



CRITICAL FACTORS FOR IMPLEMENTING BLENDED LEARNING IN HIGHER EDUCATION

Peter Mozelius¹, Enosha Hettiarachchi²

¹*Department of Computer and Systems Sciences, Mid Sweden University, Östersund, Sweden*
{peter.mozelius@miun.se}

²*University of Colombo School of Computing, Colombo, Sri Lanka* {eno@ucsc.cmb.ac.lk}

ABSTRACT

The use of blended learning environments in higher education has rapidly increased in the 21st century. Tools and techniques that initially were used in experimental distance education courses are today part of mainstream education with blended learning as a continuum between traditional face-to-face teaching and pure online courses. In this wide variety of course design there are success stories, but at the same time examples with low pass rates and poor learning outcomes.

The research question for the study is: Which aspects have to be considered in the design and implementation of blended learning in higher education? To answer this question, 15 selected publications were analysed in a literature review with the aim to identify important and critical factors when implementing blended learning in higher education.

As a result of the inductive analysis around 50 found factors have been grouped into 10 Categories of critical factors and 4 Blended learning perspectives in a strive to identify critical aspects of contemporary blended learning in a comprehensive structure. One conclusion is that blended learning today can be seen as a mature educational concept still in need of redesign. Problems that were reported two decades ago are now combined with other more recently identified critical factors. The presented categories and perspectives might be valuable as a checklist for implementations of blended learning and hopefully a useful base for further research in the field of blended learning.

KEYWORDS

Blended learning, Technology enhanced learning, E-learning, Higher education

1 INTRODUCTION

Blended learning in higher education has rapidly increased in the 21st century and as pointed out by Garrison & Kanuka (2004) the adoption of blended learning approaches in higher education is inevitable. From being an experimental concept in distance education courses, blended learning are today part of mainstream education. In a broad definition blended learning could be seen as the continuum between traditional face-to-face teaching and pure online distance courses (Watson, 2008) but the more complex definition must also include the concept of integrating the strengths of synchronous and asynchronous learning activities in a thoughtful design (Garrison & Kanuka, 2004).

The synchronous and asynchronous teaching and learning design could be seen as part of the technological and multimodal dimension in Picciano's (2009) conceptual blended learning model. There is no single type of blended education, and along the continuum from fully online to fully face-to-face extremes there will probably be a growing number of variations. Online curricula will evolve as a natural component of

instruction design at the same time as an increasing number of primarily distance-based programs can include face-to-face teaching components (Watson, 2008).

In this wide variety of instructional design several success stories have been identified, but at the same time there are many reports on failures in design as well as in the implementation of blended learning. There is an obvious economical aspect of the shift to blended learning, but in this study the focus is on the factors that are important for improving the teaching and learning quality, with decent pass rates as well as teacher and student satisfaction.

1.1 Research question

Which factors are critical and have to be considered in the design and implementation of blended learning in higher education?

In the 21st century there has been a rich plethora of blended learning setups tested in various parts of the world. This literature study has strived to identify the lessons learnt and best practices for the identified critical factors.

2 METHOD

This study was carried out as a literature review with a design inspired by the methods that earlier has been used by Wu, Chiou, Kao, Hu, and Huang (2012) and by Schweighofer and Ebner (2015). In this study the adapted method consists of the following four main steps:

1. Definition of Blended Learning
2. Definition of search strategy
3. Definition of selection criteria
4. An inductive data analysis

2.1 Definition of Blended learning

Blended learning has been a constant hype in the 21st century and sometimes so widely defined that it makes it hard to find any learning system not included (Graham, 2006). To meet the aim of the study and try to identify as many aspects as possible, the term Blended learning is in one dimension broadly defined as "The convergence of online and face-to-face Education" as in the study by Watson (2008). At the same time it is important to also include the dimension of technology and media use as it has been depicted in the multimodal conceptual model in Figure 1 below. This conceptual model was proposed and presented in an article published by Picciano (2009).

In this study Picciano's conceptual model has been used in the analysis of findings and discussions in the selected articles. One of several interesting aspect of Picciano's conceptual model is the distinction in the lower right corner between asynchronous and synchronous teaching and learning technology. Another Picciano concept is whether the use of a high degree of media infusion can meet the different needs and different learning styles in today's heterogeneous student groups.

Even if the concept of different learning styles has been questioned in later research it makes sense to care about student variations in study techniques and their various choices of paths through a given course content. It is also important to involve the third quadrant in the model with media infused teaching and learning activities in face-to-face sessions.

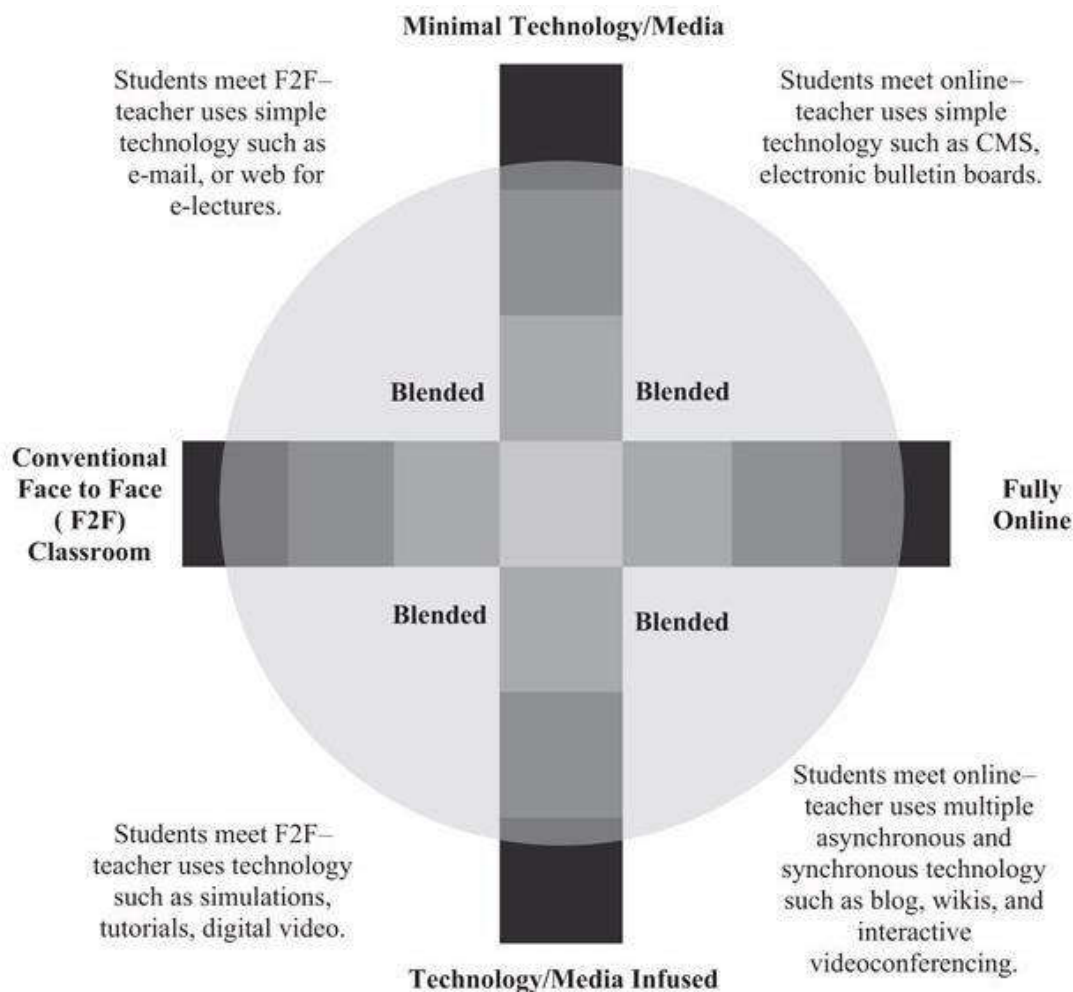


Figure 2 Picciano's conceptual multimodal model

2.2 Definition of the search strategy

To answer the research question and to construct an appropriate definition of blended learning, publications have been found with the following search strings:

- 1) "Defining Blended Learning"
- 2) "Defining Blended Learning" and "Higher Education"
- 3) "Blended Learning" and "Critical Factors" and "Higher Education"

2.3 Definition of selection criteria

Inclusion and exclusion criteria for publications to be part of this study are as below:

- Publications have to be in English
- Publication have to have a relation to the field of blended learning as it is defined for the purpose of this study
- Publications have to address one or more factors that could possibly be considered when implementing blended learning approaches **or** add to the discussion on the definition of blended learning

- To assure a relevant analysis of the current state of blended learning at least one third of the articles should be published in 2016-2017

In a strive of holism, publications should preferably have a methodological and geographical spread. The number of citations and articles ranked in the Norwegian list have also been considered, but it has always been how the publications have analysed and discussed factors or approaches in the field of blended learning that has mattered the most.

2.4 Data analysis

Selected papers have been analysed inductively without any pre-definition of main variables. The overall strategy of a qualitative and inductive analysis is to allow important analysis dimensions to emerge from found patterns, without presupposing what the most important dimensions should be (Quinn, 2002). During the analysis these patterns and their synonyms, hyponyms and hypernyms were collected, compared and clustered to form categories or analysis dimensions. Furthermore, the qualitative analyst has tried to seek and find inter-relationships between the emerging dimensions, as it is recommended without any pre-constructed assumptions (Quinn, 2002).

3 SELECTED PUBLICATIONS

In Table 1 below selected publications are listed in chronological order with number of citations, rank in the Norwegian list of publications, locale of study, methodology and contributions. The aim is to provide an updated analysis of the current state of blended learning but some older seminal papers are included for background and definition of terms. In the Norwegian list of accredited scientific journals, series and publishers, publication channels can be ranked as Level 2 (highest), Level 1 or Level 0 (unranked).

Based on the search strings and selection criteria described under 2.2 and 2.3 and a removal of irrelevant publications the following 15 articles were selected, but the analysis is also based on articles that are referred to in the selection presented below. This has been carried out as a 'backward reference search', a technique that involves identification and examination of references or works that are cited in an article. This is a way to learn more about the development of knowledge on a topic and to identify to identify experts in the studied domain (Webster & Watson, 2002; Steiger, Albuquerque, & Zipf, 2015; Machi & McEvoy, 2016).

Table 1 Sample of Publications on Blended Learning

Author(s)	Year	Citations	Rank N L	Locale of study	Methodology / Data collection	Main findings / Contributions / Critical factors
Garrison & Kanuka	2004	2197	L 1	Canada	Literature study / Position paper	Early definitions. Learning outcomes, and student satisfaction
Graham	2006	1575	L 0	US	Literature study / Position paper	Reasons for Blended learning, Definitions & visions

Watson	2008	201	L 0	US	Position paper	Definitions & visions, Teacher role Classroom design
So & Brush	2008	644	L 2	Singapore	Mixed Methods, Survey, Interviews	Course structure, Emotional support, Communication and Social presence
Picciano	2009	165	L 1	US	Literature study / Position paper	Definition, Conceptual model Learning styles, Multimodality
Kim, Kwon & Cho	2011	168	L 2	South Korea	Survey / Questionnaires	Media integration & instructor's quality teaching - related to social presence and learning satisfaction
Al-Busaidi	2012	33	L 1	Oman	Survey / Questionnaires	Critical factors in VLE learner perspective
Al-Busaidi & Al-Shihi	2012	43	L 1	Oman	Survey / Questionnaires	Critical factors - instructor / teacher perspective
Lin & Wang	2012	104	L 2	Taiwan	Mixed Methods	A blended learning framework
Garner & Rouser	2016	1	L 0	Australia	Qualitative case study-Qualitative survey	The balance between F2F on campus contact and asynchronous learning
Chen & Yao	2016	3	L 1	Malaysia	Survey-questionnaires	Design for the younger generation
Shand, Glassett-Farrelly & Costa	2016	1	L 1	US	Small sample Survey	Principles for redesign of Blended learning

Raphael Mtebe	&	2016	0	L 1	Tanzania	Mixed methods	Instructors' support services
Thai, Wever, Valcke	De &	2017	0	L 2	Vietnam	Quasi experiment	Flipped classroom concept
Fleming, Becker Newton	&	2017	0	L 2	Australia	Online survey	Low complexity, authenticity and technical support are more important factors than age

The idea with a methodological spread is that the different research approaches together should reveal more critical factors than a study with less approaches would do. Several quantitative and several qualitative studies have investigated the same themes but with different methods for data collection. Not all studies show an excellent research design but all of them have contributed with critical factors worth considering in the implementation of blended learning.

The idea with a geographical spread is that studies from different regions with cultural and infrastructural variations would reveal more critical factors than a selection with less diversity. However, studies from different areas of the world often tend to focus on the same factors, but that the same factors sometimes are more relevant or important in specific contexts. As intended and later confirmed there are definitely lessons to learn from studies in other parts of the world.

4 FINDINGS AND DISCUSSIONS

As pointed out in the article by Chen and Yao (2016) a tendency in past studies on blended learning has been to identify and discuss factors that focus primarily on technology. On the other hand, one finding is that there are several studies that argue for the need to focus on pedagogy and learning objectives and not solely on technology (Hoffman, 2006; Garrison & Vaughan, 2008; Alammary et al., 2014; McGee & Reis, 2012; Shand, Glassett Farrelly & Costa, 2016). Other findings in this study are that technology still is a critical issue (So & Brush, 2008; Fleming, Becker & Newton, 2017), not least in developing regions (Al Busaidi & Al-Shihi, 2012; Raphael & Mtebe, 2016), and also the more positive idea of technology as a supporting factor for innovative didactics and instructional design to satisfy the needs in heterogeneous student groups (Picciano, 2009).

Methodology used in the analysed publications show large quality variations both when it comes to design and descriptions. In the Level 2 publications the research design is well described and thoroughly carried out, but these well-designed studies have not always contributed with the most interesting or surprising findings. The most obvious finding is the unexpected complexity of blending learning and the amount of found critical factors and themes. In an endeavour for a holistic multi-stakeholder presentation, found factors and themes have been grouped into 10 Categories of critical factors and 4 Blended learning perspectives.

4.1 Categories of critical factors

1. Technology - virtual learning environments and media integration

There exist, as mentioned above, a large number of studies that focus on the technological aspects of blended learning. As mentioned by Chen and Yao (2016), it is important to look at other aspects as well,

but since technology is the basic ingredient that is blended with traditional learning it will be a critical factor in all implementations and cannot be neglected. In the history of blended learning, a wide variety of technologies such as television, computers, presentation software, and simulation programs have been tested during the years with a varying degrees of success (Picciano, 2009).

Since blended learning is based on web-based learning content and communication, it relies on a learning management system (LMS) or a virtual learning environment (VLE) to structure content and to facilitate interaction (Watson 2008; Garner & Rouse, 2016). The success of a LMS or a VLE in academic institutions may initially be based on teachers' and instructors' acceptance, but in the long run it is the learners' continuous acceptance and use that matters (Al-Busaidi, 2012). Teachers and learners always have different perspectives on the usefulness of involved technology, but what they have in common is that their computer anxiety, technical pre-knowledge and personal innovativeness are critical factors in their attitudes (Al-Busaidi, 2012; Al-Busaidi & Al-Shihi).

A study by So & Brush (2008) found that the participants with the lowest expectations on the investigated course were the ones that had encountered technical problems in previous blended learning experiences. What seems like a wise principle is to start blended courses with an orientation that informs students on how to use non-trivial online components, or to include digital tutorials in the online environment (Hoffman, 2006; Garrison & Vaughan, 2008; Shand, Glassett-Farrelly & Costa, 2016). There is also an identified need for technical support for teachers and instructors (Raphael & Mtebe, 2016).

2. Didactics - pedagogy, instructional design and the teacher role

One of the most frequently cited reasons for implementing blended learning is the possibility for more effective pedagogical practices, but online learning often suffers from cognitive overload by making large amounts of information available (Graham, 2008). There are many research articles advocating various pedagogical models such as constructivism, constructionism, connectivism or problem based learning, but the online part of blended learning should rather focus on didactics in a mix of ideas from various pedagogical models like it has been suggested by Terry Anderson (2008).

Instead of selecting a pedagogical model that could fit all blended learning implementations the choice of critical factors should rather be a selection of instructional design and teacher activity. Studies indicate that instructors' characteristics such as attitude, teaching style, control and responsiveness are important (Al-Busaidi, 2012) and that instructor's teaching quality are affecting students' social presence as well as learning satisfaction (Kim, Kwon & Cho, 2011). Furthermore, students have a need to feel confident that teachers' feedback to concerns, assessment outcomes and guidance should be timely and responsive. (Garner & Rouse, 2016)

A condensed and useful guideline for instructional design might be Shand, Glassett-Farrelly & Costa's (2016) second principle of blended learning redesign:

"Content delivery mechanisms, student engagement activities and assessments should be based on course content, learning needs of students, and pedagogical affordances of the designated technology tools" (Garrison & Vaughan, 2008; Massie, 2006; McGee & Reis, 2012; Means et al., 2013)

3. Course outcomes - learning outcomes and learner satisfaction

To achieve maximum outcomes of blended learning the approach should be to primarily focus on learning outcomes (Alammary, Sheard, & Carbone, 2014; Shand, Glassett-Farrelly & Costa, 2016) and that blended

learning design/redesign should start by identifying key learning outcomes (Garrison & Vaughan, 2008; Shand, Glassett-Farrelly & Costa, 2016). Active engagement, collaboration and social presence have been identified as contributors to successful learning outcomes (Parker, Maor & Herrington 2013; Garner & Rouse, 2016). Collaboration and social presence will be elaborated in the fourth category.

Beside the importance of concrete learning outcomes, a critical factor is to consider learner satisfaction. According to the study by Diep et al. (2016) instructor expertise, students' perceived task value and achievement goals are the most important factors to achieve learner satisfaction. Furthermore, there are findings indicating that student perceptions of collaborative learning in blended environments have positive relationships with perceptions of social presence and student satisfaction (So & Brush, 2008). A way to stimulate social presence and learner satisfaction could be to increase the use of media technology (Kim, Kwon & Cho, 2011), another is to care about feedback to students' concerns and queries, (Garner & Rouse, 2016).

4. Collaboration and social presence

The described importance of teacher-student and student-student interactions in learning processes indicates that e-learning alone is unlikely to be the most effective teaching and learning strategy (Rhem, 2012; Chen & Yao, 2016). A study by So and Brush (2008) found that students with high perceptions of collaboration in the learning process also perceived high social presence. Sometimes neglected emotional support is an important factor to reduce students' sense of distance in online learning environments. Their recommendation is a course design that provides such socio-affective interaction (So & Brush, 2008).

This article can only partially answer the important questions posed by Graham (2008):

- "When and why should we be considering human interaction such as collaboration and learning communities?"
- "How does live interaction versus low fidelity, asynchronous interaction affect the learning experience?"

Collaboration and interactivity among course participants could be seen as a catalyst for social presence but not necessarily leading to learner satisfaction (Kim, Kwon & Cho, 2011). To enable interaction and social presence are important factors in blended learning environments (Garner & Rouser, 2016), but not every course outline needs to require students to do group work or rely entirely on reflective activities (Picciano, 2009).

5. Course design

This is the central category that has to consider and combine all critical factors from all other categories. Appropriate course design has to include relevant multimodal technology didactics that support collaboration and active learning for successful course outcomes. The recommendation is to use a combination of synchronous and asynchronous activities, in a stepwise implementation that avoids trends and hypes to assure learning quality within the existing economic constraints in higher education.

The course structure is a critical factor related to students' perceptions of collaborative learning, social presence, and satisfaction (So & Brush, 2008). Blended course design must connect the face-to-face and online components with a meaningful flow from one medium to the next providing the students different paths through the course content (Shand, Glassett-Farrelly & Costa, 2016). One of the analysed articles claims that the younger generation demands a new redesign (Chen & Yao, 2016), another claims that age is not the critical factor and that main issues to consider are low complexity, authenticity and technical

support (Fleming, Becker & Newton, 2017). Finally, in analogy with recommendations for all types of educational contexts quality learning content is essential (Lin & Wang, 2012).

6. Synchronicity vs. asynchronicity

An effective blending of synchronous and asynchronous features can create confidence and support students' peer interaction (Hrastinski, 2010). A study by Garner and Rouser (2016) recommends a balance between traditional face-to-face activities that offers a richness of human interaction and technology enhanced asynchronous online activities. Relationships between students, teachers and peers created by the traditional synchronous interaction will later be carried over into the asynchronous online instruction making students feel more confident in their online engagement (Garner & Rouser, 2016).

The question that remains is whether the synchronous interaction should be created online like it is depicted in Picciano conceptual model or if asynchronous online activities might be combined with synchronous offline activities as suggested by Garner & Rouser (2016). Maybe answer can be Picciano's idea that the course design and the teaching tools should support the learning outcomes and not necessarily be the same in all courses (Picciano, 2009).

7. The heritage from technology enhanced distance courses

Even if blended learning can be seen as a concept that complements and cures some main issues in technology enhanced distance courses several critical factors are inherited from pure online distance education. Low complexity, authenticity and technical support seem to matter in all forms of technology enhanced learning (Fleming, Becker & Newton, 2017). To avoid earlier detected problems such as learners getting stuck in a state of confusion (Hara & Kling, 2000) or with a feeling of loneliness and boredom (Brown, 1996) blended learning must, like distance education, be designed with a human touch, otherwise there is a risk for low motivation (Keller & Suzuki, 2004).

Whether the course mode is face-to-face or online, three critical aspects are: the cognitive aspect, the social aspect, and the teaching presence and if neglected this will affect learning outcomes, student satisfaction and completion rates (Garrison & Kanuka, 2004). Studies report that technology enhanced courses in general (Chen & Yao, 2016) and MOOCs in particular still have a lower completion rate than traditional face-to-face courses with 5% seen as a high completion rate for MOOCs (Holland, 2016). A percentage impossible to accept in any form of traditional higher education.

8. Multimodal overloading

Studies indicate that students tend to be more socially engaged and satisfied with their learning with dynamic and interactive media formats. This may include asynchronous discussions, facilitating interaction, and involving useful resources in forms of graphics and audio or video files. (Kim, Kwon & Cho, 2011) Another promising multimodal blend is to involve game-based learning which also can be designed as collaborative learning and student interaction (Babu et al., 2016). It seems strategically wise for institutions to emphasise on multimodal dimensions in the redesign of blended learning environment especially if the course content should attract the younger generation as well (Shand, Glassett-Farrelly & Costa, 2016; Chen and Yao, 2016).

Picciano (2009) claims that in today's heterogeneous student groups, learners are representing various generations, different personality types and different learning styles, teachers and instructional designers ought to use multiple approaches and multiple modalities. Even if several later studies denies the idea of learning styles, students with different background have different needs and study techniques. A

recommendation for redesign is that learners should be provided with multiple paths through the course content, and preferably through different media, to better construct their knowledge (Shand, Glassett-Farrelly & Costa, 2016). To overload multiple approaches and modalities is often costly and time consuming, but also a best practice for instructional design.

9. Trends and hypes

Like other mature concepts blended learning has its trend and hypes. One trend seem to be that blended learning, that initially was a way to enhance traditional learning, now use the blend to balance online distance learning with face-to-face activities (Garner & Rouser, 2016). This seems like a sensible way to handle many of the issues that are discussed above under Category 7.

The strongest current hypes seem to be MOOCs (Massive open online courses) and the concept of 'The Flipped Classroom'. Author's opinion is that the positive reports on implementations of the flipped classroom concept (Herreid, & Schiller, 2013; Thai, De Wever, & Valcke, 2017) are worth further attention, if the concept involves more than just adding pre-recorded videos. Despite the fact that the concept shares the problems with other methods that depend on students preparing outside of class (Herreid, & Schiller, 2013), most blended learning researchers seem to view the flipped classroom as *"a strategy that nearly everyone agrees on"* (Slomanson, 2014).

MOOCs do not have the same consensus and after the initial celebrations when the concept was launched in 2011, there are now more critical opinions as well. The MOOC concept has been criticised for doing things more cheaply (Waldrop, 2014), but also for the low pass rates and poor quality (Holland, 2016).

10. Economy

There are several reasons for implementing blended learning and cost effectiveness has always been a major goal in higher education as well as in companies (Graham, 2006). The early view of technology enhanced learning as a simple way of making money has later been contradicted by low completion rates, high initial costs for preparing learning content and substantial costs for system maintenance (Rhem, 2012; Chen & Yao, 2016). Still there are many examples of low-budget implementations but the lesson learnt is that initial investment and careful time consuming course design pays off in the long run.

4.2 Blended learning perspectives

In blended learning as in many other areas there are multiple stakeholders and that successful outcomes often can be achieved with a multi-stakeholder approach. Author's suggestion is to consider the following four perspectives.

1. The University perspective

Maybe that the most obvious perceived advantage of e-learning is that factors such as enrolment, administration, delivery and assessment can all be automated and placed online. A fact which theoretically removes the upper limits on student enrolment (Holland, 2016). While the university perspective often is to increasingly look for innovative ways to make courses more accessible for students, the Teacher and the Learner perspectives must include to increase social presence and learner satisfaction (Garner & Rouser, 2016).

There are several reasons for universities to get involved in blended learning, two of them are the potential for pedagogical richness and the access to knowledge. At the same time two other reasons are cost

effectiveness, and the ease of revision (Graham, 2006). Another reason is to open up for lifelong learning and that older students tend to enjoy the flexibility of asynchronous online activities (So & Brush, 2008).

2. The Learner perspective

If the quality of blended learning environments do not live up to the same standards as traditional educational settings, blended learning is not an interesting alternative for most learners. Updated learning material of high quality is always a prime factor for the learning outcomes (Lin & Wang, 2012) and so is the quality of the virtual learning environment (Lin & Wang, 2012; Al-Busaidi, 2012). But blended learning must not only be about distributing learning content or activities (Graham, 2006) and should also include students' social and emotional needs (Picciano, 2009).

As blended learning evolves it should stay learner centred (Watson, 2008), but to achieve learner satisfaction there are also needs for discussions, collaboration and emotional support (So & Brush, 2008). To attract the younger generation is one reason for redesign of blended learning (Chen & Yao, 2016), but a better practice would be to look at the redesign issues that are common for all age groups (Shand, Glassett-Farrelly & Costa, 2016).

Two other promising ideas to make blended learning more attractive are to involve more relevant media technology (Kim, Kwon & Cho, 2011), and to care about students' need of feedback and guidance (Garner & Rouse, 2016). Teachers need to present a human face to students and share their personal experiences of the subject to create a reciprocal relationships that can inspire learner engagement with improved learning outcomes (Garner & Rouse, 2016).

3. The Teacher perspective

There are some obvious benefits from the university perspective and from the learner perspective but in a multi stakeholder approach there must be something for the teachers as well. The findings from a study by Al-Busaidi & Al-Shihi (2012) indicated that important factors to address from a teacher or instructor perspective are:

- Computer anxiety
- Learning environment quality
- Technical support
- Management support
- An incentives policy

There is also an identified need to provide professional development for online teaching (Graham, 2006) and to provide a model for teacher and instructor support (Raphael & Mtebe, 2016). Furthermore, teachers' satisfaction was found to be a significant factor for their motivation for further use of blended learning environments (Al-Busaidi & Al-Shihi, 2012). There are several obvious reasons for universities and learners to shift to blended learning but the incentives for teachers are not always that easy to find.

A Swedish longitudinal case study found that teachers choice of tools and technology in a virtual learning environment were dependent on the impact on their workload. Conclusions are that some kind of incentives for lecturers are needed if educational institutions should be able to offer students' a richer possibilities for collaboration and interaction. (Garrote Jurado, 2012) To motivate teachers to involve in blended learning by offering some incentives has also been suggested by Lin and Wang (2012).

4. The Global perspective

One strength of blended learning is the ability to find, reuse and rapidly distribute learning content. Yet, there is mostly a need to customise the content to the local cultural context (Graham, 2006). The same need for adaption to different regions and cultures can be identified for virtual learning environments and learning management systems as well (Al-Busaidi, 2012). For an emerging region with a teacher shortage it could be tempting to set up conveyor belt model of course content production, but without local adaptation the result can be stereotypical and decrease the learning potential (Mozelius & Hatakka, 2009).

In several developing regions with a shortage of teachers blended learning approaches adapted to the local conditions have opened up for a higher intake to tertiary education (Mozelius & Hatakka, 2009; Raphael & Mtebe, 2016). Learning management systems have a promising potential for developing countries, as it provides tools to build human resources (Al-Busaidi, 2012) and support the idea of education for all. On the other hand, rural regions with poor infrastructure often have the most urgent need for a support model (Mozelius, 2014; Raphael & Mtebe, 2016).

5 CONCLUSIONS AND FUTURE WORK

The chosen mix of quantitative and qualitative studies have been fruitful and also a way to strengthen the validity of findings. Early studies with a high number of citations are mostly conducted without detailed method descriptions but this kind of positional papers seem to get more readers and citations than the more thoroughly conducted studies. Publications that are ranked as Level 2 in the Norwegian list generally have a more rigorous research design and more detailed descriptions in the method chapters. However the first conclusion is that the mix of methods and also the geographical spread for the studies were a way to reveal more critical factors than what would have been the case with publications with less variety.

Blended learning is a complex field without any silver bullet that guarantees success, and factors that lead to success in one of the described perspectives might be problematic from another. The early view of blended learning as a concept where technology could replace teachers and save money has been replaced with a more mature view where the teacher / instructor role is as important online as in face-to-face activities (Lin & Wang, 2012; Garner & Rouse, 2016). Blended learning today is a mature concept, but still with a need for redesign (Shand, Glassett-Farrelly & Costa, 2016). With the advancement of technology and to build a bridge between face-to-face learning and fully online learning, blended learning was introduced which had a rapid increase of usage. In summary, blended learning could be seen as the continuum between traditional face-to-face teaching and pure online distance courses.

A found consensus is that all of the selected publications consider the blend of face-to-face sessions and online activities better than just one of them, if the implementation is carefully done. As with a fully online learning environment, even a blended learning environment face challenges. In this paper, based on the past research that has been carried-out, in order to address our research question, we have analysed the critical factors associated with designing and implementing blended learning in higher educational context. These critical factors can be grouped into 10 categories as technology, didactics, course outcomes, collaboration and social presence, course design, synchronicity vs. asynchronicity, the heritage from technology enhanced distance courses, multimodal overloading, trends and hypes, and economy.

Economy and cost efficiency is, as always, important to consider but the conclusion is that initial planning and investment is the recipe that pays off in the long run. Recommendations are to consider all found categories mentioned above and also the four various perspectives analysed such as the university

perspective, learner perspective, teacher perspective, and global perspective. All found categories have interdependency and the fifth category might be renamed from 'Course design' to 'Implementation' as an aggregation of all the other categories.

It can be argued that search criteria as well as the selection of publications could have been carried out differently. There are also reasons for extending the selection to be able to find more factors, categories and perspectives, but the choice was also based on time constraints. Hopefully, found categories and perspectives might be useful for future studies in the field of blended learning.

5.1 Future work

Nowadays, blended learning has become a worldwide trend and therefore, universities encourage their teaching staff to be more innovative by integrating ICT facilities through implementing blended learning solutions into their teaching practices. Also, teaching staff need to be the forefronts in implementing blended learning in their courses. Considering the above, based on the findings in this study, it would be interesting to further explore the teacher role and teachers' view on blended learning implementations in higher education. An idea could be to do use a mixed method approach with questionnaires followed up with interviews. The analysed publications are not without a teacher/instructional designer/subject matter expert perspective but it could be of value to investigate bottlenecks and if there exists a need for further training and support. Teachers and instructors trained for traditional face-to-face environments do probably not have the appropriate sets of skills and knowledge for blended environments.

REFERENCES

- AL-BUSAIDI, Kamla Ali. Learners' perspective on critical factors to LMS success in blended learning: An empirical investigation. *Communications of the Association for Information Systems*, 2012, 30.2: 11-34.
- AL-BUSAIDI, Kamla Ali; AL-SHIHI, Hafedh. Key factors to instructors' satisfaction of learning management systems in blended learning. *Journal of Computing in Higher Education*, 2012, 24.1: 18-39.
- ALAMMARY, Ali; SHEARD, Judy; CARBONE, Angela. Blended learning in higher education: Three different design approaches. *Australasian Journal of Educational Technology*, 2014, 30.4.
- ANDERSON, TERRY. [online]. The theory and practice of online learning. *Athabasca University Press*. 2008. [cit. 20170122]. Available from: <http://www.aupress.ca/index.php/books/120146>
- BROWN, Kevin M. The role of internal and external factors in the discontinuation of off-campus students. *Distance education*, 1996, 17.1: 44-71.
- BABU, Sooraj K., et al. Collaborative Game Based Learning of Post-Disaster Management: Serious Game on Incident Management Frameworks for Post Disaster Management. In: *Technology for Education (T4E), 2016 IEEE Eighth International Conference on*. IEEE, 2016. p. 80-87.
- CHEN, Won Sun; YAO, Adrian Yong Tat. An Empirical Evaluation of Critical Factors Influencing Learner Satisfaction in Blended Learning: A Pilot Study. *Universal Journal of Educational Research*, 2016, 4.7: 1667-1671.
- DIEP, Anh-Nguyet, et al. Who or what contributes to student satisfaction in different blended learning modalities?. *British Journal of Educational Technology*, 2016.
- FLEMING, Julie, et al. Factors for successful e-learning: does age matter?. *Education+ Training*, 2017, 59.1: 76-89.

- GARNER, Rosemarie; ROUSE, Elizabeth. Social presence—connecting pre-service teachers as learners using a blended learning model. *Student Success*, 2016, 7.1: 25-36.
- GARRISON, D. Randy; KANUKA, Heather. Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education*, 2004, 7.2: 95-105.
- GARRISON, D. Randy; VAUGHAN, Norman D. *Blended learning in higher education: Framework, principles, and guidelines*. John Wiley & Sons, 2008.
- GARROTE JURADO, Ramon. Barriers to a wider Implementation of LMS in Higher Education: a Swedish case study, 2006-2011. 2012.
- GRAHAM, Charles R. Blended learning systems. *The handbook of blended learning*, 2006, 3-21.
- HARA, Noriko. Student distress in a web-based distance education course. *Information, Communication & Society*, 2000, 3.4: 557-579.
- HERREID, Clyde Freeman; SCHILLER, Nancy A. Case studies and the flipped classroom. *Journal of College Science Teaching*, 2013, 42.5: 62-66.
- HOFMANN, Jennifer. Why Blended learning hasn't (yet) fulfilled its promises. *Handbook of blended learning: Global perspectives, local designs*, 2006, 27-40.
- HOLLAND, Paul M. Developing a blended learning approach for the effective teaching of electronic circuit analysis. In: *Systems, Signals and Image Processing (IWSSIP), 2016 International Conference on*. IEEE, 2016. p. 1-4.
- HRASTINSKI, Stefan. How do e-learners participate in synchronous online discussions? Evolutionary and social psychological perspectives. In: *Evolutionary psychology and information systems research*. Springer US, 2010. p. 119-147.
- KELLER, John; SUZUKI, Katsuaki. Learner motivation and e-learning design: A multinationally validated process. *Journal of educational Media*, 2004, 29.3: 229-239.
- KIM, Jungjoo; KWON, Yangyi; CHO, Daeyeon. Investigating factors that influence social presence and learning outcomes in distance higher education. *Computers & Education*, 2011, 57.2: 1512-1520.
- LIN, Wen-Shan; WANG, Chun-Hsien. Antecedences to continued intentions of adopting e-learning system in blended learning instruction: A contingency framework based on models of information system success and task-technology fit. *Computers & Education*, 2012, 58.1: 88-99.
- MACHI, Lawrence A.; MCEVOY, Brenda T. *The literature review: Six steps to success*. Corwin Press, 2016.
- MCGEE, Patricia; REIS, Abby. Blended course design: A synthesis of best practices. *Journal of Asynchronous Learning Networks*, 2012, 16.4: 7-22.
- MEANS, Barbara, et al. The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record*, 2013, 115.3: 1-47.
- MOZELIUS, Peter. *Education for All in Sri Lanka: ICT4D Hubs for Region-wide Dissemination of Blended Learning*. 2014. PhD Thesis. Department of Computer and Systems Sciences, Stockholm University.
- MOZELIUS, Peter; HATAKKA, Mathias. Conveyor Belt Production of Course Material—a Case Study in Sri Lanka. In: *8th European conference on e-Learning, ECEL 2009, 29-30 October, Bari, Italy*. 2009. p. 406-412.
- PARKER, Jenni; MAOR, Dorit; HERRINGTON, Jan. Authentic online learning: Aligning learner needs, pedagogy and technology. *Issues in Educational Research*, 2013, 23.2: 227-241.

- PICCIANO, Anthony G. Blending with purpose: The multimodal model. *Journal of asynchronous learning networks*, 2009, 13.1: 7-18.
- QUINN, Patton Michael. Qualitative research and evaluation methods. *California EU: Sage Publications Inc*, 2002.
- RAPHAEL, Christina; MTEBE, Joel S. Instructor support services: An inevitable critical success factor in blended learning in higher education in Tanzania. *International Journal of Education and Development using Information and Communication Technology*, 2016, 12.2: 123.
- RHEM, James. *Blended learning: Across the disciplines, across the academy*. Stylus Publishing, LLC, 2012.
- SCHWEIGHOFER, Patrick; EBNER, Martin. Aspects to be considered when implementing technology-enhanced learning approaches: A literature review. *Future Internet*, 2015, 7.1: 26-49.
- SHAND, Kristen; GLASSETT FARRELLY, Susan; COSTA, Victoria. Principles of course redesign: A model for blended learning. In: *Proceedings of Society for Information Technology & Teacher Education International Conference 2016*. 2016. p. 378-389.
- SLOMANSON, William R. Blended learning: A flipped classroom experiment. *Journal of Legal Education*, 2014, 64.1: 93-102.
- SO, Hyo-Jeong; BRUSH, Thomas A. Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education*, 2008, 51.1: 318-336.
- STEIGER, Enrico; ALBUQUERQUE, João Porto; ZIPF, Alexander. An advanced systematic literature review on spatiotemporal analyses of Twitter data. *Transactions in GIS*, 2015, 19.6: 809-
- THAI, Thuy NT; DE WEVER, Bram; VALCKE, Martin. The impact of a flipped classroom design on learning performance in higher education: Looking for the best “blend” of lectures and guiding questions with feedback. *Computers & Education*, 2017
- WALDROP, M. Mitchell. Massive open online courses, aka MOOCs, transform higher education and science. 2014.
- WATSON, John. Blended Learning: The Convergence of Online and Face-to-Face Education. Promising Practices in Online Learning. *North American Council for Online Learning*, 2008.
- WEBSTER, Jane; WATSON, Richard T. Analyzing the past to prepare for the future: Writing a literature review. *MIS quarterly*, 2002, xiii-xxiii.
- Wu, Wen-Hsiung, Et Al. Re-Exploring Game-Assisted Learning Research: The Perspective Of Learning Theoretical Bases. *Computers & Education*, 2012, 59.4: 1153-116