UNIVERSITEIT GENT

RESEARCH INTERNSHIP
BLENDED LEARNING: LITERATURE REVIEW

CONTENT

WHAT IS BLENDED LEARNING?

> *It may be helpful to think of the term blended learning as a boundary object (Norberg, Dziuban, & Moskal, 2011, as cited in Graham & Moore, 2013): an element shared across communities of practice, "plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites, weakly structured in common use, strongly structured in individual site-use" (Star & Griesemer, 1989, as cited in Graham & Moore, 2013).*

As Moskal, Dziubal and Hartman (2012) suggest, it is not easy to give a comprehensive definition of what blended learning is. They realise that many context variables have an influence on it. The researchers are thinking of characteristics of the student population, mission of the institution, the strategic planning processes, faculty responsiveness, student acceptance, community values, available resources, institution support mechanism and so on. Moskal et al. (2012) found that many institutions came to realise that blended learning is more useful if it is perceived as a mental model. Instead of adopting one definition, every institution makes its own work definition, which they adapt to their local context.
According to Diamond (1997, as cited in Moskal et al., 2012) ideas are spread and assumed in two ways: blueprint adoption and idea transmission.
Under blueprint adoption, we understand blindly implementation of existing models for blended learning in another institution. However, this is a strange method in higher education, given institutes differ much from each other.
Idea transmission occurs when an existing situation is observed, but there is a proprietary method to implement it. This is more suitable for blended learning practices, as every higher education context is very different and requires different approaches.
Graham and Moore (2013) see blended learning as three different combinations: first, the combination of different media, second, combining different teaching methods and strategies and third, the combination of face-to-face and online learning.
We mainly use the third definition, given the fact that the first two are too wide to interpret. This broad definition ensures that all learning can be seen as blended learning, which may not be the intention.
People often think the Internet was a starting point of distance education, and consequently so e-learning and blended learning, but it already started much earlier (Moore & Kearsely, 2011, as cited in Güzer & Caner, 2014). The real starting point occurred through letter correspondence between teacher and student. Moore and Kearsely (2011, as cited in Güzer & Caner, 2014) divided distance education into five generations. We distinguish correspondence, broadcast radio and television, open universities, teleconferencing and at least the Internet. But we can't deny that the Internet has caused an acceleration and that it emerged new concepts like e-learning and blended learning.
Since the beginning of the 21th century, blended learning emerged as one of the most popular pedagogical concepts in education (Güzer & Caner, 2014).
Güzer and Caner (2014) situate blended learning on a continuum in time, making a distinction between the past, from 1999 to 2009, the present, from 2010 to 2012 and the future.

Past

First attempts (Güzer & Caner, 2014)

The first documents in which we read about blended learning date from the beginning of the 21st century. The term blended learning was used first for appointing the combination of work and play in a prekindergarten school.

Classification	Sub-Classification	Year range
Past	First attempts	1999 – 2002
	Definition period	2003 – 2006
	Popularity period	2007 – 2009
Present		2010 – 2012
Future		2012 – ...

Definition period (Güzer & Caner, 2014)

This period, most of the articles focus on defining blended learning.

The most cited article on blended learning is that of Garrison and Kanuka (2004) that stated: "Blended learning is the thoughtful integration of classroom face-to-face learning experiences with online learning experiences."

One of the most cited articles is written by Osguthorpe and Graham, they define blended learning as follow: "Blended learning combines face-to-face with distance delivery systems, but it's more than showing a page from a website on the classroom screen. Those who use blended learning environments are trying to maximize the benefits of both face-to-face and online methods."

Popularity period (Güzer & Caner, 2014)

The last period in 'Past period' is called Popularity period, the increasing trend of blended learning continued within this period. Two main points have got attention by scholars: the perceptions of participants on blended learning and the effectiveness of blended learning.

Present (Güzer & Caner, 2014)

The seven most frequently cited articles give us an idea of the latest trends in the field of blended learning. Some of the most notable trends are the following:

- Miyazoe and Anderson (2010) taught us that wikis are preferred as the favourite among forums and blogs by students, who have positive feelings on blended learning. They reported blended learning as novel, easy and fun.
- Blended learning reduces dropout rates and raised exam pass rates (Lopez-Perez, Perez-Lopez & Rodriguez-Ariza, 2011). The results indicated that blended learning with vocabulary assessment system improved both the vocabulary acquisition and exam performance of students. However, only thirty percent of the students wanted to use the system outside the class. The reason of that is predicted as students' heavy workload (Jia, Chen, Ding & Ruan, 2012).
- Blended learning could improve participants' professional knowledge and personal teaching efficacy related to creativity instruction (Yeh, Y. C., Huang & Yeh, Y. L., 2011).

Future

There is need for more studies about the topic of blended learning, in order to guide teachers or administrators in how to create a successful blend. New upcoming technologies like tablets, smart phones and touch screen devices need a lot of attention, they definitely will be the next interests in blended learning courses and studies (Güzer & Caner, 2014).

Although new technologies are coming up the key question will remain the same: "How should we organize such learning environments in order to support learning effectively?" (Güzer & Caner, 2014)

LEARNING EFFECTIVENESS

'The active ingredient in learning is the pedagogy rather than the medium.' (Clark, 1983) Whatever the medium used, the didactical methods teachers use, make the difference. Researches don't agree about the effects of blended learning. Larson and Sung (2009) compared a course given in face-to-face mode, blended mode and fully online and found no significant differences in learning effectiveness. Other authors state that the medium can have an impact. In a meta-analysis made by Sitzmann, Kraiger, Stewart and Wisher (2006) and the research of Dziuban, Hartman, Moskal, Sorg and Truman (2004), the blended condition outperformed the online and face-to-face condition. Blended learning appeared to be more effective than classroom instruction and online learning for the teaching of declarative and procedural knowledge (Sitzmann et al., 2006). The causes for those differences are not always clear. Students seem to take advantage of the combination of online studying of theory and the face-to-face contact with the teacher (Means, Toyama, Murphy, Bakia, & Jones, 2009). Increased learner time on task can play a role too (Sitzmann et al., 2006; Means et al., 2009). We need more research to know exactly which factors of the blended designs make the difference. (Graham & Moore, 2013)

SATISFACTION OF LEARNERS AND FACULTY

Next to the learning results and other conveniences of blended learning, satisfaction of learners and faculty is a very important factor.

Owston, York and Murtha (2013) found a very strong correlation between outcomes and perceptions about blended learning. High achievers were more satisfied with the blended course than low achievers. They would immediately start a blended course again and enjoy it more than a purely online or purely face to face course. They had the impression that they had a better grasp of the core concepts of the course than in traditional courses in the past.

Different authors tried to identify the factors or elements that lead to student satisfaction. Ausburn (2004) identified which course design elements are most valued by adult learners. Important elements are course design with options, space for personalization, self-direction, variety and a learning community. To establish that community, two-way communication with their classmates and instructor was an important factor. Of course, there were many differences between the learners. The question is for whom which technique is most effective. Customizing learning is the future.
Rothmund (2008) found a correlation between learner interaction and satisfaction. To increase the student satisfaction, methods for high instructor-student interactivity have to be provided. Akyol, Garrison and Ozden (2009) found that students valued social presence and teaching presence in their blended learning experiences.
Not every person is satisfied with the same elements or wants to enrol in a blended course for the same reasons. Learner characteristics play an important role in BL. f.e. older students can be satisfied with BL because it is more flexible, convenient,... (Moskal, Dziuban, & Hartman, 2012).
"Many leaners value the richness of interactions in a F2F-environment and the flexibility, convenience and reduced opportunity costs associated with online learning." (Graham & Moore, 2013, p. 18) But more than the medium, the pedagogical possibilities are important.

To have a sustainable implementation of a new way of working, the satisfaction of the faculty is very important too. Dziuban et al. (2004) researched whether teachers want to teach again a blended or online course. They discovered that more teachers are satisfied with teaching a blended course and want to do it again than teaching online courses. The faculty satisfaction depends on student-related factors, instructor-related factors and institution related factors. Student-related factors appeared to be the most important, which is a sign of student-centeredness. The most important student-related factors are accessibility of the courses, active involvement, participation and communication. Instructor-related factors such as having access to reliable technology and having the skills to be creative in the courses have been reported by the teachers as well. Institution-related factors have a smaller impact, but workload still seemed to be an important factor for the teachers. (Bolliger, & Wasilik, 2009). The face-to-face part seems important for teachers as they partly build their satisfaction on the contacts with the students. Workload can potentially endanger the satisfaction of the faculty, sufficient support is crucial. (Graham & Moore, 2013)

BENEFITS AND CHALLENGES

Before a teacher (or a whole institution) decides to blend one or more courses, it is important that he is aware of the benefits and the challenges that come with blended learning. That way, he can prepare himself for the challenges and take measures to cope with them, and design the course to get the maximal benefit of it.

Blended learning wants to combine the best of two worlds: at one part, the advantages of working online, and the personal contact and opportunities of working face-to-face.

Blended learning has advantages and challenges for students and for faculty.

BENEFITS AND CHALLENGES FOR STUDENTS

The major benefits for students of working with a blended course are:

- **Time and place flexibility:** Students can work on the courses whenever they want, from the place they want (at home, in a computer lab, on the road with their mobile devices,...), teachers can develop the courses whenever and from where they want (Dziuban, Moskal, & Hartman, 2005).
- **Better learning results:** Several studies pointed out that students in the blended condition outperform other students in the face-to-face or online condition (Dziuban et al., 2005). Teachers reported that students do work of higher quality: the papers are better, the discussions go deeper, and the students get higher grades on exams,... (Garnham & Kaleta, 2002)
- **Less displacement**: Students don't need to displace so much because a part of the face-to-face sessions are replaced by online activities (Garnham & Kaleta, 2002)
- **More independence and self-directed learning:** Students develop project and time management skills, they are more responsible for their own learning (Garrison & Anderson, 2003)
- **Differentiation:** Blended learning provides students with possibilities to adapt their own learning path (the pace, the deepness). In a blended environment, teachers can provide students with supplementary deepening and broadening information. Students can easily extend their knowledge. Blended environments are a good way to cope with differences in prior knowledge of the students. (Garrison & Anderson, 2003)

- **Students learn to learn:** In our present society, it is not enough that students learn content, they need the skills to cope with the explosion of information: critical thinking and management of their own learning. Blended learning environments can provide them with the necessary opportunities to practice those skills. (Garrison & Anderson, 2003)
- **Create communities of learning:** Through several communication tools, students get the opportunity to share knowledge and build their own meanings. (Garrison & Anderson, 2003)
- **learn new technical skills** (Dziuban et al., 2005)
- **More authentic learning environments**: Oliver states that it is easier to insert up to date and authentic materials in a blended course, such as topics of the news. This leads to more meaningful learning (as cited in Graham, 2003).
- **Transfer details about tacit and explicit knowledge** (Garcia, Garcia-Alvarez, & Moreno, 2014)
- **Less direct instruction** (Garcia et al., 2014)
- **Increased motivation** (Garcia et al., 2014)

Next to the benefits, teachers have to keep in mind the challenges that come with working in a blended way:

- **time management:** for some students, planning their own learning is difficult as they are used to be passive learners and being told what to do on what moment (Vaughan, 2007)
- **take responsibility for own learning:** students have problems with switching to a role as active learner, they need support in the transition from passive to more active learner (Vaughan, 2007; Dziuban et al., 2005)
- **use sophisticated technologies:** however most of the students are almost digital natives and used to work with computers and the internet, some of them can encounter technical problems (Vaughan, 2007)
- **False expectations:** some students wrongly think that blended courses are less work because they have fewer classes, but are negatively surprised when they find out that they have a lot of work at home. Some of them perceive blended courses as more work, because they have to be more active online than they are used to be in class. (Aycock, Garnham, & Kaleta, 2002)

BENEFITS AND CHALLENGES FOR FACULTY

The main benefits of 'going blended' for faculty are:

- **More and better interaction:** In blended courses, students and teachers have more and different ways to communicate through online discussion forums, chat, e-mail,... They have new ways to engage in communities. Blended learning enhances the opportunities for teacher-student interaction, give teachers the opportunity to get to know students better, and can improve the quality of the interaction. The discussions go deeper and the quality of the face-to-face discussions improves. (Dziuban & Moskal, 2001)
- **students are more engaged with their own learning process** (Vaughan, 2007)
- **More flexibility in the teaching and learning environment:** Teachers can use new learning activities and have more freedom to find solutions for problems. Through blended environments teachers can reach more easily their objectives. (Aycock, Garnham, & Kaleta, 2002)

- **opportunities for continuous improvement** (Vaughan, 2007)
- **Fewer dropouts:** Dziuban et al. (2005) demonstrated that the student dropout in blended courses is lower than in fully online courses due to the face-to-face support. Twigg (2003) described that the dropout-failure-withdrawal rate is lower than in traditional classes.
- **Access to learners:** With a blended course, faculties can reach students that are otherwise difficult to reach: students with disabilities, students who work, students that combine different courses that organize classes at the same time,... (Graham & Moore, 2013)
- **More time for students with special needs** (Garcia et al., 2014)

Faculties can also be confronted with some challenges when 'going blended':

- **Lack of time:** The development and the weekly administration in a blended course take more time. Teachers need support and resources to redesign their courses. (Dziuban et al., 2005)
- **Acquire new teaching skills**: Blended learning is more than just adding technology to the courses, to blend a course successfully, teachers have to rethink their teaching and adapt their teaching methods. They will need to be trained in new skills. (Vaughan, 2007)

MODELS OF BLENDED LEARNING

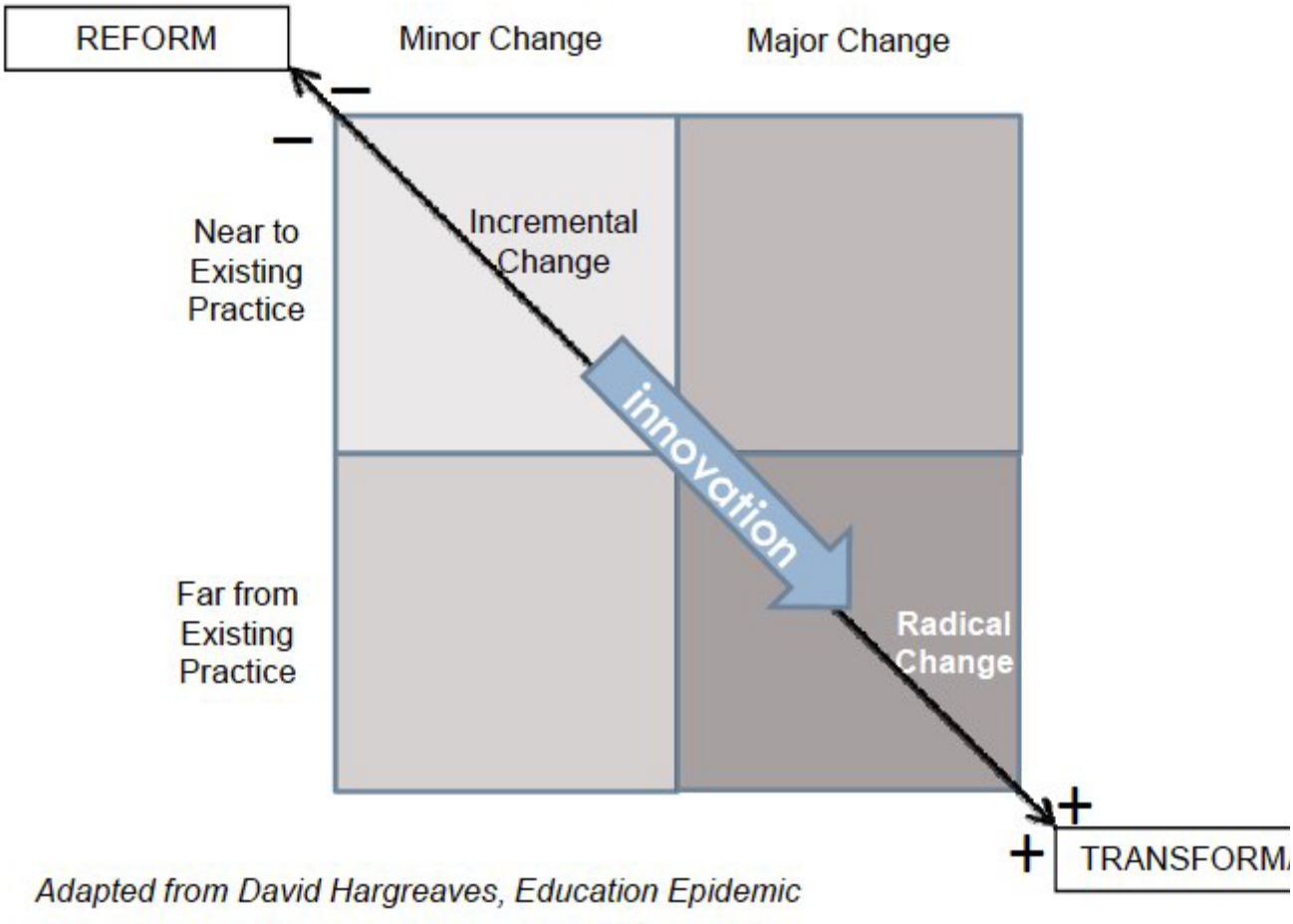
As blended learning is a very ill-defined concept, there is a very big diversity in the models employed. Models vary from almost totally online to face-to-face courses that are only slightly web-enhanced. Watson, Gemin, Ryan and Wicks (2000) identified seven dimensions that define where the course is placed on the continuum from face-to-face to online: the level of online instruction (unit/lesson, single course, entire curriculum), the time (fixed schedule, modified schedule, open entry/open exit), the role of online components (enhance traditional instruction/ transform traditional instruction), the teacher role (leads instruction, supports instruction, not involved), the student role (teacher-driven learning, teacher-guided learning, independent learning), the student support (little or none, school-based mentoring, school and home mentoring) and the student to teacher ratio (traditional ratio, 2-3 times traditional classroom ratio, instructional helpdesk model).

Blended learning systems can be divided in three categories depending on their goal (Graham, 2003). Enabling blends are focused on issues of access and convenience. They want to give students in face-to-face, blended and online environments an equivalent learning experience. Enhancing blends are meant to improve teaching by adding some online elements, but they do not really change the pedagogy. Transformative blends do not only add technology, but radically change the pedagogy. The students become more independent, active learners. The technology makes a new pedagogy possible.

Blending occurs at many different levels. Graham (2003) distinguishes four different levels:

- activity level: a learning activity contains face-to-face and online elements f.e. by using technologies in the class to make learning activities more authentic, by using mixed reality technology
- course level: a course consists of face-to-face and online learning activities
- program level: some courses of a curriculum are face-to-face, others are fully online
- institutional level

Hargreaves (2003) described a model that visualises in which extent a course is being blended incrementally of radically.



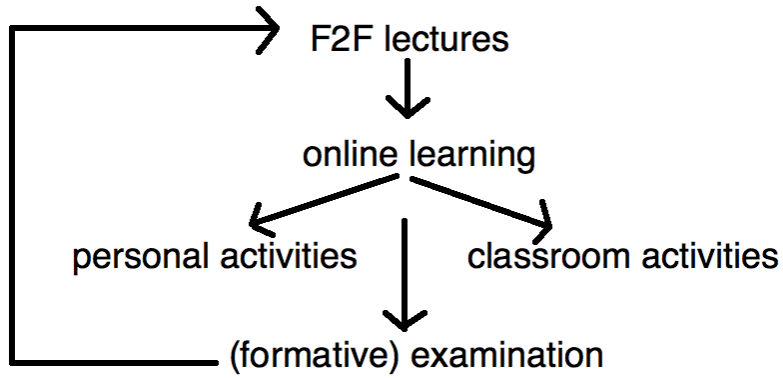
Adapted from David Hargreaves, Education Epidemic

Different authors made a distinction of different models of blended learning based on the continuum from face-to-face to online learning. We made a table with an overview of some of those classifications. (insert table).

To illustrate this theoretical models, I'll discuss one example of a blended course model. Köse (2010) worked out a model of blended learning for mathematics education. We can place it in the category of blending at course level. We can call the course an M course: a blended course with reduced seat time (Dziuban et al., 2004) or an E-focused course (Jones, 2006). A significant part of the face-to-face part is replaced by online activities in order transform the education. (Graham, 2003). The course consisted of different components, as shown in the scheme:

- face-to-face activities:
    - the teacher discusses about important parts of the given course subjects
    - the teacher introduces the objectives of the course
    - socialization process
    - opportunity to discuss about more difficult parts of the course
- online activities:
    - individual activities:

        - blogs: students use blogs as personal diaries or platforms to share knowledge, reflect and debate, the teacher shares information about the course and the assessment on his own blog
        - podcasts: the teacher uses podcast service to share video or voice records about the given course subjects (available on teachers' blog)
        - video sharing service: students can make comments about the added videos and rate them
        - Facebook/social networking: used to support socialization process (optionally)
    - group activities
        - wikis to share ideas, reflect on each other,...
        - video conferencing: the teacher communicates with the students and controls their learning processes



THE FLIPPED CLASSROOM

1. WHAT IS THE FLIPPED CLASSROOM?

The flipped classroom is a model for blended learning in which the activities that normally take place in class, like lectures now take place outside the class and vice versa. (Lage, Platt, & Treglia as cited in Bischop & Verleger, 2013)
The method consists of two parts (Bischop & Verleger, 2013): students first process the content themselves at home, through looking to video lectures or by doing other activities such as solving closed-ended problems or quizzes. These learning activities are quite behaviouristic. During the class meeting, there is more time for active, group-based problem solving, discussion,... which leads to deep learning. These learning activities are based on constructivism.

2. WHY CHOOSE FOR THE FLIPPED CLASSROOM? WHAT ARE THE ADVANTAGES?

By letting students look to video lectures and process the information before the class meetings, the in-class time can be used better to work on problem solving. There is more space for interaction. This approach leans towards the theory of student-centred learning.
The flipped classroom approach appears to be effective: students like the interactive nature of the class meetings (Toto & Nguyen, 2009) and the videos work well to transfer the knowledge: they are effective to explore new knowledge (Toto & Nguyen, 2009) and outperform reading texts about the same topic. (Falconer, Nicodemus, DeGrazia, & Medlin, 2012). Day and Foley (2006) measured the impact on learning results and found students in

the flipped classroom had better learning results than the students in other conditions. However, we need to be careful with the generalization of these results.

3. ROLE OF THE TEACHER

The teacher needs to think well about the design of the course. He needs to redesign his class time. Interaction and active learning are crucial elements. He also needs to think well about the video lectures or screencasts. Short videos are better than long ones. If the video is too long, it is better to split it up. Videos can be recordings of lectures, screencasts of the solution of problems or exam reviews, explanations of difficult concepts,... (Falconer et al., 2012)

CONDITIONS TO IMPLEMENT BLENDED LEARNING

An increasingly amount of institutions of higher education adopt blended learning in their education. However, little of the current research on blended learning pays attention to the institutional embedding and possible problems that are involved with this issue (Porter, Graham, Spring and Welch, 2014).

ADOPTION OF BLENDED LEARNING: A MODEL IN THREE PHASES

Following the model of Graham, Woodfield and Harrison of 2012, the adoption of blended learning can be divided in three phases at the institutional level:
(1) awareness/exploration,
(2) adoption/early implementation and
(3) mature implementation/growth.
As Porter et al. (2014) stated, in the first stage, they are aware of the existence and the possibilities of blended learning, but there is limited support for individual faculty exploring and to use the specific techniques in classroom settings.
The second phase is adoption and early implementation, which means that blended learning is accepted and that there is a policy and practices that support the implementation.
Last but not least, there is the stage of mature implementation and growth. In this case, there are already established strategies for blended learning, structure and support that are fully dedicated to the university activities (Porter et al., 2014).

WHAT ARE THE CONDITIONS FOR THE SUCCESFULL ADOPTION OF BLENDED LEARNING?

The study of Porter et al. (2014) examines institutions of higher education in the United States, who are transitioning between the first, awareness/exploration, and the second phase, adoption/early implementation. By focusing on these stages, Porter et al. (2014) want to achieve the following research objectives:

- Identify institutional strategy, structure, and support markers that would allow administrators to determine their progress in transitioning from awareness and exploration of BL to adoption and early implementation.
- Identify and provide details about issues administrators should address in order to successfully facilitate their institution's transition from awareness and exploration of BL to adoption and early implementation.

Graham, Allen, and Ure (2005, as cited in Porter et al., 2014) cited three general purposes for the adoption of blended learning: (1) enhanced pedagogy, (2) increased access and flexibility,

and (3) improved cost-effectiveness and resource use.

1. PIONEERS
   The recommendations of the eleven university settings make clear that there is a need for pioneers in the field of blended learning at the different institutional levels. That way, a shared vision can be created, the necessary resources are obtained and potential adopters are attracted.

2. INFRASTRUCTURE
   There is also a need for infrastructure that lends itself to the use of technology and thus blended learning.

3. TECHNICAL AND PEDAGOGICAL SUPPORT
   There is also a need for technical and pedagogical training to bring the best of two worlds together: the necessary elements of face to face learning and the innovative and good elements of online learning.
   Not only teachers need such technical and pedagogical support, but also students who need these skills to function optimally in a blended learning classroom.

4. CLEAR PEDAGOGICAL VISION
   Similar to the finding of Graham et al. (2005, as cited in Porter et al., 2014), Garrison and Anderson (2003) state that we must rethink our pedagogy, in order to exploit the potential of e-learning. Technology is more than a medium to view contents. There are no significant differences in effectiveness between traditional and technological media as they are used in the same way. We need to look at the strengths and weaknesses of the communication technology and implement them in a way that student allow to come to deep and meaningful learning. In addition, via blended learning, the learner has control over his own learning process. The teacher should translate the principles and guidelines of the learning process to the needs of this unique context. We must think about what blended or e-learning can offer, compared to what we could or could not do before (Garrison & Anderson, 2003).

5. STRONG LEADERSHIP AND CLEAR POLICY
   Garrison and Kanuka (2004) stated that it is inevitable that campuses of higher education will have an impact on the implementation of blended learning. Once there is a strong leadership and a clear policy, a rapid evolution may occur. In a few years, higher education can undergo a transformation that is consistent with their values and the advantages may outweigh the disadvantages.

6. EVALUATION
   Furthermore, it is important to evaluate the effectiveness of blended learning and to compare this with previous results during traditional teaching. We must pay attention to both the learning outcomes and the learning process (Garrison & Kanuka, 2004).

7. STRONG LEARNING ENVIRONMENT
   A prerequisite for optimal results, is an appropriate learning environment. This is challenging for teachers with the constant emergence of new technologies. Teachers don't only need expertise about the content, but also about the pedagogical aspect. In that way, students get responsibility for their own learning, which is a crucial step in

the realization of successful educational outcomes (Garrison & Anderson, 2003).

8. ASSESSMENT
   It is important that assessment is not only a responsibility of the teacher, but also of the learners. Otherwise you create situations where you expect students to take responsibility during the process, without having any involvement in the outcomes.

TEACHING PRINCIPLES TO PROMOTE DEEP LEARNING

Further, there are some important teaching principles according to Garrison and Anderson (2003)

- Negotiable expectations, clearly expressed, encourage deep approaches to learning
- Coherent knowledge structures facilitate purposeful and integrative learning
- Control creates commitment and encourages personal responsibility to monitor and manage meaningful approaches to learning
- Choice in content and process is a catalyst for spontaneous and creative learning experiences and outcomes while recognizing and valuing intuition and insight
- Critical discourse confirms understanding and diagnoses misconceptions
- Critical thinking must be modelled and rewarded
- Assessment must be congruent with expected learning outcomes
- Learning is confirmed through assessment

TOOLS FOR BLENDED LEARNING

DISCUSSION FORUMS

1. WHAT IS A DISCUSSION FORUM?

A discussion forum is an asynchronous communication tool. It can be embedded in a course management system. Teachers and students can start discussions by posting a question, a quote,... Other students or teachers can react. A discussion forum is a purely written medium without any pictures or sound. The messages are stored and can be reread at any time. Discussion forums can be open to the whole class group or only for a selected part of the students, for example for group work.

2. WHAT ARE THE ADVANTAGES ?

Working with a discussion forum for the online communication has some important advantages. Because the communication is asynchronous, students can contribute whenever they want. Harasim (as cited in Zhu, 2006) reported that discussion forums are especially good for shy students who don't dare to discuss in class, but are very active online. Students have more time to think about their questions than in class and can make more meaningful reflections. (Schweizer, Paechter, & Weidenmann, 2003) Compared with face-to-face communication or methods such as videoconferencing, discussion forums have the advantage that you can store the messages and read them again afterwards. Teachers can easily monitor the discussions and use the insights or the problems discussed afterwards in class. That way, the quality of the class discussions can be improved. (Akyüz & Samsa, 2009). Discussion forums are a good medium to practice and improve the critical thinking skills of students. By training their communication skills and providing them with sufficient support (structure,

good thought-provoking questions...), the level of the discussions can improve. (Macknight, 2000)

3. WHAT ARE THE CHALLENGES?

Schweizer et al. (2003) discussed some disadvantages of working with discussion forums. Students don't have any auditory or pictorial context cues. Because of the asynchronicity the feedback is delayed, while in face-to-face conditions, they can immediately reply and rapidly build chains of associated ideas (Mickulecky as cited in Graham, 2003).Students need to do a lot of effort to log in several times. They don't know how many times or when their peers will take part. This can lead to a low level of cooperation. (Schweizer et al., 2003)
Teachers can partly solve these problems by making good agreements about how much, and when to participate.

4. ROLE OF THE TEACHER

The role of the teacher in discussion forums is crucial. Just providing a communication tool does not guarantee any quality of discussion. Teachers can have a considerable effect on the quantity and quality of the participation of the students by selecting the interaction type they will try to set up (Zhu, 2006), deciding on which level they will participate (Mazzolini & Maddison, 2007) and selecting which questions they will ask (Bradley, Thom, Hayes, & Hay, 2008).

Zhu (2006) distinguished two types of interaction in his research on online discussion forums. At one side, he described the star interaction type, in which one person has a central role and is connected with everyone. He sets the agenda. There is low network density. This type of interaction is suitable for giving information to students or for students to ask questions to the teacher. The students are quite passive 'receivers' of information. At the other side, he identified the interconnected web interaction type. There are multiple points of centrality. Students exchange, elaborate on and challenge each other. They receive information and construct new information. They are active learners. This type of interaction suits well for environments that require collaboration and knowledge construction. There is not one type of interaction that is better than the other. Both types are useful in different stages of the learning process. The teacher has to select which type is most suitable for the goals he wants to reach, while he keeps in mind which prior knowledge, skills and experience the students have with this type of communication. By adapting his role, presence, expectations and questions, the teacher can influence the type of interaction.

Mazzolini and Maddison (2007) described how the presence of the teacher can have an influence on the interaction of the students. First of all, they state that the amount and lengths of the posts are not good predictors of the health of the discussion forum. A lot of people tend to say that a discussion with a lot of long contributions of the students is the best, but this is not always the case. They found out that when teachers contribute a lot by asking questions or answering questions, students tend to post less, but they highly appreciate the contributions of the teacher. When teachers only contribute a few times, students do more contributions, discuss more, but appreciate less the teacher and are not always sure about the correctness of the contributions of their fellow students. Teachers have to find a balance between contributing too much and stifle the discussions and contributing too little and let errors occur. They need to lead the discussions in the right direction. One method to do this without giving too many cues, is the Socratic approach, described by Macknight (2000). Instead of answering

questions, teachers ask follow-up questions that help students to get a deeper level of understanding.

The questions teachers ask have a considerable effect on the amount, length and thinking level of the answers. Bradley et al. (2008) describe that limited focal and direct link questions generate the most words, while application and course link questions generate fewer words. Direct link, brainstorm and course link questions stimulate higher thinking. Macknight (2000) proposes a model in which the teacher starts with a focal question that provokes thinking, and in which he reacts on the answers of the students with faculty raising questions that provoke clarification, elaboration and higher thinking.

Eventually, the teacher should explain very well to the students what is the purpose of the forum, which role the students and the teacher have, when they are expected to post and which rules for the communication apply.

CHATROOMS

1. WHAT ARE CHATROOMS?

Chatrooms are tools for synchronous communication. People can communicate through written text and emoticons and immediately react on each other. Generally, you can see it when someone else is writing. Chatrooms can be anonymous or can require a log in.

2. WHAT ARE THE ADVANTAGES ?

Chatrooms are a quick way to communicate. You get immediately feedback about what you say. You can enrol with a whole group of people in a chat. The messages are stored, so you can reread them afterwards. They are a good tool when you want to create a chain of associations, such as in a brainstorm.

3. WHAT ARE THE CHALLENGES?

It is difficult to structure a chat session. As everybody can write at the same time and there is no non-verbal communication, so there is no context, it can be difficult to maintain a logical sequence. (Schweizer et al., 2003)

4. ROLE OF THE TEACHER

The teacher needs to provide structure in the chats by teaching the students how to link the different contributions or by doing it himself and by developing strategies to structure the chat: someone leads the chat and decides who can talk at which moment, someone summarizes the most important contributions,... (Schweizer et al., 2003)

PODCASTS AND VODCASTS

1. WHAT ARE PODCASTS AND VODCASTS?

As with all tools, there are many descriptions of what podcasts actually are. Evans (2008) describe podcasts as downloading a series of audio or video, that can be viewed or listened over a period of time, when the student has the time for it.
Lazzari (2009) defines podcasts as "a method for distributing any digital media file, or series of files, over the Internet for playback on portable media players, such as iPods, and personal computers".

2. WHAT ARE THE ADVANTAGES?

Students are very used to work with audio and media files and laptops and other devices, so pod- and vodcasts could be a good way to reach students (Evans, 2008).
Although, according to Lazzari (2009) there is no unanimity about the benefits and potential of podcasts, some studies report on the positive influences of pod- and video casts.
Evans (2008) investigated the perceptions of students who use podcasts in higher education. The results show that students find the flexibility very valuable. A quarter of the students reported listening the podcast while travelling, indicating that it allows you to schedule your learning activities more than with traditional education.
Students have indicated that listening to podcasts is a quicker way to revise than their own notes. Secondly, podcasts prove to be more effective revision tools than textbooks, but not than their own notes. Students are also more receptive to podcasts than for reading or re-reading a textbook.
According to Lonn and Teasley (2009) most students use podcasts for reviewing the course material before an exam, mostly on their desktop or laptop. Perhaps surprising is the fact that students don't skip classes as a result of the available recordings.

3. WHAT IS THE ROLE OF THE TEACHER?

Both teachers and students agree on the fact that podcasts help students learn, but the use of the podcasts doesn't necessarily improve the instructor's teaching. The teaching of most instructors doesn't change because of the podcasts, they just record their classes (Evans, 2008).

WIKIS

1. WHAT IS A WIKI?

The best-known wiki is probably Wikipedia, but there are much more wikis on the public web. A wiki is a web application that allows people to work out a product (in small groups) and thereby add text, change or delete it.
It differs from a blog in the respect that it has no defined owner or leader and the structure depend on the participants.
We can distinguish six core functions of wiki software (De Wever, Van Keer, Schellens & Valcke, 2011):

- Editing, which clearly is the ultimate typical feature of a wiki
- Links, the possibility to form a network
- These first two functions are indispensable for the joint knowledge construction.

- History, with this function it is possible to turn back to previous versions of a page and to see the differences between two versions
- Recent changes gives to student or the teacher an overview of recent changes
- These are important for the collaborative process.
- Sandbox, a place where students can try out the system, without spamming a regular page
- Search function, which speaks for itself

These last two functions make it possible that students (and their instructors) can follow the process of the (knowledge) construction of the wiki.

2. WHAT ARE THE ADVANTAGES?

Sometimes the question arises how wikis can be optimally employed in education. Therefore, we must first look at what the possibilities of such a wiki actually are. Elgort, Smith and Toland (2008) believe that "wikis seem the ultimate solutions for learning situations in which students are required to work and write together, sharing and constructing knowledge". De Wever (2011) adds that one of the main characteristics of a wiki is that every user who accesses the wiki is able to edit it in a rather straightforward way. According to Merril (1991, as cited in De Wever et al., 2011), the integration of a wiki in higher education fits perfectly with the social constructivist ideas. They see learning as an active, situated and collaborative process of constructing knowledge, where meaning is negotiated from multiple perspectives. Parker noted in 2004 that wikis are an important tool of the Web 2.0 generation. These are called social software, because it gives users the opportunity to offer an online content to the general public. On top of that, wikis are very easy to use and are interesting for educational purposes because they involve learners in their own construction of knowledge.

3. WHAT ARE THE CHALLENGES?

Using wikis in education can cause some problems. Wikis have functionalities that are not suitable for use in the classroom: all content is modifiable by any user, all content is public, simultaneous edits are allowed but not successful, and the wiki is forever evolving. To cope with these problems, the authors created a wiki with extensions: with pages that are blocked, the possibility to take a snapshot at the end of the course, user login,... (De Wever et al., 2011)

4. WHAT IS THE ROLE OF THE TEACHER?

In a wiki, we distinguish two levels of users: normal users and administrators. Normal users on one hand can add, edit, move or rename pages or upload files and so on. Administrators on the other have more options. They can protect pages from editing, deleting or retrieving information and editing protected pages, banning users from the wiki and so on (Lund & Smordal, 2006).

Unlike a Learning Management System, where teachers have the explicit role of organizer and facilitator of the learning activities, the distribution of learning materials and where they are responsible for the evaluation, wikis propose different demands on the teacher. Lund and Smordal (2006) gave some examples of some useful tools for the teacher within a wiki:

- Discussion page: a place for the teacher to participate in the online activity and which can be used as a space to facilitate the discussions on the topics of the assignments by asking questions, provoking learners' opinions, suggesting sources of information, etc.
- History page: a place for the teachers to get information about the learning process of the students by observing who's active, how many students are active and when, the rate of new topics compared to the improvement of existing topics, etc.

- Special pages: they give a lot of information to the teacher about new topics or wanted topics, aid to navigation by giving a list of categories or maintenance needs of the students.

LEARNING PATH

1. WHAT IS A LEARNING PATH?

A learning path or a computer-supported learning package is a sequential range of learning activities that work towards a fixed goal. The students take all the steps in the learning path in order to reach that goal. They can do it at their own pace, can interrupt it and start again where they stopped, can look again to previous steps,... (Demets, 2011) The teacher can see how long it took to the students to complete the path. Learning paths can be made with open source software such as eXe-learning and embedded into the course management system. Learning activities can be reading a text, looking to a little movie, do an exercise, doing online quizzes …

2. WHAT ARE THE ADVANTAGES?

Learning path can offer many opportunities for learning and have many advantages compared to face-to-face learning. Learning paths are always accessible (Chau, 2007). Students can do it in their own time; at their own pace, there are multiple opportunities for assessment and remediation. They are more responsible for their own learning. The teacher becomes a coach. Students like to work with learning paths. They see it as a valuable learning tool. (Van Petegem & Imbrecht, 2004) Working with learning paths can enhance their problem solving skills. When a learning path is well constructed, it can lead to better learning results. (Devitt & Palmer, 1998) Chau (2007) also emphasized the power for differentiation of learning paths: not only for the pace, but teachers can embed extra exercises, links with more explanation, more advanced knowledge. Learning paths are an ideal tool when the group of students is diverse and has different prior knowledge or pace of learning. (Van Petegem & Imbrecht, 2004)

3. WHAT ARE THE CHALLENGES?

The main disadvantage of working with learning paths is that it is a lot of work to make them. (Demets, 2011) That's why teachers should start small, with small parts of the course. Next to that students tend to go very quickly through the learning path without really absorbing the information. Learning paths are not a reason to adopt the 'one fits all approach'. Teachers should think about how they can differentiate.

4. WHAT IS THE ROLE OF THE TEACHER?

The teacher should start small, with small parts of the course. To avoid that students go very quickly through the learning path, teachers should install sufficient anchor points such as thinking or writing exercises that make students slow down at important parts of the course. The teacher should build in differentiation by providing extra exercises, links, extra documentation,… He has to assure that the learning path is very clear to use on itself, without any help.

ONLINE FORMATIVE ASSESSMENT

According to Williams and Howell (2005), online assessment is suitable for the evaluation of more constructivist courses. As we want to promote more deep learning, and the construction of knowledge, we have to adapt our ways of evaluation. Paper and pencil tests are not enough, we need an alignment and interaction between curriculum, assessment and instruction (Newmann, 1995). As a result, we need assessment that can show how students acquire deep understanding, how they engage in elaborated communication, how they document their own learning... Feedback is a crucial element for students learning. It has to be concurrent and continuous and needs to be a bridge to other learning opportunities (Williams & Howell, 2005).

CONDITIONS OF AN INNOVATIVE WAY OF ASSESSING

Gikandi, Morrow and Davis (2011) made a literature review about online formative assessment in higher education.
They stated that online formative assessment is influenced by different approaches that may have an impact and in that way could improve the learning experiences and outcomes.
Three fundamental aspects of assessment in the online context are validity, reliability and dishonesty (Gikandi et al., 2011).
Validity in the context of online assessment includes guaranteeing some meaningful assessment activities that promotes contextual, experiential learning and encourage multidimensional perspectives.
Gikandi et al. (2011) also emphasized that validity is also related to the effectiveness of formative feedback regarding the adequacy, immediacy, encouraging meaningful interactions and provides adequate support for the learners.
Reliability relates to sufficient opportunities for multiple sources of evidence of learning.
The issue of dishonesty in online formative assessment, which relates to students really owning their work, depends on the validity and reliability. So, improving the reliability and validity can minimize dishonesty (Gikandi et al., 2011).
Conditions of an innovative, pedagogical strategy of evaluation/assessment (Gikandi et al., 2011):

- Formative and immediate feedback

According to Wolsey (2008, as cited in Gikandi et al., 2011) supporting formative feedback in an online context, helps students to identify their strengths and weaknesses. In addition, it helps students to review their work and it ensures continuous improvement of their understanding by renewing, constructive feedback.
Crisp and Ward (2008) take it for granted that formative feedback enhances the commitment of the student, the motivation to learn and the increased acquisition (of knowledge).

Based on the findings of Sorensen and Takle (2005) and Vonderwell, Liang and Alderman (2007), formative assessment within online courses promotes a sense of interactivity and collaboration between the participants in the learning community.

- Engagement with critical learning processes

Online formative assessment can involve students in meaningful learning experiences by creating learning environments that support the active involvement of students. Engagement is needed to achieve meaningful learning.

- Promoting equitable education

Online formative assessment can respond to the diversity of students and the different needs they encounter. Moreover, it anticipates to different learning styles and capabilities.

Williams and Howell (2005) designed four elements to take into account when designing assessment:

- The social construction of knowledge: The assessment needs to consist of a variety of tasks; we must go beyond mere facts, and striving for the zone of proximal development.

Students have to work together to organize, synthesize, interpret and evaluate complex information. Further, they need to consider alternative solutions, strategies and perspectives. Therefore, we can use online tools such as graphic organizers, share work on website, have online discussions, getting feedback from peers and faculty and so on.

- Promote deep understanding: We need robust learning that can be transfered to new situations (Newmann, 1995), and that goes beyond school. We need a long-term process of evaluation, more than one quiz at one moment, one exercise or essay.
- Learning with value and meaning beyond school
- Scaffolding

ADVANTAGES OF FORMATIVE ASSESSMENT

Riffell and Sibley (2005) see the opportunity to build more formative evaluation as one of the big benefits of online learning. Their research made clear that students who were obligated to make online assignments and quizzes, have to use their textbook before starting to study for the exam. In that way, these students were better prepared to in-class discussions and exercises.

In the last decade, a lot of different forms of assessment are introduced in higher education. New forms, because of the emergence of ICT, have replaced the traditional forms of assessment. Self-tests, quizzes, discussion forums, e-portfolios, wiki's and so on replace pre-post-tests, portfolios and final exams (Garcia, Garcia-Alvarez & Moreno, 2014).

One new form of evaluation is peer assessment. Topping (2003, as cited in De Wever, Van Keer, Schellens & Valcke, 2011) describes peer assessment as "an arrangement for learners and/or workers to consider and specify the level, value or quality of a product or performance of other equal-status learners and/or workers". Based on the findings of Davies (2006, as cited in De Wever et al., 2011), De Wever et al. (2011) agree that assessment in needed to provide information about the progress made by the studens. It is an indicator for both students and teachers. De Wever et al. (2011) admit that the assessment of the collaboration between students during a group task should be asked to the students themselves. They have the best view on their collaboration process. According to a survey at Ghent University, De Wever et al. (2011) could conclude that peer assessment is a reliable tool and can be implemented in online collaboration contexts, for example a wiki.

ICTs play a key role in the acquisition and transmission of information about the different types of knowledge (Garcia et al., 2014).

Considering learning and instruction as very competence-based, using a single assessment method is not sufficient to determine acquired competences. Moreover, it is important to pay attention to both product and process evaluation (Garcia et al., 2014).

EVALUATION OF A BLENDED COURSE

Whenever you adopt a new way of teaching, another didactical method, a new tool, it is necessary to check whether you reach the objectives you had with this innovation, and if it is an added value compared with what you did before. The framework of Badrul Khan (2012) that provides support for planning, developing, delivering, managing and evaluating blended courses emphasizes the importance of both the evaluation of how effective a blended course is as well as the performance of each student separately (Singh, 2003).

When you want to evaluate a course, it is useful to take into account the different elements of the conceptual framework for evaluation of Williams and Howell (2005). The conceptual framework consists of 9 elements and gives an overview of the different steps you need to take when you evaluate:

1. context
2. stakeholders
3. evaluand: what you want to evaluate
4. issues and concerns
5. values and criteria
6. questions
7. data collection and analysis
8. reporting results, conclusions, and recommendations
9. implications

Different factors can be measured in the evaluation. Not only learning effectiveness, but also withdrawal rates, satisfaction, changes in the way of learning, impact on workload, changes in theories about teaching and learning, motivation, attendance rates … (Dziuban & Moskal, 2001; Riffell & Sibley, 2005) Look back to your rationale, the reasons why you adopted the blended way of teaching and deduct which variables you want to examine.

Whether you want to study the impact of the new course on learning effectiveness, satisfaction or other variables, it is crucial to try to maintain some experimental control (Day & Foley, 2006). However we realize it is not easy to control all the variables, certainly when you work with real class groups, you should try to match the experimental and control groups on as many factors as possible to get a valid comparison: the instructor, the covered topics, the lecture slides, the assigned reading, the exams, the criteria for the evaluation and the time on task (Day & Foley, 2006). Depending on the context you work in, these variables can be different.

WHICH TOOLS CAN BE USED FOR THE EVALUATION? WHICH METHOD SHOULD BE ADOPTED?

There is a wide variety of methods and tools for evaluation.

Research of Porter, Graham, Spring and Welch (2014) shows that most of the schools who had implemented blended learning, do not adapt their processes of evaluation to their blended course. They use their existing evaluation method. Only three out of eleven schools indicate to adapt their way of evaluating. The staff of the first school met regularly to discuss their blended courses. Another school evaluates by considering the findings of the teachers while

teaching. The last example determines the strengths of the blended courses by focusing on data of the course management system.

A possible and commonly used method is the use of surveys. Surveys are particularly useful to collect information about the perceptions of students and faculty: whether they liked the way of working, how they perceived the effectiveness of the new teaching method or tools,... Williams and Howell (2005) formulated some guidelines for the use of online surveys. A survey should be as brief as possible. The questions have to be relevant and clear. For each question, you should provide a Likert-scale with 5 options. To enhance the validity and reliability, you should ask stakeholders to help you to define which items can have an impact, f.e. if you want to study the satisfaction. You have to cluster the items and make a selection of them. To be able to compare the perceptions of students throughout the process, it is important to do an entrance survey, a survey in the middle of the course and a survey after the exam. (Day & Foley, 2006).

Statistical analysis to compare the effects of a blended or a face-to-face course can be used as well. Important is to control for the effects of other variables such as learner characteristics, motivation, etc.

Eventually, it is useful to ask teachers and students to give advice to others who want to enrol in blended courses in order to avoid to make the same mistakes and to improve the blended learning and teaching experience. (Dziuban & Moskal, 2001)

COMMUNICATION WITH THE STUDENTS

As blended courses are new to students, clear communication is needed. First of all, teachers need to explain well to students what blended learning means for their course and why they chose for it. Next to that, Tambuyser, Vandeput, & De Gruyter (2011) suggest teachers to make a study guide in which the intended competencies, the learning activities and information about the assessment are explained. Further, they need to make a kind of roadmap per week in which the topics, the learning activities, the tasks and assignments, the support and the face-to-face activities are described in a clear table. This can help students with their time management. Research demonstrated that the time management is one of the challenges for students and that they need support for it (Aycock et al., 2002). Clear schedules and discussions in class time about how to organize their work can help. Eventually, to avoid problems with the use of technology, teachers should make complete instructions of how to use it and schedule some time in the first weeks to train the students on the use of technology (Aycock et al., 2002).

HOW TO BLEND A COURSE?

When you decide, as a teacher, to blend your course, there are several things you need to take into account. Aycock et al. (2002) formulated some important lessons. There is no standard approach to blend a course. Depending on your goals, the context, stakeholders, the characteristics of the students, the blending process will be different and will have different outcomes. An important lesson is ‘start small and keep it simple’. Success experiences are important, once small changes are installed well, you can increment the changes. To realize an effective hybrid course, it is not enough to add technology to an existing course. Technology makes no difference when used in a traditional way. You need to investigate what does not

work well in your existing course and what can be improved with technology. The online and face-to-face components need to be integrated in order to have one course. During the design process, it is important to exchange and discuss with colleagues. That way, you can share ideas and experiences.

When making the transition from traditional learning materials to e-learning materials, there are three possible strategies (Tambuyser et al., 2011):

1. use existing materials and put them online in a pdf
2. adapt and re-develop the existing materials
3. develop new learning materials

The choice of the strategy depends on your goals and your underlying theory about learning.

Several authors described models to develop a blended course. Here are three examples. The model of E-merge is meant to blend an existing course, the models of Moodle and Troha are described to develop a blended course, starting from zero.

E-merge (Van Peursen, van Eijl, Jacobs, de Jong, Oueslati, Philipsen, & Wagenaar, 2007)	Moodle (Tambuyser et al., 2011)	Troha (2002)
1. divide de existing course in components 2. examine where online activities can be useful 3. link online and F2F learning activities to an integrated whole 4. make a blueprint 5. test run 6. implement in the whole course	1. prepare the learning environment in terms of technology and organisation 2. develop activities and content 3. do a pre-test 4. share the activities and content with other users 5. plan the F2F sessions 6. evaluation of the learning results	1. collect background information about the students 2. make a list of the goals 3. which subjects and content will you address 4. link learning activities to the learning content 5. preparation of learning strategies to make the new knowledge stick 6. develop an evaluation strategy 7. collect and categorize the learning material 8. organize all the previous steps in a document 9. identify which steps can be made online 10. inform all the stakeholders and ask their FB and permission 11. ask blended learning providers to help you with the implementation 12. present the finished project to the stakeholders

To summarize, we can say that to blend a course, the teacher has to take the following steps. The order is not that important, but the teacher needs to take all these topics into account.

1. Collect background knowledge about the students: their learning needs, learning styles, problems,...
2. Make a list of the goals you want to reach and the content you will use
3. Divide the content into parts
4. Link learning activities to the different components: examine where online components can be an added value and for which parts it is better to organize F2F meetings. Carefully select the online tools by examining the pros and cons. Make sure you take into account the learner characteristics when choosing the activities.
5. Think about the evaluation
6. Organize all the learning activities in a document with the goals, content, materials, support and evaluation. Make sure it is an integrated whole.
7. Do a pre-test or ask feedback to colleagues and students and revise the parts that don't work.
8. Inform the stakeholders
9. Implement the course

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