

Review

A systematic review examining the effectiveness of blending technology with team-based learning



Jo River PhD, Lecturer*, Jane Currie MSc, Lecturer, Tonia Crawford MHLthSc(Ed), Lecturer, Vasiliki Betihavas PhD, Lecturer, Sue Randall PhD, Senior Lecturer

Sydney Nursing School, The University of Sydney, 88 Mallett Street, Camperdown, NSW 2050, Australia
 Sydney Nursing School, 88 Mallett Street, Camperdown, NSW 2050, Australia

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ABSTRACT

Background: Technological advancements are rapidly changing nursing education in higher education settings. Nursing academics are enthusiastically blending technology with active learning approaches such as Team Based Learning (TBL). While the educational outcomes of TBL are well documented, the value of blending technology with TBL (blended-TBL) remains unclear. This paper presents a systematic review examining the effectiveness of blended-TBL in higher education health disciplines.

Objectives: This paper aimed to identify how technology has been incorporated into TBL in higher education health disciplines. It also sought to evaluate the educational outcomes of blended-TBL in terms of student learning and preference.

Method: A review of TBL research in Medline, CINAHL, ERIC and Embase databases was undertaken including the search terms, *team based learning, nursing, health science, medical, pharmaceutical, allied health education and allied health education*. Papers were appraised using the Critical Appraisal Skills Program (CASP).

Results: The final review included 9 papers involving 2094 student participants. A variety of technologies were blended with TBL including interactive eLearning and social media.

Conclusion: There is limited evidence that blended-TBL improved student learning outcomes or student preference. Enthusiasm to blend technology with TBL may not be as well founded as initially thought. However, few studies explicitly examined the value of incorporating technology into TBL. There is a clear need for research that can discern the impact of technology into TBL on student preference and learning outcomes, with a particular focus on barriers to student participation with online learning components.

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1. Introduction

Technological advancements are rapidly changing the way nursing, medical and allied health education is delivered in higher education settings. Universities are under increasing pressure to incorporate innovative technology-based educational methods to accommodate diverse student learning needs and situations and remain competitive in the global education market (Garrison and Kanuka, 2004). As a result, many academics are adopting technology both within classes to enhance student engagement, as well as in 'blended learning' formats, which combine face-to-face teaching with online learning experiences (Stacey and Gerbic, 2008).

* Corresponding author at: Sydney Nursing School, The University of Sydney, 88 Mallett Street, Camperdown, NSW 2050, Australia.

E-mail addresses: jo.river@sydney.edu.au (J. River), jane.currie@sydney.edu.au (J. Currie), tonia.crawford@sydney.edu.au (T. Crawford), Vasiliki.betihavas@sydney.edu.au (V. Betihavas), sue.randall@sydney.edu.au (S. Randall).

More recently there has been a move to blend technology with the active face-to-face learning method known as Team Based Learning (TBL) (Freeman, 2004). TBL, which was developed by Larry Michaelsen in the United States in the early 1980's, has gained considerable popularity in higher education health disciplines. It has proved particularly popular since it allows health professional educators to provide students with a low-cost, authentic experience of working in small teams to solve 'real-world' clinical problems (Cheng et al., 2014; Haidet et al., 2014; Parmelee et al., 2012; Sisk, 2011).

Academics in health disciplines are blending technology with traditional TBL formats in a variety of ways. For some, a blended-TBL format simply means providing 'pre-class' individual study through online readings or lectures, whereas others are using more innovative approaches such as adaptive eLearning platforms and social media sites such as Twitter (Wright et al., 2014; Corbridge et al., 2013; Davidson, 2011). Yet, to date, there has been no systematic evaluation of the recent trend towards blended-TBL.

This paper, therefore, examines how technology has been incorporated into TBL, the educational outcomes of this approach and student experience of courses incorporating technology into TBL.

2. Background

Proponents of blended-learning argue that it is not sufficient to simply use old methods of content delivery on new platforms. The blending of technological innovations with face-to-face teaching may add little value unless they are thoughtfully integrated (Garrison and Kanuka, 2004). It has long been recognised that didactic teaching methods promote passive content memorisation and student apathy (Bligh, 2000). Using eLearning platforms to provide didactic lectures may be no more effective in increasing student engagement than traditional face-to-face lectures, albeit in an online format (Vaughan, 2007; Littlejohn and Pegler, 2007; Garrison and Kanuka, 2004).

Given the challenges of didactic teaching methods (online or otherwise), academics are increasingly adopting in-class active learning methods and blending this with innovative technologies (Stacey and Gerbic, 2008). Active learning methods enable students to engage with authentic learning tasks that promote critical thinking, peer collaboration and accountability and frequently result in improved learning outcomes (Biggs, 1991). Carefully designed active learning activities – that use a soundly constructed knowledge base to focus on higher-order learning objectives of application, analysis and evaluation, and incorporate a variety of ways of encoding the learning task – tend to lead to what has been described as ‘generative’ learning (Biggs, 1991; Anderson and Krathwohl, 2001).

The nature of health professional education means that the skillful integration of active learning pedagogy, with technologies, holds particular considerations. While student engagement and critical thinking are a major educational objective, nursing, and other health professional educators, are also concerned to promote inter and intra-disciplinary team skills, interpersonal communication as well as provide ample opportunities for application of clinical skills (Benner et al., 2009; Park et al., 2015; McLaughlin et al., 2014; Zerwekh, 2011). The non-technical skills of teamwork, communication, leadership and the ability to ‘think on your feet’ are key graduate attributes for nurses and other health professionals who work in multidisciplinary teams to provide evidence based care to patients in dynamic healthcare settings (Banfield et al., 2012). Indeed, ineffective teamwork can lead to patient safety incidents and medical errors (Greenberg et al., 2007).

TBL has proved particularly popular in nursing, medicine, pharmacy, dentistry and allied health education. It meets the needs of health professional educators to provide students with an authentic experience of working in a healthcare teams, and challenge them to effectively solve real-world clinical problems (Cheng et al., 2014; Haidet et al.,

2014; Parmelee et al., 2012; Sisk, 2011). In brief, the traditional format for TBL has three major phases. Phase one involves pre-class preparation. In phase two students engage in a Readiness Assurance Process (RAP) whereby the individual’s and team’s understanding of key concepts is ascertained through a Readiness Assurance Test (RAT). In phase three, using the key concepts tested during phase two, students work together to ‘solve’ clinical cases or scenarios (Parmelee et al., 2012). The three phases of TBL are outlined in Fig. 1.

Health professional educators are blending this traditional TBL format with online learning approaches. While some academics are simply providing online pre-class lectures or video conferencing, others are using multi-media adaptive eLearning platforms and social media sites such as Twitter for pre-class and in-class learning (Corbridge et al., 2013; Davidson, 2011). Although the positive outcomes of TBL in its traditional format are well documented (e.g. Cheng et al., 2014; Sisk, 2011), what is still unclear is the effectiveness of blending technology with TBL.

An initial review of the literature indicated that there were few papers examining the incorporation of technology into TBL in nursing education. The systematic review presented here, therefore, looks beyond nursing to incorporate other higher education health education disciplines in order to identify the effectiveness of blended-TBL approaches. This systematic review focuses specifically on the incorporation of technology into TBL formats that go beyond standard Learning Management System (LMS) functions (for example for student notifications, lecture slides and grades entry etc.), which are now in place across most universities worldwide.

To identify the effectiveness of blending technology with TBL approaches in higher education health disciplines, this review specifically sought to: 1) Identify how technology has been incorporated into TBL within higher education health disciplines, and 2) Identify the educational outcomes in terms of student learning and preference for the incorporation of technology into TBL delivered in higher education health disciplines.

3. Method

3.1. Search Process

A systematic review of published TBL research was undertaken between June and July 2015 in Medline, CINAHL, ERIC and Embase databases. The review process followed the three phases as set out in the Joanna Briggs Institute Reviewers Manual (2014). In the first phase initial key words were identified from the researchers’ knowledge of the field. These included: *team-based learning, nursing education, health science education, medical education, pharmaceutical education and allied health education*. An initial search was conducted in CINAHL

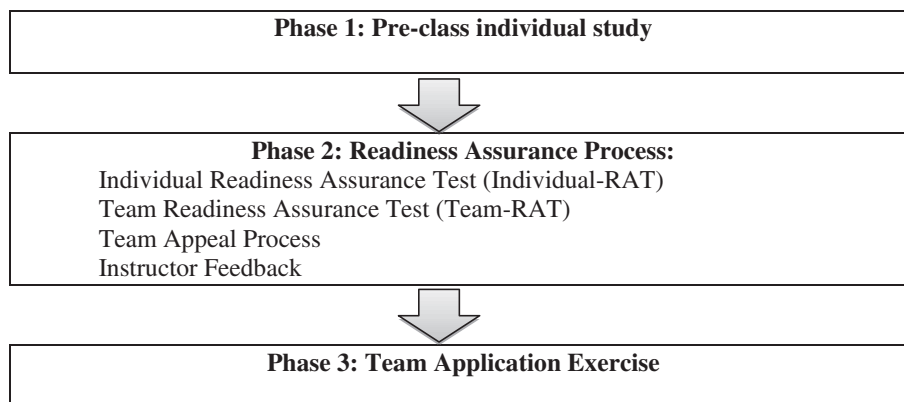


Fig. 1. The three phases of TBL. (Adapted from Parmelee et al.¹³).

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