



Review

The promised land of blended learning: Quizzes as a moderator



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ABSTRACT

Blended learning, defined as a combination of face-to-face and online learning, is expected to lead to improved education. Besides, practical reasons, like increased access to education and resource management, are mentioned for its implementation. To examine whether the expectation of improved education is met, meta-analyses were conducted. They revealed that, on average, blended learning is somewhat more effective than more traditional learning. Additionally, students evaluated it as equally attractive, but seemed to perceive it as more demanding. In sum, blended learning is equal, or maybe even better, than more traditional learning. However, the effects on effectiveness, attractiveness and perceived demands differed much between studies. Moderator analyses found that quizzes positively affect the effectiveness and attractiveness of blended learning. Concluding, blended learning has potential to improve education, when thoughtfully designed, for example by the inclusion of frequent quizzes.

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1. Introduction

Blended learning is a popular concept. A common aspect in many definitions of blended learning is that it combines online and face-to-face learning (e.g., [Graham, 2013](#)). Hence, it is assumed to combine the advantages of both (e.g., [Delialioglu & Yildirim, 2008](#); [Feist, Ciccarelli, McFerron, & Molleston, 2013](#); [Vernadakis, Giannousi, Tsitskari, Antoniou, & Kioumourtzoglou, 2012](#)). Blended learning is widely used in higher education ([Allen, Seaman, & Garrett, 2007](#); [Bonk, Kim, & Zeng, 2006](#)); and it is also used in K-12 education (e.g., [Picciano, Seaman, Shea, & Swan, 2012](#)) and in the corporate world (e.g., [Bonk et al., 2006](#); [Kim, Bonk, & Oh, 2008](#)).

Blended learning is the focus of many research studies ([Drysdale, Graham, Spring, & Halverson, 2013](#)). Part of the studies on blended learning are comparisons of blended and face-to-face learning ([Drysdale et al., 2013](#); [Halverson, Graham, Spring, Drysdale, & Henrie, 2014](#)). These studies are particularly interesting, as they enable us to draw conclusions about the effects of blended learning on effectiveness, student satisfaction and evaluations of required investments, compared to more traditional education. With a meta-analysis the results from these comparisons can be combined into one statistical synthesis, to draw stronger overall conclusions. This article presents meta-analyses examining the effects of blended learning on effectiveness, student satisfaction and evaluations of required investments. However, before describing our meta-analyses, first the main reasons for implementing blended learning are described in the next section. Subsequently findings of previous meta-analyses are discussed as well as the main methodological differences between those previous meta-analyses and our meta-analyses.

1.1. Improved education and practical reasons for the implementation of blended learning

Improving education is one of the main reasons to implement blended learning (e.g., [Graham, 2006, 2009](#)). Internet and computers, mostly used to access the internet in studies on blended learning, offer opportunities to include more, authentic, varied and different instructional materials and innovative learning activities. It is, for example, easier to incorporate frequent quizzes or self-tests in a blended learning environment than in a more traditional learning environment. Moreover, the computer can automatically score the answers of the students on those quizzes or self-tests and provide the students with feedback (e.g., [Cole & Robertson, 2006](#); [Jia, Chen, Ding, & Ruan, 2012](#); [Riffell & Sibley, 2005](#)).

Additionally, the introduction of blended learning in a course might lead to rethinking of the instructional design and the investment of additional time and effort in the design ([Kaleta, Skibba, & Joosten, 2007](#)). The capabilities and affordances of computers and internet as well as the additional time and effort put into the course design might trigger a shift toward a more active and learner-centered approach ([Graham & Robison, 2007](#); [Kaleta et al., 2007](#); see also e.g., [Adileh, 2012](#); [Taradi, Taradi, Radić, & Pokrajac, 2005](#); [Vernadakis, Antoniou, Giannousi, Zetou, & Kioumourtzoglou, 2011](#); [Yang, 2012](#)).

Furthermore, in blended learning learners have, to some extent, control over their learning. They can, for example, work on their own pace, choose to revisit materials and/or choose when to study (e.g., [Feist et al., 2013](#); [Salyers, 2007](#); [Yapici & Akbayin, 2012](#); [Yang, 2012](#)). This control might give them the possibility to adapt the learning materials to their individual needs or preferences (e.g., [Cole & Robertson, 2006](#); [Kavadella, Tsiklakis, Vougiouklakis, & Lionarakis, 2012](#)). However, also other capabilities of blended learning might give students the possibility to adapt the learning materials to their individual needs or preferences. Examples of such capabilities are the choice between a variety of learning materials explaining concepts ([Chandra & Watters, 2012](#)) or the choice to use e-mail and discussion fora (e.g., [Cole & Robertson, 2006](#)). Blended learning is also assumed to better meet the needs of a diverse population of students (e.g., [Adileh, 2012](#); [Cole & Robertson, 2006](#); [Edwards, Kitzmiller, & Breckenridge-Sproat, 2012](#); [Picciano, 2009](#); [Yapici & Akbayin, 2012](#)). It is, for example, stated to better meet the needs of students with different learning styles ([Adileh, 2012](#); [Rudestam & Schoenholtz-Read, 2010](#); [Yapici & Akbayin, 2012](#)). Blended learning has this capability, because it combines different forms of instruction ([Picciano, 2009](#)). Additionally, by the incorporation of technology, blended learning might also be better able to meet the needs of the current generation of students, who are surrounded by computers in their daily life ([Costello, Lenholt, & Stryker, 2004](#); [Lancaster, Wong, & Roberts, 2012](#)). Additionally, blended learning can include activities which guide, support or force students to space their learning

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