

Research focus and methodological choices in studies into students' experiences of blended learning in higher education

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Abstract

The paper reviews representative research into blended learning in universities, taking into account the methodology used, the focus of the research and the relationship between the two. In terms of methodology, most research was classifiable as case-studies, survey-based studies or comparative studies. A small number of studies take a comparatively more holistic approach and one of the outcomes from this review is a recommendation for more holistic studies to be undertaken. In the studies reviewed, the focus of the research is often related to the degree of methodological complexity. That is, less methodologically elaborated studies tend to have a more specific focus, while the studies employing a more complex methodology tend to report more varied aspects of the students' learning experience. It is argued that educationally useful research on blended learning needs to focus on the relationships between different modes of learning (for example, face-to-face and on-line) and especially on the nature of their integration. In particular, such research needs to generate usable evidence about the quality of the students' learning experiences and learning outcomes. In turn, this demands appropriately powerful methodologies, rooted in a firm theoretical foundation.

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1. Introduction

The language of 'blended learning' is relatively new in educational practice: very few references to the term predate the year 2000, though hundreds of articles containing the phrase have been written since then. It is clear that 'blended learning' has caught on — indeed there is now a handbook on the topic (Bonk & Graham, 2005). However, it is also clear that the term is used with a variety of meanings, that it connotes something which has existed for the whole lifetime of educational technology, and that there are some serious doubts about its conceptual integrity (Oliver & Trigwell, 2005). Mixing technology-enhanced learning experiences with other, more traditional, learning experiences would have been seen as normal practice in the mainstream of developments in computer-assisted learning in higher education during the last 30 years of the 20th century. Indeed, *integration* of such experiences was seen as a core challenge (Draper, Brown, Henderson, & McAteer, 1996; Rushby, 1979). The idea of 'blended learning' really only makes sense if one looks at the

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recent history of corporate training and makes the contrast with forms of ‘e-learning’ that were intended to dispense entirely of the costs and inflexibilities of ‘conventional’ face-to-face learning. In terms of the prevalence of blended learning delivery modes compared to courses delivered exclusively on-line, a recent Sloan Consortium’s report (Allen, Seaman & Garrett, 2007) found that, in United States, although the percentage of on-line courses is still greater than blended courses, there is an increasingly large market for blended learning delivery as suggested by strong consumer preference for and openness to this mode of delivery which far exceeds the consumer experience.

This paper is part of the process of making sense of ‘blended learning’ in the context of higher education practice. By reviewing recent research that wears this badge, the intention was to contribute to a redemption of the term. Another objective was to map some of the focal points of research on blended learning, some of the methodological choices made by researchers, and some of the connections between foci and methods. A strong theme in our reflection on the literature is that research on blended learning needs to pay much more careful attention to issues of integration, and to choose conceptual tools and methods that will help us all arrive at a better working knowledge of how to help students integrate the various learning experiences that come their way.

1.1. Goals and scope

This paper reviews research into university students’ experiences of blended learning, using an approach to classifying the research in terms of *methodological complexity* and *focus*. By so doing, the paper seeks to clarify:

- the nature and scope of blended learning;
- difficulties in trying to quantify methodological complexity;
- the relative immaturity of research into blended learning in universities, compared to other more established fields of research into university student learning;
- a need for findings that are evidence-based; and most importantly
- the value of research into blended learning that focuses on the *combination* and *integration*, rather than the *contrasting*, of technology supported learning and other contexts and opportunities for learning.

All these are necessary to a proper and useful understanding of blended learning, whether by students, teachers, administrators or institutions.

While reviewing research for this article, the authors discovered that a substantial amount of research into blended learning arises from learning contexts that were originally face-to-face, and to which some sort of technologically-supported learning activity has been added. In studies published over the last seven years, the technologically-supported activity is usually some kind of on-line or web-based activity. (Our review does not include studies of contexts in which *only* on-line/web-based or distance-based methods were used.)

Another outcome which was at first unanticipated, and then became understandable from the review process, was that a large percentage of research into blended learning at universities takes the form of case-studies. These are much more common than the other categories of research described here, and there are two main reasons for this. First, the field is relatively new and many researchers are still in exploratory mode: aiming to discover which are the more robust variables or constructs that explain successful experiences of face-to-face learning when it is combined with some technologically-supported learning. As a consequence, researchers seem to be more comfortable anchoring their investigation within the context of a case in order to remove some of the ambiguity that can occur if more abstract or poorly defined variables are used to design the investigation. Second, a substantial portion of the literature is written by teachers researching their own innovative educational practice.

The discussion of studies below is used to provide a representative summary of categories of research into blended learning, for the purpose of moving the field forward. It is not intended as an *exhaustive* listing of all studies into blended learning in higher education.

There are different ways to conceptualize how the multidimensional space of research into blended learning in universities is structured. This can be done *a priori*, imposing a structure by drawing on some theoretical principles. Or it can be done empirically, by identifying the main ways in which published studies actually vary. The second approach was adopted for this paper and two main dimensions that can be used to structure the field were identified: focus of study and methodology. The *focus* of the research turns out to range from studies of specific “parts” or separate aspects of a phenomenon (such as an on-line part of a blended experience), to studies adopting a comparatively more holistic

view, focusing on a bigger picture. In terms of *methodology*, studies range from simple descriptions of blended learning initiatives (such as case-studies) to studies employing more complex designs and multivariate analysis.

Methodological complexity is not a good thing in itself. It is possible to think of methodologies being too complex to reveal anything particularly illuminating about a phenomenon under investigation. Equally infelicitous are studies which provide only a superficial description of what are clearly very complex phenomena and relationships. Aligning methodological complexity with research goals is the key.

1.2. Defining blended learning

There has been some cogent criticism of the use of the term ‘blended learning’. Oliver and Trigwell (2005) argue that the concept of blended learning is essentially ill-defined and inappropriately used in most contexts. Their argument is that the use of the term ‘blended learning’ can be misleading as blending, in this case, is essentially not about learning *per se* but rather about teaching. They propose some more appropriate terms to capture the true meaning of the concept: ‘blended pedagogics’, “blended teaching” and “learning with blended pedagogics”.

The literature offers a number of definitions of blended learning. One way is to define it as the mix of traditional methods of teaching, such as face-to-face teaching, and on-line teaching. Although relatively vague, this is probably the most common meaning of blended learning used in studies set in higher education contexts. The Sloan Consortium (see Allen et al., 2007) refers to blended education as course that blends face-to-face and on-line delivery where 30–79% of content is delivered on-line.

In comparison, there are more specific definitions which refer to the blendedness of media or pedagogies. Examples here describe blended learning as “the combination of media and tools employed in an e-learning environment”, or “the combination of a number of pedagogic approaches” (Oliver & Trigwell, 2005, p.17), or “the mix of different didactic methods (expository presentations, discovery learning, cooperative learning, *etc.*) and delivery formats (personal communication, publishing, broadcasting, *etc.*)” (Kerres & De Witt, 2003, p.103). Garrison and Kanuka (2004) suggest that defining blended learning raises some simple and some complex issues:

At its simplest, blended learning is the thoughtful integration of classroom face-to-face learning experiences with on-line learning experiences. (...) At the same time there is considerable complexity in its implementation with the challenge of virtually limitless design possibilities and applicability to so many contexts. (p.96)

Singh (2003) sees blended learning rather as a combination of multiple delivery media designed to complement each other and promote meaningful learning. From an organizational perspective, Driscoll (2002) identifies four different ways in which blended learning can be defined. Blended learning can be seen as:

- a mix of modes of web-based technology;
- a mix of various pedagogical approaches (*e.g.*, constructivism, behaviourism, cognitivism);
- a combination of any form of instructional technology with face-to-face instructor led training;
- a combination of instructional technology with actual job tasks (in order to create an effective mix of learning and working).

Graham (2006) attempts to reconcile positions which adopt a definition of blended learning which are so broad that they can include virtually all learning systems (Bersin and Associates, 2003; Driscoll, 2002; House, 2002; Orey, 2002a; Rossett, 2002; Singh & Reed, 2001; Thompson, 2002) with a position that “more accurately reflects the historical emergence of blended learning systems (...)” (Graham, 2006, p.4). He offers a ‘working definition’ of blended learning as “the combination of the instruction from two historically separate models of teaching and learning: traditional face-to-face learning systems and distributed learning systems” (p.5) with an emphasis on the role of computer-based technologies. Graham (2006) talks about a temporal dimension of blended learning when the two learning environments converge. Traditional face-to-face learning which was around for a very long time and the new distributed learning environments were separately used in the past due to different needs of students. However, recently, partly due to huge technological advances but also to improvements in instructional design, it has been recognized that blended systems of learning are able to address a large range of needs in terms of both quality of communication and human interaction.

In arguing for a better focused and methodologically richer research into blended learning, this paper adopts a definition of blended learning as follows:

‘Blended learning’ describes learning activities that involve a systematic combination of co-present (face-to-face) interactions and technologically-mediated interactions between students, teachers and learning resources.

1.3. Review methodology

A comprehensive literature search was conducted to locate papers on blended learning in higher education using search engines and databases such as ScienceDirect, ProQuest, ERIC (Education Resources Information Centre), Educational Research Abstracts and the British Education Index. The keywords used were blended learning, face-to-face learning, on-line learning, computer-mediated learning, and e-learning (as well as combinations of these). Following this literature search a database including approximately 300 titles was created using *EndNote*. This search was further refined by selecting only those papers which (a) specifically focused on blended learning in higher education (including both face-to-face and on-line aspects), and (b) reported the results of empirical research. Literature reviews and solely descriptive papers with no empirical research content were not included. Special efforts were made to ensure that all relevant papers in peer-reviewed, high impact factor journals were captured. However, the search through the other literature (unpublished manuscripts, theses, dissertations, etc) was not that exhaustive. References from the articles included in the review were examined in order to identify other potentially relevant studies which might have been missed by the initial computerized search. Additionally, a discussion of *some* key texts in the field was added (Bates, 2000; Bates & Poole, 2003; Laurillard, 2002) because of the comparatively holistic perspective they bring to the issues involved.

2. Review findings

2.1. General findings

Unlike other reviews on blended learning (Graham, Allen, & Ure, 2003; Sharpe, Benfield, Roberts, & Francis, 2006) which are mainly based around the theoretical perspectives adopted, the way arguments are construed, main themes emerging from research and additions to the literature, this review is primarily adopting a methodological perspective on recent research on blended learning at the same time considering the focus of the research. That is, it was attempted to structure research on blended learning depending on both methodological development and focus of research. It is believed this is necessary in order to further understand how the field of research on blended learning evolves, to examine both *how* researchers choose to investigate the questions of interest in the field and *what* questions (and their degree of specificity) are predominantly addressed in their research. Exploring the methodology employed by researchers, that is looking at the study design and instruments used for producing empirical, measurable and reliable findings, enables us to adopt a more objective position when reviewing the literature on blended learning. Also, it is important to consider the questions addressed by researchers and how their degree of specificity and content are related to the methodology.

Generally speaking, the research articles reviewed here tended to exhibit a direct relationship between methodological complexity and breadth of focus. The methodologically complex studies tended to have a more comprehensive research focus, while simple descriptions tended to focus on fewer dimensions. Taking into account the methodology used and the research focus, studies of blended learning covered by the review can be categorized as follows:

- case-studies with a specific research focus (*i.e.*, when one or more specific dimensions are explored);
- survey-type studies with a focus on a range of specific dimensions and links between them;
- comparative studies with a focus on specific dimensions in different contexts (that is, on-line *versus* blended learning, face-to-face *versus* blended learning, distance *versus* blended learning, face-to-face *versus* on-line *versus* blended learning);
- comparatively more holistic studies which provide some evidence of an awareness of a bigger picture and how the parts of the picture are related to student learning.

While restrictions of space mean that not all studies in the field are covered in this paper, it was apparent from the search conducted that the most common kind of studies undertaken into blended learning was case-studies. Least

common were survey-based studies in which data were subjected to statistical analysis to identify relationships between different variables of interest.

2.2. Case-studies

At a relatively low level of methodological complexity are descriptions and evaluations of blended learning courses, usually represented as case-studies. Case-studies may focus on one or more dimensions with varying degrees of specificity (for example, the design of a course, the quality of learning, learners' needs and expectations, student support *etc.*). In fact, it seems to us that most research on blended learning to date has come from teachers as researchers analysing their own students' experiences of blended learning in the context of a particular case. Although the methodology used is generally simple and straightforward, case-studies can be useful in identifying important aspects of a particular context and providing a teacher perspective on descriptions of the course, teaching, student learning, *etc.* Case-studies most often provide detailed background information on the course as well as student feedback or learning outcome information usually collected during or soon after the completion of a course. Blended learning case-studies drawn from the writers' own teaching experiences have been published by Aycock, Garnham, and Kaleta (2002), King (2002), Johnson (2002), Boyle, Bradley, Chalk, Jones and Pickard (2003), Carroll, B. (2003), Christensen (2003), Cottrell and Robinson, (2003), Khine and Lourdusamy (2003), MacDonald and McAteer (2003), Kupetz and Ziegenmeyer (2005), Dron, Seidel, and Litten (2004), Stubbs, Martin, and Endlar (2006), Boyle (2005), Matheos, Daniel, and McCalla (2005) and Motteram (2006). Some of these case-studies are discussed in more detail below.

An example of case-study with a *focus on more general dimensions*, that is, students' perceptions of the learning experience and the quality of course content, is provided by Khine and Lourdusamy (2003). They describe a teacher education course in which a blended learning approach was employed, combining face-to-face tutorials, activities involving multimedia, and on-line discussions. The authors based their argument on the idea that one important advantage in using blended learning is that by combining different 'delivery modes', the learning experience would improve for the student. Analysing feedback collected at the end of the course from 250 students, the authors concluded that overall, the blended learning experience was perceived as positive by the participants.

In other case-study research, this time *focusing on a single aspect* of blended learning, Kupetz and Ziegenmeyer (2005) discuss and evaluate a model of blended learning for teaching English as a foreign language. The aspect they focus on is how trainee teachers can be supported in gaining a teacher perspective on teaching and learning English. The authors call their model "interactive e-learning and contact learning", and it covers a wide range of activities: classroom recordings, multimedia-based case stories, an electronic interview with an expert (*i.e.* an experienced grammar school teacher), mini-practices and so on. Each of these activities was designed to support different aspects of student learning and to be flexible enough to respond to the needs of different types of learners. The researchers conclude that careful evaluation of each component of the blended module, in terms of its potential to support learners' needs as prospective language teachers, can prove to be a very useful tool in improving the ability to design effective blended learning courses able to respond to a wide range of learners' needs.

An example of a case-study with a *very specific focus* is provided by Dron et al. (2004). The authors analyse and discuss in great detail the difficulties encountered during the design and implementation of a blended learning course based on Moore's theory of transactional distance. Both student and tutor experiences are considered and analysed in order to produce findings which would facilitate the improvement of the module. Although the study might be beneficial for the purpose of improving this particular course, and maybe others based on similar frameworks, it is difficult to identify the generalization value of such a specific investigation.

Other case-studies focus on student experience more generally but in a specific context. For example, Motteram (2006) explores the student experience of program design in a teacher education course using blended learning. The main question addressed in this study was the importance of the blended design of the course so that the teachers could "get a balanced programme that upgrades skills and knowledge, but also enables them to reflect on past and future practice" (Motteram, 2006, p. 17). The development of the course was reviewed by the researcher over a period of three years. Information was collected from a number of face-to-face groups and from a distance learning group in the form of open-ended questions aimed to identify the participants' experiences on discussion lists, the role of the website in the delivering of information, participants' interactions outside the electronic forum, the validity of experience for onsite education, and finally whether there were additional knowledge or skills developed as a result of the blended learning experience. Participants' responses revealed that, overall, the blended learning approach positively enhanced the

learning experience, as the course structure allowed them to deal with topics in their own time, to organize themselves better around the tasks, and the activities involved in the module promoted good learner autonomy. Participants reported experiences suggesting that they engaged with the ideas and processes in the module, they found them stimulating and motivating, at the same time enabling them to reflect on the meaning of the methods employed in learning.

Stubbs et al. (2006) also describe the challenges of implementing effective blended learning design in a case-study involving approximately 200 students across a 2 year period. The case-study was based on the description of the re-design of a course component in order to make it suitable for blended learning delivery. Based on structuration theory (Giddens, 1984), two core design principles were identified by the researchers: pursuing “intended outcomes through careful attention to the axes of structuration (communication, power, and sanction)”, and designing “IT and work routines with an acute sense of audience” at the same time being “ready to encourage/discourage unanticipated behaviour.” (p.166). End-of-year feedback questionnaires from students were used to assess their perceptions of the course in relation to engagement with the content (*i.e.*, assessment marks). This evaluation allowed researchers to “consolidate good practice, close loop holes, and increase the range of skills developed by the student (...)” (p.173).

Making the transition to more methodologically comprehensive research, some case-studies has complemented the methodology with qualitative instruments. Research using a case-study approach (Boyle, 2005; Boyle et al., 2003) includes questionnaires and interviews to explore ways in which blended learning can be flexibly designed to take into consideration and respond to a wide range of individual learner needs. The researchers describe how a course can be improved by using a blended learning approach which is based on learners’ individual needs. Their argument is that learners’ individual needs should motivate the use of a particular blend and each component of the blend should be designed to deal with a significant pedagogical problem. The researchers describe how by introducing new elements in an already implemented blended learning module on programming, student performance can be improved. Based on the idea that blended learning requires a full course redesign, major changes were made to the existing program. The new blended learning course delivery consisted of integrating face-to-face with on-line delivery, providing support for students in tutorials and through e-learning materials, supporting the learning of difficult topics by providing learning objects and monitoring performance through continuous assessment which was managed on-line. By comparing students’ results on the improved modules with baseline results from previous years, improvements in pass rates, student evaluations and student engagement (*i.e.*, attendance and use of electronic resources) were identified. The main advantages identified by the researchers in adopting a blended learning approach include the possibility of tackling multiple issues when a problem is multi-faced; providing a “stable transition of familiar and new features” (p.176), and the ‘reusability’ of learning objects as the same objects can be used in different blends designed for a range of pedagogical purposes.

The examples of case-study research in this section provide background on a diverse range of blended learning initiatives, at the same time indicating what evidence was found about the quality of the student learning experience that arose from the cases. The description of these cases has foreshadowed some of the limitations in using case-studies and course evaluation to measure the success of blended learning. Firstly, there are common complaints about employing case-studies in general as a tool of research because, although case-studies can offer the opportunity of in-depth exploration, the findings produced may be embedded in the context so specifically that attempts to generalize or extrapolate findings may be thwarted. As Gall, Borg, and Gall (1996) note, case-studies are “ideally suited to investigate outliers and other unusual phenomena” (p.585), their main disadvantage being the difficulty of generalizing their findings. Secondly, given the way this type of research is often applied, case-studies can have a focus either on general dimensions such as quality of learning or student experiences (Davies, Ramsay, Lindfield, & Couperthwaite, 2005; Khine & Lourdasamy, 2003; Motteram, 2006) or on a very specific single aspect such as improving a particular dimension of the student experience (Dron et al., 2004; Kupetz & Ziegenmeyer, 2005; Stubbs et al., 2006). This second limitation is especially challenging because, if the findings are not further investigated by other means, the method does not allow any comparison or other valid means of testing the reliability of the findings. Case-study methodologies complemented by other methods (such as in Boyle, 2005; Boyle et al., 2003) provide a strategy to overcome the limitations of using case-studies alone.

2.3. Survey-type studies

A more methodologically complex way of investigating blended learning is by conducting survey-based studies in which the relationships between different aspects of the process are explored. The survey method is typically defined as

a methodology aimed to obtain “information about a number of different variables in which the researcher is interested and identify the relationship between those variables” (Haslam & McGarty, 2003, p.54). This review found comparatively few examples of studies using survey-based approaches. Studies involving more than one or two types of statistical treatment were even rarer. Examples of survey-type studies reported in the literature include: Graff (2003), O’Toole and Absalom (2003), Pan, Sivo, and Brophy (2003), Aspden and Helm (2004), Ausburn (2004), and Jelfs, Nathan, and Barrett (2004). Some of these examples are described in more detail below.

Graff (2003) focuses on the sense of classroom community in a blended learning environment, pointing out that previous research suggests that lack of close interaction between students engaged in on-line learning might create problems for establishing an effective blended learning system. Graff looks at the relationships between cognitive style and the sense of classroom community, measured by the Classroom Community Index developed by Rovai (2002). The sense of classroom community has been described as equivalent to a sense of real, meaningful interaction between learners. Several dimensions were identified as part of the sense of the classroom community concept. These are: spirit (“the feeling of belonging to and acceptance of group identity”), trust (“feeling that the group can be trusted”), interaction (the “feeling that community members have that they may benefit by interaction with other members of the community”), and learning (“sense that (...) knowledge can be constructed by the community”, p.204). It was found that cognitive styles and sense of classroom community are indeed associated — students with intuitive cognitive styles showing lower levels of community sense than students with intermediate or analytic styles. The research emphasises the importance of considering both these concepts when designing effective blended learning situations. An additional issue explored was a potential link between gender and sense of classroom community. However, no significant effect of gender on sense of classroom community was found in this study.

Aspden and Helm (2004) explored *student engagement and interaction* in the context of a blended learning situation at Sheffield Hallam University. They argue that by making appropriate use of a mix of technologies, students can feel increased connectivity with both their colleagues and university staff. Specifically, by using a diary/interview approach they collected data to examine the properties of the blended environment that enable and facilitate high quality interactions. They quantified the blended learning environment by using a continuum of activities ranging from highly tutor-dependent (*e.g.*, lectures) to activities carried out independently by the student (*e.g.*, individual research). It was found that in many cases a blended learning approach was useful in facilitating connections and engagement between students and the other aspects of their learning experience and “although many of the learning activities were carried out independently by students, the discrete activities did link together to form a cohesive learning experience, which involved interactions with others, with resources and with the institution” (p.251). The authors conclude that the effectiveness of a blend depends on the “active participation of all involved and the environment is only going to be effective if the relevant parties engage with the process” (p.251).

Ausburn (2004) focuses on elements of the course design which are most valued by adult learners in a blended learning contexts. In terms of methodology, the author used a questionnaire developed by herself aimed to assess a range of variables such as initial level of technology skills, pre-course experience with technology supported learning and self-directed learning. The participants also selected and ranked their preferred course elements and instructional goals. Additionally, the Assessing the Learning Strategies for Adults (ATLAS) self-test was administered to participants in order to capture their learning strategies. The survey revealed that learners with different characteristics have different preferences in terms of instructional features and goals. The findings also supported the basic principles of adult learning (*e.g.*, expectations of personal relevance in learning, involvement in setting learning outcomes based on real-world needs, self-direction of learning and pathways, and establishing an active learning community, see Ausburn, 2004). Finally, it is also emphasised the importance of conducting research to further validate empirical tools such as ATLAS which constitutes a useful instrument for the instructional design of blended learning initiatives.

There are a number of survey studies on blended learning which emphasise only the on-line elements of the delivery. For example, Jelfs et al. (2004) explore implications of the transition from paper-based delivery of study support materials for students at the Open University, UK, to on-line delivery. Methodologically, the research comprises both quantitative and qualitative tools, that is, closed and open-ended questionnaire administration is followed up by 60 phone interviews with students aimed at exploring students’ perceptions of the on-line support toolkit. The objective of the survey is to identify answers to three fundamental questions which arise when on-line support or learning is introduced: what? when? and how? The authors conclude that it would be most beneficial for students if the content of on-line support would include multiple media and opportunities for students to be totally independent and to have a wide choice of resources that they can use. In relation to timing, it is emphasised that a “drip feed” delivery is important

to avoid overloading students by ensuring they receive appropriate materials at certain key moments in time. Finally, the authors argue that it is important to use the on-line elements to complement rather than totally replace more traditional forms of delivery in order to preserve advantages of both approaches, and they endorse the importance on ongoing research which would include both on-line and face-to-face learning.

There are limitations associated with survey-based research when used alone. Such research may tend to focus on exploring relationships between a specific set of variables. They usually do not deal with a richer description of issues such as one typically finds in qualitative studies. Gall et al. (1996) warn that this type of research tends to break down complex processes and patterns into simple components which, although it can be an appropriate procedure in some cases, may also distort and lose the real meaning of the variables explored in other cases. In addition, without being accompanied by more explorative studies that may identify variables that may have been overlooked or may have only recently arisen within the learning context, there is a danger that the variables used in surveys may miss aspects of the learning experience which can explain a lot of the variation in the quality of the experience of learning. In the case of surveys, incomplete and ambiguous answers cannot be followed up and (as in all survey-based research) participants are restricted in the expression of their opinions due to the inherent nature of the methodology (Burns, 1994).

2.4. Comparative studies

A potentially more comprehensive way of conducting research into blended learning is by comparing or contrasting learning across two or more contexts, such as some combinations of exclusively on-line, exclusively face-to-face, and/or distance education. Focus in these studies is generally on how particular student variables and relationships between them vary across the different contexts which have been chosen for the comparison. Thus, besides identifying relationships between variables (as in surveys) comparative studies explore these variables and relationships in contrasting learning situations, generally focusing on differences between different learning environments. There are a number of studies comparing a range of student variables across different learning contexts: Johnson, Aragon, Shaik, and Palma-Rivas (2000), Cameron (2003), Dowling, Godfrey, and Gyles (2003), Meyer (2003), Parkinson, Greene, Kim, and Marioni (2003), Schweizer, Paechter, and Weidenmann (2003), Harker and Koutsantoni (2005), Rovai and Jordan (2004), Reasons, Valadares, and Slavkin (2005), Riffell and Sibley (2003, 2004), etc.

Firstly, there are studies comparing *blended learning and exclusively on-line contexts*. For example, Schweizer et al. (2003) examine the impact of blended learning on collaborative task performance and group discourse. They compared the achievement of a group task in exclusively on-line courses and a blended learning course in the Psychology of Learning at a German University. Specifically, the variables compared in the two learning situations were: the extent of on-line activity, groups' task performance, and the coherence of group discourse. It was found that collaborative task performance was not actually predicted by only the type of learning situation (on-line *versus* blended) but rather by an interaction between the type of task and learning situation. That is, where the task consisted of sharing and exchanging ideas to arrive to a common solution and the learning situation was of blended learning, the achievement tended to be the highest. However, the main difference observed was that in the blended learning situation the group discourse tended to be more coherent compared to the on-line learning situation.

Secondly, there are studies comparing *blended learning and exclusively face-to-face contexts*. The example described here has a specific focus on student satisfaction and learner preferences. It is expected that by providing a wide range of choice in terms of modes of delivery and content, blended learning would also provide a more enjoyable, complete experience for students.

However, in relation to the level of student satisfaction when experiencing blended learning, the findings are more contradictory than expected. Parkinson et al. (2003) compared student satisfaction and learning preferences in different course delivery methods such as students enrolled in face-to-face and blended learning settings for the same course. Following a qualitative survey focused on students' reflections on their learning experiences, they identified several emerging themes including classroom climate (*i.e.*, emotional wellbeing and physical setting), learning needs (need for hands-on activities/applications and student learning styles), learner efficacy (ownership for learning and feelings of confidence *versus* lack of confidence/confusion), interaction, and appropriate format for the content. Wide differences in learner's satisfaction in the two situations were identified. Specifically, students enrolled in traditional face-to-face classes constantly expressed positive feelings in relation to all themes, while the students using blended learning facilities reported "feelings of disenchantment". However, in this study the authors used the term blended learning to

refer to a distance learning mode comprising a blend of on-line and video facilities (*i.e.*, advanced interactive video system), where the face-to-face activities were totally eliminated. Thus, these findings can be explained in terms of the lack of the face-to-face ingredient to create a truly blended learning experience. When face-to-face and on-line learning experiences alone are compared there is evidence to suggest that students prefer more traditional formats, particularly at the level of interactivity and social contact during the course.

For example, Johnson et al. (2000) compared learner satisfaction and learning outcomes in a graduate on-line course and its equivalent taught in face-to-face format. Although there was no significant difference in the course evaluation and in the learning outcomes in both situations, it was found that students were more satisfied with the instructor, the type and amount of group interactions and the instructor support in the face-to-face format than in the on-line settings.

Thirdly, there are studies comparing *blended learning and distance education modes*, in terms of student satisfaction, student retention and achievement levels in this particular example. Harker and Koutsantoni (2005) focused on blended learning effectiveness as indicated by student satisfaction, retention and performance. The program involved in their research was a web-based course on English for Academic Purposes (EAP) designed for students from diverse ethnic backgrounds undertaking the course either in a blended learning context or in a distance education mode. Comparisons on student retention, achievement levels and satisfaction with the program between the two groups of students suggest that performance and satisfaction levels were similar in the two groups, the blended learning mode being significantly superior only in terms of student retention.

Finally, there are three-way comparisons in which all three contexts are considered: *blended, only on-line and only face-to-face*. For example, Rovai and Jordan (2004) focused on how the sense of community varied across these three learning contexts. They found that the sense of community measured by self-reported items in the Classroom Community Scale (Rovai, 2002) was stronger in the blended learning context than both traditional and fully on-line. The authors argue that these findings are due to the fact that,

“... a combination of face-to-face and on-line learning environments provides a greater range of opportunities for students to interact with each other and with their professor. These interactions should result in increased socialization, a stronger sense of being connected to each other, and increased construction of knowledge through discourse, thus providing stronger feelings that educational goals were being satisfied by community membership” (p.5).

Additional evidence based on this type of three-way comparison is provided by Felix’s survey conducted in 2001 in Australian universities showing that there is a general preference among students to use web-based facilities in conjunction with face-to-face activities, that is, blended learning, rather than solely the web-based or face-to-face ones.

Comparative studies come with their own limitations as a means of researching blended learning. The main concern in relation to blended learning is that by their very nature these comparative studies tell us more about separated components than they do about integrated wholes. With the exception of the last example described above, such comparative studies overlook the benefits of interactions between on-line and face-to-face activities and they are generally aimed to identify which learning situation is working best separately not together. A quick review of the websites of universities and their course offerings will reveal that a very common realisation of blended learning is a previously-existing face-to-face course being supplemented with some on-line learning. Adopting a student perspective in this case would suggest that a comparison of modes (F2F *versus* on-line) is not the most useful way of approaching research. Rather, it calls for a focus on the benefits for learning that might arise when students experience a well-planned combination of face-to-face and on-line activities.

2.5. Adopting a comparatively more holistic approach

Given the increasingly ubiquitous use of technology to support some student learning activities, we argue that the focus of research should be on holistic aspects of the student learning experience, and especially on how well the different components of that learning experience are integrated, and what this means for learning. This more holistic approach applies to the *focus* of research, but probably also to research *method*. Describing what constitutes a more holistic research focus is relatively clear; that is, some evidence about the technologically-supported experience of learning, some evidence about the broader context such as the experience of learning in the face-to-face context, and some evidence of the connections between the two as part of an integrated learning experience. Describing what constitutes a more holistic approach in terms of method is not as clear and it has the potential to become too subjective or contextually contingent. In

the case of researching blended learning, the argument was simply for an adequately comprehensive methodology which would allow some meaningful analysis and conclusions based on more than one method (with more than one type of evidence being sought) if the field is to move forward more surely. For example, if there is substantial empirical investigation employing quantitative methods, research activity resulting in complementary rich description would be recommended. If case-studies are providing a strong context for the investigation, some additional research which allows a greater abstraction of the findings would be beneficial. The use of more than one method of research is desirable as some authors have noted “built-in weaknesses” in all research methods (Denzin, 1988, p. 512) suggesting that, “no single research method will ever capture all of the changing features of the social world in study”. It is also often the case that quantitative evidence may tend to sway a more scientifically-orientated audience, while more qualitative research may speak to a more arts-orientated audience. These audiences are stakeholders in the quality of student learning in higher education and gatekeepers on the path between research and its application.

There are some studies which have adopted a more holistic approach in either or both *focus* of the research and/or *methodology*. These include studies into what students learn in blended contexts (Ellis, Goodyear, Prosser, & O’Hara, 2006, 2007; Sweeney, O’Donoghue, & Whitehead, 2004) and studies which focus on improving student experience using holistic contexts; some research from a cost-effectiveness perspective (such as Twigg, 1994, 1996, 2003), other research from the perspective of managing technological change across a campus-based university (Bates, 2000; Bates & Poole, 2003) and of providing a framework for an integrated use of technologies for student learning (Laurillard, 2002).

A complementary observation from meta-studies into blended learning found a need for more holistic research (Sharpe & Benfield, 2005; Sharpe et al., 2006). Sharpe et al. concluded that very few studies take a holistic research focus, one exception being the work of Sweeney et al. (2004). Although it would not be regarded as comprehensive from a methodological point of view, since it only employs qualitative tools, Sweeney and colleagues’ study adopts a holistic research focus. It explores in an integrated way marketing students’ perspectives on both face-to-face and on-line learning in a course where face-to-face tutorials were replaced by on-line tutorials. The face-to-face learning comprised a series of 10 traditional tutorial groups of 1 h, while the on-line component included use of a bulletin board. The researchers conducted 12 in-depth interviews with 77 students, exploring students’ perspectives of the two learning contexts. By “perspectives” the authors mean “frameworks by which people make sense of the world” (Woods, 1983, p.7); frameworks which are composed of three strands, that is: participants’ intentions in relation to the phenomenon, participants’ strategies in relation to realising their intentions, and participants’ reasons for their intentions and strategies. By using this approach the authors were able to explore in depth how students experienced blended learning by looking at both on-line and face-to-face learning. The authors argue that the study adds to the body of existing literature in the area of the role of assessment in each of the tutorial components (*e.g.*, tutorial session, tutor, student, etc), both face-to-face and on-line. Most importantly from a holistic point of view, it is argued that each component of the learning experience plays a critical role in the framework of the learning session and it is essential to also capture the inter-relationships between all the parts.

It is unusual to find substantial qualitative and quantitative research in the one journal article, often for simple reasons of space, but sometimes for reasons of philosophical or methodological inclination. Some examples can be found of such combinations in journal articles reporting on investigations of blended learning using both qualitative and quantitative methods (*e.g.* Ellis et al., 2006, 2007). The authors employ a qualitative approach, including open-ended questionnaires and semi-structured interviews, in one set of studies, and complement this with quantitative survey-based approaches, usually involving two or three statistical analyses to unpack patterns in the data that relate to face-to-face and on-line learning in a blended learning context. In line with previous research (Ellis & Calvo, 2006), qualitatively different conceptions, intentions, and approaches to learning through discussions are identified in both face-to-face and on-line contexts. Associations were found between what students thought they are learning through discussions (their conceptions), the way they approach the discussions (their approaches) and their level of academic performance in both contexts. Additionally, unanticipated responses revealed affective aspects of learning. It emerged that students’ feelings about on-line posting varied across the sample interviewed, with some students showing reluctance and some revealing very positive feelings towards the on-line component of the learning experience. This study was complemented by quantitative investigations into the same research questions (Ellis et al., 2007). The complementary quantitative study explored the students’ experience of face-to-face and on-line discussions using closed-ended questionnaires on how students approach the discussions, and on what they think they are learning through the discussions. The study provides empirical evidence that is consistent with findings provided by previous

qualitative research. It demonstrates that the ways students approach discussions, their conceptions of learning through discussions and their achievement levels were all inter-related in and across on-line and face-to-face contexts. Along the same lines, [Ginns and Ellis \(2007\)](#) explore the quality of the blended learning experiences of Veterinary Science students from two consecutive years. They focus on how the on-line aspects of the learning experience relate to the face-to-face component, specifically, how perceptions of the quality of on-line learning relate to student's approaches to learning and levels of academic achievement. In these studies, the researchers sought to investigate the different but complementary roles of the face-to-face and on-line aspects of the student experience. By exploring the roles played by each of the different aspects of the learning experience and how they related to each other, the authors were able to better understand how these parts can be best integrated so that more, meaningful blended learning experiences can be conceptualized for students. Studies into how approaches to design are related to student understanding are an important area that will attract treatment in future studies.

Researchers such as [Twigg \(2003\)](#), [Bates \(Bates, 2000; Bates & Poole, 2003\)](#) and [Laurillard \(2002\)](#) focus on improving the quality of student learning using holistic contexts; Twigg from a cost-effectiveness perspective at the level of courses, Bates from the perspective of managing technological change across a campus-based university, Laurillard from the perspective of providing a conversational framework to identify the appropriate use of technologies in an experience of learning. While researching ways to reduce costs in universities, Twigg focuses on comprehensive ways to ensure that 'blends' which are effective for student learning are implemented. Specifically, based on an analysis of detailed evaluations focused on student learning outcomes from 30 universities in the US, five course-redesign models were identified (*i.e.*, supplemental, replacement, emporium, fully on-line and buffet). In all these models on-line and face-to-face elements can be effectively blended in different degrees according to a range of demands: the specific content of a discipline, particular student audiences, and the preference of the faculty. [Twigg \(1994\)](#) also emphasises the changing nature of student learning in line with technological and economical changes in society, and the challenges academic institutions face to meet these new requirements. Ideas about what students need to learn change continuously and universities must adapt by shifting their focus from "teaching content to enabling students to develop lifelong skills" (p.2). Also, students are becoming increasingly diverse in terms of learning needs and patterns, and implementing on-line learning alongside the more traditional formats can be the optimal solution. She proposes that rather than researching in order to get answers in relation to cost effectiveness issues in universities and student learning, it is more useful to actually design and implement new blended learning programs, programs designed to be both cost-effective and beneficial for student learning ([Twigg, 1996](#)).

Bates uses the context of a campus-based, research-intensive university to discuss cultural change issues involved in embedding technology. His research ([Bates, 2000; Bates & Poole, 2003](#)) underscores the importance for universities of comprehensively meeting students' constantly changing needs, which derive in part from economic, technological and cultural changes in society. Student needs include new skills required in the workforce and Bates argues that properly-used technology (that is, ensuring effective blended learning) can have an important role in meeting this challenge. Drawing on the experience of helping a campus-based, research intensive university to integrated technology into learning and teaching systems, Bates regards technology both as a 'classroom aid', that is, an effective way to improve traditional teaching and learning and as an enabler of 'distributed learning' which can range from technology used to supplement face-to-face teaching in a small degree to completely on-line learning (distance learning). In one of his more recent books ([Bates & Poole, 2003](#)), designing courses with a focus on the newly emerged students' learning needs is discussed from a holistic perspective. After dealing with some fundamental issues to do with educational delivery, this book considers the role of technology within the context of course design, development, teaching and evaluation. It is the conceptualization of the life-cycle of course maintenance that provides a strong holistic context for Bates' arguments.

Laurillard provides an analytical framework for considering the role of learning technologies in universities which unites on-line and face-to-face learning contexts ([Laurillard, 2002](#)). In the 'Conversational Framework' the organizing principle is a discussion leading to the development of student understanding in which all types of educational media (lectures, seminars, tutorials, libraries, databases, microworlds, the Internet etc) play a role in the structure of a meaningful discussion. This framework continues to provide researchers a useful analytical tool for investigating experiences of learning comparatively more holistically.

The studies and the key texts discussed in this last section are not the only studies that could be placed in a category discussing comparatively more holistic research. They are rather a representative sample of such work. However, this review suggests that the number of studies adopting this perspective is relatively small compared to other types of studies described here (in particular case-studies). In order to move the field of blended learning research forward it is

essential to supplement the existent body of studies with more research which is comparatively more holistic in both focus and methodology.

3. Discussion and conclusions

This review has considered representative research into blended learning in terms of the focus of the research and the methodology employed. By using this framework to structure the review process, interesting findings emerged: a definition of the term ‘blended learning’ is not generally agreed upon; a significant percentage of the research into blended learning available is in the form of case-studies; the focus of much of the research does not tend to cover holistic aspects of blended learning; and there is little consensus about which are the main variables or constructs that should be investigated when considering links between blended learning and student understanding. On the basis of reviewing this literature, it is argued that for the field to move forward in ways that will improve the understanding of the structure and purpose of blended learning for students in higher education, there is a need for greater consensus on basic definitions of blended learning, more research that offers different perspectives and methods of collecting evidence about the value of blended learning, and research that is comparatively more holistic or systemic in its focus.

In the context of this review, the authors were aware that many of the studies considered were of courses that had originally been wholly face-to-face and which subsequently introduced some technologically-supported learning, often on-line learning. For the purposes of this review, the definition adopted for blended learning was learning activities that involve a systematic combination of co-present (face-to-face) interactions and technologically-mediated interactions between students, teachers and learning. Adopting a clear definition for blended learning allowed an explicit treatment of the concept of *focus* of the research. Some studies positioning themselves as an investigation into blended learning, often restricted their focus to the technologically-supported part of the experience. While the technology-supported part of blended learning is necessary and interesting, it is nevertheless only *part* of the picture. Without an understanding how such a part may fit into and synergise with a greater whole, then readers and researchers are handicapped in their attempts to gain a better understanding of the complexity of blended learning. A comparatively more holistic focus is to recognize the co-existence of two or more aspects of the learning experience which may be different in structure but work towards a common outcome. This review suggests that more studies into how different aspects of student experiences of blended learning are interrelated, and how they can be better integrated to support student understanding need to be conducted. Questions such as: what is the value to the overall learning experience of the technologically-supported aspects of learning? what are the costs and cultural change issues related to embedding technology in learning? what aspects need to be included in an investigation into experiences of blended learning in order to improve the ways in which it is used to develop student understanding? These are the types of questions that will beneficially guide research foci for the future. This is because they can provide detail not only about the parts of a greater whole, but also an awareness of how the parts might be related.

In terms of methodology, the review identified three categories of approaches: case-studies, survey studies and comparative studies. Given the relative youth of the field, in comparison to better-established research areas such as assessment, it is not very surprising that there should be such a preponderance of small-scale, exploratory studies. But for the field to mature, a pressing need for the adoption of complementary methodologies was identified. For example, although case-studies can be very informative in providing a rich description of a context, their roots in their context can make abstraction and generalization difficult. Survey-type studies can provide a better glimpse of the associations between significant variables, but if they are carried out prematurely then it can be hard to understand what lies behind observed associations. Comparative studies can provide a useful framework for deductions about the components of a system, but they tend to obscure interactions between those components. There is a need for some reduction of complexity in order to make research tractable, but it is also needed to understand whole systems — especially in the case of multi-faceted approaches such as blended learning. Thus the methodological plan for any future research into blended learning will benefit from considering the tension between understanding parts and understanding wholes, as well as from anticipating how its contribution will sit in relation to the approaches and evidence that already exist in the literature.

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References

- Allen, I. E., Seaman, J., & Garrett, R. (2007). *Blending in*. The extent and promise of blended education in the United States. Retrieved on 5th of August, 2007 from http://www.blendedteaching.org/system/files/Blending_In.pdf
- Aspden, L., & Helm, P. (2004). Making the connection in a blended learning environment. *Educational Media International*, 41(3), 245–252.
- Ausburn, L. J. (2004). Course design elements most valued by adult learners in blended online education environments: An American perspective. *Educational Media International*, 41(4), 327–337.
- Aycock, A., Gamham, C., & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology Today*, 8(6). Retrieved on the 3rd of March, 2007 from <http://www.uwsa.edu/ttt/articles/gamham2.htm>
- Bates, A. W. (2000). *Managing technological change*. Strategies for college and university leaders. San Francisco: Jossey-Bass Publishers.
- Bates, A. W., & Poole, G. (2003). *Effective teaching with technology in higher education*. Foundations for success. San Francisco: Jossey-Bass.
- Bersin & Associates (2003). *Blended learning: What works?* An industry study of the strategy, implementation, and impact of blended learning. Oakland, CA: Bersin & Associates.
- Bonk, C., & Graham, C. (Eds.). (2005). *The handbook of blended learning: Global perspectives, local designs*. New York: Pfeiffer.
- Boyle, T. (2005). A dynamic, systematic method for developing blended learning. *Education, Communication and Information*, 5(3), 221–232.
- Boyle, T., Bradley, C., Chalk, P., Jones, & Pickard, P. (2003). Using blended learning to improve student success rates in learning to program. *Journal of Educational Media*, 28(2–3), 165–178.
- Burns, R. B. (1994). *Introduction to research methods*. Melbourne: Longman Cheshire.
- Cameron, B. (2003). The effectiveness of simulation in a hybrid and online networking course. *TechTrends*, 47(5), 18–21.
- Carroll, B. (2003). Going hybrid: Online course components increase flexibility on on-campus courses. *Online Classroom* (pp. 4–7). H.W. Wilson Co.
- Christensen, T. K. (2003). Finding the balance: Constructivist pedagogy in a blended course. *Quarterly Review of Distance Education*, 4(3), 235–243.
- Cottrell, D. M., & Robinson, R. A. (2003). Blended learning in an accounting course. *The Quarterly Review of Distance Education*, 4(3), 261–269.
- Davies, A., Ramsay, J. R. E., Lindfield, H., & Couperthwaite, J. S. (2005). A blended approach to learning: added value and lessons learnt from students' use of computer-based materials for neurological analysis. *British Journal of Educational Technology*, 36(5), 839–849.
- Denzin, N. K. (1988). Triangulation. In J. P. Keeves (Ed.), *Educational research, methodology, and measurement: An international handbook*. Pergamon Press.
- Dowling, C., Godfrey, J. M., & Gyles, N. (2003). Do hybrid flexible delivery teaching methods improve accounting students' learning outcomes? *Accounting Education*, 12(4), 373–391.
- Draper, S., Brown, M., Henderson, F., & McAteer, E. (1996). Integrative evaluation: an emerging role for classroom studies of CAL. *Computers and Education*, 26(1–3), 17–31.
- Driscoll, M. (2002). *Blended learning: Let's get beyond the hype*. Learning and training innovations. Retrieved on 14th of August, 2006 from <http://www.ltinewline.com/ltimagazine/article/articleDetail.jsp?id=11755>
- Dron, J., Seidel, C., & Litten, G. (2004). Transactional distance in a blended learning environment, ALT-J. *Research in Learning Technology*, 12(2), 163–174.
- Ellis, R. A., & Calvo, R. A. (2006). Discontinuities in university student experiences of learning through discussions. *British Journal of Educational Technology*, 37(1), 55–68.
- Ellis, R. A., Goodyear, P., O'Hara, A., & Prosser, M. (2007). The university student experience of face-to-face and online discussions: Coherence, reflection and meaning, ALT-J. *Research in Learning Technology*, 15(1), 83–97.
- Ellis, R. A., Goodyear, P., Prosser, M., & O'Hara, A. (2006). How and what university students learn through on-line and face-to-face discussion: Conceptions, intentions, and approaches. *Journal of Computer Assisted Learning*, 22, 244–256.
- Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction*, (6th ed.). New York: Longman Publishers.
- Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education*, 7, 95–105.
- Giddens, A. (1984). *The constitution of society*. Cambridge, MA: Polity Press.
- Ginns, P., & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *Internet and Higher Education*, 10, 53–64.
- Graff, M. (2003). Individual differences in sense of classroom community in a blended learning environment. *Journal of Educational Media*, 28(2–3), 203–210.
- Graham, C. R. (2006). Blended learning systems. Definitions, current trends and future directions. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco: Pfeiffer.
- Graham, C. R., Allen, S., Ure, D., (2003). Blended learning environments. A review of the research literature. Unpublished manuscript, Brigham Young University.
- Haslam, S. A., & McGarty, C. (2003). *Research methods and statistics in psychology*. London: Sage.
- Harker, M., & Koutsantoni, D. (2005). Can it be as effective? Distance versus blended learning in a web-based EAP programme. *ReCALL*, 17(2), 197–216.
- House, R. (2002, January 8). Clocking in column. Spokesman-Review.
- Jelfs, A., Nathan, R., & Barrett, C. (2004). Scaffolding students: Suggestions on how to equip students with the necessary skills for studying in a blended learning environment. *Journal of Educational Media*, 29(2), 85–95.

- Johnson, J. (2002). Reflections on teaching a large enrolment course using a hybrid format. *Teaching with Technology Today*, 8(6). Retrieved 4th of April, 2007 from <http://www.uwsa.edu/tt/articles/jjohnson.htm>
- Johnson, S. D., Aragon, S. R., Shaik, N., & Palma-Rivas, N. (2000). Comparative analysis of learner satisfaction and learning outcomes in on-line and face-to-face learning environments. *Journal of Interactive Learning Research*, 11(1), 29–49.
- Kerres, M., & De Witt, C. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*, 38(2–3), 101–113.
- Khine, M. S., & Lourdasamy, A. (2003). Blended Learning approach in teacher education: combining face-to-face instruction, multimedia viewing and on-line discussion. *British Journal of Educational Technology*, 34(5), 671–675.
- King, K. (2002). Identifying success in online teacher education and professional development. *Internet and Higher Education*, 5, 231–246.
- Kupetz, R., & Ziegenmeyer, B. (2005). Blended learning in a teaching training course: Integrated interactive e-learning and contact learning. *RECALL*, 17(2), 179–196.
- Laurillard, D. (2002). *Rethinking university teaching: A framework for the effective use of educational technology*, (2nd ed.). London: Routledge.
- MacDonald, J., & McAteer, E. (2003). New approaches to supporting students: Strategies for blended learning in distance and campus based environments. *Journal of Educational Media*, 28(2–3), 129–146.
- Matheos, K., Daniel, B. K., & McCalla, G. I. (2005). Dimensions for blended learning technology: Learners' perspectives. *Journal of Learning Design*, 1(1), 56–76. Retrieved on 25th of October 2006 from www.jld.qut.edu.au/Vol1No1
- Meyer, K. (2003). Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Networks*, 7(3), 55–65.
- Motteram, G. (2006). 'Blended' education and the transformation of teachers: A long-term case study in postgraduate UK higher education. *British Journal of Educational Technology*, 37(1), 17–30.
- Oliver, M., & Trigwell, K. (2005). Can 'blended learning' be redeemed? *E-learning*, 2(1), 17–26.
- Orey, M. (2002). *Definition of blended learning*. University of Georgia. Retrieved on 21st of August, 2006 from <http://www.arches.uga.edu/~mikeorey/blendedLearning>
- O'Toole, J. M., & Absalom, D. J. (2003). The impact of blended learning on student outcomes: Is there room on the horse for two? *Journal of Educational Media*, 28(2–3), 179–190.
- Pan, C., Sivo, S., & Brophy, J. (2003). Students' attitude in a web-enhanced hybrid course: A structural equation modeling inquiry. *Journal of Educational Media and Library Sciences*, 41(2), 181–194.
- Parkinson, D., Greene, W., Kim, Y., & Marioni, J. (2003). Emerging themes of student satisfaction in a traditional course and a blended distance course. *TechTrends*, 47(4), 22–28.
- Reasons, S. G., Valadares, K., & Slavkin, M. (2005). Questioning the hybrid model: Student outcomes in different course formats. *Journal of Asynchronous Learning*, 9(1), 83–94.
- Riffell, S. K., & Sibley, D. F. (2003). Learning online: Student perceptions of a hybrid learning format. *Journal of College Science Teaching*, 32(6), 394–399.
- Riffell, S. K., & Sibley, D. F. (2004). Can hybrid course formats increase attendance in undergraduate environmental science courses? *Journal of Natural Resources and Life Sciences Education*, 33, 1–5.
- Rossett, A. (2002). *The ASTD e-learning handbook*. New York: McGraw-Hill.
- Rovai, A. P. (2002). Development of an instrument to measure classroom community. *Internet and Higher Education*, 5(3), 197–211.
- Rovai, A. P., & Jordan, H. M. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully on-line graduate courses. *The International Review of Research in Open and Distance Learning*, 5(2), 1–17.
- Rushby, N. (1979). *An introduction to educational computing*. London: Croom Helm.
- Schweizer, K., Paechter, M., & Weidenmann, B. (2003). Blended learning as a strategy to improve collaborative task performance. *Journal of Educational Media*, 28(2–3), 211–223.
- Sharpe, R., & Benfield, G. (2005). The student experience of e-learning in higher education: A review of the literature. *Brooks eJournal of Learning and Teaching*, 3(1), 1–10.
- Sharpe, R., Benfield, G., Roberts, G., & Francis, R. (2006). *The undergraduate experience of blended e-learning: A review of UK literature and practice*. The higher education academy. Retrieved on 10th of November, 2006 from www.heacademy.ac.uk
- Singh, H. (2003). Building effective blended learning programs. *Educational Technology*, 43(6), 51–54.
- Singh, H., & Reed, C. (2001). *A white paper: Achieving success with blended learning*. Retrieved on 10th of August, 2006 from <http://www.centra.com/download/whitepapers/blendedlearning.pdf>
- Stubbs, M., Martin, I., & Endlar, L. (2006). The structuration of blended learning: Putting holistic design principles into practice. *British Journal of Educational Technology*, 37(2), 163–175.
- Sweeney, J., O'Donoghue, T., & Whitehead, C. (2004). Traditional face-to-face and web-based tutorials: A study of university students' perspectives on the roles of tutorial participants. *Teaching in Higher Education*, 9(3), 311–323.
- Thompson, I. (2002). *Thompson job impact study: The next generation of corporate learning*. Retrieved on 19th of November, 2006 from <http://www.netg.com/DemosAndDownloads/Downloads/JobImpact.pdf>
- Twigg, C. A. (1994). The changing definition of learning. *Educom Review*, 29(4). Retrieved on 24th of August, 2006 from <http://www.educause.edu/pub/er/review/reviewArticles/29422.html>
- Twigg, C. A. (1996). Is technology a silver bullet? *Educom Review*, 31(2) On-line document: <http://www.educause.edu/pub/er/review/reviewarticles/31228.html>
- Twigg, C. A. (2003). *Improving learning and reducing costs: New models for on-line learning*. Retrieved on 19th of November, 2006 from <http://www.educause.edu/ir/library/pdf/erm0352.pdf>
- Woods, P. (1983). *Sociology and the school — An interactionist viewpoint*. London: Routledge and Kegan Paul.