Use of videos to support teaching and learning of clinical skills in nursing education: A review

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PII: S0260-6917(16)30029-6
DOI: doi: 10.1016/j.nedt.2016.04.010
Reference: YNEDT 3265

To appear in: Nurse Education Today

Received date: 18 December 2015
Revised date: 26 March 2016
Accepted date: 18 April 2016

Please cite this article as: Forbes, Helen, Oprescu, Florin I., Downer, Terri, Phillips, Nicole M., McTier, Lauren, Lord, Bill, Barr, Nigel, Alla, Kristel, Bright, Peter, Dayton, Jeanne, Simbag, Vilma, Visser, Irene, Use of videos to support teaching and learning of clinical skills in nursing education: A review, Nurse Education Today (2016), doi: 10.1016/j.nedt.2016.04.010

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Title:
Use of videos to support teaching and learning of clinical skills in nursing education: A review

Word Count:
2,654 words

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Acknowledgements
This project was funded by the Australian Office of Learning and Teaching.
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Abstract

Information and communications technology is influencing the delivery of education in tertiary institutions. In particular, the increased use of videos for teaching and learning clinical skills in nursing may be a promising direction to pursue, yet we need to better document the current research in this area of inquiry. The aim of this paper was to explore and document the current areas of research into the use of videos to support teaching and learning of clinical skills in nursing education. The four main areas of current and future research are: effectiveness, efficiency, usage and quality of videos as teaching and learning materials. While there is a clear need for additional research in the area, the use of videos seems to be a promising, relevant and increasingly used instructional strategy that could enhance the quality of clinical skills education.

Keywords
Nurse education, nursing skills, nursing students, video, blended learning

INTRODUCTION

Information and communications technology (ICT) is increasingly influencing the delivery of education in tertiary institutions (Arguel & Jamet, 2009; Johnson, et al., 2010) and is attractive to contemporary students who have been exposed to technology use from an early age (Duncan, Yarwood-Ross, & Haigh, 2013; Kelly, Lyng, McGrath, & Cannon, 2009). In
line with the above there is an accelerating shift towards utilising online, mobile and handheld technology in health education (Hansen, 2011; Koeniger-Donohue, 2008). This may be opening new directions of research especially in health disciplines such as nursing.

Educators and academic developers may use blended learning methods to enhance the acquisition of both cognitive knowledge and practical skills in health disciplines. Nursing education warrants extensive preparation and training for nursing students to acquire competency in clinical skills prior to student exposure to clinical settings (Cardoso et al., 2012; Hibbert et al., 2013). Research shows that nursing students benefit from exposure to simulation situations both when learning basic clinical skills such as cardiovascular haemodynamics, and advanced clinical skills that are more complex to obtain like management of pulmonary embolism (Good, 2003). ICT strategies such as video use could thus assist the development of psychomotor clinical skills (Holland et al., 2013) that are critical for patient care and challenging to teach to students (Lynch, Barr, & Oprescu, 2012). Teaching strategies that include videos provide a visual demonstration of clinical skills in a simulated close to real setting (Cardoso et al., 2012; Hansen, 2011), offering context to the skill (Sowana & Idhail, 2014) and allowing students to experience performance of the skill by linking classroom (face-to-face) learning to clinical practice (Duncan et al., 2013; Holland et al., 2013).

Ensuring high level of competency in clinical skills acquisition may reduce healthcare costs, patient morbidity and mortality rates and increase patient safety (Hibbert et al., 2013; Holland et al., 2013; Koeniger-Donohue, 2008). In particular, the use of videos for teaching and
learning clinical skills in nursing may be a promising direction to pursue, yet we need to better document the current research in this area of inquiry.

The aim of this paper was to explore and document the current areas of research in regards to the use of videos to support teaching and learning of clinical skills in nursing education.

**CURRENT AREAS OF RESEARCH**

Four key directions of research (Figure 1) have been identified in the literature in regards to the use of videos to support teaching and learning of clinical skills in nursing education. The four directions of research are: effectiveness (Cardoso et al., 2012; Hansen, 2011; Hibbert et al., 2013; Holland et al., 2013; Kelly et al., 2009; Lee, Boyd, & Stuart, 2007), efficiency (Arguel & Jamet, 2009), video usage patterns (Chan, 2010; Koeniger-Donohue, 2008) and quality of videos (Clifton & Mann, 2011; Duncan et al., 2013). They are described in more detail below.

**Effectiveness**

This category included research projects that focused on the effectiveness of using video as a form of instruction and report videos as an equal or more effective teaching method for advanced clinical skills compared to traditional face-to-face teaching (Cardoso et al., 2012; Hansen, 2011; Hibbert et al., 2013; Holland et al., 2013; Kelly et al., 2009; Lee et al., 2007). Use of videos was reported as effective both in terms of skill acquisition (Cardoso et al., 2012; Hansen, 2011; Hibbert et al., 2013b; Holland et al., 2013; Kelly et al., 2009; Lee et al., 2007) and student satisfaction (Cardoso et al., 2012; Kelly et al., 2009; Lee et al., 2007; McKinney and Page, 2009).
Kelly, et al. (2009) tested student knowledge and skill performance in relationship to three nursing skills. This research confirmed that teaching of clinical skills supplemented with online videos was as effective as face-to-face teaching with the added benefit of higher student satisfaction with the learning experience (Kelly, Lyng, McGrath, & Cannon, 2009). In a similar study focused on the teaching of Puncture and Heparinisation of Totally Implantable Access Ports (PHTIAP) clinical skills using supplementary video materials, Cardoso, et al. (2012) reported increased cognitive and procedural knowledge of nursing students, high student satisfaction with teaching experience and lower anxiety levels.

Multiple studies testing various clinical nursing skills appraised the effectiveness of video instruction as being superior in ensuring performance outcomes, student confidence and satisfaction compared to traditional methods used in nursing education (Hibbert et al., 2013; Holland et al., 2013; Lee, Boyd, & Stuart, 2007). Students perceived videos to be particularly useful as a revision tool and as a good preparation method for practice (Holland et al., 2013) preferring this teaching method for its flexibility, self-management and repetition (Barratt, 2010; Kelly et al., 2009).

Efficiency

The cognitive load theory, focuses on how the mind processes multimedia information, explaining this variance by drawing on evidence from the two types of human working memory processes (visual and auditory or verbal). Due to limited memory capacity, overload may occur when presented with information that requires processing by the two memory types simultaneously and hinders learning (Homer, Plass, & Blake, 2008; Sweller, 2003).
One direction in research was the focus on learning efficiency of dynamic video content compared with static images and their combinations to teach and learn procedural content (Arguel & Jamet, 2009; Höffler & Leutner, 2007; Wong et al., 2009). Arguel and Jamet (2009) concluded videos enabled learners to create a better internal representation of the learning content than static images. However, the literature presents some contradictory evidence regarding efficiency of videos in supporting teaching with variation in results associated with video format and/or content (Höffler & Leutner, 2007; Mayer, Hegarty, Mayer, & Campbell, 2005).

According to the static-media hypothesis, knowledge retention is improved by presentation of static information rather than dynamic media (videos) (Mayer et al. 2005). Improvement in knowledge retention is due to fewer cognitive processes being involved (Homer et al., 2008; Mayer et al., 2005). However, Wong et al. (2009) confirmed that instructional animations consistently ensured superior learning when videos depicted human movement. Wong et al. (2009) hypothesised that human evolution through learning by imitation has led to the development of a separate component of working memory dealing with human compared to mechanical movement, which has contributed to people being able to readily manage video content that shows human performance. This is promising for future development of videos that teach students clinical skills by expert demonstration.

Current research indicates that cognitive load can be managed through the use of appropriate educational design principles. The literature supports a number of video development strategies to reduce cognitive overload, increase learner attention span and improve learning efficiency. These measures include: combining static pictures together with videos (Arguel & Jamet, 2009), using narrations (Homer et al., 2008), annotations (Plass, Chun, Mayer, &
Leutner, 1998), adding captions (Chan, 2010), chunking information into smaller parts (Chan, 2010; Hasler, Kersten, & Sweller, 2007) or discrete steps (Rieber, 1990), and enabling user control (Hasler et al., 2007; Schwan & Riempp, 2004; Wong et al., 2009). Mayer et al. (2005) concluded that engaging learners by giving them control over sequence and speed of video presentations enables more active processing of information and enables comprehension before proceeding with the video (Schreiber, Fukuta, & Gordon, 2010; Wong et al., 2009). Students appreciated the freedom to pause, rewind and replay videos to accommodate their learning needs (Schreiber et al., 2010).

Regarding video content, multiple authors confirm that videos improve learning outcomes when they are realistic (Alfes, 2008; Höfler & Leutner, 2007) and allow concentration on essential information only (Lowe, 2003). Literature indicates that video resources that are efficient in instigating a feeling of social presence may lead to deeper learning (Homer et al., 2008). Moreno and Mayer (2000) established that multimedia that communicated with the learner directly and informally using narratives from a first-person point of view were more efficient in engaging students cognitively and socially, resulting in increased application of new knowledge. Exploration of how to best utilise social and emotional factors to support cognitive processing of video content may prove to be a relevant direction of research for clinical education (Homer et al., 2008).

**Usage**

Chan (2010) studied video usage and student beliefs about video instructions for ‘beyond classroom’ learning and concluded that videos are preferred by students as learning tools compared to other online learning media. The literature confirms that instructional videos are particularly useful for learning nursing skills, as the videos enable a visual representation of
clinical care situations viewed safely in a controlled environment (Cardoso et al., 2012; Williams, French, & Brown, 2009). Videos contribute to quality nursing care as they enable learners to develop clinical competencies in a close to real life situation facilitating correct performance and knowledge acquisition without the added anxiety that may be experienced practicing nursing skills in real life situations (Cardoso et al., 2012). Students can view videos repeatedly as part of the revision process that is supportive of individual learning needs (Barratt, 2010; McAllister et al., 2013).

As instructional videos are increasingly freely accessible online, research into students’ video access patterns is growing with the potential to impact video development and presentation. The need for instant access to information has led to improved use of mobile and handheld technology in health related education. This is an emergent research direction that is as yet relatively unexplored (Koeniger-Donohue, 2008), particularly regarding video usage when accessed via portable devices such as smart phones (Jang & Kim, 2014), tablets (O’Donovan & Maruthappu, 2014), iPods or MP3 players (Clay, 2011; Hansen, 2011), and other handheld computers like PDAs (Park, 2011). Koeniger-Donohue (2008) researched the use of handheld technology (Personal Digital Assistants or PDAs) in learning of clinical nursing skills reporting enhanced learning with potential improvements for patient safety and care. Recent literature supports the recommendation that videos accessed using mobile devices are valuable just-in-time learning and teaching resources (Hibbert et al. 2013; Jang & Kim, 2014; McAllister et al., 2013).

Additionally, research into video usage has highlighted that the video learning strategy is useful for technological skills development that is crucial to nursing education and competency (Bond, 2009; Holland et al., 2013). Bond (2009) established that nursing
education often fails to equip nurse graduates with technological skills and knowledge that is necessary to conduct their daily work and interact with patients. Literature indicates that effective health information skills that may be lacking include: basic computer skills, clinically relevant information search and processing techniques, research and critical reflection skills (Bond, 2009; Holland et al., 2013). Pereira et al. (2014) evaluated a project where nursing students created their own online clinical skills videos and found that students highly valued this experience with 82% believing they had increased their technological competency as a result of the video project. Emergent literature is exploring the impact of the use of video learning on development of a range of cross-curricular competencies that complement clinical and technological skills and range beyond problem-solving, communication and social skills (Orús, et al., 2016; Ottenbreit-Leftwich et al., 2010; Pereira, et al., 2014).

**Quality**

Research is emerging that focuses on the quality of educational clinical skills videos available online. Duncan, Yarwood-Ross and Haigh (2013) reported overall (69%) poor video quality of clinical skills videos found on YouTube and concluded there was a clear need for rigorous evaluation of the quality of educational videos. These findings and recommendations are supported by Clifton & Mann, (2011) and Rössler, Lahner, Schebesta, Chiari, & Plöchl (2012).

Hibbert et al. (2013) warned that students subjected to incorrect clinical skills demonstrations through online videos may learn techniques that will cause harm to patients. Rössler et al. (2012) explored clinical skills videos teaching aseptic technique and confirmed a much higher number of videos were available depicting incorrect information compared to
good quality videos on YouTube. However, the proportion of videos demonstrating skills that could be deemed unsafe for patients was found to be low (Rößler et al., 2012).

Importantly, learners often lack the critical appraisal skills necessary to evaluate the quality of online videos including procedural accuracy (Kingsley et al., 2011). With the Internet being the largest easily accessible source of clinical information available for nursing students, research calls for ways to improve the quality of online educational videos with a particular focus on the need to warrant quality control of YouTube video clips (Burton, 2008; Hayanga & Kaiser, 2008). Currently, no content quality mechanisms exist to ensure teaching standards for YouTube videos beyond inappropriate content bans by YouTube administrators (Rößler et al., 2012). Coupling the establishment of institutional quality assurance systems to ensure students use high quality videos (Burton, 2008; Rößler et al., 2012) and developing students’ critical appraisal skills is needed in a curriculum using video resources.

In addition to the need to warrant video content quality, emergent studies explore the impact and importance of instructional video format quality. Chan (2010) conducted a survey on student perceptions about what makes good educational videos and found that high video resolution was among the top video characteristics appreciated by learners after content and loading times. High quality downloadable educational content is valued and demanded by students (Hansen, 2011; Roshier, Foster, & Jones, 2011).

**FUTURE RESEARCH DIRECTIONS**

Exploring video usage as a learning resource for nursing education has gained momentum in recent years (Cardoso et al., 2012; Hansen, 2011) with particular recognition of their value for students (Chan, 2010; Kelly et al., 2009). Studies reported that contemporary students are
comfortable using videos (Clifton & Mann, 2011) and may benefit from video learning resources that can support varied student needs and learning styles (Chan, 2010; Kelly et al., 2009).

While appraisal of effectiveness of video teaching methods for teaching and learning of clinical skills in nursing education was the most researched area, several authors recommended further testing of video instructions using a wider variety of clinical skills to build an evidence base for the video teaching method (Hansen, 2011; Holland et al., 2013; Kelly et al., 2009; Lee et al., 2007). A specific focus of future research could be the use of mobile devices as a ‘just-in-time’ learning resource (Hibbert et al., 2013).

In regards to research into efficiency of learning, Arguel and Jamet (2009) recommended investigating video production that enhances teaching and learning through appropriate educational design based on research of optimal cognitive loads during learning processes for students. Future studies in this field can include testing of hybrid models (combination of videos and static images) in several learning domains and observing visual processing using eye-tracking devices to determine the most efficient ways to deliver information (Arguel & Jamet, 2009).

Further research investigating usage should focus on user learning patterns and user-generated video instructions in support of teaching and learning, including social and context-specific determinants that may affect the choices students make regarding user-generated video instructions for learning (Chan, 2010). Furthermore, additional research is needed on the integration of technology such as handheld devices into everyday nursing education (Koeniger-Donohue, 2008).
Future research into the quality of clinical skills videos should importantly address the quality assurance standards of videos available online to ensure that nursing students use videos with correct, updated and evidence-based content (Duncan et al., 2013). Studies in this field could explore the avenues available to higher education institutions to support video content and access quality for nursing students (Shephard, 2003). The video quality aspect remains an important area of future research (Clifton & Mann, 2011).

CONCLUSION
This paper has presented a review of the existing research on four main areas relating to the use of videos and has identified areas for future research in regards to the use of videos in clinical skills education in nursing. There are four main areas of current and future research in this space: effectiveness, efficiency (production), usage and quality of videos. While there is a clear need for additional research in the area, the use of videos seems to be a promising, relevant and increasingly used instructional strategy that could enhance the quality of clinical skills education under contemporary conditions.
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Figure 1. Key areas of research for video use for clinical skills education in nursing
Highlights:

- Students value ICT-based solutions to support the learning of clinical nursing skills
- Blended learning incorporating video could enhance acquisition of knowledge and skills
- Current areas of research in clinical education using videos is focused on effectiveness, efficiency, usage and quality