

# Chapter 19

## The Learning Effect of Using a Blended Learning Design in K12 Science Teaching

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### **EXECUTIVE SUMMARY**

*In seven experiments, two learning conditions were assessed: a blended learning design against traditional instruction. 135 K12 science students were assigned to either a blended learning approach or to traditional learning instructions in authentic classroom settings. The students participated in one of two topics in the subject field of chemistry. All participants were randomly assigned within each classroom to one of two conditions: 1) an experimental blended learning group having teacher lecture plus Web-based multimedia; 2) a control group with traditional instructions having teacher lecture plus text and diagram. On subsequent retention and transfer tests, the blended learning group performed significantly better on retention in two of seven comparisons, and there was no significant difference in the rest. The challenge that lies ahead is to identify the characteristics of effective blended learning approaches for this type of learning programme. Recommendations for further research are made.*

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## **INTRODUCTION**

Information and Communication Technologies (ICT) affect many areas where people need more knowledge. Education is one of these fields and ICT has become an inevitable part of modern education mainly because of the opportunities the technologies offers (Mitchell & Forer, 2010; Köse, 2010). For ICT-supported education the most accepted term today is e-learning (Hoic-Bozin, et al., 2009), emphasizing that technology in education should be assisted with appropriate pedagogical methods, design and principles, and particularly with forms that encourage active learning (Del Corso, et al., 2005). A suggestive definition for e-learning is made by the Alonso *et al.* (2005): “Using new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration.”

By including the advantages of e-learning into traditional learning approaches a new educational model has emerged, which is called “blended learning.” Elearnspace (2005) states that “Blended learning takes the best of both worlds and creates an improved learning experience for the students.” It seems that blended learning is becoming an increasingly popular form of e-learning particular suitable for the process of transition from traditional forms of learning and teaching towards e-learning (Alonso, et al., 2005; Edginton & Holbrook, 2010; Koohang, 2009; Rush, 2008; Wu, et al., 2010). The literature has many definitions regarding blended learning. Wu (2010) defines it as an educational approach that combines different delivery methods and learning styles. According to Rush (2008) blended learning is a situation which includes students interaction with content while still being in contact with the instructors as well as the project group members as they progress through the task. The most popular definition of blended learning is probably the mix of traditional face-to-face instructions led by teachers and online learning in with the online portion is delivered via a courseware through the Internet (Koohang, 2009; Oliver & Trigwell, 2005). Some of the advantages of blended learning according to the literature are convenience, flexibility, increased retentiveness, enhanced learning, reduced seat time and decreased costs (Young, 2002; Garnham & Kaleta, 2002; Elearnspace, 2005). With emphasis on the two aspects of increased retentiveness and enhanced learning, the aim of this study was to conduct an experiment with the power qualitative to test these certain learning benefits between a blended learning design and a traditional learning activity.

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