A didactical framework for the design of blended learning arrangements

#12

Introduction

Digital media will not substitute traditional approaches to learning and teaching as advocated by some e-learning enthusiasts few years ago. Digital media do not question the existence of teachers or educational institutions as such and they will coexist with traditional approaches of teaching and training. In many cases, computer or internet-based trainings are accompanied by face-to-face (FTF) meetings to ensure the quality of learning and to reduce dropouts. The now widely adopted term "blended learning" refers to all combinations of FTF learning with technology based learning: Traditional education can be enriched with the use of technology and learning with technology can profit from FTF meetings.

The term blended learning, however, is still quite vague and does not provide a conceptual framework. In many cases, blended learning is used simply as a buzz phrase that is so "open" that everyone can agree on it, maybe one of the reasons why it has gained so much attention in the practical field, whereas it has not reached much notice in theoretical discussions so far. The major challenge is how to find the right mix for a blended learning arrangement? Is it an intuitive endeavour that has to accommodate to changing situational demands or can we derive these decisions from a conceptual framework that is based on theoretical considerations? Our paper tries to outline such a framework for the didactical design of blended learning arrangements.

Typical ingredients of blended learning

Driscoll (2002) points out that blended learning can mean different things to different people. It can mean:

- to combine different web-based technologies,
- to combine different pedagogical approaches,
- to combine any form of instructional technology with FTF instructor led training or / and
- to combine instructional technology with actual job tasks in order to improve learning transfer.

Driscoll (2002) sees blended learning primarily as an strategy to help starting e-learning in organisations: "Blended learning allows organizations to gradually move learners from traditional classrooms to e-learning in small steps making change easier to accept." (p. 1)

In a recent online survey,[1] the status of blended learning approaches in training was assessed. More than 85% of the participants of the survey are using a combination of delivery formats or didactical methods. The mostly used "ingredients" of the blend include (in order of relevance):

- classroom instruction
- interactive web-based training
- email based communication
- self-paced content
- threaded discussion
- collaboration software
- virtual classroom
- print-based workbooks
- on-line testing

In most cases, 6 to 10 different components are used. The most important reasons for using such a strategy were:

- more effective than classroom training alone
- high learner value/impact
- effectiveness greater than for non-blended approaches
- learners like it.

[1] www.elearningguild.com, survey conducted between February 10th and March 5th 2003, N = 192

In a broader perspective Valiathan (2002) applies didactical criteria to the categorization of blended learning approaches. She differentiates:

- skill driven learning (combines self-paced learning with instructor support to develop specific knowledge and skills)
- attitude-driven learning (combines various events and delivery media to develop specific behaviours)
- competency-driven learning (combines performance support tools with knowledge management resources and mentoring to develop workspace competencies)

Like others, this model is descriptive in that it illustrates possible options to combine different elements but it does not propose a prescriptive model as to when and how these elements are to be included in a learning arrangement (see also: Bielawski & Metcalfe, 2002; Thorne, 2003).

In our interpretation, blended learning basically refers to (at least) the mix of different:

- didactical methods (expository presentations, discovery learning, cooperative learning …) and
- delivery formats (personal communication, publishing, broadcasting, …)

Decisions about didactical methods and delivery formats are independent which means all didactical methods can be delivered by (almost) any media (cf. Clark & Salomon, 1986): A teacher can make an expository presentation, a taped presentation can be transmitted by air, by wire or via internet. Books or videos cannot only be used for expository approaches but also for exploratory methods as well as for cooperative learning etc.

A conceptual framework for a blended learning arrangement should include guidelines for selecting elements of a blended learning arrangement and for the sequential ordering of these elements.

3C - didactical components of a learning arrangement

The 3C-model of didactical components outlined in the following tries to provide such a framework for specifying parts of a blended learning arrangement and their relative weight. In a second step, the delivery format will be chosen based on these didactical decisions.
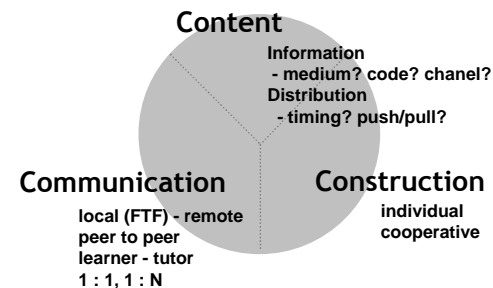

Figure 1: Components of a blended learning arrangement

According to the 3-C model, any learning environment consists of three components:

- a *content* component that makes learning material available to a learner
- a *communication* component that offers interpersonal exchange between learners or learners and tutors and
- a *constructive* component that facilitates and guides individual as well as cooperative learning activities to actively operate on learning tasks (or assignments) with different degrees of complexity (from multiple-choice to projects or problem based learning)

These components can be delivered in various formats: in a FTF scenario, based on exchange media, transmitted as analogue information by air or via cable or as digital packets over the internet in a synchronous or asynchronous setting with text, audiovisual or other multimedia elements.

Learning arrangements differ in the relative weight of the three components. The didactical scheme of a learning arrangement can be described by specifying the amount of time a learner is engaged with activities regarding these three components. There are learning arrangements where learning is based solely on a content component, e.g. a web-based-training that is

managed completely by the computer. In a "virtual seminar", the communication component is the most prominent feature of the learning arrangement. Finally, in problem based and collaborative learning approaches, the learner will devote most of the learning time with the constructive component of a learning environment.

Such "pure" approaches, however, often fail in the field because they are not able to deliver the rich experience that is essential for successful learning. It becomes necessary to combine elements from different components in order to support learners to reach their learning objectives.

It is important to point out that neither "content", nor "communication" or "construction" are always necessary elements in all blended learning arrangements. Furthermore, the preference for a certain philosophy of learning and teaching (e.g. a constructivist approach or learner-centred principles) does not automatically answer the question what component to include in what quantity. Regardless of a theoretical model of learning, it seems necessary to start with the goals and learning objectives a blended learning arrangement shall address.

The basic design issue of a blended learning arrangement therefore is: How much time should learners spent with activities related to the three components? To answer this question the goals and objectives the learning environment tries to address have to be analysed. The specification of learning objectives usually helps to define the relative weight of the three components in blended learning arrangements.

If the learning objectives primarily consist of the acquisition of information and basic knowledge then the communication and construction component can be limited. Communication and construction are not necessary ingredients in all learning environments and learners do not accept them if they are not perceived as facilitating elements to their learning process.

(Blended) learning arrangements most often consist of a content component, it is, however, not an essential ingredient of all environments. Approaches of virtual "learning communities", for example, do not necessarily need a base of didactically structured learning materials.

The content component will be included if

- the knowledge consists of facts or rules the learner should be able to recall
- the knowledge can be explicated and communicated by media / technological means
- information should be presented to learners
- the knowledge of certain information is a prerequisite for other communicative or constructive learning activities

The communication component seems necessary when
- the knowledge reaches a certain complexity
- a deeper understanding of a theoretical framework is required
- the knowledge consists of different competing concepts
- students should learn to formulate, express and discuss a personal point of view
- students should learn to participate in discussions, to formulate and receive feedback in discursive settings

The construction component will be included if
- knowledge is to be applied (and not only to be recalled)
- the knowledge consists of procedures (and not only of declarative knowledge) that require practice
- the content includes "fuzzy" knowledge

The didactical design specifies the quantitative amount of these three components in a given learning environment. The question is how to find a suitable mixture of these components. Different learning theories accentuate different aspects and would emphasise one or the other component.

"Activity theory claims that conscious learning and activity are interdependent and are the central mechanisms of learning. Thus in order to learn it is necessary to act on some entity." (Collis, Margaryan, & Cooke, 2003, p.1). Such an activity can consist of an intensive and "deep" reading of text, especially if students have some prior knowledge and can integrate the presented information into their personal memory. In other cases, it will be necessary to include assignments for individual or group work as constructive activities in a blended learning arrangement.

Jonassen et al. (1995) outline a constructivist approach to the design of computer based learning environments that consists of the components: context, construction, collaboration and conversation. A recent publication, also from a constructivist perspective, by Schneider et al. (2002) presents the three components: content, community and collaboration. These authors emphasise the importance of "real world" scenarios and the exchange between learners in communities.

These are important design principles but they do not seem applicable to all learning situations. In our view, "content" can refer to a social "context" but it does not necessarily include context in all cases. "Constructive" activities may consist of group activities ("communities") as well as individual learning. Furthermore, it should be considered that conversational activities are associated with "costs" for the learner that need special consideration, as will be explained in the following section.

As a rule of thumb one could suggest that a third of the learning time should be devoted to each component. The relative weight of each component, however, cannot be derived from learning theory alone; it has to suit the demands of the learning situation and depends on several parameters of the didactical field (e.g. learning goals and objectives, characteristics of the content, the target group and situational / institutional demands).

Choosing a delivery system

In the context of learning with multimedia, the didactical discussion concentrated on new options for presenting information interactively to the learner (e.g. by text, video, simulation, animation …). With the internet, the discussion has moved to new possibilities for using communication technologies in learning environments. These technologies offer the option to vary the degree of synchronicity of communication in subtle ways. Blended learning definitely is more than the simple combination of FTF teaching plus E-Learning. The integration of communication tools with different degrees of synchronicity in a learning scenario opens a wide range of options in the design of learning scenarios.

For the didactical design of such scenarios, the question arises what the criteria for those design decisions could be. One position, held by Clark (1994), proposes that media do not influence learning substantially and that the choice of media can be reduced to a matter of

cost-effectiveness. The other position claims that media differ in their ability to transport information and that a good match between characteristics of a medium and one's communication activities will lead to better (more effective, satisfying, etc.) performance (Rice, 1993). This position has for example been elaborated in the context of information richness theory by Daft & Lengel (1984) and Rice (1992) or media synchronicity theory by Dennis & Valacich (1999). Other relevant theories in this context are social presence theory (Lombard & Ditton, 1997) or information processing theory (Fulk, Steinfield, Schmitz, & Power, 1987). In general, these theories would claim that the most favourable medium can be identified when the characteristics of a task are specified.

Social presence theory predicts that CMC (Computer Mediated Communication) can create a sense of intimacy and immediacy in users to a certain amount depending on different parameters. In technology-based communication, people develop a feeling of participating in a "real event" to different degrees. According to social presence theory, FTF communication generally should imply the highest level of social presence, whereas different forms of asynchronous communication should lead to lower levels of social presence (Lombard & Ditton, 1997).

Media richness theory predicts that group performance on equivocal tasks (with multiple and possibly conflicting interpretations to the available information) is better supported by "rich" media that provide many cues, immediate feedback, language variety and a personal focus. Richer media, like FTF communication, enable learners to communicate more quickly and to better understand ambiguous messages on equivocal tasks. In a didactical context, learning "facts", for example, could be considered as an unequivocal task with low ambiguity that does not require "rich" media. Although the theory seems intuitive at first sight, it is not supported well by empirical research data as Dennis & Kinney (1998) point out.

According to media synchronicity theory, tasks are composed of two fundamental communication processes: conveyance and convergence. Synchronous settings are more suited to reach a shared understanding (*convergence*), whereas asynchronous settings are better for the exchange of information (*conveyance*): "Media synchronicity is the extent to which individuals work together on the same activity at the same time; i.e., have a shared focus." (Dennis & Valacich, 1999, p. 5)

Learning tasks typically involve both divergent as well as convergent processes in communication. In divergent processes, knowledge is created and distributed, in convergent processes communication establishes a common ground for sharing knowledge and therefore narrows possible (miss-) interpretations of information. A high degree of synchronicity in communication (high feedback and low parallelism) is necessary to create such a shared understanding, whereas asynchronous settings (low feedback and high parallelism) are best for making knowledge available. In a typical blended learning scenario learners for example shift from asynchronous group work on an assignment to synchronous communication, when they have finished their individual tasks, and when they need more input or feedback from other group members or tutors. In a synchronous setting, group members can update their common understanding, and reach shared meanings and interpretations.

Because task and communication requirements of learners are not static, the level of media synchronicity must be adapted over time. In general, groups with established social roles and norms should be more comfortable with low synchronous media than newly formed online classes. They have to resolve ambiguity in several areas in order to ascertain group functioning, which can be realized best by media with high levels of synchronicity. On the other hand, students can retrieve information, for example from a syllabus, in order to reduce uncertainty regarding schedule and assignments, which will be communicated best with asynchronous media. The longer the group exists the less it will rely on high synchronous media (Hiltz, 1993).

Some empirical studies support the hypotheses of media synchronicity theory (Mulder, 2000; Speier, Morris, Valacich, & Dennis, 1998). However, the theory has been developed in the context of business / project management; it was not originally formulated for the design of learning environments and therefore has some shortcomings. Media synchronicity theory postulates that the best communication tool can be identified by knowing certain features of a given task. The model neglects the influence of context and user characteristics in media selection: Some learners, for example, prefer asynchronous communication simply because they cannot afford to participate in synchronous or FTF meetings. The theory ignores that synchronous as well as FTF meetings are associated with certain costs that do not make them the optimum choice in all cases.

Furthermore, media synchronicity theory, like others, tends to favour FTF communication whereas technology based options seem to suffer from one or several deficiencies. For education, this position could strengthen the – widely encountered – view that communication in classroom settings is superior to technology based communication. However, some students do favour technology based learning for some tasks in some situations. Students do not inevitably perceive technology based learning as inferior to FTF learning in classrooms. Depending on their personal situation, technology can open new options for learning if its use is planned and implemented thoroughly.

In our view, for choosing a delivery format the *costs* associated with the use of different communication scenarios have to be taken into account quite carefully. From the point of view of the institution, costs mainly derive from setting up, operating and maintaining a learning environment, which (mainly) can be expressed in monetary units. From the learner's perspective, communication is associated with monetary as well as non-monetary costs, for example travel or internet access. Additionally, these scenarios imply different demands on the time budget of the participants. Especially in further education, students typically have rather limited time budgets at their disposal and expect a communication scenario that adjusts to their personal situation. Finally, different communication scenarios subjectively demand more or less cognitive effort. Students perceive some delivery technologies as more demanding than others (e.g. TV vs. text, Salomon, 1984).

Costs of communication

Generally, participating in synchronous communication is "expensive" for learners. In many cases, meeting someone FTF is the option associated with the highest overall expenditures regarding time and (often) money when compared with other technology-based formats. Technology based synchronous conferences, like chats, still oblige the learner to join a virtual meeting at a given time, which for some learners is difficult or impossible to realise.

Asynchronous formats of communication typically can reduce the individual's (monetary as well as non-monetary) costs for communication severely. For this reason, like correspondence courses that were delivered "asynchronously" by mail, delivery formats based on asynchronous communication are and will be a central ingredient of blended learning arrangements, at least in cases where time is a restricted resource on the part of the learner.

Furthermore, users of CMC typically develop strategies to compensate for possible disadvantages of asynchronous media. For example, since producing written communication in CMC takes longer than oral communication users typically reduce redundancy or the amount of information conveyed (Hollingshead, 1996).

In our experience, the cost of communication as perceived by learners in further and distance education[2] primarily is related to the dependency of time and location and the directionality of communication (s. table 1):

- Communication that is time and / or location independent is perceived as requiring less expenditure than meetings that require being present at a certain time / in a certain place.
- Uni-directional "transmission" or "broadcast" of information is associated with less cognitive effort than active participation in bi-directional communication.

A learner will weigh these factors against possible benefits of various communication tools. This cost-benefit relation is of different importance to different learners. Students entering university for example typically do not evaluate communication scenarios and delivery formats in ways a business manager interested in further education and with a highly restricted time budget would do. Especially in further and distance education the cost-benefit relation of communication scenarios proves to be an important criterion for choosing the ingredients of a blended learning arrangement.

communication scenario	location	time	communication	learner's costs
face-to-face	dependent	dependent	bidirectional	4 (very high)
"personal telecommunication" tele- and videoconferencing	independent	dependent	bidirectional	3 (high)
"broadcasting" Radio, TV	independent	dependent	unidirectional	2 (low)
"publishing"	independent	independent	unidirectional	1 (very low)

[2] besides monetary costs for using the technology

Print, CD etc.				
Internet	(in-) dependent	(in-) dependent	bi- / unidirectional	from 1 to 3

Table 1: Communication scenarios and perceived costs

The internet until now is not yet as "ubiquitous" (= independent from location) as other media like print or radio and TV. Besides that, the major advantage of the internet is that all other technology-based scenarios can be implemented with it. It can be used for all variants of synchronous as well as asynchronous communication scenarios like "publishing" or "broadcasting" as well as for "personal communication".

FTF meetings in blended learning arrangements

Generally, a major advantage of FTF meetings is the potential for intensive interpersonal communication and for building social relations. FTF communication therefore might be experienced as the "richest" medium in general. However, FTF communication in many cases are also perceived as very "expensive". Learners choose distance education programs or courses with distance education elements either because there are no traditional courses available or because of constraints in their time budgets. Therefore, for learners who decide to take a course with virtual learning elements in this context FTF is not at all the most favoured alternative for communication.

Consequently, when planning a blended learning arrangement the FTF component must be evaluated most critically. A FTF meeting might for example seem appropriate as a kick-off meeting for a course, but further FTF meetings must be planned very carefully and the necessity for such meetings must be explained meticulously to the learners.

In general, with respect to social interaction, most authors recommend initially meeting FTF, and to exchange background information about the group members on web pages in the start-up phase. This corresponds with media synchronicity theory, which suggests that communication based on synchronous media should be used when a group is established, whereas in later phases of group work asynchronous delivery formats become more important.

This is in line with results of the evaluation of the study programme "Master of Arts of Educational Media" (http://www.online-campus.net) from University Duisburg-Essen that has started in April 2003 and follows a blended learning approach. The programme is based on learning materials that are distributed per internet including assignments for individual and cooperative work that is coached by tutors. Most of the interaction between group members and the tutors is based on asynchronous communication.

Since most of our students go to work and deliberately ask for few FTF meetings, we have reduced them to one per semester (each at Friday 1.00pm – Saturday 1.00pm). However, these – short – meetings have proven to be very important for the overall success of the programme. We intentionally do not present learning content in FTF meetings; they rather serve for:

- delivering basic information about the course and the used technology / tools,
- getting to know each other (including staff and tutors),
- establishing learning groups and rules for group work,
- presenting group work and
- carrying out exams and evaluations.

Most importantly, even short FTF meetings ensure a common ground for understanding and strengthen the individual's commitment to the course essentially. Our experience indicates that FTF meetings should be designed differently in blended learning arrangements than in traditional classroom trainings. For all planned activities in a FTF meeting, it must be considered carefully whether it is necessary to include them in the FTF meeting or whether they can be postponed onto a later phase based on online communication. Participants continuously ask themselves: Was it necessary that I came here to participate in this FTF activity? Therefore, the presentation of knowledge and the training of simple procedures in handling technology should be reduced or even abandoned in FTF meetings, simply because (our) learners typically prefer to do this online from home (at least after they have experienced the convenience of remote access to the learning environment). Discussions in small groups or presentations by learners, on the other hand, are activities that are perceived as appropriate for FTF meetings. In some cases, they also value invited "key-note" presentations by experts in a FTF meeting.

In our distance education courses participation in FTF meetings is related with the probability of drop out: Learners who actively take part in FTF meetings are less likely to abandon their studies. Therefore, FTF meetings should be planned carefully with the aim that learners perceive the meeting as an event that is worth the effort and necessary expenses. To raise the motivation to take part in further events it is essential that the first FTF meeting is perceived as "successful" by the participants. For this, the meeting must be designed as an event that emphasizes the "magic of people's presence" and conveys the experience of the wealth of FTF meetings.

Conclusion

In a blended learning arrangement, a mix of different didactical methods and delivery formats has to be identified. The appropriate solution has to match didactical parameters like learning goals and objectives, characteristics of the content, the target group and situational / institutional demands. This will result in a learning environment that can be described as consisting of a content, a communication and a constructive component. It seems not suitable to favour a certain didactical approach or delivery format if they do not address the demands of a given learning situation.

The problem of identifying the right "blend" has been discussed in the context of a distance education programme, especially the communication component. The discussion proves that it remains difficult to formulate general guidelines for the specification of blended learning arrangements. Learners, for example, evaluate communication tools and scenarios according differently and according to their personal situation. FTF communication, although favoured by some theories, are associated with high expenditures. Therefore, in order to fulfil their potential, FTF meetings must be designed differently in a blended learning arrangement than in the context of classroom learning.

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