Nurse Education in Practice 31 (2018) 151–155

Contents lists available at ScienceDirect

Nurse Education in Practice

journal homepage: www.elsevier.com/locate/nepr

Original research

Youtube for millennial nursing students; using internet technology to support student engagement with bioscience

Amy NB. Johnston[c,d,e,*], Matthew J. Barton[a,b,c], Grant A. Williams-Pritchard[b,c], Michael Todorovic[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

ARTICLE INFO

Keywords:
YouTube
Nurse education
Biosciences
Pathophysiology
Digital media
Online learning

ABSTRACT

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 5000 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.

1. 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 et al., 2012). While some authors suggest that non-traditional students are an increasing proportion of University students in nursing programs internationally (Bye et al., 2007; Bloomfield et al., 2013; Natan, 2016), it is clear that students who are training in a 24 h 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 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 et al., 2008) contribute to academic stresses, potentiating existing 'science-phobias' (Stecker, 2004; Craft et al., 2013; Johnston et al., 2015; McVicar 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 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 et al., 2010).

Online learning has witnessed an exponential growth within health

* Corresponding author. Department of Emergency Medicine, Princess Alexandra Hospital 199 Ipswich Rd, Woolloongabba, QLD 4102, Australia.
E-mail addresses: amy.johnston@uq.edu.au (A.N. Johnston), m.barton@griffith.edu.au (M.J. Barton), grant.pritchard@griffith.edu.au (G.A. Williams-Pritchard), m.todorovic@griffith.edu.au (M. Todorovic).

https://doi.org/10.1016/j.nepr.2018.06.002
Received 15 December 2017; Received in revised form 28 May 2018; Accepted 8 June 2018

science tertiary education (Skiba, 2007; Crookes et al., 2013; May et al., 2013; Barry, Marzouk et al., 2016a; El Hussein, Salyers et al., 2016), due to its apparent convenience, flexibility and ease of accessibility (Kala et al., 2010; Clifton and Mann, 2011; Johnston 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 et al., 2008), and inflexible capacity to access content off campus (Koch et al., 2010), seems to contribute to a lack of student use of available resources and associated decrements in academic performance (Johnston 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 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., 2016a). This may be problematic as many of these sources have limited academic oversight (Azer, 2012; Barry, Tierney et al., 2016b). 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 et al., 2012; May 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 et al., 2013), like many educational interventions, there is little objective quantitative evidence of their effectiveness (Snelson, 2011; May et al., 2013; McVicar 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).

2. Methods

2.1. 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.

2.2. Resource development

YouTube videos, like any learning resource, needed to be developed using evidence-based pragmatic and conceptual guidelines (Barry, Tierney et al., 2016b; 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 5–7 min long and covering a single key bioscience concept with clear links to clinical relevance, ensured a simple engaging design and guaranteed interaction usability (Todorovic 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., 2016b). 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 et al., 2010). For online learning activities using constructivism to be successful, they should contain applied or relevant knowledge and appropriate context (Brown 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 et al., 2012). Using these underpinning principles the YouTube channel 'Biological Sciences' was created and 149 short YouTube videos were created and uploaded.

2.3. 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 et al., 2014). These processes contributed to the dependability of the data (O'Brien et al., 2014).

2.4. 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).

3. Results

3.1. Quantitative

The 'Biological Sciences' YouTube channel has, as of the 7th December 2017, 5135 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 s, aligning well with the average duration of the videos (approx. 10 min). Data suggests that approximately 30% of the videos are watched. The total 'watch' time for the videos was more than 1,577, 200 min.

Numerical responses to the videos were primarily positive, with approx. 4000 recorded likes against only 60 dislikes and more than 2000 (2187) 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.

3.2. Qualitative

The qualitative comments aligned well with many of the nine dimensions of the learning object review instrument established by 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.

3.3. 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"

3.4. 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"

3.5. Motivation

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

3.6. Presentation design

"delivered in a clear and concise format"

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

3.7. Interaction usability

"Thank you! Amazing and helpful explanation)"

"thanks for the clarification – makes it even more relevant"

3.8. Accessibility

"Great to watch anytime after the lecture and again before the exam"

3.9. 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"

3.10. 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.

3.11. Workload

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

4. 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 et al., 2013; McVicar et al., 2014; Salvage-Jones et al., 2016; Todorovic 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 et al., 2013; Todorovic et al., 2017). Also significant were the more than 1.5 million minutes of viewing time (> 26,286 h, > 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 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, though images and video as well as text, from multiple sources simultaneously(Kelly et al., 2009; Koch et al., 2010). They operate at what 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 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 et al., 2010; Clifton and Mann, 2011; Salvage-Jones 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 et al. 2015b). The use of publically available resources premised on an international standard may help alleviate some of this variability (Taylor et al. 2015a).

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 excepted 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.

Author contribution

Listed authors made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted and so meet the criteria for authorship.

Declaration of interest

The authors declare that they have no conflict of interests.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. None of the authors have financial or personal relationships with other people or organisations that could inappropriately influence (bias) their work.

Acknowledgements

We would like to thank the students whose input made this work possible and the A/Prof learning and teaching, Thea van de Mortel for her ongoing support of excellence in learning and teaching.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.nepr.2018.06.002.

References

Andrew, S., Salamonson, Y., Weaver, R., Smith, A., O'Reilly, R., Taylor, C., 2008. Hate the course or hate to go: semester differences in first year nursing attrition. Nurse Educ. Today 28 (7), 865–872.
Azer, S.A., 2012. Can "YouTube" help students in learning surface anatomy? Surg. Radiol. Anat. 34 (5), 465–468.
Barry, D.S., Marzouk, F., Chulak-Oglu, K., Bennett, D., Tierney, P., O'Keeffe, G.W., 2016a. Anatomy education for the YouTube generation. Anat. Sci. Educ. 9 (1), 90–96.
Barry, D.S., Tierney, P., O'Keeffe, G.W., 2016b. The need for ethical and pedagogical frameworks for developing online media in anatomy education. Anat. Sci. Educ. 9 (5), 498–499.
Berk, R.A., 2009. Multimedia teaching with video clips: TV, movies, YouTube, and mtvU in the college classroom. Int. J. Tech. Teach. Learn. 5 (1).
Bloomfield, J.G., Cornish, J.C., Parry, A.M., Pegram, A., Moore, J.S., 2013. Clinical skills education for graduate-entry nursing students: enhancing learning using a multimodal approach. Nurse Educ. Today 33 (3), 247–252.
Brown, J., Collins, A., Duguid, P., 1989. Situated cognition and the culture of learning. Educ. Res. 18 (1).
Burke, S.C., Snyder, S.L., 2008. YouTube: an innovative learning resource for college health education courses. Int. Electron. J. Health Educ. 11, 39–46.
Bye, D., Pushkar, D., Conway, M., 2007. Motivation, interest, and positive affect in traditional and nontraditional undergraduate students. Adult Educ. 57, 141–158.
Clifton, A., Mann, C., 2011. Can YouTube enhance student nurse learning? Nurse Educ. Today 31 (4), 311–313.
Craft, J., Hudson, P., Plenderleith, M., Wirihana, L., Gordon, C., 2013. Commencing nursing students' perceptions and anxiety of bioscience. Nurse Educ. Today 33 (11), 1399–1405.
Crookes, K., Crookes, P.A., Walsh, K., 2013. Meaningful and engaging teaching techniques for student nurses: a literature review. Nurse Educ. Pract. 13 (4), 239–243.
Duffy, P., 2008. Engaging the YouTube google-eyed generation: strategies for using web 2.0 in teaching and learning. Electron. J. e Learn. 6 (2), 119–130.
El Hussein, M.T., Salyers, V., Osuji, J., 2016. Use of visual narrative illustrations to teach pathophysiology concepts to nursing students. J. Nurs. Educ. 55 (2), 109–112.
Elison-Bowers, P., Snelson, C., Casa de Calvo, M., Thompson, H., 2008. Health science students and their learning environment: a comparison of perceptions of on-site, remote-site, and traditional classroom students. Perspects Health Inf. Manag. 5, 2.
Ertmer, P., Newby, T., 2013. Behaviorism, cognitivism, constructivism: comparing critical features from an instructional design perspective. Perform. Improv. Q. 26 (2).
Glen, S., 2005. E-learning in nursing education: lessons learnt? Nurse Educ. Today 25 (6), 415–417.
Godwin, P., 2007. Information Literacy meets Web 2.0: how the new tools affect our own training and our teaching. N. Rev. Inf. Netw. 13 (2), 101–112.
Herrman, J.W., 2011. Keeping their attention: innovative strategies for nursing education. J. Cont. Educ. Nurs. 42 (10), 449–456.
Hsieh, H.-F., Shannon, S.E., 2005. Three approaches to qualitative content analysis. Qual. Health Res. 15 (9), 1277–1288.
Jaggars, S.S., Xu, D., 2016. How do online course design features influence student performance? Comput. Educ. 95, 270–284.
Johnston, A., Hamill, J., Barton, M., Baldwin, S., Percival, J., Williams-Pritchard, G., Salvage-Jones, J., Todorovic, M., 2015. Student learning styles in anatomy and physiology courses: meeting the needs of nursing students. Nurse Educ. Pract. 15 (6),

415–420.
Johnston, A.N.B., Massa, H., Burne, T.H.J., 2013. Digital lecture recording: a cautionary tale. Nurse Educ. Pract. 13 (1), 40–47.
Kala, S., Isaramalai, S.A., Pohthong, A., 2010. Electronic learning and constructivism: a model for nursing education. Nurse Educ. Today 30 (1), 61–66.
Kellner, D., Kim, G., 2009. YouTube, Politics, and Pedagogy: Some Critical Reflections. na.
Kelly, M., Lyng, C., McGrath, M., Cannon, G., 2009. A multi-method study to determine the effectiveness of, and student attitudes to, online instructional videos for teaching clinical nursing skills. Nurse Educ. Today 29 (3), 292–300.
Koch, J., Andrew, S., Salamonson, Y., Everett, B., Davidson, P.M., 2010. Nursing students' perception of a web-based intervention to support learning. Nurse Educ. Today 30 (6), 584–590.
Krauskopf, K., Zahn, C., Hesse, F.W., 2012. Leveraging the affordances of Youtube: the role of pedagogical knowledge and mental models of technology functions for lesson planning with technology. Comput. Educ. 58 (4), 1194–1206.
Leacock, T.L., Nesbit, J.C., 2007. A framework for evaluating the quality of multimedia learning resources. J. Educ. Tech. Soc. 10 (2).
Lizzio, A., Wilson, K., 2013. First-year students' appraisal of assessment tasks: implications for efficacy, engagement and performance. Assess Eval. High Educ. 38 (4), 389–406.
May, O.W., Wedgeworth, M.G., Bigham, A.B., 2013. Technology in nursing education: youtube as a teaching strategy. J. Pediatr. Nurs.: Nurs. Care Child. Fam. 28 (4), 408–410.
McVicar, A., Andrew, S., Kemble, R., 2014. Biosciences within the pre-registration (pre-requisite) curriculum: an integrative literature review of curriculum interventions 1990–2012. Nurse Educ. Today 34 (4), 560–568.
McVicar, A., Andrew, S., Kemble, R., 2015. The 'bioscience problem'for nursing students: an integrative review of published evaluations of Year 1 bioscience, and proposed directions for curriculum development. Nurse Educ. Today 35 (3), 500–509.
Natan, M.B., 2016. Interest in nursing among academic degree holders in Israel: a cross-sectional quantitative study. Nurse Educ. Today 38, 150–153.
NMBA, 2016. Registered Nurse Standards of Practice. Nursing and Midwifery Board of Australia, Canberra Australia.
O'Brien, B.C., Harris, I.B., Beckman, T.J., Reed, D.A., Cook, D.A., 2014. Standards for reporting qualitative research: a synthesis of recommendations. Acad. Med. 89 (9), 1245–1251.
Potomkova, J., Mihal, V., Schwarz, D., 2012. Medical Education for YouTube Generation. E-Learning-Engineering, On-Job Training and Interactive Teaching. InTech.
Prensky, M., 2007. Digital GameBased Learning. Paragon House, St Paul USA.
Ruiz-Gallardo, J.-R., González-Geraldo, J.L., Castaño, S., 2016. What are our students doing? Workload, time allocation and time management in PBL instruction. A case study in Science Education. Teach. Teach. Educ. 53, 51–62.
Salvage-Jones, J., Hamill, J., Todorovic, M., Barton, M.J., Johnston, A.N.B., 2016. Developing and evaluating effective bioscience learning activities for nursing students. Nurse Educ. Pract. 19, 63–69.
Sharoff, L., 2011. Integrating YouTube into the nursing curriculum. OJIN: Online J. Issues Nurs. 16 (3).
Skiba, D.J., 2007. Nursing education 2.0: YouTube™. Nurs. Educ. Perspect. 28 (2), 100–102.
Snelson, C., 2011. YouTube across the disciplines: a review of the literature. MERLOT J. Online Learn. Teach. 7, 159–169.
Stecker, T., 2004. Well-being in an academic environment. Med. Educ. 38 (5), 465–478.
Taylor, P., Fell, P., Goacher, P., Jolly, J., Ashelford, S., 2015a. International Quality Assurance Framework for Biosciences Education in Nursing.
Taylor, V., Ashelford, S., Fell, P., Goacher, P.J., 2015b. Biosciences in nurse education: is the curriculum fit for practice? Lecturers' views and recommendations from across the UK. J. Clin. Nurs. 24 (19–20), 2797–2806.
ten Hove, P., van der Meij, H., 2015. Like it or not. What characterizes YouTube's more popular instructional videos? Tech. Commun. 62 (1), 48–62.
Todorovic, M., Johnston, A.N.B., Fenwick, C., Williams-Pritchard, G., Barton, M.J., 2017. Enriching remote access to the biosciences in undergraduate nursing programs: establishing and evaluating online video resources. Int. J. Innovat. Sci. Math. Educ. (formerly CAL-laborate International) 24 (4).
Van Horn, E.R., Hyde, Y.M., Tesh, A.S., Kautz, D.D., 2014. Teaching pathophysiology: strategies to enliven the traditional lecture. Nurse Educat. 39 (1), 34–37.
WMA, 1964. WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. Retrieved May, 2018, from. https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/.
Wray, J., Barrett, D., Aspland, J., Gardiner, E., 2012. Staying the course: factors influencing pre-registration nursing student progression into Year 2—a retrospective cohort study. Int. J. Nurs. Stud. 49 (11), 1432–1442.