was the sole dimension that was not well represented in the data. The main criticism of the YouTube videos by several students was associated with a perception of additional workload.

Workload

“How can I look at Youtube as well as all the other course resources?”

Discussion

The response to the provision of the YouTube videos was immense. The cumulative total of accesses exceeded an average of ten views per video by each individual student and they were very well appraised in the University's student evaluation of courses (SEC). Thus, unlike some other digital learning resources, students accessed these resources for self-directed learning (Johnston, Massa et al. 2013, McVicar, Andrew et al. 2014, Salvage-Jones, Hamill et al. 2016, Todorovic, Johnston et al. 2017). Moreover, the average viewing duration, aligned to the average video length suggesting that students view much of the YouTube videos and do not simply clicking onto the resource, view a short section and leave. The >30% 'watch to completion' rate of the videos exceeds other reports of video resource usage such as more traditional lecture captures (Johnston, Massa et al. 2013, Todorovic, Johnston et al. 2017). Also significant were the more than 1.5 million minutes of viewing time (>26,286 hours, >3280 working days or more than 2 working years of video viewing time) which demonstrates the utility of the resource for staff. The degree of, triangulation evident in these findings supports the premise that they can be a valuable resource. A relatively small investment of staff time equated to large volume of student learning time. Additionally, students accessed the videos around the clock, enhancing the utility of the resources for students.

None of the student responses indicated that the YouTubes videos required additional time and/or effort around engaging with course content, even though they may have added to study time and thus time on task (Lizzio and Wilson 2013, Ruiz-Gallardo, González-Geraldo et al. 2016). Moreover, none of the comments indicated that students were dissatisfied with the integration of a separate delivery media in the course.

These results demonstrate that YouTube videos, conceptualised within the concrete framework of the tertiary curriculum structure, are resources that can engage and motivate students throughout a series of undergraduate nursing bioscience courses. Videos that are purposely scaffolded into a learning module allow students to construct their knowledge in a conceptualised framework. They create a user guided experience that is congruent with principles of excellence in learning and teaching, (Duffy 2008, Lizzio and Wilson 2013), and appears to offer a student-centred, motivating learning process. Furthermore, the YouTube videos appear to present challenging learning concepts/outcomes in an engaging and

relatively novel way through the use of technology that was positively evaluated by the students and other respondents (Herrman 2011, Van Horn, Hyde et al. 2014). The findings concur with other evidence of visual narratives supporting clinical bioscience learning (El Hussein, Salyers et al. 2016).

Learning and teaching research with nursing students accessing video resources suggests that students absorb information quickly, through images and video as well as text, from multiple sources simultaneously. (Kelly, Lyng et al. 2009, Koch, Andrew et al. 2010) They operate at what Prensky (Prensky 2007) describes as, “twitch speed”, expecting rapid responses and feedback. Indeed students suggest that they prefer random “on-demand” access to media; that aligns with their expectation to be in constant communication with their peers and mentors (Clifton and Mann 2011). Moreover, the open accessibility over multiple platforms and devices may support continued engagement with tertiary study by limiting the demands around travel to and from campus (Andrew, Salamonson et al. 2008). Our previous data and work of other groups suggests that the repeatability and ongoing formative self-assessment associated with online activities will allow students to work at their own pace, whilst providing useful success criteria which should promote self-confidence, reduce student anxieties and facilitate their motivation for a journey of discovery and construction (Kala, Isaramalai et al. 2010, Clifton and Mann 2011, Salvage-Jones, Hamill et al. 2016).

Nursing education is typically premised on meeting professionally required standards for registration and practice (NMBA 2016) and thus it is of note that standards compliance was the sole dimension that was not well represented in the qualitative data. There is wide variation in the quality and depth of bioscience content into nursing programs (Taylor, Ashelford et al. 2015). The use of publically available resources premised on an international standard may help alleviate some of this variability (Taylor, Fell et al. 2015).

YouTube presentations have a number of utilities for academic staff as well as students and these have yet to be fully explored. While academic staff maybe less familiar with the power of YouTube (Burke and Snyder 2008) and other digital media, therefore less likely to innovate (Berk 2009) time saving and flexible teaching practices. Indeed, in keeping with the changing landscape of tertiary education (Duffy 2008), YouTube videos will become an expected medium, particularly with increasing evidence of positive contributions to student performance (Jaggars and Xu 2016). YouTube videos can stimulate engaged discussion and deep learning, enhance student motivation, as well as help support development of critical review and evaluation of online information (Godwin 2007, Kellner and Kim 2009). Indeed,

as academics our data indicate value in preparatory and delivery time, ease of use, and capacity to engage a wide and time-poor participant group from media such as YouTube, they help create an evidence-base for the development of bioscience-competent nursing graduates, and thus uptake is likely to increase.

This study had a number of limitations. It did not directly address student academic performance or utility of the bioscience content in clinical practice. YouTube viewers were not restricted to nursing students and thus video usage may reflect wider access, from beyond even nursing or allied professional groups and this may distort study findings. Data were collected retrospectively.

In conclusion, flexible, adaptable, self-pacing online resources can support student satisfaction within challenging bioscience courses as well as improving academic engagement in such courses. Academics and educators need to adapt to the needs of the contemporary student cohorts to ensure that learning and teaching practices best suit program and learner requirements.

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Highlights

- YouTube videos are an innovative time-effective way to present bioscience content
- Accessible and engaging online resources support bioscience-confident graduates
- Open access resources enhance user feedback and engagement
- YouTube videos can enhance student engagement with bioscience content
- Open access biosciences resources may help maintain minimum bioscience standards

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