

A Good Mix in Blended Learning For Small and Medium-sized Enterprises In Particular from the IT and Tourism Industry

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Declaration

I Sabine Moebis declare that this thesis is submitted by me in partial fulfillment of the requirement for the degree MSc by Research, is entirely my own work except where otherwise accredited. It has not at any time either whole or in part, been submitted for any other educational award.

Sabine Moebis

Executive Summary

Twenty-three million small and medium sized enterprises (SMEs) provide around 75 million jobs, that is two thirds of all jobs and 99% of all enterprises in Europe, states the Observatory of European SMEs. SMEs tend to maintain their staff even during economically difficult times, which makes them an important, stabilizing pillar of the national economies. The increasing globalization and the consequent competitiveness together with changing legal requirements force SMEs to permanently build up knowledge beyond their core area of expertise (EU 2003).

Blended learning, a mix of online and face-to-face learning, can combine the positive aspects of both, classroom-based learning and e-learning environments (Bonk and Graham 2006). Yet, although blended learning seems to be quite suitable for SMEs, current uptake of this learning method is low.

A lot of research has been done on a number of very specific aspects of blended learning, often with a higher education student population. An open research approach seemed adequate, to leave enough room for emerging topics, to give enough room for all the stakeholders to get involved, and to find out which of the previous research in relation to blended learning and e-learning are actually relevant in the context of SME learners.

The research question emerging is: “What are relevant characteristics for successful blended learning for learners in SMEs?”

More specifically this thesis aims to answer the following questions:

- What is a successful mix for learners in SMEs from the IT sector in blended learning?
- Does this mix vary depending on the industry and the size of the company?
- Which recommendations can be given in regard to the adaptation of blended learning and SME learners needs?

In this thesis an explorative study and a case study on blended learning in SMEs explore these questions.

The literature review in chapter 2 explores the background of the initial research question. Section 2.1 describes promoters, benefits and barriers to e-learning. The main promoters and benefits are the possibility to provide dependable content and guarantee the same content for every participant. Another key benefit is the significantly reduced delivery time to the learner (Garavan and O'Donnell 2003). Over commitment to multiple roles and responsibilities, the interruptions at home, work or wherever one studies, the lack of time to study and technology barriers (Mungania 2003; Page 2006) could be identified as main barriers. Section 2 looks in detail at definitions, dimensions, frameworks and success factors for blended learning. In summary the term blended learning is used for a combination of e-learning and face-to-face learning, varying in the use of ICT and the materials used, and striving to develop continuously towards a better quality learning experience. As success factors for blended learning the design of the blend, time flexibility, the matching of media and learning styles, student support, executive support, content and the consideration of different learning styles could be identified from the literature.

Learning in SMEs and e-learning in Irish companies are the focus for section three and four respectively. Learning in SMEs can be characterized by a list of obstacles, including lack of time, cost issues and the limited ability of company owners to contact suitable sources for e-learning. E-learning in Irish companies is coined by the previous characteristics in addition to a lack of a learning culture.

Chapter 3 outlines the methodology and the research design, which examines the requirements for successful blended learning in SMEs. Participants for the online-Delphi study and the semi-structured interviews were selected following a list of panel criteria and were grouped into sub-panels of SME learners, trainers and providers of e-learning as well as learners from large companies as a control group for the SME learners. The research design is based on an online three-round ranking-type Delphi study with initially fifty panellists and a case study, including interviews with 4 interviewees, representing the sub-panels of the Delphi study. Our method takes into account that the area and the term "blended learning" are discussed in very different, partially contradicting connotations.

The findings of the Delphi study and the case study are presented in chapter four, followed by chapter five which presents the analysis of the findings of the Delphi study. Chapter provides an outline for a guidebook for tutors, which was applied in the interviews for the case study, presented in chapter seven. The data analysis methods include Kendall's coefficient of concordance, concept maps and radar chart analysis. The results of chapter four to seven can be summarized by answering the initial research questions.

What is a successful mix for learners in SMEs from the IT sector in blended learning?

In order of relevance the final "Top 10" characteristics for successful blended learning in SMEs from the IT sector are: time flexibility, cost efficiency, support mechanisms, accessibility, efficiency, quality, self-paced learning, results measurement, content design and learner-centeredness. These characteristics put a balanced emphasis on the areas design, skill-driven learning, and the access to knowledge, quality assurance and cost effectiveness. Surprisingly social interaction was not selected.

Does this mix vary depending on the industry and the size of the company?

In comparison the sub-panel tourism SMEs selected social interaction as an important area, whereas design was not selected.

The large companies sub-panel choose clearly different areas, compared to the IT SME sub-panel. There was a strong emphasis on design and social interaction, whereas cost effectiveness was not considered important. Skill-driven learning and quality assurance only show a weak consideration.

Which recommendations can be given in regard to the adaptation of blended learning and SME learners needs?

A sound approach for blended learning in SMEs should consider the "Top 10" aspects selected and the characteristics outlined above in combination with the results of the case study, which showed the importance of the role of the tutor or trainer. All interviewees pointed out the importance of a personal touch for a successful blended learning scenario.

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The final chapter provides an outlook for future research. Future research might involve a validation of the results in a quantitative study with a larger sample. Further areas that could be explored are the impact of initial training to improve the digital literacy within the SME learner group. The learning theories which can support the SME learners' preferences best and what kind of learning system could support these requirements are two other directions for future research.

Related Publications

Moebis, S., Piombo, C., Batatia, H. and Weibelzahl S. 2007, 'A Tool Set Combining Learning Styles Prediction, a Blended Learning Methodology and Facilitator Guidebooks – Towards a Best Mix in Blended Learning', in *Proceedings Interactive Computer Aided Learning*, Villach, Austria

Moebis, S., Weibelzahl, S. and Dowling, N. 2007, 'Supporting Facilitators of Blended Learning with Guidebooks', in *Proceedings Eighth Annual Irish Educational Technology Users' Conference*, Dublin, Ireland

Moebis, S. and Weibelzahl, S. 2007, 'A Ranking-Type Delphi to explore Blended Learning in SMEs', in *Proceedings Interactive Computer Aided Blended Learning*, Florianopolis, Brazil

Moebis, S. and Weibelzahl, S. 2007, 'Blended Learning: Towards a Mix for SMEs - Stakeholders and their Priorities' in Fong, J. and Wang F.L. (eds.), *Blended Learning*, Prentice Hall, Singapore, p. 162-173

Moebis, S., & Weibelzahl, S. 2006, 'Towards a good mix in Blended Learning for Small and Medium-sized Enterprises – Outline of a Delphi Study' in E. Tomadaki and P. Scott (eds.), *Innovative Approaches for Learning and Knowledge Sharing*, EC-TEL 2006 Workshops Proceedings, 1-4 October 2006, Crete, Greece, Milton Keynes, Open University, p. 10-17

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Abstract

While blended learning seems to be quite suitable for small and medium sized enterprises (SMEs), current uptake of this learning method is low. For this thesis an explorative study on blended learning in SMEs examines the requirements for successful blended learning in SMEs. The research is based on an on-line three-round ranking-type Delphi study and a case study. This method takes into account that the area and the term “blended learning” are discussed in very different, partially contradicting connotations. For this reason, first the background of the initial research question is provided and a description of the research design. Then the results of the Delphi study and the case study are presented. Participants were selected for the online-Delphi study and the semi-structured interviews following a list of panel criteria and were grouped into sub-panels of SME learners, trainers and providers of e-learning as well as learners from large companies as a control group for the SME learners. Data analysis methods include Kendall’s coefficient of concordance, concept maps and radar chart analysis.

The results indicate how to improve the uptake of blended learning by SME learners. Recommendations for a guidebook for facilitators and a checklist with “Top 10” aspects from the different sub-panels provide a tool set for a sustainable approach to a responsive learning environment. A main result of the case study is the role of the tutor or trainer. All interviewees pointed out the importance of a personal touch for a successful blended learning scenario.

Future research could involve validating the results in a quantitative study with a larger sample. Further areas that could be explored are the impact of initial training to improve the digital literacy within the SME learner group. The learning theories which can support the SME learners’ preferences best and what kind of learning system could support these requirements are two further directions for future research.

Keywords: Blended learning, SME, Delphi study, concept maps, radar chart analysis, case study, guidebooks

1. Introduction

Small to medium-sized enterprises (SMEs) are often innovative, but they are also under great economic pressure which is a threat to ongoing learning activities even though continuous training and learning is necessary to stay competitive. Learning in the form of e-Learning is not in high demand with SMEs although one would expect that it is extremely suitable to a learning demand at short notice (Wood and Watson 2002) which is typical for SME learning.

Blended learning, a mix of online and face-to-face learning, can combine the positive aspects of both, classroom-based learning and e-learning environments (Bonk and Graham 2006). Blended learning can then, provide an alternative to e-learning and might have the potential to better meet SME learners' needs.

A mix of learning styles and a mix of the different dimensions of learning at course level can increase the usage of blended learning opportunities as a suitable way for training in SMEs and thereby increase or keep up the competitiveness of these companies.

This thesis describes an explorative study on blended learning in SMEs. This study's main goal is to find out whether or not a list of aspects can be determined that enable learners in SMEs to use blended learning successfully. To investigate this topic, a three round ranking-type Delphi study has been conducted. The study involves four groups of stakeholders in blended learning in SMEs; 1.) the developers of e-learning and blended learning, 2.) the trainers in blended learning, 3.) the learners from SMEs and 4.) a control group drawn from learners in large companies. Depending on the input of the participants, the study will either show diverging or homogeneous recommendations regarding the adaptation of blended learning to SME learners' needs.

A case study investigates this question from a different point-of-view and also explores the role of tutors and guidebooks for facilitators in this blended learning context.

This research was conducted as part of the project "Upskilling to Object-Oriented Software Development with the Unified Modeling Language" - Up2UML.

UML, the Unified Modelling Language, is a non-proprietary modelling and specification language often used by software developers to describe the functionality, the structure and the internal behavior of software systems. The project aims to develop new content and training material for UML2 while providing syllabi for different target groups and develop innovative training concepts (e.g. distance learning with on-line tutoring, social learning, virtual learning cycles, community of practice, etc.).

Twenty-three million SMEs provide around 75 million jobs and represent 99% of all enterprises in Europe states the Observatory of European SMEs. SMEs tend to maintain their staff even during economically difficult times, which makes them an important, stabilizing pillar of the national economies.

1.1. The Need for training

European companies and SMEs in particular, recognize and face the challenge to adapt themselves to the increasing demands on knowledge, skills and competencies in the so-called knowledge economy. The increasing globalization and the consequent competitiveness together with changing legal requirements force SMEs to permanently build up knowledge beyond their core area of expertise (EU 2003).

To become the most competitive and dynamic knowledge-based society in the world by 2010, the European Commission (EU, 2004) has established a group of experts to put forward a framework detailing eight key competencies which they consider necessary for all in a knowledge-based society.

This goal can only be achieved if it is supported by education and training on all levels and in all areas of learning such as formal, informal and vocational training. Several of these key competencies, including mathematical literacy, basic competences in science and technology and digital competence are directly related to the research described in this thesis.

The training need for UML2 applies to the software business as a whole, and to SMEs in Europe in particular, as they are facing the threat that IT services will be off shored to save costs.

1.2. Blended Learning

Blended learning, a mix of on-line and classroom activities is an alternative that can combine the positive aspects of both of these worlds.

MacDonald (2006, p.3) cites Laurillard (2002) in suggesting that “a balance of media is essential to make learning and teaching effective”. She argues that supporting learners is the essential issue, and that, while automatic online support is beneficial, “tutor-mediated support is central to blended learning” (MacDonald 2006, p3).

Blended learning combines classroom-based learning with computer-mediated instruction (Bonk and Graham 2006). It can be described as “learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning” (Valiathan 2002, p.1).

The concept of blended learning has been examined in a number of research projects (Hall 2002; Johnson and Tang 2005; van der Westhuizen and Krige 2003; Donnelly 2006). However, the focus of these projects was on the role of technology often in higher education settings and rarely on employees of SMEs in the role of the learner (Wood and Watson 2002).

1.3. Conclusion

Small and medium-sized enterprises provide the majority of the enterprises in Europe, many of them are highly innovative, all of them under constant pressure to update their knowledge. The mix of e-learning and face-to-face learning has not been looked at in detail as an alternative to either e-learning or blended learning to provide the required learning and teaching delivery mode. This study enquires the topic, starting out with a literature review in the two areas. The questions arising are then examined with an on-line Delphi study and a case study.

2. Literature Review: Concepts, Theories and Frameworks

The literature review will look at e-learning as a new paradigm. It gives an overview for the topic areas which have been identified as main areas for blended learning in SMEs, e-learning, blended learning and learning in SMEs. The literature review first looks at different aspects of e-learning, barriers to e-learning and learning styles for e-learning. It proceeds to blended learning, its definition, dimensions, frameworks and its success factors. The section on frameworks describes exemplary theoretical models for blended learning development. The section on success factors of blended learning highlights the results of previous research. The final section looks at research on learning in SMEs in general, and e-learning in Irish companies in particular. The section on learning styles describes research that addresses learning styles in conjunction with e-learning and the so-called 'neomillennial' learners. However the discussed research predominantly does not look at the same learner group as this study, learners in SMEs, because there has been very little research done so far. Finally the last part looks at the state of practice of learning in SMEs. The summary of the main ideas of the literature review leads to the research question.

2.1. e-Learning

E-learning provides the opportunity to develop the skills required in a knowledge-based society by applying a wide array of internet technologies and a variety of solutions (Rosenberg 2001). There are three fundamental criteria for e-learning which include that learning needs to be networked, it needs to enable instant updating, storage, retrieval and distribution as well as sharing of instruction and information. The content is delivered to the end-user via a computer and it focuses on a broad view of learning solutions.

E-Learning has often been described as one of the most important developments in learning.

2.1.1. Promoters and Benefits of e-Learning

One of the big advantages of e-learning is the possibility to provide dependable content and guarantee the same content for every participant. Another key

benefit is the significantly reduced delivery time to the learner (Rosenberg 2001).

E-Learning provides good possibilities for participant interaction and barrier-free access to learning resources using text-based online-learning materials compared to learning environments where sound or language can constitute serious obstacles. Movie-based learning in on-line learning serves as an opportunity to carefully observe verbal and nonverbal information and thus motivates the learner in a way that is not available in classroom teaching (Makino 2004).

E-learning becomes more and more attractive in lifelong learning. Reduced prices for broadband as well as the availability of free development software for e-learning developers lead to a general reduction in costs. A number of initiatives of the European Community, as well as the individual member states, address the low level of digital literacy and make e-learning attainable for more people (EU 2004). To promote e-learning for SMEs a greater cooperation between academia and SMEs is encouraged. Several initiatives are set up to promote networking between SMEs as well as aligning SMEs to universities, which develop and provide courseware for the companies. Some examples are the SME environment portal of the EU (SME Environment 2007; ELQSME 2005; SIMPEL 2007). More universities are embracing e-learning in a blended learning format, and provide professional development programs for staff to allow them to meet increased demand for e-learning content in their programs (Page 2006).

2.1.2. Barriers to e-Learning

According to a recent study the top three barriers for e-learning are an over commitment to multiple roles and responsibilities, the interruptions at home, work or wherever one studies, and the lack of time to study. Problems with the language in course materials, lack of confidence in the ability to participate in e-learning, as well as resistance to change are not very relevant to learners and only few perceive these as barriers. It is difficult for learners to find time for study and at the same time cope with job duties and travel. Lessons of more than one hour are another obstacle that often leads to interruption during study (Mungania 2003; Page 2006).

Technology barriers interfere with learning in different ways. LMS quality, connectivity, lack of product training, lack of support, poor navigation and fear of loss of data are the most common obstacles. Landline broadband is not available everywhere while many blended learning courses necessitate it (Mungania 2003; Page 2006).

Learners find it difficult to assess whether or not a course fulfils their expectations, as there are no quality standards set for private e-learning providers, other than through self-administered associations (Mungania 2003; Page 2006).

E-Learning is rated as a reasonably effective method of training and development, but traditional methods are still ranked far higher in terms of effectiveness (Garavan and O'Donnell, 2003). To bridge that gap between perceived benefits of traditional learning and the many advantages of e-learning, many companies have discovered blended learning as a viable third alternative.

2.2. Blended Learning

Blended learning describes a learning environment that either combines teaching methods, delivery methods, media formats, or a mixture of all these. The term blended learning is very complex and ambiguous. Therefore the next paragraphs aim to give a comprehensive overview of the different definitions.

2.2.1. Definitions of Blended Learning

In the literature the term is used to describe for example the integrated combination of traditional off-line methods of learning with intranet, extranet web-based or internet-based online approaches (Garavan and O'Donnell 2003).

To accentuate the fact that the concept is learner centred, blended learning can be described as a combination of delivery methods that have been selected and fashioned to accommodate the various learning needs of a diverse audience in a variety of subjects (Mc Sporrán and King 2005).

Blended learning combines classroom-based learning with computer-mediated instruction (Graham 2006; The eLearning Guild 2003), but it also describes learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning (Valiathan 2002).

The differentiation in skill-driven, attitude-driven and competency-driven learning as different forms of blended learning looks at the focus of the learning. Skill-driven learning combine self-paced learning and support mechanisms to develop certain knowledge and skills. Attitude-driven learning aims at developing specific behaviour by mixing different event types and delivery media. Competency-driven learning targets workplace related competencies and provides performance support tools, knowledge management resources, and mentoring (Valiathan 2002).

The availability of pedagogical expertise, as well as learning delivered through videoconferencing and video streaming in combination with face-to-face collaboration is a blend described for the ABEL program in Canada (Murphy 2007).

Oliver and Trigwell (2005) provide a whole collection of partly contradicting definitions from different authors. They dismiss definitions that consider a combination of e-learning with traditional learning, the combination of online learning with face-to-face learning, the combination of different media, the combination of contents, the combination of theories and learning, the combination of learning objectives and finally combined pedagogies. In their conclusion, the authors come to the decision that blended learning misses the learner's perspective. They recommend the variation theory of Boden and Marton (1998) for the development of blended learning courses to improve learning.

Another approach uses the mix of learning theories towards blended learning, combines cognitivism, constructivism and performance support which transforms it into a very practical approach defining live events, self-paced learning, collaboration, assessment and performance support materials as the key ingredients of blended learning (Carman 2005).

To explore the diversity of blended learning definitions further, two of the most recent books, "The Blended Learning Handbook" by Graham and Bonk (2006) as well as the book "Blended Learning" by Fong and Wang (2007), have been closely examined for definitions of blended learning.

Probably the most succinct definition of the term is provided by Reynolds and Greiner, who describe blended learning simply as the “use of more than one instructional methodology” (Reynolds and Greiner 2005, p. 216).

A combination of storytelling, song, recitation, reading aloud, flash cards, puppetry, and corporal punishment is what Cross (2006) adds to the discussion about a blended learning definition with a retrospect to traditional teaching methods. Included in this definition is the remark that most learning is blended in the sense that it always combines different methods, materials and media. His perception is in agreement with Elliott Masie (2006), who goes on by saying that since 1998 the term is widely used for a combination of e-learning and classroom learning.

Wagner, Graham and Dennis (Wagner 2006; Graham 2006; Dennis 2006) describe blended learning as a combination of face-to-face instruction and computer-mediated instruction. Wagner adds that blended learning always involves content objects and assets, or as Lindquist puts it, a combination of classroom and online (Lindquist 2006). This is almost equal to Wright’s definition, who adds traditional distance learning measures to the blend (Wright 2006), or Jung and Suzuki, who define blended learning as face-to-face blended with traditional distance learning (Jung and Suzuki 2006). The combination of an online teaching environment and face-to-face lectures leads to a blended learning frameworks as an approach for open interaction, information dissemination, efficient management or knowledge creation or a combination of all these.

A very open definition is given by Ziob and Mosher (2006), who also add the aspect of business perspective to the learning scenario. They define the term as “any combination of self-paced, instructor-led, distance, and classroom delivery with various digital and print form factors to achieve a positive business outcome” (Ziob and Mosher 2006, p.97). Jones also provides a variable definition, but she is focusing on the degree of technology use in blended learning from “basic use of communication and information technology (ICT) use to intensive ICT use” (Jones 2006, p. 186). The combination of ICT and face-to-face instruction is the typical characteristic for a number of authors (Lee 2006; Limon, Kaur and Ahmed 2006). The ICT use is mainly determined by

different forms of e-media (Lee 2007) The mode of delivery via a managed learning environment in combination with tutor-led support systems, such as synchronous and asynchronous discussion groups supplemented by face-to-face meetings is pointed out as a typical feature of blended learning systems (Jones 2006, p.190). Jones coins the term of the 'continuum of blended learning', that describes a continuous increase of ICT use in combination with face-to-face activities (Jones 2007).

A different terminology is used by Ross and Gage, who describe different flavours of blended learning. Blended learning courses are either web-enhanced or technology enhanced or else they are hybrid or reduced. They look at the aspect of blending on course or program level (Ross and Gage 2006).

The combination of the latest technology and high-skilled human support are the essentials of blended learning (Salmon and Lawless 2005), or in other words traditional face-to-face teaching combined with evolving technical possibilities (Henrich and Sieber 2007). This eventually leads to an evolution model of blended learning. This model starts out with synchronous learning, moves on to the more effective simple blend, and progresses on to rich-experience seamless blending to eventually reach performance personalization, the fusion of learning and work as an embedded system, linked with business applications (Singh 2006). This evolution aims at a continuously improved learning quality: recognizing cost, time, effectiveness and the fusion of learning and work as main settings.

In summary the term blended learning is used for a combination of e-learning and face-to-face learning, varying in the use of ICT and the materials used, and striving to develop continuously towards a better quality learning experience.

2.2.2. Dimensions of Blended Learning

To describe the variety of interaction Graham (2006) introduced the so-called four dimensions of interaction in face-to-face and distributed learning environments. The four dimensions are space, time, fidelity and humanness. Space can range from live or physical and face-to-face over mixed reality to virtual reality. The time dimension develops from live synchronous with a very short lag time to asynchronous, which has a long lag time. Fidelity reaches from

a high level that is rich in senses, which means it can incorporate sound, pictures, text and even fragrances, to a low level, using only one of the senses, e.g. text only. The humanness dimension addresses the ratio of human interaction and machine interaction.

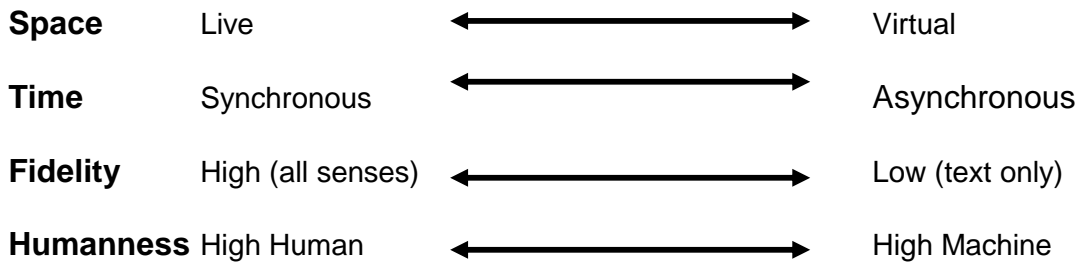


Figure 2-1 Four dimensions of interaction in face-to-face and distributed learning environments (Graham 2006)

Figure 2-1 shows the dimensions and also helps to visualize the variety of systems possible within the range described above. All the dimensions can vary between the extreme values, thus providing a huge variety of different interaction settings for the design of blended learning and accommodating the diversity of individual learner needs, learner styles as well as teaching styles.

2.2.3. Frameworks in Blended Learning

Poor design of blended learning material can lead to much poorer learning results in a blended environment compared to a single method of delivery. Several authors developed frameworks to react to this challenge.

Wenger and Ferguson (2006) describe a framework to guide the design and deployment of company training and courses. The framework reflects the idea that most learning environments are blended anyway, considering that even a classroom-only course incorporates a variety of different learning modalities.

Their approach consists of three steps:

In a first step, the learning ecology matrix is developed. The x-axis illustrates the focus on the delivery of instruction that varies from “content delivery focus” to “experience and practice focus”; whereas the y-axis illustrates controls the navigation of the learning process that varies from “guided navigation” to “learner self-navigation”. In a second step, four general learning modalities are included: studying, practicing, teaching and coaching. These modalities do not refer to either classroom or e-learning, but are rather applicable to both. In a last

step the matrix is completed with distinct instructional, learning and knowledge elements. Figure 2-2 shows the framework by Wenger and Ferguson.

Studying	Learner Self-Navigation	Practicing
Content Delivery Focus	<ul style="list-style-type: none"> • Books, articles, guides • References • White Papers • Asynchronous content • Job aids • Glossaries • FAQs 	<ul style="list-style-type: none"> • Authentic tasks • Role play • Projects • Case studies • Peer discussion • Discussion forums
	<ul style="list-style-type: none"> • Classroom lectures • Synchronous content • Demonstrations • Reviews/discussions • Video • Videoconferencing 	<ul style="list-style-type: none"> • Exercises • Diagnostic labs • Practice labs • Mentoring/tutoring • Experiments
Teaching	Guided Navigation	Coaching

Figure 2-2 Learning Ecology Matrix (Wenger & Ferguson 2006)

The learning ecology matrix aims at delivering a high quality learning experience and at providing control over the learning experience for both the learner and the instructor. It strives at combining formal and informal learning rather than positioning them as opponents. The social nature of learning has to be considered in all learning elements. The aspect of cost-effectiveness is recognized, but merely in the sense that any project aims at a combination of learning outcomes at a minimum total cost.

Another example is the generic framework that was developed by McSporryn and King (2005) to enable a structured combination of educational delivery methods. Table 2-1 shows the generic framework for blended learning by McSporryn and King.

Table 2-1 Generic framework for blended learning (Mc Sporrán & King 2005)

A	B	C	D	E	F	G
Category of learning needs	Examples	Possible methods	Benefits	Constraints / difficulties	Likely effectiveness	Possible blend
This column is used to describe the skills or concepts that need to be learned	Examples place the learning needs in context	A selection from a given list or other methods	Allows author to clarify benefits of particular selected method. Used as a check	Indicates possible challenges to implementation	Provides ranking for selected method. Used in conjunction with columns D and E	Suggestions of complementary methods

The framework is intended to provide guidance for the selection of delivery methods, considering the learning needs as well as available resources. Benefits, difficulties, constraints, but also complementary methods are listed to provide the information necessary to develop the right blend. The generic framework is then applied to specific learning needs.

2.2.4. Success Factors for Blended Learning

A variety of teaching methods, as well as a variety of different learners with different preferences and needs determine the success of blended learning. Several success factors have been identified in the literature.

Design of the blend A well-designed blend of teaching methods can provide an appropriate learning experience for most learners. The characteristics of the audience have to be considered. This includes recognition of the amount of time they will have to access the content, which includes connectivity issues (Bersin 2003; McSporrán and Kind 2005; Saunders and Werner 2004).

Time flexibility The flexibility in scheduling and a variety of document formats is critical to success. System availability enables them to study when they are ready to do so.

Mix of media and learning styles The flexibility in media formats provides optimum learning experiences based on personal preference. To select the right methods and formats the learning styles and the education level of employees has to be considered as well as the motivation of the learners (Bersin 2003; Serveau 2004).

Student support Response from tutors, subject matter experts as well as technical or logistical support staff needs to be posted within 24 hours, which

corresponds to a rule of thumb for effective e-communication in general. The positive effect of a timely response can be intensified by additional phone calls and face-to-face conversations and will provide a sense that there are real people behind the online environment (Serveau 2004).

Executive support Blended learning needs executive support for the introduction just as any other major change in a business environment. The decision to change to a blended solution from the system that was in use before cannot be left to individuals who are not in charge (Serveau 2004).

Content The kind and quality of learning content is critical for success. Apart from choosing the appropriate kind of content and deciding whether learning activities are intended to inform people, develop skills, or build competencies, the consideration of the time before information becomes outdated is of high importance (Bersin 2003).

Learning Styles Another factor for success of any learning system is the consideration of learning styles. There are a variety of different models and theories for learning styles. In engineering education Felder and Silverman's model (1988) is mentioned most often. A lot of research has developed from there, such as the impact on learning styles through web-based course components (Smart, Kumar and Kumar 2005) or the implications through research literature (McLoughlin 1999). Different authors describe the application of the theory of learning styles in computer-based settings (Fenrich 2006), the incorporation of learning styles in adaptive hypermedia systems (Stash 2007) and frameworks to adapt instruction to learning styles (Piombo, Batatia and Ayache 2003) have been developed. Recently learning styles and the so-called neomillennial learners, learners who grew up using interactive media, opened up the area of research on the impact of the use of social software on learning styles (Baird and Fisher 2006). In a recent publication Felder describes how learning styles, approaches to learning and different intellectual development forms a diversity in students that can only be fully addressed applying different models for each of these aspects (Felder and Brent 2005).

All this research usually does not consider typical settings in small and medium-sized enterprises. The following paragraph therefore has a closer look at the typical characteristics of SMEs and learning in SMEs.

2.3. Learning in SMEs

Continuous learning is crucial for small and medium-sized enterprises (SMEs), to foster the continual acquisition of knowledge and to improve their position in the market. SMEs need to ensure that their employees consistently expand their expertise. According to the European Commission (2003) the main reason for SMEs to engage in training activities is the growing pressure from the internationalization of markets, difficulties in recruiting or retaining staff, as well as the inability of formal education to match the enterprise's needs. All this is further aggravated by other factors such as continuous technological developments, shorter product life cycles, and increasingly demanding customers.

Due to the difficulties of defining SMEs in qualitative terms, this paper will use a quantitative classification for SME. Quantitative classifications usually apply the criteria "Number of employees" and "annual turnover" to distinguish between small- and medium-sized enterprises. The most recent definition of SMEs according to EU-regulations is listed in Table 2-2.

Table 2-2 The new thresholds for SMEs (EC 2003)

Enterprise Category	Headcount Annual Work Unit	Annual turnover	Or	Annual balance sheet total
Micro	< 10	≤ € 2 million	Or	≤ € 2 million
Small	< 50	≤ € 10 million	Or	≤ € 10 million
Medium	< 250	≤ € 50 million	Or	≤ € 43 million

The company size and figures of turnover alone cannot describe typical SME characteristics fully. The following Table 2-3 describes the characteristics, advantages and disadvantages of SMEs and helps to explain what makes their learning situation different from larger companies or small units within multinationals.

Table 2-3 Advantages and disadvantages of SMEs (Recklies 2001; Baaken & Launen 1993)

Characteristic	Advantages	Disadvantages
Dependence on a limited number of people (often owners and managers are one and the same persons)	<ul style="list-style-type: none"> • Long-term thinking, perspectives • Stability • No pressure for short-term success • High identification with the business, stable culture • High commitment 	<ul style="list-style-type: none"> • Static thinking, limited to the experiences and the knowledge of the owner(s) • Difficulties to adapt corporate culture to new situations and challenges • Potential conflicts between corporate objectives and personal objectives of the owner
Close relationships to customers and business partners	<ul style="list-style-type: none"> • Stable basis for further business • Ability to cooperate successfully for mutual advantage • Ability and willingness to enter partnerships 	<ul style="list-style-type: none"> • Risk to focus too much on existing basis of business
Simple structures	<ul style="list-style-type: none"> • High flexibility and adaptability • Short reaction times • Cross-functional communication and cooperation within the organization 	<ul style="list-style-type: none"> • In many cases not suitable for the complex planning and implementing of international activities • Low willingness to introduce more sophisticated structures
Small size	<ul style="list-style-type: none"> • Basis for specialization, often successful with niche strategies • Innovations and patents 	<ul style="list-style-type: none"> • Limited resources (in terms of financial means and manpower): • Limited funds to finance investments and initial operating losses for new activates • Spendings for market research and market entry take a much higher proportion of total spendings in SMEs than in larger businesses • Limited number of staff to take on additional tasks • Lack of internationally experienced employees
Decision maker is owner of the company	<ul style="list-style-type: none"> • Quick decision making • High motivation level of decision maker • Wide experience 	<ul style="list-style-type: none"> • Limited willingness to delegate tasks • Owner=person who doesn't take necessary steps: long-term strategy falls behind day-to-day business

The dependency on a small number of people puts a lot of pressure and time restraints on these employees.

Time management is often neglected or impossible due to time pressure caused by sudden demands of company owners. On the one hand, necessary training courses are decided on the spot when the need arises due to a new project, customers or pressure of the market, rather than as part of a sound

training strategy. The lack of a general, long-term strategy includes the lack of a strategy for development and training. Owners of SMEs often rely too much on their own expertise and knowledge and are prone to ignore the opportunities that staff development can provide (Baaken and Launen 1993).

On the other hand, SME culture is often characterized by high identification with the business and a stable culture. Due to the simple structures, any decision usually has very short reaction times and once a decision is made, another advantage, the cross-functional communication and cooperation with the organisation enables solving some of the time restriction mentioned previously. SMEs are often highly specialised. In order to maintain this niche expertise, training is required and therefore provided.

One of the well-known problems for learning in SMEs is that it is often not feasible for employees to attend training during working hours. Due to a huge workload, taking training outside office hours is also not always possible (Mungania 2003). Training costs, including direct expenses as well as costs related to the absence of an employee from the workplace, seem to be too high for many of these companies. Moreover, the cost issue confronts small companies with huge problems since there are only a few colleagues to fill absences. General financial constraints make training activities even more difficult, too.

The need for flexibility and, therefore the option to use quiet periods for training make e-learning attractive for SMEs (Beer, Hamburg & Paul 2006). This, however, requires a structured approach that enables learning-on-demand as well as corresponding delivery structures which need to be introduced.

E-learning, however, has a number of disadvantages from the perspective of employees in SMEs. Employees tend to interpret the substitution of face-to-face learning by e-learning as a cost reduction measure and perceive that their company is not willing to spend the money for travel and accommodation. They also miss the lack of social contact and interaction with other learners as well as the distance necessary to reflect on new topics when learning in their working environment (Beer, Hamburg and Paul 2006).

Obstacles that make it difficult for SMEs to engage in competence development activities are typically:

- Important short-term business pressures (lack of time)
- Cost issues
- Entrepreneurs' limited ability to effectively diagnose the competence needs or to contact sources of competence
- Poor quality, extent and theoretical orientation of the existing supply of formal training and external advice (EC 2003)

Important obstacles to small business usage of e-learning are a total lack of a training culture within the SME, the lack of appropriate learning materials, the attitude of individual managers, and lack of access to sufficient bandwidth to ensure high quality training (Mc Cullough 2005).

More factors limiting the proliferation of e-learning are perceived ineffectuality, computer anxiety and a perceived lack of structure and guidance (Wood and Watson 2002).

A recent study on learning and development in Ireland revealed that only 1% of the panel believe that e-learning is the most effective way to learn (CIPD 2006). Almost four in ten respondents said that on-the-job training is the most effective form of learning in their organization. Work experience and formal training courses are the next most popular answers for organizations with less than 200 employees.

2.4. E-Learning in Irish Companies

Blended learning as a concept, especially in Ireland, has been covered in many recent studies focusing on Higher Education. Blended learning as a concept for training and development in companies on the other hand, has not been covered often. Therefore, this study will focus on the situation in companies, especially in small and medium-sized enterprises.

In 2003, the Government's National Training Advisory Committee (NTAC) reported that "for Ireland to maintain its position as a strong knowledge-based economy, there are urgent and far-reaching implications for the training and upskilling of workers. Investment by companies in training their employees, with

the encouragement and, where appropriate, the support of the State is critical to maintaining a strong economy” (NTAC 2003, p.13).

Recent studies show that the take-up of e-learning is modest. Most learners remain sceptical as to its effectiveness and there seems to be a misunderstanding as to its role. It is viewed as expensive and technically complex. Content is expected to be of low quality when presented through technically limited applications (Garavan and Carbery 2003).

Respondents from small to medium sized firms are significantly more likely to report the following as barriers to participation when compared to large firms:

- insufficient training culture
- a lack of skilled trainers
- fewer training opportunities
- poor quality training provision
- lack of career opportunities
- the manager prevented participation in training and development

(Garavan and Carbery 2003)

The most important reasons for non-participation are the lack of a learning culture; whereas the lack of training opportunities and the poor quality of training provision are mentioned considerably less in a study among the Irish workforce (Garavan and Carbery 2003).

While e-learning had significantly altered learning and training offerings, in a recent study only 25% out of 275 participants saw learning and training changed through e-learning (CIPD 2006).

2.5. Summary

Blended learning is not a very established way of learning and teaching yet, and leads to blended learning struggling with disadvantages and misconceptions of both learning paradigms. Effectively it offers the possibility to combine the advantages of e-learning as well as face-to-face learning.

To accommodate individual and group learner needs the concept of learning styles is commonly applied.

The literature review shows that research on blended learning in SMEs is needed. A lot of research has been done on a number of very specific aspects of the topic, often with a higher education student population though.

3. Methodology and Research Design

This chapter aims at explaining the suitability of the selected research design and analytical strategies to answer the research question and to provide the rationale behind the selected research design. It also describes the research process and how the method was implemented. This includes a description of the selection process of the participants, how they were contacted and finally agreed to participate. It provides information on the tools used, the development of the questionnaires, the online tool and the instructions given to the panelists.

3.1. From Literature Review to Research Question

The literature review shows that the topic of blended learning in SMEs covers a broad range of topics. Learning in SMEs is of interest as a research area, because the majority of Irish and European companies and the majority of the workforce can be allocated to companies that size.

Learning in SMEs suffers from an insufficient training culture and is often impeded by the fact that it is difficult for the learners to be absent from the workplace to attend training. Research shows that training programs offered by providers often do not adequately recognize the specific training needs of SMEs. On the other hand continuous training is crucial to stay competitive and SMEs spend money on training.

The shift from e-learning to blended learning evolved due to the experience that uptake in e-learning classes is modest, unrestricted internet access in the workplace is not always available and the lack of social contact and support made it less attractive for many learners.

Blended learning is not a very established way of learning and teaching yet, and leads to blended learning struggling with disadvantages and misconceptions of both learning paradigms. Effectively it offers the possibility to combine the advantages of e-learning as well as face-to-face learning.

To accommodate individual and group learner needs the concept of learning styles is commonly applied.

The literature review shows that research on blended learning in SMEs is needed. A lot of research has been done on a number of very specific aspects

of the topic, often with a higher education student population. An open approach seems adequate, to leave enough room for emerging topics, give enough room for all the stakeholders to get involved, and to find out which of the previously examined topics in relation to blended learning and e-learning are actually relevant in the context of SME learners.

The research question emerging is: “What are relevant characteristics for successful blended learning for learners in SMEs?”

More specifically this thesis aims to answer the following questions:

- What is a successful mix for learners in SMEs from the IT sector in blended learning?
- Does this mix vary depending on the industry and the size of the company?
- Which recommendations can be given in regard to the adaptation of blended learning and SME learners needs?

3.2. Methodology & Research Design

In order to address these questions the research design consists of a Delphi study and a case study. The Delphi study aims to either show diverging or homogeneous recommendations regarding the adaptation of blended learning to SME learners' needs from the different stakeholders of that topic. A case study investigates this question from a different point-of-view and also explores the role of tutors and guidebooks for facilitators in this blended learning context.

3.2.1. The Delphi Method

The question about important aspects in blended learning has been asked under a number of different points-of-view. Previous surveys often concentrate on higher education environments and consider technological or pedagogical settings (Daniel, Matheos and McCalla 2004; Grund, Grote and Gerber 2004; Hannigan and Davies 2004; Mortera-Gutiérrez 2006; Hall 2002). The exploration of the question of blended learning with a focus on the requirements of learners in small and medium-sized companies on the other hand has not been examined in this particular form. The Delphi technique supports explorative research, including a variety of different experts in different locations

with the goal to form a common opinion on a topic, come to an agreement or select a ranked list of items. The study did not exclude any aspect of blended learning a priori, but rather left it up to the panelists to select the topics and narrow the selection down in the course of the Delphi rounds.

People in charge of education and training in SMEs as well as representatives from the e-learning industry provided input and thereby ensured consideration of all the main stakeholders in regard to that question. The aim of the study was to collect input from a group of people large enough to include typical representatives of the different stakeholder groups of blended learning and to include feedback with a variety of perspectives on the topic.

To test the reliability of the results a case study with structured interviews was conducted in parallel to the Delphi study. The case study is introduced and described in more detail in a separate chapter.

3.2.2. Characteristics of the Delphi Method

The Delphi method is characterized by the following aspects:

1. Structuring of information flow

The initial contributions from the Delphi candidates are collected in the form of answers to questionnaires and their comments to these answers. The panel director controls the interactions among the participants by processing the information and filtering out irrelevant content. This avoids the negative effects of face-to-face panel discussions.

2. Regular feedback

Participants comment on their own forecasts, the responses of others and on the progress of the panel as a whole. At any moment they can revise their earlier statements. While in regular group meetings participants tend to stick to previously stated opinions and often conform too much to a group leader.

3. Anonymity of the participants vs. confidentiality

All participants maintain anonymity. Their identity is not revealed even after the completion of the final report. This stops them from dominating others in the process by using their authority or personality and frees them to some extent from their personal biases and helps to minimize the "bandwagon effect" or "halo effect". In doing so it caters for the individual candidate to freely express their opinions, encourages open critique and ability of the candidate to admit to errors by revising earlier judgments.

The first two reasons in particular apply to the given setting of the research as part of an international research project. The aspect of anonymity among the participants was important to examine whether the selection in the final round had any relation to the initial round.

Additional reasons to choose Delphi (Turoff and Linstone 2002) include:

- The individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communication and may represent diverse backgrounds with respect to experience or expertise
- More individuals are needed than can effectively interact in a face-to-face exchange
- Time and cost make frequent group meetings infeasible
- The problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis

The Delphi method, originally developed by the RAND Corporation in the late 50s and 60s of the last century, has been used to answer questions in an educational context from the beginning (Helmer 1966). The Delphi method was originally developed to forecast the impact of technology on warfare, but has been applied to a number of different questions and research topics. Table 3-1 lists two application areas and a number of research topics in information systems research. The list includes research by Kendall and Schmidt which was the main influence for the development of this research. The table gives an impression of the diversity of the topics. It also shows that Delphi studies are an established technique to investigate questions in the research area of this study

and that participant selection is similar to the participant selection for this study too.

Table 3-1 Applications of the Delphi Method in Information Systems Research (Okoli and Pawlowski 2004)

Application of the Delphi Method	Example Studies
Forecasting and issue identification / prioritization	<ul style="list-style-type: none"> • Brancheau et al. – Purpose: Identify the most critical issues facing IS in the coming 3-5 years. Participants: Senior IS executives • Czinkota and Ronkainen – Purpose: Forecast changes in the international business environment over the next decade and the impact of these changes on corporate practices. Participants: Experts from policy, business and academic communities • Hayne and Pollard – Purpose: Identify the critical issues in IS in the coming 5 years perceived by Canadian IS executives and non-management IS personnel and compare to global study rankings. Participants: IS personnel • Kendall et al. – Purpose: Forecast the role of the systems analyst in the 21st century • Lai and Chung – Purpose: Identify a prioritized list of international data communication activities to multinational corporations in managing information exchanges for control and implementation of global business strategies. Participants: IS executives • Viehland and Hughes – Purpose: Compile a ranked list of 12 future scenarios related to the potential success of the Wireless Application Protocol (WAP). Participants: Industry and academic experts
Concept/framework development	<ul style="list-style-type: none"> • Bacon and Fitzgerald – Purpose: Develop a framework of the main areas of the IS field. Participants: IS academics • Holsapple and Joshi – Purpose: Develop a descriptive framework of elemental knowledge manipulation activities. Participants: Researchers and practitioners in the knowledge management field • Mulligan – Purpose: Develop a capability-based typology of information technologies within the financial services industry. Participants: Members of 11 different organizations • Nambisan et al. – Purpose: Develop a conceptual taxonomy of organizational design actions-mechanisms to enhance technology users' propensity to innovate in information technology. Participants: Practicing senior managers from diverse industries • Schmidt et al. – Purpose: Develop a ranked list of common risk factors for software projects as a foundation for theory building about IS project risk management. Participants: Three panels of experienced software project managers from Hong Kong, Finland and the United States

3.2.3. Research Guidelines

Research guidelines for Delphi studies provide a minimum structure for the research design (Hasson, Keeney and McKenna 2000). There are a number of key areas which require consideration, most of them not very different from a standard structure of other research documentation. The topics of the guideline are research problem, research rationale, literature review, methodology, data analysis, discussion, conclusion and essential appendices.

The research problem needs to be clearly defined and the research rationale has to justify the topic as well as the method of the research. In this study the Delphi study is supplemented by a case study. The literature review has to show that the research area has been explored and the topic is understood. At the end of the literature review the research question should become clear. The methodology describes the data collection. In case of the Delphi study this is information on the number of rounds is needed, what the rounds are going to look like, the type of questions asked, and the connection of topics between rounds. In this study a decision was made to have three rounds in total. The methodology has to explain how the reliability and validity of the collected data can be guaranteed and some information on the statistical interpretation has to be given. The case study aims at testing the external validity of the Delphi study results.

Table 3-2 Areas for reporting on the Delphi technique (Hasson, Keeney and McKenna 2000)

Research problem	Clearly defined
Research rationale	Topic and method justification
Literature review	Topic understudy
Methodology	Data collection: clear explanation of the Delphi method employed Rounds: number employed, outline of each Sample: experts selection process and characteristics described in detail Reliability and validity issues identified Statistical interpretation: guidelines for the reader Ethical responsibilities: towards 'expert' sample and research community
Data Analysis	Response rate for each round Round 1: presentation of total number of issues generated Round 2: presentation of results indicating the strength of Support Further rounds (if applicable): presentation of results
Discussion	Issue of consensus
Conclusion	Interpretations of consensus gained/not gained Direction of further research leading from conclusions
Appendices	Copy of each round questionnaire illustrated.

The expert selection process needs to be described in detail. A careful selection for the Delphi study as well as the case study determine whether the quality of the external validity. The selection process is described further down in more detail.

The data analysis looks at the response rate for each round, the number of issues generated in the first round, the results generated in round two and the support or agreement on the results. Optionally this step can be repeated several times, depending on the research question. Issues of consensus are discussed in the final chapter progressing towards the conclusion with interpretations of the results and an indication of research question emerging from the study results.

The appendices need as a minimum requirement a full documentation of the questionnaires for the different rounds. Table 3-2 summarizes the main research guidelines.

3.3. Pre-Study

To determine whether a Delphi study would be a suitable approach and which type of Delphi study would be most appropriate, a pre-Delphi study (Turoff and Linstone 2002) was conducted. In the pre-study only a small group of potential study participants was included: a representative from an SME, a provider, a trainer and a researcher.

During the pre-study the idea of using a mind map to collect initial input in the first round was disregarded, because it seemed likely that a number of participants might not be familiar with the technology and therefore be distracted or even turned off from the study topic itself. Instead it was decided to develop an online form with a clear navigation, a good usability that takes as much work from the participants as possible and which is at best self-explaining how to use.

Initially a set of questions was extracted from a literature review of the two areas blended learning and learning in small and medium-sized enterprises as well as recommendations from the Delphi technique (Turoff and Linstone 2002). Initial considerations to ask for feedback, eventually leading to consensus on different topic areas such as learning styles, different dimensions of interaction,

delivery modes and learning modalities were abandoned in favour of one main question. The formulation model of the questionnaire is shown in Figure 3-1.

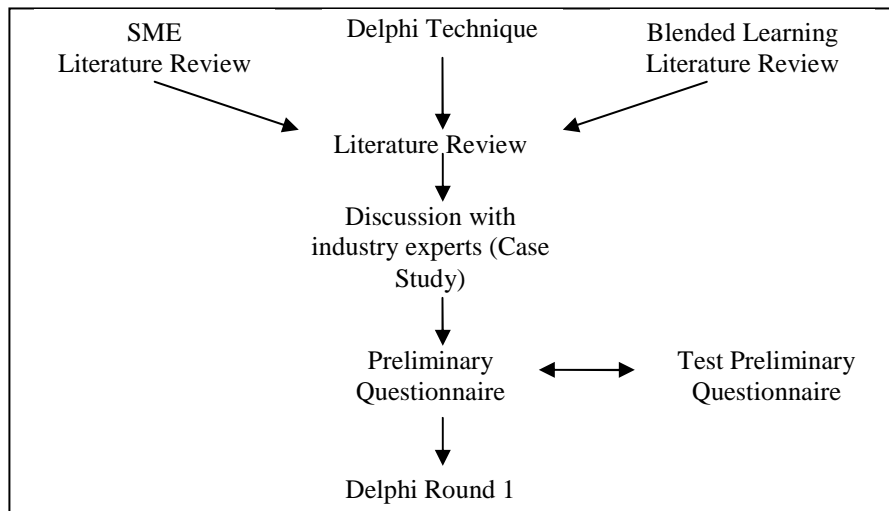


Figure 3-1 Formulation Model of Questionnaire for 1st Round Delphi

The pre-test showed that this questionnaire would not provide input from panelists about their priorities, but rather about agreement or disagreement with the researchers' perspective or previous research.

The pre-Delphi study provided a decision to conduct a ranking type Delphi study as described in previous research (Schmidt 1997; Couger 1988). In accordance with the procedure described in the literature the limit for the number of issues to be asked from the panelists in the first round was set at a minimum of five aspects and a maximum of ten. This seemed to be feasible without strongly increasing drop-out rates from the participants due to high demands in the first round.

3.4. The Workshop at ECTEL 06

A workshop at the First European Conference on Technology Enhanced Learning (ECTEL) was organized to collect input from fellow researchers on the topic of blended learning in SMEs and to get external views on the research design.

The preparation of the workshop included the submission of the proposal (see Appendix A), finding suitable members for the program committee to review the submissions, to contact the possible candidates for the job and provide them with the necessary information. The workshop was announced on appropriate websites and mailing lists (see Appendix B).

During the half-day workshop four papers were presented:

- Sonja Trapp, Fraunhofer IESE
Blended Learning Concepts – a Short Overview
- Mary Buckley, National College of Ireland
Blended Learning and SME's: the challenge for NCI library: USB key as a learning tool
- Silke Steinbach-Nordmann, Fraunhofer IESE, Germany
Applying Blended Learning in an industrial context – an experience report
- Ray Rosdale, akademie.de asp, Germany
Who Needs "Blended Learning"? Some Thoughts on a Political Concept.

Especially the last paper presentation encouraged discussion on the term "blended learning". The discussion did not result in a clear picture though and the discussion about blended learning in SMEs was eclipsed by the discussion how blended learning can be defined.

Nevertheless the discussion provided a few main ideas:

- The context of the learning makes a difference. Looking at the cultural context of learning is important.
- Entrepreneurs do use training options a lot. They choose what accommodates their needs best.
- Blended learning has to be discussed on either a micro- or macro level. The macro level will consider organization issues, media, technology, time and location. The micro level considers the blend on the course level.
- Future research on the topic of blended learning in SMEs needs to include and consider the learners as experts much more.

3.5. Delphi Rounds

To select a suitable Delphi application a taxonomy proposed by Day and Bobeva (2005) was adopted. The Delphi study design can be described using their taxonomy. There will be three rounds, one for discovery of issues and the two following rounds to determine the most important issues and to rank them. The participants will be heterogeneous since there will be five sub panels of

participants with different expertise, researchers and providers of e-learning, online and face-to-face trainers, learners in SMEs and learners in big companies. Within the sub panels the aim is the best possible homogeneity. The study was conducted as an on-line survey and all communication was conducted electronically using e-mail, website and Voice over IP. The aim was single-blind anonymity of the panelists while conducting the study. In addition to these criteria a ranking type survey was selected. The ranking-type Delphi aims at finding an agreement between groups through a ranking of self-selected issues. The ranking type Delphi study requires that the researcher focuses on three initial decisions:

1. when to stop polling
2. how many aspects to carry over to the next round
3. use of statistical techniques to support qualitative conclusions.

Literature suggests that these answers have to be decided individually, depending on the study design, number of participants, area of interest, etc. The following steps are performed:

1) Initially the panelists are asked to list five to ten important aspects of blended learning. Participants have to add a description and a rationale for putting the item on the list.

The total input from round 1 is consolidated into a list size short enough to be accepted by the participants in the next round. The full list of all aspects, including duplicated and synonyms can easily overstrain the participants and might result in high drop-out rates. A too short list on the other hand can result in loss of information. Where panelists use different terms for the same issue the researchers have to provide a summary matching the different terms and one common description of the issue. In the study an initial list of 225 items from round 1 was condensed to a list of 59 items as input for round 2.

2) The facilitator prepares a ranked, consolidated list from first round results.

Techniques of the coding phase in grounded theory (Strauss and Corbin 1990) were applied to analyze the results of round one of the Delphi study. Constant comparison of the aspects collected eventually revealed common properties,

categories and eventually identified core categories. Table 3-3 summarizes the process of consolidation from round 1 to round 2.

It had to be checked continually whether new categories or concise concepts emerged.

Table 3-3 Consolidation of List Items from Round 1 to Round 2

	R 1	→		→		→	Round 2
Activity		Merge doubles		Merge synonyms & word radicals		Join similar context	
No. Items	225		176		145		59

The results were analyzed in three steps. First an alphabetical list of all items revealed doubles. If the descriptions of the items actually described the same aspect they were merged. In the next step the reduced list was checked for synonyms and word radicals. In case they revealed more doubles in the descriptions, one of the aspects was kept on the list. In the third step similar contexts or differently named aspects with an identical or similar description were summarized and designated umbrella terms.

3) The panelists rank their “Top 20 Issues”, ties not allowed from the n-item list from round 1. The results of this second round are aggregated into a list of “Top 20” items for each sub panel.

This 20-item panel specific list is presented in the third round as a list of the “Top 10” with ranks from ten to one. All other items on the list (11-20) are equally ranked “0”.

4) The panelists rank their “Top 10” issues from the 20-item list in the third round. The invitation for the third round informed the panelists that the results of the second round for all the sub-panels were accessible on the website.

5) The facilitator prepares a list with “Top 10”; all others (11-20) are ranked equally rank “0”.

The polling stops after round 3.

The rank is calculated by combining percentage of mentions and relative rankings by the individual panelists. An approximation of the mean ranks has been produced by multiplying each percentage of mention by its first-round rank.

A combined measure of the ranks in the second and third round provide a value for each item and provide the final evaluation of each item on the 20 item list.

The procedure described above includes possible weaknesses of the method. A careful selection of the experts determines the reliability of the results.

If the selection of the experts is not done carefully, a bias can be implemented right from the start. To avoid these problems, basic principles of research design have to be considered. The selection of the experts has to follow a defined procedure, as to make the results reproducible.

3.6. The Panel

The design of a selection pattern for the different groups involved in the study is helpful (Haeder 2000). The Delphi study involved a total of 50 participants. They were selected for the sub-panels small and medium sized enterprises (SMEs) from the IT industry, SMEs from the tourism industry, large companies, trainers, providers and researchers from the areas blended learning, e-learning and lifelong learning. SMEs were selected following the current SME definition of the European Commission (2004).

3.6.1. Identifying Experts

What is an expert or what makes a person an expert? The Oxford dictionary defines an expert as “a person well informed or skilful in a subject”. Following this definition people were selected who possess either skills or knowledge in the area of the research. Careful selection of suitable panelists is crucial for the success of a Delphi study. Before looking for panelists, a pattern for the selection criteria for each sub-panel has to be developed. It was necessary to find experts on blended learning in SMEs. This question includes a number of different stakeholders, learners in SMEs, the people in SMEs deciding about training and development and those who are responsible for the budget. In small companies these functions are typically combined (Moebs 2002).

The next group of stakeholders in regard to this question are training providers; this includes specialized e-learning and blended learning providers. The blend of online and face-to-face learning demands to also consider the point-of-view of tutors, trainers or facilitators; they are a further group of stakeholders.

To actually investigate blended learning in SMEs it is essential to compare the results of these learners with learners from large companies. Therefore a panel with learners from large companies was included as a control group. These four groups provide experts who are mainly engaged in using and providing blended learning. A fifth group of researchers was included to bring an extended view from a research perspective into the study.

To find suitable candidates several organizations representing the different expert groups were contacted. Among these organizations were ISME, IBEC, SFA, the Future Skills and Labour Market Research Unit at FAS, Skillnets, the Dublin Chamber of Commerce and the German-Irish Chamber of Industry and Commerce in Ireland. The project was presented to companies in the International Centre for Education and Learning Technology (ICELT), adjacent to the research office of the college and also to a group of trainers involved in blended learning in the college. Several business networks got involved in the research. Here a personal connection is helpful – for example a membership in a relevant network or previous joint projects. In particular the Software Technology Initiative (STI), a network of predominantly small and medium-sized enterprises from the IT industry, webgrrls, a network of female specialists in new media and other similar networks were contacted in the first phase of the panelists' selection process. In addition, an online research and the most recent company directories for Ireland helped to get an initial list of suitable companies. Appendix C provides a full list of organizations and resources contacted in the initial step of the selection process. Unfortunately most of the publicly available lists and directories do not provide clear information about the actual size of a company.

Cooperation on that topic turned out to be a lot more difficult than expected with most of the organizations mentioned above and eventually the preferred idea of cooperating on the research topic was given up in preference of tackling the problem using existing access to the business community, including some of the networks mentioned above.

3.6.2. Panel Criteria

To ensure the selection of suitable companies, institutions, and people, a pattern (Alexander, Ishikawa, Silverstein et al. 1977) for each stakeholder group

was designed. Following this pattern, possible panelists were contacted. The patterns for the stakeholder groups or sub-panels are briefly outlined.

SME panels Selection for the SME panels followed a general pattern for all SME participants and an additional industry specific pattern. All SME participants need to be employed by an SME according to the EU definition for SMEs. The main characteristic is the number of employees and for SMEs the maximum number of employees is 249. The participants need to have an interest in or experience with blended learning or e-learning and access to the internet. It was not made a compulsory requirement, but panelists with management responsibility (team leader, project manager, department head) were preferred. And finally we were looking for panelists with several years of experience in the industry. For the tourism panel the sub-panel specific selection criteria was to represent the variety of different tourism service providers such as hotels, B&B, tourism information, transportation, guides.

Large company panel The large company panel participants need to be employed by a company with more than 249 employees. Again the criteria for the selection of panelists was some experience with or interest in blended learning or e-learning and they also needed internet access. Again team leaders, project managers and department heads were preferred for this panel.

Trainer panel Participants for the trainer panel were selected depending on the number of years of experience in blended learning, but also experience with learners in SMEs and again panelists need internet access.

Provider panel The participants for the provider panel were selected for their experience in blended learning and their position in an e-learning company.

Research panel The participants in the research panel were selected for their research area, their work and publications in the areas of e-learning, blended learning and lifelong learning.

3.6.3. Contacting Panelists

To find suitable contacts, a list of potential panelists for each sub-panel was put together from the sources described previously. The list was combined with a list of randomized numbers and then ordered by these numbers. The candidates were then contacted following that list, using Skype, a voice over IP

tool. The list contained a little over 1100 contact data sets. In total close to 200 phone calls were made and 60 panel profiles were send out to people who expressed their interest to participate in the study during the call.

The panel profile with a cover letter, both documents either in English or German depending on the recipient, were send out as email attachments. 52 panel profiles with the confirmation to participate were sent back. The panel profile was also used to determine the suitability of a potential candidate in combination with some online research on the details of the companies contacted. The panel profiles asked for the demographic data, as well as the permission to store and analyze the data and whether the candidate was interested in being mentioned in the final documentation. The full panel profile form is provided in Appendix D.

The panelists are predominantly from Ireland and Germany, but the panel also includes participants from Austria, Belgium, Canada the US.

3.6.4. Minimum Participation

It is necessary to determine a sufficient number of panelists for each sub-panel before starting contacting potential candidates. The allocation to the different sub-panels is also important. If the number is too small, not enough input is given whereas a too large number makes handling the responses especially in the first round very difficult. It is also questionable whether a larger number of panelists actually can provide more and additional information to the study. Following the recommendations in the various publications (Couger 1988; Turoff 2002; Haeder 2000) the threshold was set to a minimum of four and a maximum of ten panelists per sub-panel. For the recruitment of candidates we aimed at signing up ten panelists for each sub-panel.

Table 3-4 Development of the number of panelists

Submitted Panel Profiles	Panelists Round 1	Panelists Round 2	Panelists Round 3
52	39	32	29

The initial panel profile form was send in by 52 potential candidates, input in round one was given by 40 panelists, round two was submitted by 32 panelists and the final round was completed by 29 panelists (see Table 3-4).

The initial sub-panels include ten panelists in the sub-panel IT SMEs, eight panelists in the sub-panel tourism SMEs, eight panelists in the large companies sub-panel, eight panelists in the provider sub-panel, twelve panelists in the trainer sub-panel and six panelists in the research sub-panel. Table 3-5 displays the completion of the Delphi study rounds in the sub-panels.

Round 1 was completed by six panelists in the sub-panel IT SMEs; six panelists in the sub-panel tourism SMEs, six panelists in the large companies sub-panel, six panelists in the provider sub-panel, 11 panelists in the trainer sub-panel and four panelists in the research sub-panel.

Table 3-5 Completion of Delphi Study Rounds in the Sub-panels

	IT SMEs	Tourism SMEs	Large Companies	Provider	Trainer	Researcher
Round 1	6	6	6	6	11	4
Round 2	5	6	4	7	8	2
Round 3	4	5	4	8	8	0

Round two was completed by five panelists in the sub-panel IT SMEs; six panelists in the sub-panel tourism SMEs, four panelists in the large companies sub-panel, seven panelists in the provider sub-panel, eight panelists in the trainer sub-panel and two panelists in the research sub-panel.

After round two the research panel was closed since the minimum number of replies was not reached. The two remaining participants and their input were assigned to the trainer and the provider sub-panel respectively in agreement with the panelists and in accordance with a second preference given in the initial panel profile.

Round three was completed by four panelists participated in the sub-panel IT SMEs, five panelists in the sub-panel tourism SMEs, four panelists in the large companies sub-panel, eight panelists in the provider sub-panel and eight panelists in the trainer sub-panel.

The reasons for dropout varied, depending on the time or stage of dropout.

Reasons mentioned for dropping out before the first round were

- Misunderstanding; candidate thought the panel profile was the study
- No reply to any emails and no availability on the phone

- Change of jobs or area of work

Reasons mentioned for dropping out after the first round were

- Unexpectedly big work load in the job
- Change of jobs or area of work
- Serious illness

Only one of the researchers expressed disagreement with the study design other than that none of the panelists dropped out because of the study, but rather due to work-related or health issues.

3.7. Demographics

3.7.1. Sub-panel Characteristics

The participants in the sub-panels, who signed up for the study, fulfil the required patterns. The following descriptions quickly outline each sub-panel.

Figure 3-2 shows a comparison of the sub-panels by years of experience in the industry. The panelists in the tourism sub-panel have the by far longest experience. This is possibly due to the fact that many of the small companies are family-owned businesses and most owners will have been working in the industry most of their lives. Whereas the panelists from the IT industry have comparatively little experience, which might be explained by the generally younger workforce in the IT sector.

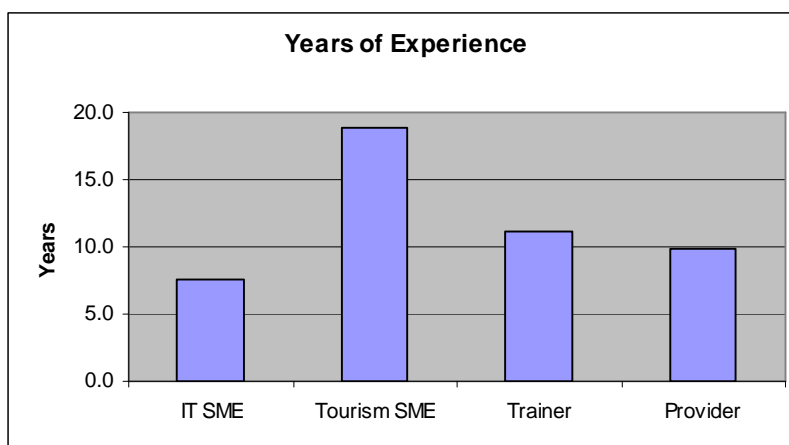


Figure 3-2 Panelists' Average Years of Experience in the Industry by Sub-panels

The participants from the IT SME panel are managing directors, owners, manager, network technical staff and software developers. They have an average of 7.6 years experience in the industry.

The tourism SME panel includes the following areas: hotels, B&B, tourism information, travel agent and tourist guide or instructor (ski, snowboard, sailing, etc.). They are owners, managing directors and project managers and work for B&Bs, hotels, an outdoor events provider, travel agencies and tourism information. The participants from the tourism SME panel have an average of 18.8 years experience in the industry.

The trainer panelists are mainly trainers in the IT sector, some in general education. The panelists have an average experience of 11.1 years in blended learning; the median is 8 years and years of experience ranges from 5 to 22 years.

The provider panelists' positions are head of product development or education management, learning design manager, technical staff, project manager and managing director. They have an average of 9.9 yrs experience in blended learning; the median is 4 years and years of experience ranges from 4 to 16 years.

The research panelists' research topics are evaluation of TEL, access to learning, digital learning styles, social media, open educational research, business models in e-learning and e-learning standards. They have an average of 11.6 yrs experience; the median is 10 years and years of experience ranges from 9 to 16 years.

3.7.2. Panel Characteristics

The following graphs give a quick overview of the main characteristics of the Delphi panel at the start of the survey. The description always looks at the full panel for the survey and does not differentiate between the sub-panels.

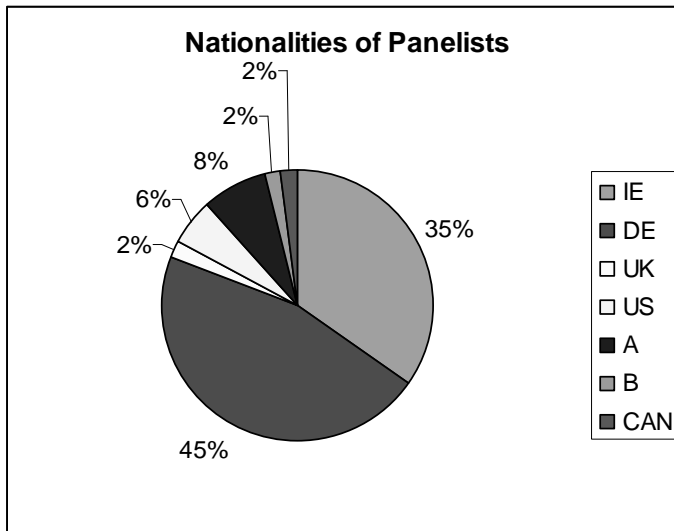


Figure 3-3 Distribution of Nationalities in the Panel

Most of the panelists are from Ireland or Germany respectively. Participants from the US, Canada and Belgium are in either the provider or the trainer sub-panels. Austrian panelists participate in the tourism sub-panel. Figure 3-3 shows the distribution of nationalities in the panel.

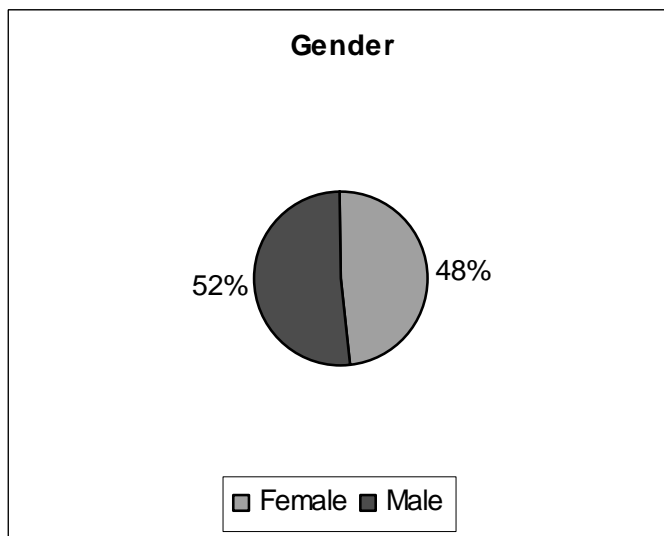


Figure 3-4 Gender Distribution in the Panel

The distribution between the genders is very balanced, not only across the complete Delphi panel, but also within most sub-panels. Figure 3-4 shows the gender distribution in the panel.

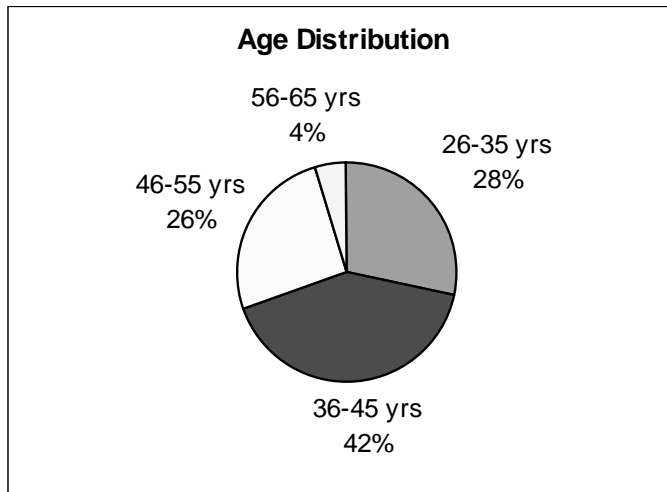


Figure 3-5 Participating Age Groups in the Panel

The age distribution shows that there are no panelists with an age below 26 years. This is possibly related to the selection criteria “years of experience”. The age of most of the panelists in the first category lean towards the upper end of the category. The biggest group is in the category between 35 to 45 years of age. This reflects the comparatively young age structure for the IT sector as well as the training industry (National Skills Bulletin 2005). The age distribution is illustrated in Figure 3-5.

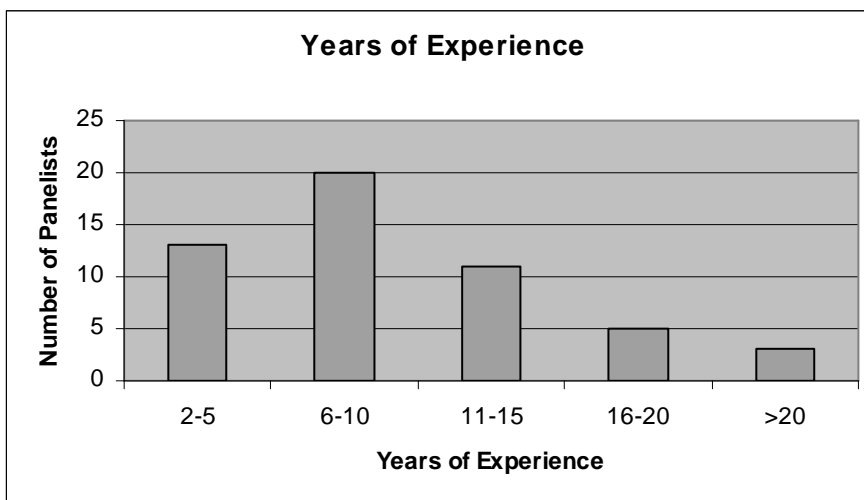


Figure 3-6 Years of Experience in the Industry in the Panel

Figure 3-6 shows that the majority of the participants has more than five years experience in the respective industry. None of the participants have less than 2 years of experience, this clashes sometimes with career changes and explains the low number of years.

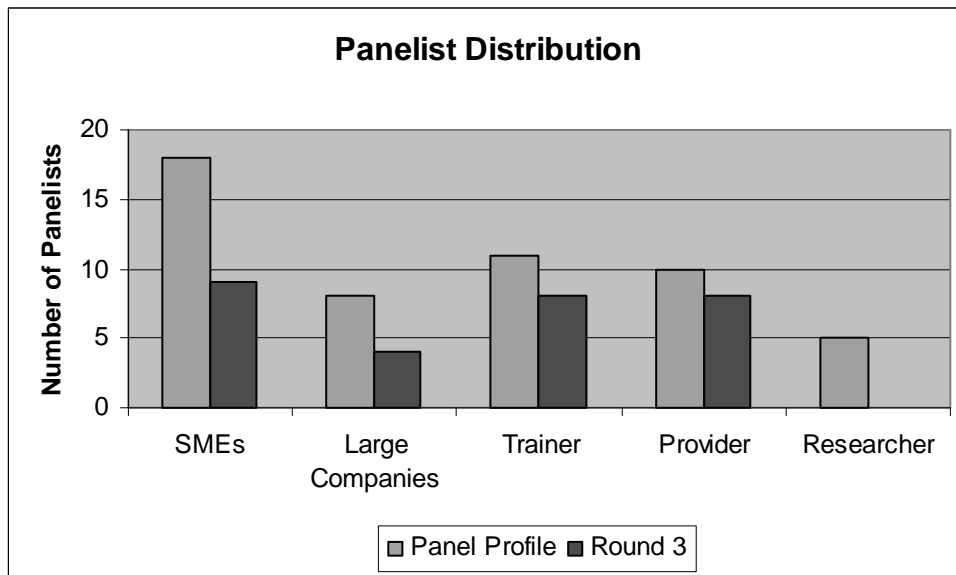


Figure 3-7 Distribution of the Sub-panels, comparing Start Panel to Round 3

Figure 3-7 makes it very obvious where the dropout was strongest. The research panel disintegrated in the second round, the sub-panels with employees either in SMEs or large companies lost half of their population. The losses in the trainer and provider panel are comparatively small. The dropouts in the company panels were caused unanimously due to unexpected work load in the company or serious health problems.

3.8. Data Collection

The purpose of the research was to identify a list of aspects which are essential for successful blended learning in SMEs.

3.8.1. Data Collection Step-by-step

The data collection was done in four main steps. The initial panel profile provides the statistics about the panel. The three rounds of the Delphi study follow a survey methodology described by Couger's initial paper and Schmidt, who analyzed Couger's research in a later publication. The first round explores the topic and provides the scope of the ranking items. Rounds two and three provide the ranking of the items and eventually deliver the final result of the study.

3.8.2. The Panel Profile Form

The panel profile form to assess the panelists' professional and demographic profile was sent out as a PDF-attachment to an email to all potential candidates

who had been contacted beforehand. Interested candidates were asked to send back the signed form by a deadline. The form asks for the following information:

- Contact information (company name, contact name, postal address, email address)
- Company profile (industry, size)
- Details on the participant (years in the industry, age, position in the company)
- Professional training in the company (development plan, training budget, importance of workforce development, corporate culture's impact on development, use of e-learning/blended learning, planned use of e-learning/blended learning)
- Permission to store and analyze data

The complete form is shown in Appendix D.

3.9. Web-based Research Design

The Delphi study itself was conducted as an online study. An online study has the advantage that it cuts out costs for printing, paper, envelopes, mailing, just as any other internet-based communication. The online questionnaire was deployed to all panellists at the same time; questions via email can be answered within 24 hours and the submission of the questionnaire does not have to deal with international mail delivery times, typical for paper-based communication.

The online survey simplified data handling. The panelists' responses were recorded immediately by the system and the input from round one could be used for the next steps by "copy and paste", rather than typing in the results.

3.9.1. Design and Development of Online Delphi Instruments

Ready-to-use online survey sites (e.g. surveymonkey) were not suitable for the questionnaire design. Simple HTML-pages were developed, to cut out any technology issues. Figure 3-8 shows the sitemap of the survey website which can be found for future reference at www.specialtrees.net.

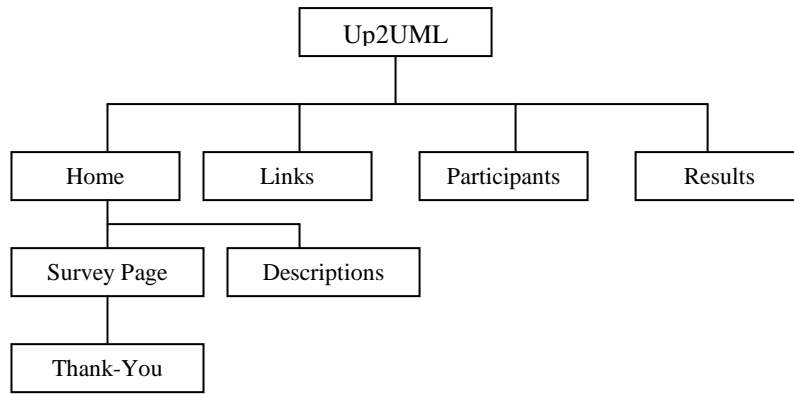


Figure 3-8 Sitemap Survey Page

The design of the website leads the participants directly from the homepage of the survey to the survey page and once this page is submitted the Thank-you page leads again to the navigation of the website with the pages “Links”, “Participants” and “Results”. The pages with the links provides information about upcoming conferences and information sites on blended learning, the page on the participants provides information on the selection criteria for the survey and finally the results page provided information about all the sub-panel results between round two and three. The page with the definitions is accessible only via the survey page in round two and three and provides a list with the descriptions of the aspects.

The test during the pre-study already eliminated some of the initially considered tools and technologies like mind mapping or the use of concept maps.

Usability was an important issue for the development of the survey tool.

Although all panelists are familiar with using internet tools, I suppose that a user-centred design reduced the dropout rate and made participation more enjoyable. We followed the basic principles of usability outlined in Nielsen’s heuristics (Nielsen n.d.).

Anticipation: Anticipation of the users’ needs was one of the main aspects considered for the usability. We aimed at giving concise information on what to do, where, why and when with a type of guiding system that would lead the panelists through the study without having to think too much about what to do next.

The four steps of the guiding system are

1. Invitation email
2. Homepage
3. Login
4. Survey page
5. Thank-you page

The panelists received first information on how to use the website with their invitation email (see Figure 3-9).

The first round of the online questionnaire is now open.

Round 1 of the study asks for five to ten major characteristics related to blended learning which you believe are important for blended learning to fulfill the needs of learners in SMEs. Please provide the characteristics with a brief definition and an explanation why you consider these characteristics important. The form requires a minimum of 5 characteristics with definition and explanation to be submitted.

You can reach the survey here:

http://www.up2uml.org/jumppage_en.html

There you can select the link for your 'Panel Trainers' to progress to the online questionnaire.

The form will open in a new window of your browser.

To access the form you will need your username and password.

username: [username]

password: [password]

The form will be available until 20 March 2007.

Figure 3-9 Invitation for the First Round of the Delphi Study

The instructions in the email were well received by all panelists, some of them even commented on it and how it made participation very easy.

The hyperlink included in the email lead to the home page, which again provided brief information about the background of the study and the researchers conducting the survey. To make actions and options clearly visible, we reduced the information load on this page as much as possible.



Blended Learning for Small and Medium-Sized Enterprises

[Home](#) [Participants](#) [Results](#) [Up2UML](#) [Links](#)

What works best in blended learning for SMEs? This study will highlight what is a good mix in blended learning - a mix of online and face-to-face teaching - for learners in small and medium-sized enterprises (SMEs). The study includes input from trainers, providers and researchers from the area of e-learning, blended learning and lifelong learning. The input from learners in SMEs will be compared with a control group from large companies.

Please access the questionnaire by clicking the appropriate link below.

- Panel [SMEs from the IT industry](#)
- Panel [SMEs from the tourism industry](#)
- Panel [Large Companies](#)
- Panel [Trainers](#)
- Panel [Providers](#)
- Panel [Researchers](#)

Thank you for your participation in our study. This study is partially funded by:
National College of Ireland
School of Informatics
Sabine Moebs, MSc by Research Candidate



Figure 3-10 Screenshot Homepage during Round 1

The homepage provides some information on the survey, it mainly repeated the question we were trying to answer and it also gave the panelists clear indication what to do and where to go next (see Figure 3-10).

Although in the first round there was no need to divide the panel into the sub-panels we used a homepage that stayed the same throughout the study to increase the consistency within the study. The German-speaking panelists were provided with an equivalent homepage in German. The hyperlinks from any of the panels lead to the login screen.

The actual survey page always starts with a section with instructions on how to use the page (see Figure 3-11).



How to complete this form:

- Please state a minimum of five major characteristics of blended learning that you think are important for fulfilling the needs of SME learners. If possible, list up to 10 characteristics.
- Please also provide a short description (1-2 sentences) for at least five characteristics as well as a short explanation, of why you consider this aspect important.
- Mandatory input is marked with an asterisk *.
- Please submit this form no later than 20 March 2007

Definition of Blended Learning:

The inclusion of different methods of learning, both traditional forms and electronic forms to achieve real and lasting learning.

Example:

Characteristic: (Specify the characteristic)

e.g. fully web-based e-learnin

Description (Describe the characteristic)

e.g. The e-learning components should be accessible through a browser without the need for additional software installation on a pc or laptop.

Explanation (Explain why this characteristic is important)

e.g. I think that it is important to have the online components available through the web without being tied to a specific computer or location. Thus employees

Online Questionnaire:

Figure 3-11 Screenshot Round One Questionnaire - Instructions

Consistency with the user expectations was considered under several aspects.

The main aspect is the guiding system that stayed the same throughout the different rounds. A consistent look-and-feel of the web pages made it easier to always recognize the pages. The navigation was done with CSS to ensure a consistency for all pages and all rounds of the survey. It stayed in the same position and indicated visited links by colour change.

The login procedure was left unchanged for all rounds, as mentioned previously. The panelists were sent their username and password with the invitation for each round (see Appendix E). The login screen usually gave an indication which sub-panel survey was accessed in the login screen text.

Inconsistency This heuristics deals with things that require different input and which therefore should look different. The questionnaire design had to be different between round one compared to rounds two and three, because they require different form of input.

In round one the panelists were asked to actually type text in different entry fields (see Figure 3-11), whereas in rounds two and three alike, panelists had to simply type two-digit numbers into a ranking list (see Figure 3-12).



Blended Learning for Small and Medium-Sized Enterprises

How to complete this form

- Please select what you consider to be the 20 most important aspects of Blended Learning from the list below. This list has been compiled from your input in Round 1.
- To read the summarized description of an aspect, just click on it. A page will open in a new window with the definitions of all the aspects on the list.
- Input your choices into the "Top 20" form below. The list includes a ranking, aspect "No 1" is the aspect you consider most important.
- Boxes marked with an asterisk * must be filled.
- Please submit the form by 25 June 2007.

List of the most important aspects of Blended Learning (from Round 1)

01 Accessibility	02 Adaptability	03 Affordability	04 Anchor Variety
05 Behaviour Change	06 Beneficial	07 Blend - General	08 Blend Design
09 Clarity	10 Communication	11 Competition	12 Concept Congruence
13 Constructivism	14 Content Design	15 Cost Efficiency	16 Effectiveness
17 Efficiency	18 Engagement	19 Feasibility	20 Flexibility
21 Usability	22 Getting out of daily business	23 Integrated Life-long Learning	24 Workplace-Related Learning
25 Hands On Experience	26 In House Classroom	27 Individuality	28 Fun
29 Intelligent Systems	30 Knowledge Base Internet	31 Learner-Centered	32 Logical Flow of Topics
33 Materials Availability	34 Mix of Methods and Media	35 Mix of Learning Styles	36 Motivation
37 Offer Redundancy	38 Ongoing Contact	39 Open Learning Environment	40 Performance
39 Offer Redundancy	40 Ongoing Contact	41 Open Learning Environment	42 Performance
41 Planned Teaching	42 Quality	43 Follow-Up	44 Relevance of Content
45 Results Measurement	46 Self-Paced Learning	47 Simulations	48 Skills Training
49 Student Interaction	50 Support Mechanisms	51 Sustainability	52 Team Collaboration
53 Technology	54 Time Flexibility	55 Train the Trainers	56 Training Methods
57 Recognition of Traditional Learning	58 Geographical Independence		

Selected "Top 20": (No. 1 = most important)

">

No. 1* No. 2* No. 3* No. 4* No. 5* No. 6* No. 7* No. 8* No. 9* No. 10*

No. 11* No. 12* No. 13* No. 14* No. 15* No. 16* No. 17* No. 18* No. 19* No. 20*

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Figure 3-12 Screenshot Round Two – "Top 20" Online Form

Short and concise dialogues The dialogues were kept short and to the point to make sure they did not contain irrelevant information. To make sure the bilingual online survey asked for the same information in both versions, the texts were developed in English, and then translated into German. A back translation was done by a second person to check whether the text actually expressed what was intended initially.

Speak the user's language Concepts, words and phrases that might not be familiar to all the panelists with their diverse backgrounds were avoided.

Efficiency of the user This required looking at the user's efficiency by reducing the amount of clicks and input to the minimum. The questionnaires were designed to be short enough to fit onto one page without the need for much, if any scrolling (see Figure 3-12). This way the panelists could easily estimate the amount of work expected. The questionnaires for the second and third round were designed in a way that the users simply had to type in two-digit numbers rather than typing item names (see Figure 3-12).

Learnability Here the heuristics clearly recommended avoiding any learning curve using the interface. Judging by the feedback of the users we seem to have reached that goal; nobody reported any problems, but a few participants actually got back to me via email making positive comments how easy to use and self-explaining the website was.

A heuristic evaluation of the website with four potential users checked the suitability of the language used and the navigation, and whether the time estimate of 30 minutes was feasible. The evaluation showed minor deficiencies in word choice, location and order of buttons and confirmed that the instructions given to the users of the site were sufficient and clear. During the survey the simplicity of the page showed one down-side: the pages with preliminary input could not be stored. On one occasion this caused loss of the input of one of the panelists. Fortunately, he contacted us and submitted the input again.

4. Findings of the Delphi Study

This chapter presents the results of the three round ranking-type Delphi study.

First response patterns for the different sub-panels became obvious in round 3 of the Delphi. These patterns are analyzed and discussed, applying comparisons, categorisation, concept maps, radar charts and Kendall's coefficient of concordance. Detailed lists of the results from round 3 of the Delphi study are provided in Appendix H.

4.1. Findings for the Sub-panels

The input from round 1 can be traced throughout the following two rounds. The tables and lists in this section give an overview of which input was given by each sub-panel in the first round, which aspects were selected into the Top 20 in round two, and which aspects were ranked into the Top 10 in the final round. A complete list of the various entries from round one is given as well as mappings showing which of these inputs were condensed into aspects for the list of aspects in round 2 in Appendix F.

These Top 10 results show which aspects were ranked as important aspects. Due to the nature of the Delphi study as an explorative study, these results must not be read as quantitative results, which they are not. Aspects not mentioned or not selected can not automatically be considered unimportant. Nevertheless the study gives the big picture of what was considered important enough to be submitted by the panelists in the initial round, what the panelists ranked as important, and what the panelists finally ranked as the ten most important aspects. The fact that an aspect is actually submitted is more important than the final ranking. The analysis and discussion of the findings is presented in Chapter 6.

The first column of Table 4-1 to Table 4-5 shows the list of aspects selected in round two and three of the Delphi study. The second column, Table 4-1 to Table 4-5, shows where the aspects originated by the respective sub-panel in the first round. Column three shows the aspects selected as the Top 20 in the second round and fourth column shows the Top 10 in the third round.

4.1.1. Results IT SME Sub-panel from Round 1 to Round 3

In total the sub-panel provided input for 26 aspects. All Top 10 aspects in the last round have sub-panel input in the first round. Panelists selected 4 aspects without any initial sub-panel input in the following rounds 2 and 3. Table 4-1 shows the input from the sub-panel and the selection in rounds 2 and 3.

Table 4-1 Input IT SMEs Round 1 and Selection in Round Two and Three

List of Aspects in Round 2 & 3	Originated from IT SME sub-panel	Top 20 in Round 2	Top 10 in Round 3
Accessibility	X	X	X
Adaptability	X		
Anchor variety	X		
Behavior Change		X	
Blend – general	X	X	
Content design	X	X	X
Cost Efficiency	X	X	X
Effectiveness	X	X	
Efficiency	X	X	X
Feasibility	X	X	
Flexibility		X	
Follow-Up	X	X	
Fun	X		
Getting out of daily business		X	
Intelligent systems	X		
Learner-Centered		X	X
Materials Availability	X		
Mix of Learning Styles	X		
Motivation		X	
Planned Teaching	X		
Quality	X	X	X
Recognition of Traditional Learning	X		
Relevance of Content	X	X	
Results Measurement	X	X	X
Self-Paced Learning	X	X	X
Simulations	X		
Support Mechanisms	X	X	X
Sustainability	X	X	
Team Collaboration	X		
Time Flexibility	X	X	X
Workplace-Related Learning	X		

The sub-panel IT SMEs selected the following aspects as Top 10 in the 3rd round:

1. Time Flexibility
2. Cost Efficiency
3. Support Mechanisms
4. Accessibility
5. Efficiency
6. Quality
7. Self-Paced Learning
8. Results Measurement
9. Content design
10. Learner-Centred

A comparison of the results of rounds 2 and 3 shows that seven out of ten aspects remained among the Top 10 in both rounds. Three new aspects were selected for the Top 10 in the third round from the list of items ranked between 11th and 20th in the second round. Figure 4-1 shows the TOP 10 of rounds 2 and 3 in direct comparison.

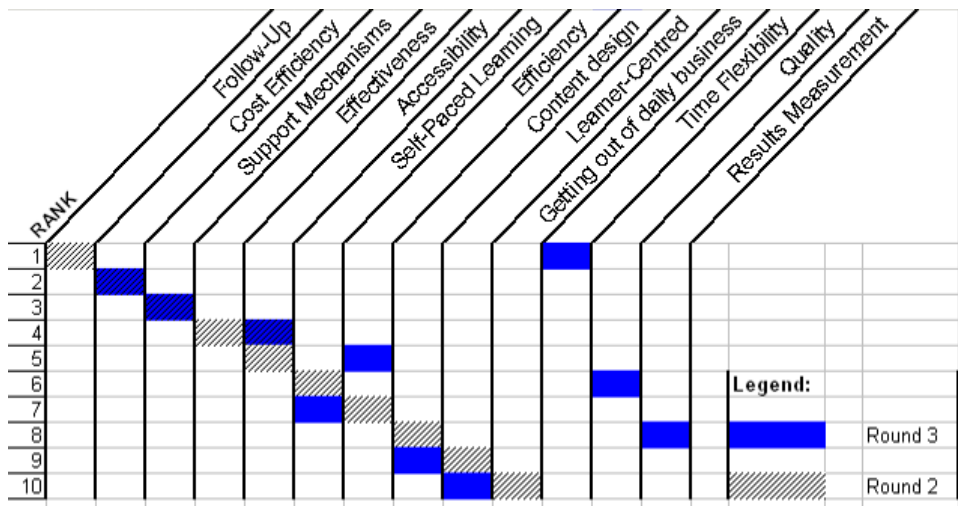


Figure 4-1 Comparison Top 10 Sub-panel IT SMEs

4.1.2. Results Tourism Sub-panel from Round 1 to Round 3

In total the sub-panel provided input for 15 aspects. Six of the Top 10 aspects in the last round have sub-panel input in the first round. Panelists selected 12 aspects without any initial sub-panel input in rounds 2 and 3. The tourism sub-panel selected the most aspects originally provided by other sub-panels compared to the other sub-panels. This is possibly due to the fact that the tourism sub-panelists are the least exposed to the technical terminology used, compared with the other sub-panels. Table 4-2 shows the input from the sub-panel and the selection in rounds 2 and 3.

Table 4-2 Input Tourism SMEs Round 1 and Selection in Round Two and Three

List of Aspects in Round 2&3	Originated from Tourism SME sub-panel	Top 20 in Round 2	Top 10 in Round 3
Accessibility	X	X	X
Beneficial		X	
Competition	X		
Cost Efficiency	X	X	X
Effectiveness	X		
Efficiency		X	X
Feasibility		X	X
Flexibility	X	X	
Geographical independence	X	X	X
Getting out of daily business		X	
Individuality	X	X	X
Knowledge Base Internet		X	
Logical Flow of Topics		X	
Mix of Learning Styles	X		
Motivation		X	
Open Learning Environment		X	
Planned Teaching		X	
Quality	X	X	
Relevance of Content	X		
Results Measurement	X	X	X
Self-Paced Learning	X	X	X
Student interaction	X		
Support Mechanisms		X	
Team Collaboration	X		
Time Flexibility		X	X
Training Methods	X		
Workplace-Related Learning		X	X

The sub-panel tourism SMEs selected the following aspects as TOP 10 in the 3rd round:

1. Self-Paced Learning
2. Time Flexibility
3. Geographical independence
4. Cost Efficiency
5. Workplace-Related Learning
6. Results Measurement
7. Efficiency
8. Accessibility
9. Individuality

A comparison of the results of rounds 2 and 3 shows that eight out of ten aspects stayed among the Top 10 in both rounds. Two new aspects were selected among the Top 10 in the third round from the list of items ranked between 11th and 20th rank in the second round. Figure 4-2 shows the TOP 10 of rounds 2 and 3 in direct comparison.

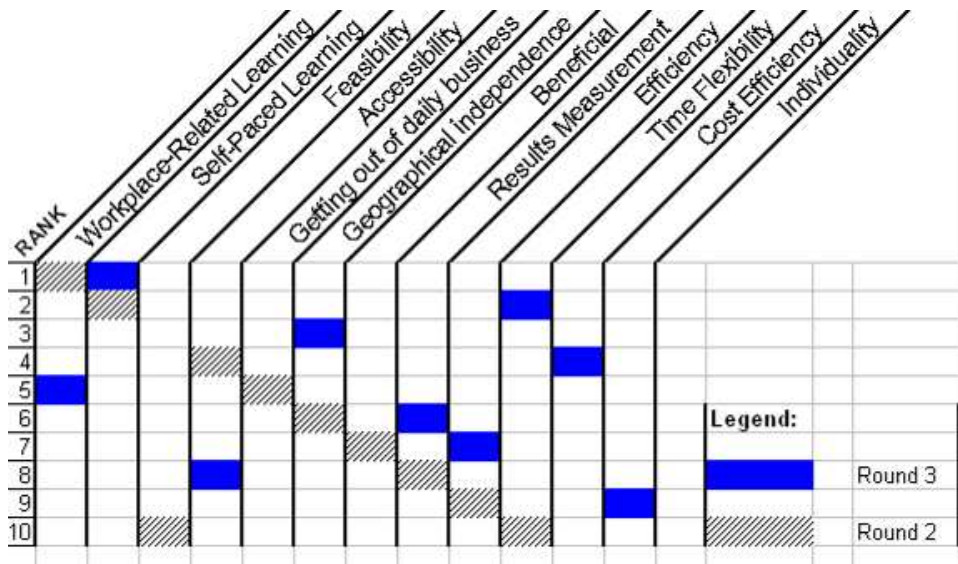


Figure 4-2 Comparison Top 10 Sub-panel Tourism SMEs

4.1.3. Results Large Company Sub-panel from Round 1 to Round 3

In total the sub-panel provided input for 19 aspects. Three of the Top 10 aspects in the last round have sub-panel input in the first round. Panelists selected 14 aspects without any initial sub-panel input in rounds 2 and 3. Table 4-3 shows the input from the sub-panel and the selection in rounds 2 and 3.

Table 4-3 Input Large Companies Round 1 and Selection in Round Two and Three

List of Aspects in Round 2 & 3	Originated from Large Company sub-panel	Top 20 in Round 2	Top 10 in Round 3
Accessibility	X	X	
Adaptability	X		
Affordability		X	
Blend Design		X	X
Communication		X	X
Content design		X	X
Effectiveness	X		
Engagement		X	
Feasibility		X	
Flexibility		X	X
Getting out of daily business	X	X	X
Hands On Experience	X		
In House Classroom	X		
Individuality		X	
Intelligent systems		X	
Materials Availability	X		
Mix of Learning Styles	X		
Mix of Methods and Media		X	
Motivation		X	X
Open Learning Environment	X		
Performance	X	X	
Quality	X		
Recognition of Traditional Learning	X		
Relevance of Content	X		
Results Measurement		X	X
Self-Paced Learning		X	X
Student interaction	X		
Support Mechanisms	X		
Technology	X		
Time Flexibility	X	X	X
Train the Trainers		X	
Training Methods	X		
Usability	X	X	X

The sub-panel large companies selected the following aspects as the TOP 10 in the 3rd round:

1. Usability
2. Communication
3. Blend Design
4. Motivation
5. Results Measurement
6. Self-paced Learning
7. Time Flexibility
8. Getting out of daily business
9. Content Design
10. Flexibility

A comparison of the results of rounds 2 and 3 shows that six out of ten aspects stayed among the Top 10 in both rounds. Four new aspects were selected among the Top 10 in the third round from the list of items ranked between 11th and 20th in the second round. Figure 4-3 shows the TOP 10 of rounds 2 and 3 in direct comparison.

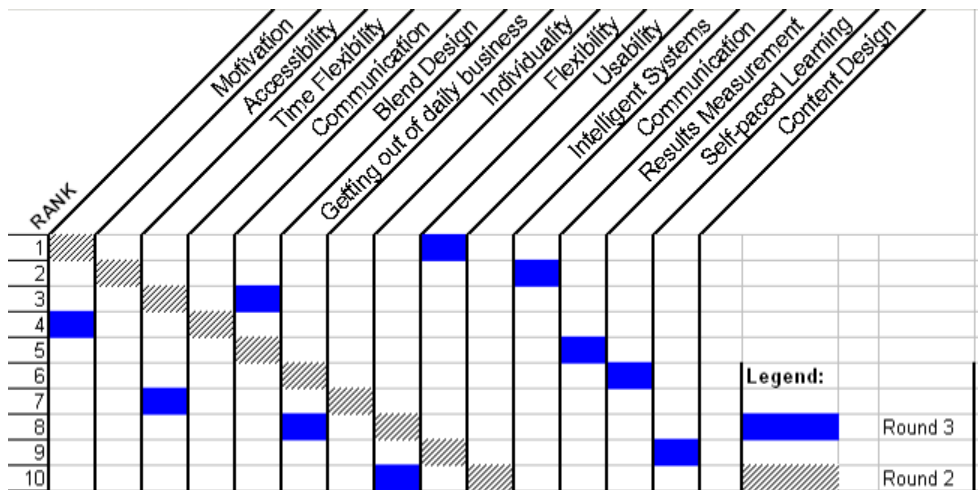


Figure 4-3 Comparison Top 10 Sub-panel Large Companies

4.1.4. Results Trainer Sub-panel from Round 1 to Round 3

In total the sub-panel provided input for 33 aspects. Nine of the Top 10 aspects in the last round have sub-panel input in the first round. Panelists selected 4 aspects without any initial sub-panel input in the following rounds 2 and 3. Table 4-4 shows the input from the sub-panel and the selection in rounds 2 and 3.

Table 4-4 Input Trainers Round 1 and Selection in Round Two and Three

List of Aspects in Round 2 & 3	Originated from Trainer sub-panel	Top 20 in Round 2	Top 10 in Round 3
Accessibility	X		
Adaptability	X	X	X
Affordability		X	X
Beneficial	X		
Blend - general	X	X	
Blend Design	X		
Clarity	X		
Communication	X		
Constructivism	X		
Content design		X	
Cost Efficiency	X		
Effectiveness		X	
Efficiency	X	X	
Engagement	X		
Flexibility	X		
Geographical independence	X	X	X
Hands On Experience	X	X	
Individuality	X		
Integrated Life-long Learning	X	X	
Intelligent systems	X		
Knowledge Base Internet	X		
Learner-Centered	X	X	X
Logical Flow of Topics	X		
Mix of Learning Styles	X	X	X
Mix of Methods and Media	X	X	X
Offer Redundancy	X		
Open Learning Environment	X	X	
Planned Teaching	X		
Quality		X	
Relevance of Content	X	X	
Self-Paced Learning	X	X	X
Skills Training	X		
Student interaction	X	X	X
Support Mechanisms	X	X	X
Team Collaboration	X		
Time Flexibility	X	X	X
Workplace-Related Learning	X	X	

The sub-panel trainer selected the following aspects as the TOP 10 in the 3rd round:

1. Self-Paced Learning
2. Adaptability
3. Time Flexibility
4. Mix of Methods and Media
5. Student interaction
6. Geographical Independence
7. Mix of Learning Styles
8. Learner-Centred
9. Support Mechanisms
10. Affordability

The comparison of the results of rounds 2 and 3 shows that eight out of ten aspects stayed among the Top 10 in both rounds. Two new aspects were selected among the Top 10 in the third round from the list of items ranked between 11th and 20th in the second round. Figure 4-4 shows the TOP 10 of rounds 2 and 3 in direct comparison.

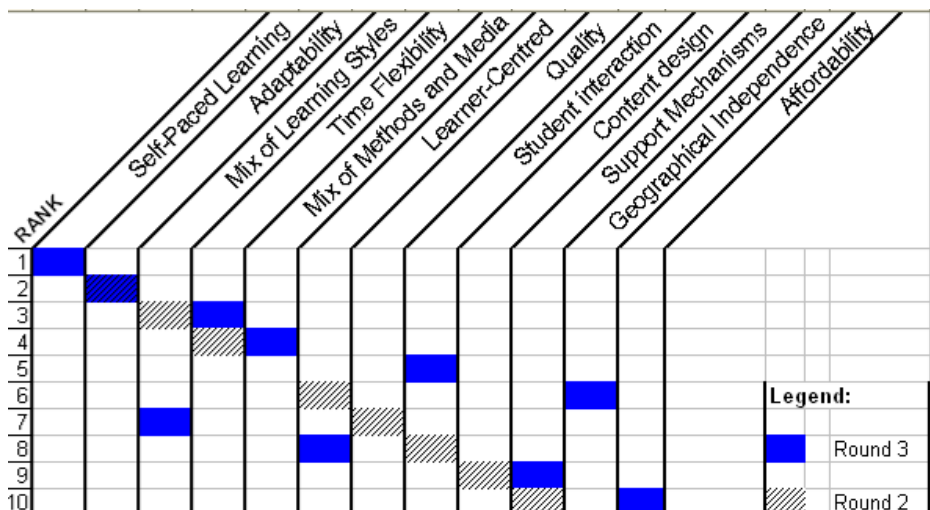


Figure 4-4 Comparison Top 10 Sub-panel Trainer

4.1.5. Results Provider Sub-panel from Round 1 to Round 3

In total the sub-panel provided input for 30 aspects. Eight of the Top 10 aspects in the last round have sub-panel input in the first round. Panelists selected 5 aspects without any initial sub-panel input in the following rounds 2 and 3. Table 4-5 shows the input from the sub-panel and the selection in rounds 2 and 3.

Table 4-5 Input Provider Round 1 and Selection in Round Two and Three

List of Aspects in Round 2&3	Originated from Provider sub-panel	Top 20 in Round 2	Top 10 in Round 3
Adaptability		X	
Affordability	X		
Behaviour Change	X	X	
Blend - general	X		
Blend Design	X		
Clarity	X		
Communication		X	
Concept Congruence	X		
Content design	X	X	X
Effectiveness	X	X	
Efficiency		X	X
Engagement		X	
Flexibility	X	X	X
Fun	X	X	
Hands On Experience		X	X
Individuality	X		
Integrated Life-long Learning		X	
Knowledge Base Internet	X	X	
Learner-Centered	X	X	X
Mix of Learning Styles	X		
Mix of Methods and Media	X	X	
Motivation	X	X	
Ongoing Contact	X		
Quality	X	X	X
Recognition of Traditional Learning	X		
Relevance of Content	X	X	X
Results Measurement	X		
Self-Paced Learning	X		
Student interaction	X	X	X
Support Mechanisms	X		
Sustainability	X		
Technology	X		
Time Flexibility	X		
Training Methods	X		
Usability	X	X	X
Workplace-Related Learning	X	X	X

The sub-panel providers selected the following aspects as TOP 10 in the 3rd round:

1. Quality
2. Hands on Experience
3. Relevance of Content
4. Usability
5. Student interaction
6. Learner-Centred
7. Content design
8. Workplace-Related Learning
9. Flexibility
10. Efficiency

A comparison of the results of rounds 2 and 3 shows the same ten aspects are selected as Top 10 in both rounds. Figure 4-5 shows the TOP 10 of rounds 2 and 3 in direct comparison.

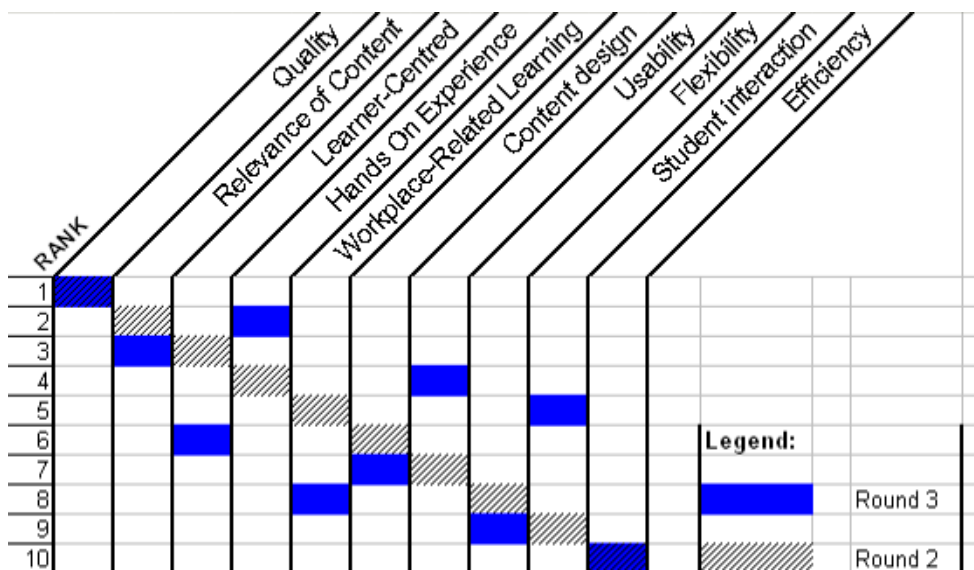


Figure 4-5 Comparison Top 10 Sub-panel Providers

4.2. Findings for the Delphi Panel in the Initial Round and in the Final Round of the Delphi Study

4.2.1. Results Round 1

In round 1, the panelists were asked to collect a minimum of five and a maximum of ten aspects of blended learning that they considered important for

successful blended learning. A consolidated list with all the items from all participants was given to the participants in round 2.

In round 1 a list of approximately 200 unsorted items were collected. The following list highlights the aspects that were mentioned by five panelists or more. The aspects are briefly described, reflecting the variety of notions. It has to be mentioned that for reasons of authenticity the explanations given by the panelists were kept rather than being edited them and thereby perhaps changing the intended meaning.

Accessibility 24-hour accessibility of online parts, the option to work from home or while travelling were mentioned was mentioned. Materials, tutor, IT and classrooms have to be as convenient as possible for the learner to encourage maximum participation. The learner has to be able to decide where and when to learn.

Time Flexibility Trainers and participants should have the time to get to know the system and the combination of online and face-to-face teaching and learning. Online learning should enable to learn when it suits the learner and moreover enable completely independent learning. It should enable participants to decide on suitable learning times suitable to other activities and to use times in between normal work. Online learning should support the learner in making best use of their own time.

Cost Efficiency Blended learning as an option to keep the price of the training solution as low as possible was mentioned. Participants also see a potential to find a good mix by emphasizing the lower-cost elements of the blend (e.g. off-the-shelf e-learning entities, on-line books, etc.). Some participants expressed belief that blended learning often means lower costs. The option to use online course materials for training courses at a regional level with participants in different, often remote locations, is expected to reduce travel costs. In general participants expressed the opinion that online learning is more cost-efficient both from a short-term as well as from a long-term perspective.

Student Interaction The ability to interact at different levels and through different media should allow a more adaptive approach to learning. Participatory opportunities for students to have a voice e.g. using Voice over IP was

mentioned several times, but also taking the student through a number of learning routes rather than a given sequencing of learning materials.

Support Mechanisms Personal support for every participant by mail, phone or chat or mentoring is considered important. Collaboration tools are seen as possibilities to greatly improve the team work that can be allocated and performed. The ability to work in teams or virtual teams is perceived as a supporting function. Providing ample opportunities for students to obtain help with specific problems was mentioned as well as the need to explore topics that might be a little off the curriculum. The online assessment is considered helpful for motivating the learner, because it gives immediate feedback. Nevertheless, social interaction in the classroom is also required.

Mix of Methods and Media The use of different media, different learning media, face-to-face and online are the characteristics mentioned most often. A selection of media for specific parts of a course, e.g. test or interactive content that is read to the learner or includes images and text as well as the classical reading of books, is mentioned several times. The user should have print/offline media supplementing the online learning content. Learning with suitable media and the right selection of methods by the tutor is crucial for blended learning. Online modules allow flexibility, but can be very generic. Face-to-face phases in contrast can be very intensive and don't allow for distraction. They are considered more restrictive.

Mix of Learning Styles A mix of learning styles is expected to support learning success. A basic mix of online and offline activities are expected as well as a mix of different ways to present and teach. This mix is also expected to increase motivation.

Workplace-related Learning Learning must be relevant and useful to the learner, otherwise it is just an exercise soon to be forgotten. The course needs to be relevant to the skills / information gap that the organization has. Learning content has to be up-to-date and important to the user.

Individuality Instruction should be designed to adapt to the individual learner and it should provide different kinds of learning experiences. The e-learning

enables learners to set an individual focus. Trainers or facilitators need to be able to deal with different personalities and heterogeneous groups.

Knowledge Base Internet The internet provides the most recent knowledge to people via forums and it is a unique, easily accessible dictionary for any topic. Accessibility and easy search functions make the internet a vast source of teaching materials and enables trainers to provide access to lots of related material to build students' enthusiasm. It provides a number of elements that can be added into a blend, like blogs, wikis, mobile, podcasts etc.

Recognition of traditional learning Formal classroom training which follows a specific training guideline tends to cover the topic in question in greater detail. From experience this is suited to the more committed. Formal classroom/college is ideal also for employee networking.

Self-Paced Learning One needs to learn self-paced learning. A lot of learning is simply presented to students rather than letting them explore it themselves. Provide learning and practice experiences that are available over a continuum of time, versus all within a short timeframe. Spaced learning and practice helps cement new knowledge into long term memory, and provides additional cues for retrieving the knowledge and skills under different circumstances. Self-paced courses enable participants to select the order of topics and modules. The pacing of the learning process is placed to a certain extent with the student and can suit their time needs and commitment. Self-paced learning is suitable for shift workers and those on time constraints who may not be able to attend a conventional timetable class or course. Blended learning's main benefit for students and employers is the flexibility to do the course at your own time and pace.

Technology Keep technology simple - If and when technology driven solutions are part of blended programs, keep it as simple as possible. The switching between mask/pages should be kept at a minimum. The learning environment has to be kept simple. Many LMS have lots of different functions and features that an average learner in an SME does not need. It is better to reduce the number of functions so that learning of content plays the main role - not learning to use the system. Courses should offer social software tools for more

experienced learners. The course should support easy access and operation of any technology components in the blended solution (web page, on-demand course, pod-cast, virtual classroom, etc.).

4.2.2. Final Results Delphi Panel

By combining the different sub-panel results into one result panel a list of “overall Top 10” topics can be found. The TOP 10 topics selected most often and with the highest rankings from all panelists are:

1. Self-Paced Learning
2. Time Flexibility
3. Quality
4. Learner-Centred
5. Content design
6. Efficiency
7. Student interaction
8. Workplace-Related Learning
9. Usability
10. Relevance of Content

The complete list of all aspects not selected for any of the sub-panel TOP 10 are listed in alphabetical order in Table 4-6.

Table 4-6 List of Aspects Not Selected into TOP 10

- Anchor variety
- Behaviour Change
- Beneficial
- Clarity
- Competition
- Concept congruence
- Constructivism
- Effectiveness
- Engaging
- Fun
- General Blend
- In House Classroom
- Integrated life-long learning
- Intelligent systems
- Knowledge base internet
- Logical flow of topics
- Materials availability
- Offer redundancy
- Ongoing Contact
- Open learning environment
- Performance
- Personal contacts
- Planned teaching
- Problem-based learning
- Recognition of traditional learning
- Rewarding the trainee
- Simulations
- Sustainability
- Team collaboration
- Technology
- Training Methods

A copy of the consolidated list from round 1 with information on which sub-panel contributed to which aspect is provided in Appendix G.

5. Analysis of Findings of the Delphi Study

The panelists submitted aspects to be considered in the first round. In the second round, each sub-panel selected twenty aspects in a ranking order. In the third round, the sub-panels selected and ranked their top ten aspects from their list of twenty aspects. As shown in the previous chapter, most aspects selected by a panel in the third round contain input from that same panel in the initial round. This suggests that the final TOP 10 in each panel are not just arbitrary snapshots but rather reflect a fairly stable opinion among the panel members.

The data analysis includes three main methods, Kendall's coefficient of concordance, the categorisation mapping and the radar charts analysis. Kendall's coefficient of concordance is applied to the results of the third round in the sub-panels and for the total of the Delphi panel in the Delphi study. This provides information about the agreement within the sub-panels on the ranking and the selection of the TOP 10 aspects.

To describe the agreement between the sub-panels, the categorisation mapping and the radar chart analysis with the surface measure of agreement are applied.

Section 5.1 introduces Kendall's formula and how it is applied to the question and the data of this study. The lists provided in annex H are the raw data used. In section 5.2 the aspects selected for the last round over all the sub-panels are grouped into categories to see whether any typical selection criteria can be found. In Section 5.3 the categories are developed applying previous research in that area, rather than randomly combining aspects. These categories are then analyzed in more detail for the different sub-panels, using radar charts to visualize the results.

5.1. Kendall's Coefficient of Concordance

Kendall's coefficient of concordance is a measure of agreement between several different rankings of a number of objects, which ranges from 0 (no agreement) to 1 (perfect agreement). A high value of W indicates that the panelists tend to agree on the relevance and the ranking of the item.

Kendall's Coefficient of Concordance

Equation 1 Kendall's Coefficient of Concordance

$$W = \frac{12 \sum T^2}{m^2 N(N^2 - 1)} - \frac{3(N+1)}{N-1}$$

Legend:

m – Number of panelists

N – Number of objects being ranked

T - Sums of the ranks for each subject

Kendall's W (Kendall 1939), as shown in Equation 1 considers the number of the panelists (m), the number of the aspects being ranked (N) and also includes the sums of the ranks for each subject (T). It requires the ranking of all the objects, or here: aspects, on the list. Due to the design of the study, the participants only select ten out of twenty aspects in the final round. Schmidt, whose setup the Delphi study follows, provides a modified formula for this adaptation of the original ranking procedure. It is shown Equation 2.

Schmidt's Modified Formula for W

Equation 2 Schmidt's Modified Formula for W

$$W = \frac{\sum_{i=1}^N D_i^2}{\frac{\left(\frac{N}{2}\right)\left(\left(\frac{N}{2}\right)^2 - 1\right)}{12} + N \left(\frac{\frac{N}{2} + 1}{4}\right)^2}$$

Legend:

D_i^2 – Variance of rank

N – Number of ranked aspects

The research followed closely the procedure outlined in Schmidt's (1997) and Couger's (1988) papers. The modified formula was not given in the original document, but was provided on request together with a detailed description for the calculation of D_i^2 by Schmidt. A detailed explanation of the modified formula for W can be found in Appendix M.

The value for W was calculated, using the modified formula for W as explained above for the results of the third round of the Delphi study for each sub-panel and the Delphi panel in total. The detailed raw data applied here can be found in Appendix H.

The values for W for the sub-panels and the Delphi panel are shown in Table 5-1.

Table 5-1 W for Sub-Panels and Delphi Panel

Name of Panel	W	Number of Panelists
IT SMEs	0.25	4
Tourism SME	0.24	5
Large Companies	0.22	4
Trainer	0.13	8
Provider	0.31	8
Delphi Panel	0.71	29

Couger (1988) provides a guideline for the interpretation of these values, provided in Table 5-2.

Table 5-2 Interpretation of Kendall's W

W	Interpretation	Confidence in Ranks
0.1	Very weak agreement	None
0.3	Weak agreement	Low
0.5	Moderate agreement	Fair
0.7	Strong agreement	High
0.9	Unusually strong agreement	Very high

All the sub-panels have a very weak to weak agreement. This indicates that the sub-panels with panel size between 4 and 8 were possibly too small. For instance, different rankings from individual panelists immediately had a very strong impact on the results. The Delphi panel on the other hand shows a strong agreement.

5.2. Categorisation and Radar Charts

The value for W shows the agreement on the ranking within a sub-panel. To compare the results between the sub-panels, categorisation and radar charts were applied. All concept maps with categories and radar charts can be found in Appendix J. Figure 5-1 summarizes the considered categories and the associated aspects. It gives an overview for the following detailed analysis.

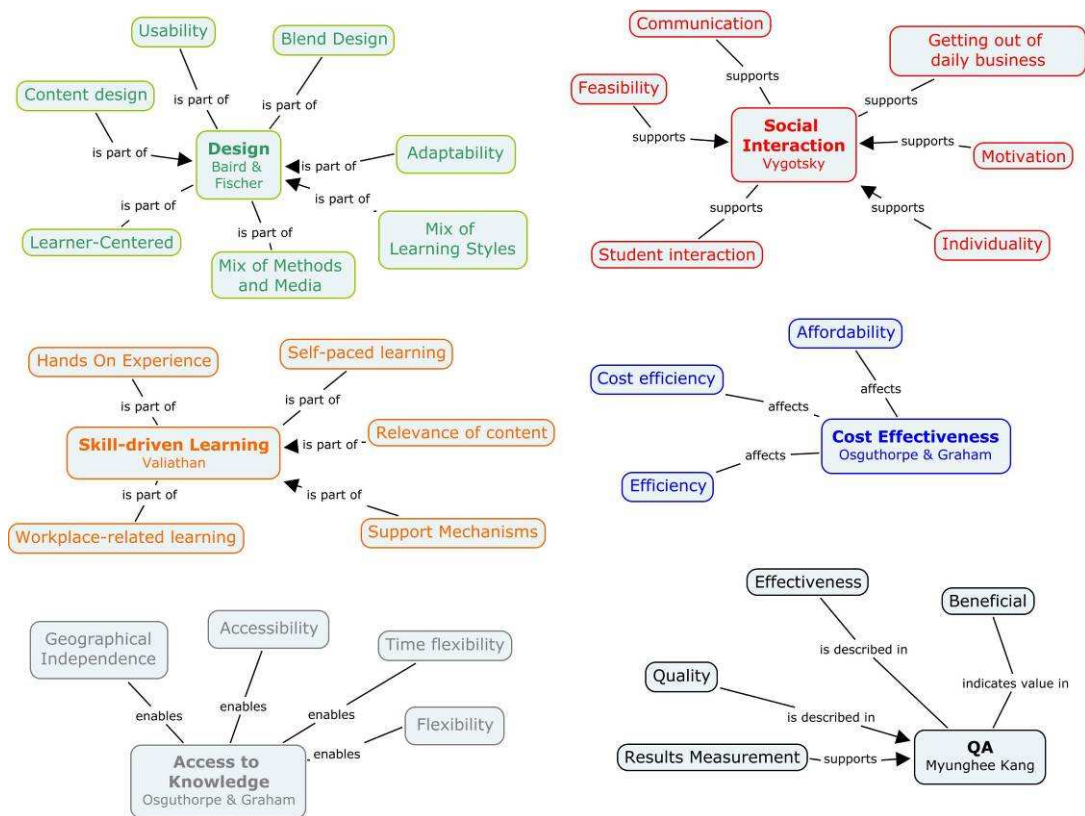


Figure 5-1 C-Map with All Categories

Using the lists of TOP 10 from the third round, the categorisation c-maps present individual profiles for the sub-panels. The sub-panels can be differentiated by their selection of categorized aspects. The information from these maps is then transferred into radar charts.

5.3. Categorisation

The final results in the different sub-panels and the Delphi panel consist of a total of 31 aspects from the consolidated list of 58 aspects provided in the first round. To analyze the results, this list of aspects (see Appendix G) can be allocated to different categories: social interaction, cost effectiveness, quality assurance, access to knowledge, skill-driven learning, and design. The

categories are derived from blended learning related research and are described below.

5.3.1. Social Interaction

Vygotsky’s theory (Lefrancois 2006) with an emphasis on social interaction as an important element for any higher learning and especially the role of language for learning is reflected in the category “social interaction”. This category includes the aspects communication, “getting out of daily business”, motivation, individuality, student interaction, and feasibility. Figure 5-2 shows the category with the assigned aspects.

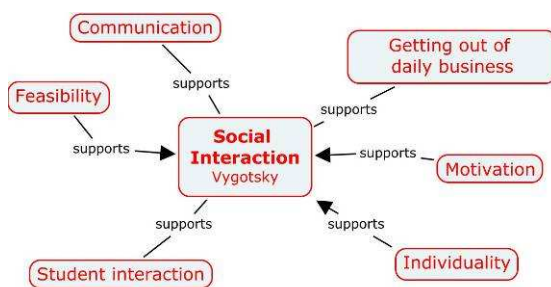


Figure 5-2 Category Social Interaction

5.3.2. Quality Assurance

This category summarizes a number of aspects that relate to quality assurance. A holistic approach to e-learning quality assurance considers a list of factors such as subject matter, instructional design and online specific aspects (Myunghee Kang 2007; Jones 2002). The quality related aspects contributed by the panelists were beneficial, effectiveness, quality, and results measurement. Figure 5-3 shows the category with the assigned aspects.

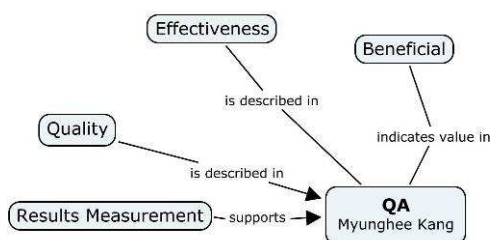


Figure 5-3 Category Quality Assurance

5.3.3. Access to Knowledge and Cost Effectiveness

The goals of blended learning can be divided into five main goals: pedagogical richness, access to knowledge, social interaction, personal agency, cost

effectiveness and ease of revision (Osguthorpe and Graham 2006). Access points to knowledge as well as cost effectiveness were the two goals that also came up in the Delphi study. The access to knowledge is determined by an improved access to information, a potential for more intense interaction with learning materials and more room for comments compared to traditional face-to-face teaching environments. The aspects related to the category were geographical independence, accessibility, time flexibility, flexibility, intelligent systems. Figure 5-4 shows the category with the assigned aspects.

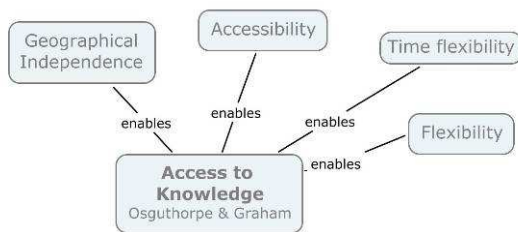


Figure 5-4 Category Access to Knowledge

Cost effectiveness can be reached by reducing student time in class, which often corresponds to more time at the workplace, the chance to replace full-time faculty by less costly part-time faculty.

The Delphi panelists contributed and selected the following aspects of blended learning for the category cost effectiveness: affordability, cost efficiency and efficiency. Figure 5-5 shows the category with the assigned aspects.

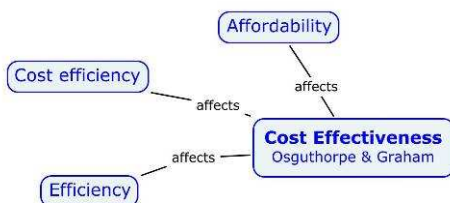


Figure 5-5 Category Cost Effectiveness

5.3.4. Skill-driven Learning

There are different models for blended learning, three of which are skill-driven learning, attitude-driven learning and competency-driven learning (Valiathan 2002).

Skill-driven learning is characterized by self-paced learning, instructor or facilitator support and the aim to develop special knowledge or skills.

Attitude-driven learning is a mix of various events and delivery media that support the learner in developing specific behaviours.

Competency-driven learning on the other hand uses performance support tools, knowledge management resources and provides mentoring to develop workplace competencies.

From these three models the skill-driven learning model was identified as a category in the panelists' input. The aspects for this category are hand-on experience, self-paced learning, relevance of content, support mechanisms, and workplace-related learning. Figure 5-6 shows the category with the assigned aspects.

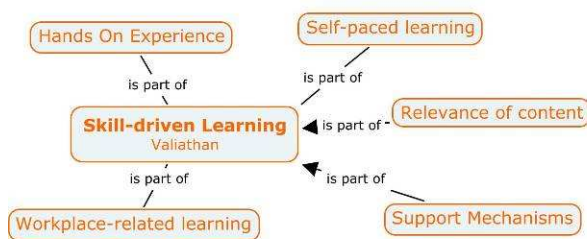


Figure 5-6 Category Skill-Driven Learning

5.3.5. Design

Learners who grew up, using a variety of interactive media, the so-called “neomillennial” learners, have very concise expectations and demands on the design of a learning environment (Baird & Fisher 2006). The technologically savvy learners ask for a mix of media and use the learning resources in a variety of devices such as PDA, IM and iPod. Social networks are used in all aspects of life, including learning. These learners also have clear expectations of a well-designed user experience design that reflects their digital learning style. Usability of the system is of high importance as well as the option to personally tailor the learning paths.

This corresponds with the seven aspects usability, blend design, content design, adaptability, mix of learning styles, mix of methods and media, and learner centred from the Delphi panel as depicted in Figure 5-7.

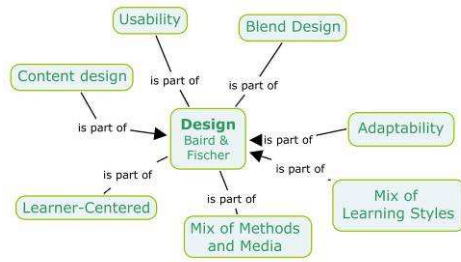


Figure 5-7 Category Design

5.3.6. Categorisation of IT SMEs Sub-panel Results

The most significant result is that social interaction was not selected at all by the IT SME sub-panel. This corresponds to a stereotype of IT people being less socially active and not so interested in social aspects of work. Two aspects were selected from each of the remaining categories. This sub-panel showed a very balanced selection of categories.

A focus on self-paced learning is emphasized by the selection of self-paced learning and support mechanism from the category “self-driven learning” as well as the selection of the aspects “accessibility” and “time flexibility” from the category “access to knowledge”.

Figure 5-8 shows the c-map for the IT SME Delphi results.

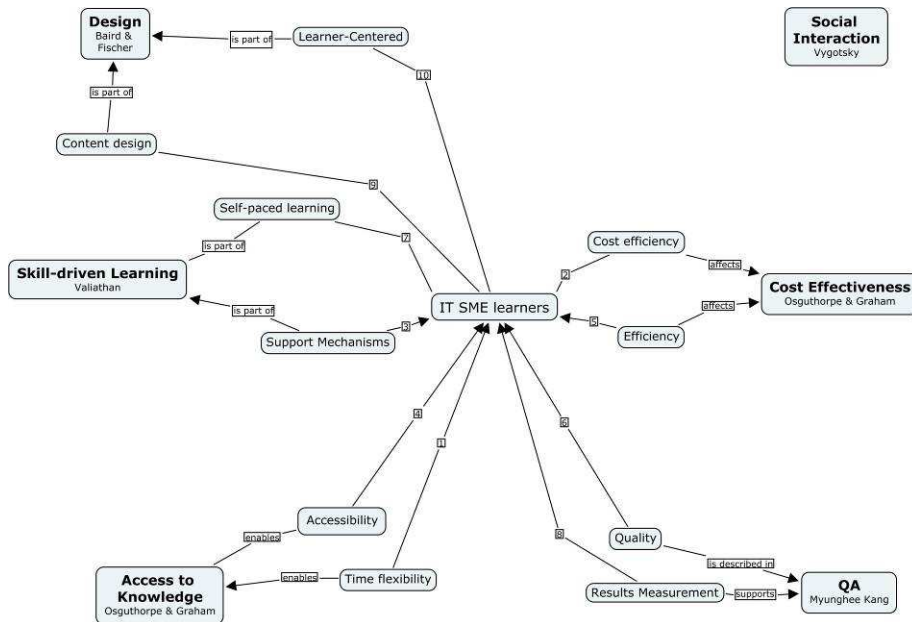


Figure 5-8 C-Map IT SMEs

5.3.7. Categorisation of Tourism SMEs Sub-panel Results

Again one category has not been selected at all, this time it is the “design” category. This is surprising, however, it might reflect the fact that a lot of software interfaces in tourism, for example, interfaces from booking engines are still not in conformity with basic usability heuristics and design principles. All other categories have been selected equally strong. In contrast to the IT SMEs only one aspect from the “quality assurance” category has been selected, and only one more aspect from the category “access to knowledge” was chosen. Figure 5-9 displays the c-map for the selection of the tourism SME sub-panel.

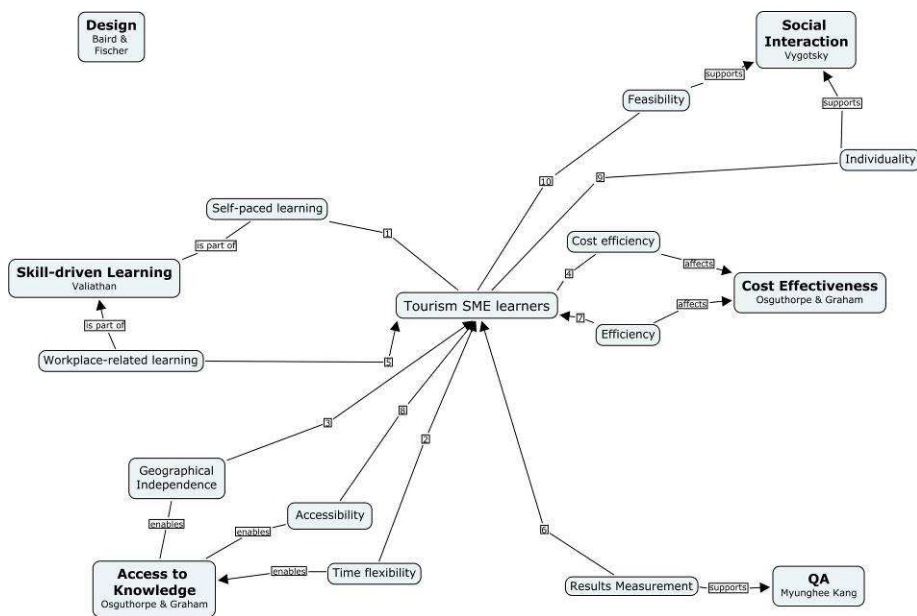


Figure 5-9 C-Map Tourism SMEs

5.3.9. Categorisation of Trainer Sub-panel Results

The trainer selection is clearly focusing on the “design” category with four aspects selected. The aspects selected by the trainer sub-panel do not match the selection of the learners in large companies and only overlap in one aspect with the selection of the learners in SMEs. Aspects from “quality assurance” have not been selected at all and the two categories “social interaction” and “cost effectiveness” have both only been considered once. The one aspect selected from the category “social interaction” is student interaction, but it does not match the selection of any of the learner sub-panels. Figure 5-11 presents the selected categories and aspect.

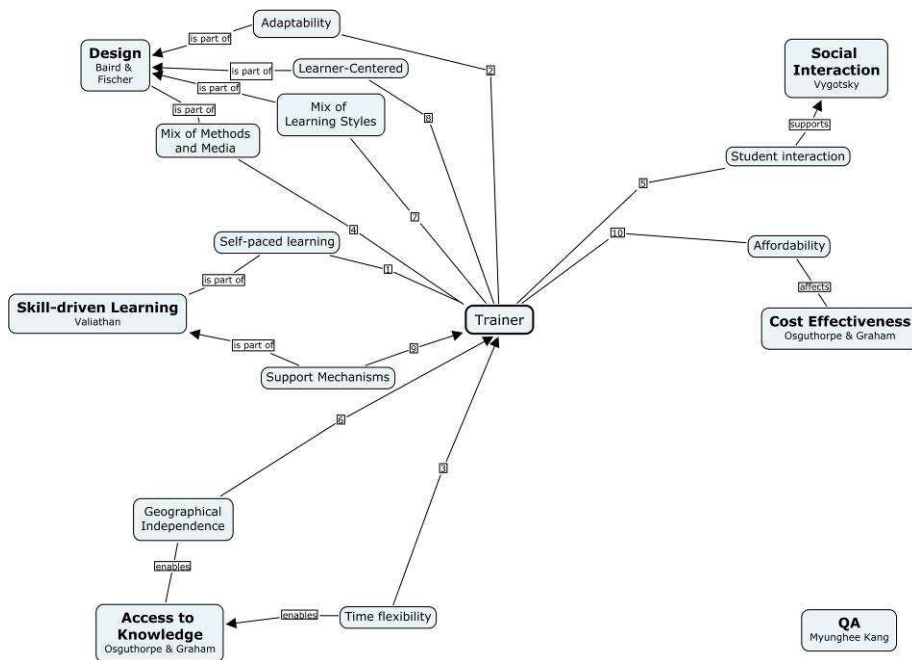


Figure 5-11 C-Map Trainer

5.3.10. Categorisation of Provider Sub-panel Results

The concept map for the provider sub-panel shows a similar selection as the trainer panel in regard to the categories. This sub-panel has selected all categories at least once, which differentiates it from all others. The selection shows an emphasis on the two categories “design” and “skill-driven learning”, which have each been considered three times. The aspects chosen from the “skill-driven learning” category vary from all other sub-panel selections.

Figure 5-12 shows provider sub-panel selection of categories.

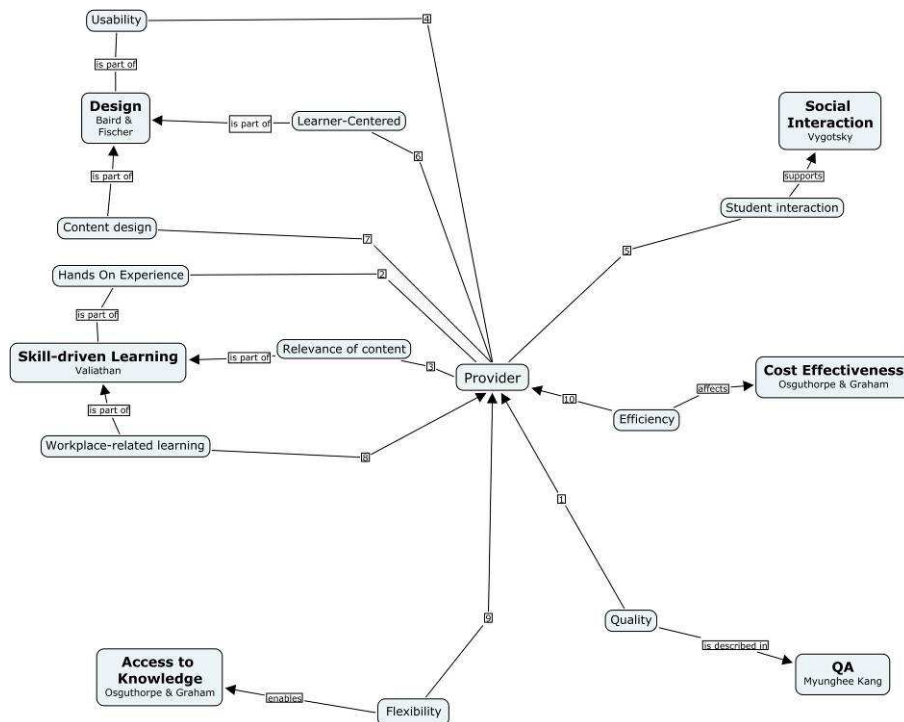


Figure 5-12 C-Map Provider

5.3.11. Summary Categorisation

All five concept maps show the specific selection profile in relation to the developed categories for each of the sub-panels. They give a first impression of the similarities and differences for the selection of aspects of blended learning. The learner sub-panels seem to be comparatively close in their selection, as do the trainer and provider sub-panels.

5.4. Radar Charts Analysis

Radar charts are commonly used to visualize survey results, but they can also be used as an analytical tool. Following a procedure outlined for benchmarking of national labour market performance (Mosley and Mayer 1998) the radar charts are used to compare the results of round 3 of the sub-panels. The results are allocated to the categories outlined above and then entered into the radar charts. To do this the categories are assigned an axe on the radar chart. The values for the different categories are entered. The values for each sub-panel are determined by the sum of ranks for each category. The surface of the figure formed by the axes of the radar chart can be used as an indicator for the overall importance of the considered aspects within the categories. On the basis of the explanations outlined by Mosley and Meyer (1998) the intersection of the polygons from different sub-panels give a measure for the agreement between the two groups, called the surface measure of agreement (SMA). Higher values indicate a higher level of agreement and vice versa.

The following radar chart analysis is expected to clarify the overall picture. By combining the information from the c-maps, including the ranking, the agreement between two or more sub-panels can be visualized and analyzed, using the surface measure of agreement (SMA). The SMA can be calculated by simply calculating the area of the polygon. The exact calculation is not given, due to the nature of the Delphi study and its explorative character. The following remarks should be read as initial findings. To make exact predictions, more data would be needed from a quantitative survey. Nevertheless the charts give a good indication what to look for and how to investigate the topic further.

5.4.1. Category Comparison SMEs

The SME sub-panels show a comparatively big surface measure of agreement. The biggest consent seems to exist in the categories “access to knowledge” and “skill-driven learning”. The radar chart shows that SMEs have a number of requirements for blended learning in common, but that there are also very clear differences, depending on the industry (see Figure 5-13).

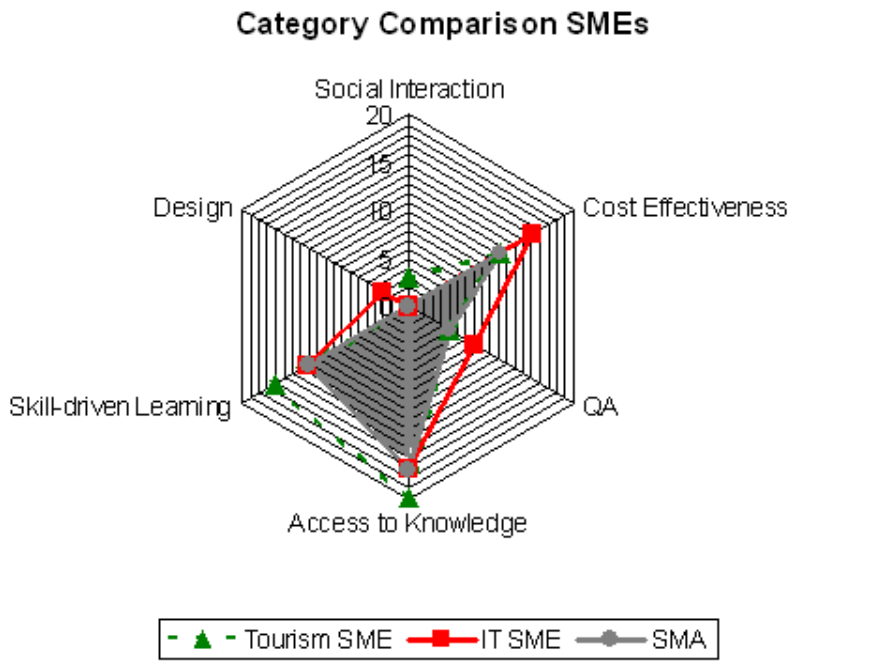


Figure 5-13 Category Comparison SME Sub-panels

5.4.2. Category Comparison IT SMEs - Large Companies

The comparison between the IT SME sub-panel and the large company sub-panel holds a much smaller SMA, suggesting that there are considerable differences in the requirements for blended learning depending on the size of the organization (see Figure 5-14).

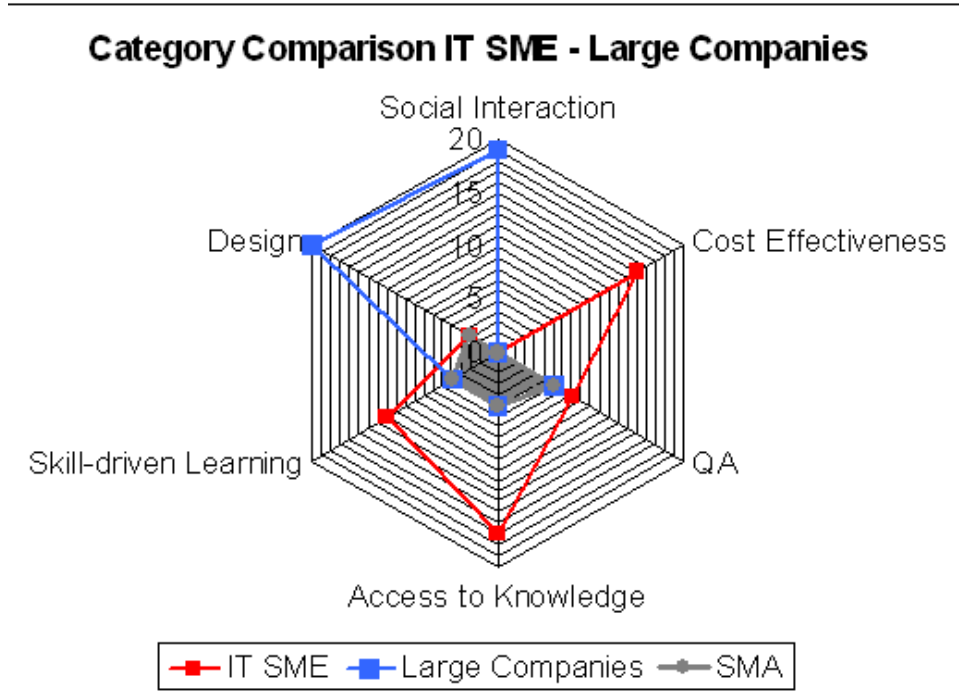


Figure 5-14 Category Comparison IT SME – Large Companies Sub-panels

5.4.3. Category Comparison IT SMEs - Trainer

The SMA between the trainer sub-panel and the IT SME sub-panel is considerably larger than the previous one, but also clearly smaller than in the SME radar chart. Trainers seem to have similar understanding of the importance of the two categories “access to knowledge” and “skill-driven learning”, whereas there is almost no overlap in any of the other categories (see Figure 5-15).

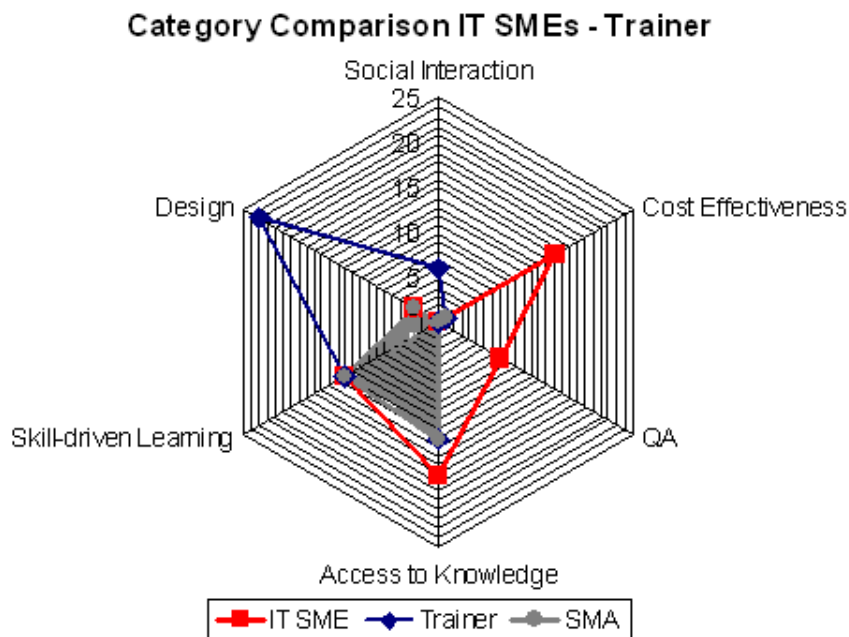


Figure 5-15 Category Comparison IT SMEs - Trainer Sub-panels

5.4.4. Category Comparison IT SMEs - Provider

The chart with the comparison between the IT SME sub-panel and the provider sub-panel holds an SMA similar in size than the one from the large company-SME comparison. There are only two categories with a significant overlap, quality assurance and skill-driven learning, but even those do not reach very high values. In total this results in a small SMA, which suggests that the perspective on important aspects in blended learning is significantly different between those two stakeholder groups (see Figure 5-16).

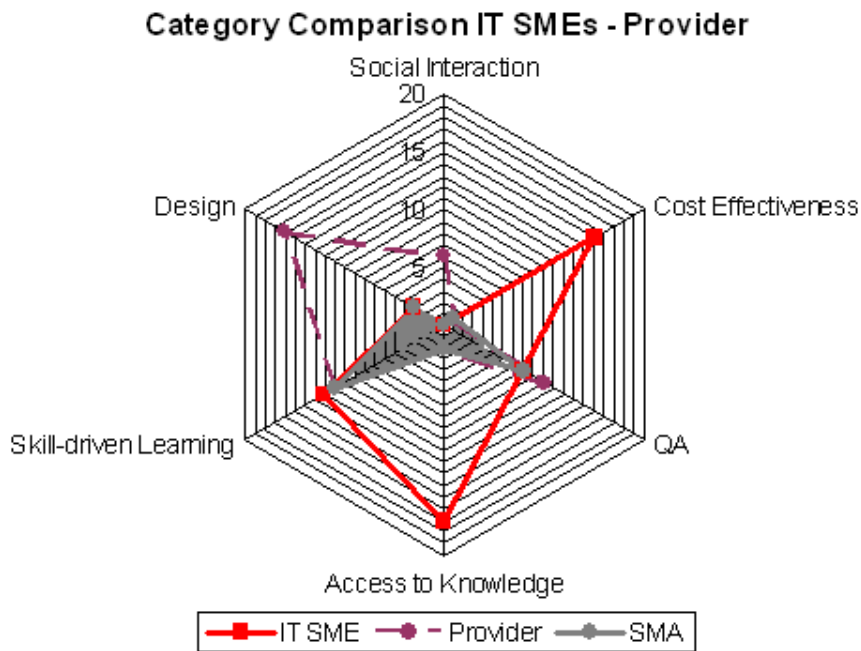


Figure 5-16 Category Comparison IT SMEs - Provider Sub-panels

5.4.5. Category Comparison Trainer - Provider

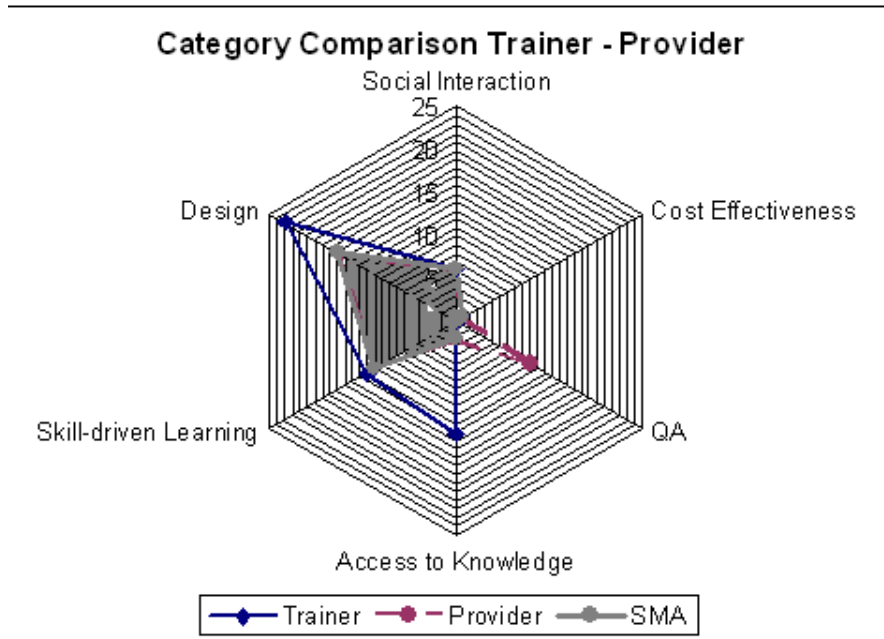


Figure 5-17 Category Comparison Trainer - Provider Sub-panels

The comparison between the trainer and the provider sub-panels shows a comparatively large SMA, including mainly the category “design”, but also the categories “skill-driven learning” and “social interaction” (see Figure 5-17).

5.4.6. Summary Radar Chart Analysis

The radar chart analysis shows that the SME sub-panels have the biggest SMA, and the SMA from the comparison between the trainer sub-panel and the trainer sub-panel has the next biggest SMA.

The comparison between the IT SME sub-panel and the large company sub-panel and the comparison between the IT SME sub-panel and the provider sub-panel both shows a small SMA.

6. Guidebook for Tutors

The following guidebook structure was developed and has been used for testing of the UML course prototype as part of the UP2UML project. The development of the guidebook considers the results of the Delphi study, described in the respective chapters of this text. It has two main parts: the description of the guidebook structure itself and the information for the tutors.

Guidebooks are a formalized way of describing blended activities. They provide instructions for course facilitators or tutors on how to conduct a course using the available course material (Naidu 2003). Guidebooks may contain different syllabi based on the same material. In particular the proportion of self-paced and blended activities may vary as well as the pedagogical approach (Moebs, Weibelzahl and Dowling 2007). It assists facilitators in providing suitable scaffolding for different learning styles as well as online and face-to-face learning. Its main function is to outline the options for face-to-face activities with special consideration of the different learning styles of the learners. By prescribing the setting and possible usage of the material, guidebooks aim to guarantee a constant standard for the course across facilitators.

The “course start” and the “course execute” structure nodes (see Figure 6-1) list the standard activities for a particular part of the course. The “course execute” node branches out to “self-paced activities” and “blended activities” and from there into the detailed activities. The information for tutors provides three main types of information required by the tutors regarding practice, projects and assessments, and which information is required for each of these activities.

The mind map in Figure 6-2 provides information about the structure of the guidebook. It is divided into three main parts: “Course start”, “Course execute” and “Course terminate”. The part “Course start” contains the content of the first session. Usually the trainer introduces herself, provides an overview of the course, asks learners for their own experience, and introduces the course environment. The “Course start” session provides an overview for all learners. It checks that everybody is able to use the main course infrastructure, and also provides the opportunity for students to get to know each other, to cater for a supportive social environment.

The “Course execute” node provides a structure for the recurring elements of the successive course sessions. It is divided into the two options, self-paced activities and blended activities.

The self-paced activities typically comprise a theoretical introduction into the problem, followed by an example or an initial exercise, and closing with the final objectives.

The blended activities usually start with a discussion of a topic which can then be followed either by an introduction or demonstration of a tool, then an exercise - training one skill only - followed by a project that trains several skills, and finally an assessment.

The “Course terminate” node usually contains of two parts: the in-class assessment, and the collection of informal feedback from the learner. This feedback is often collected by use of a formal learner feedback form.

The information for the tutors is again divided into three main parts: namely practice, project and assessment. The practice information considers required resources, material and information about the required time and duration of the course, and the deadlines within the course. The mode of delivery can either be group work, online or classroom sessions and which can include lectures, discussions or written communication.

The project information consists of the scope of the project, an example for the project scenario, evaluation and assessment criteria, and time, duration and deadline information. The project information also includes advice on required (software) tools. Information on elicitation of real world examples from the learner’s workplace environment enables the tutor to develop workplace-related projects. Figure 6-1 shows the mind map that outlines the guidebook structure and tutor information.

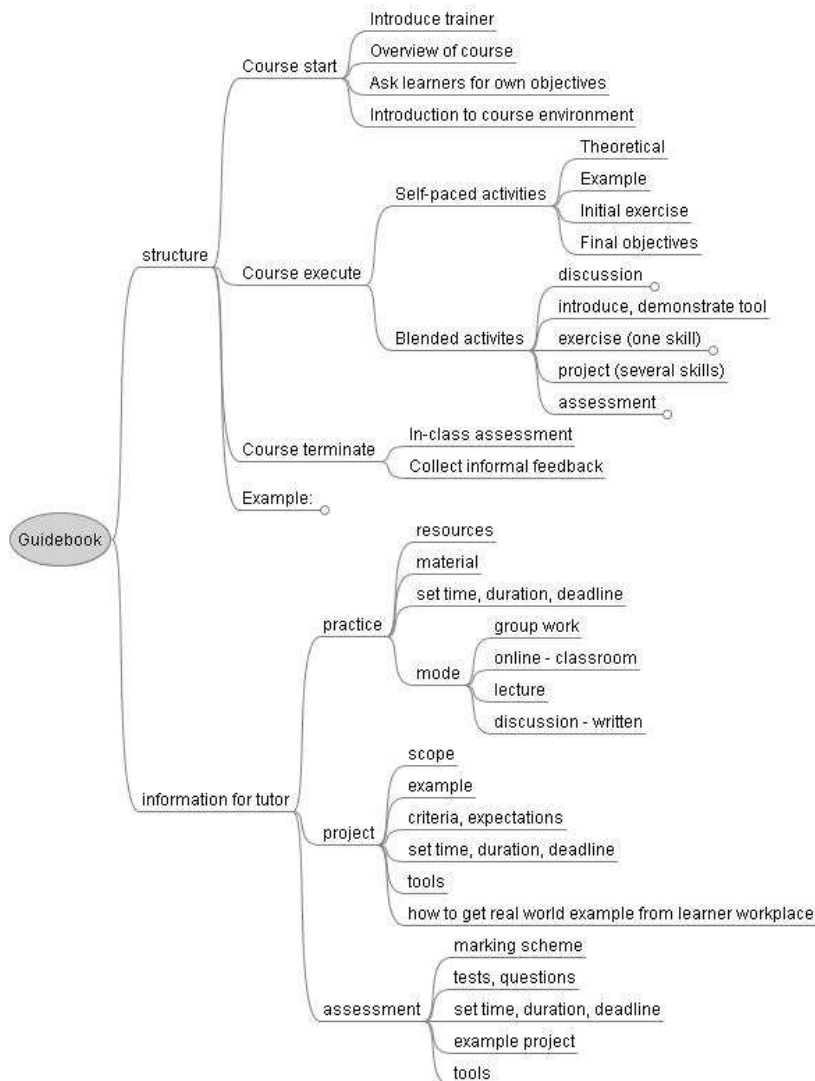


Figure 6-1 Guidebook Structure and Tutor Information

The sample guidebook can be found in Appendix I. Figure 6-1 shows the structure for a sample guidebook, following the previously described guidebook structure. The example is divided into three sessions with two online sessions in between. The first session covers the “Course start” and the first “Course execute” gives an introduction in the use of the learning management system (LMS). The necessity of this introduction to the use of the LMS depends very much on the learner group and the usability of the LMS. If the learners are used to familiarizing themselves with new online interfaces, they will not have many problems and the first “Course execute” session can move on to other course content. The first session is followed by the first online activities; usually self-paced activities that exercise the use of the LMS and at the same time provide content.

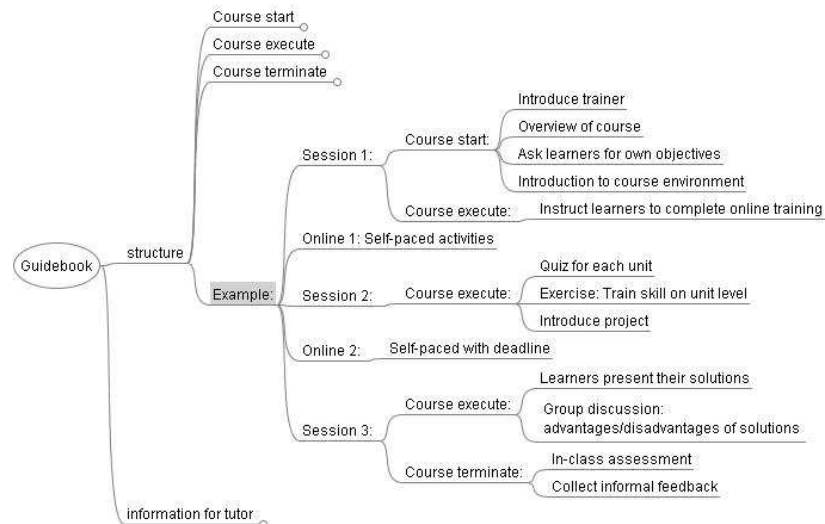


Figure 6-2 Guidebook Structure Example

The second session is again a “Course execute” session, this time with a test after each learning unit, which trains one skill for each unit and finally provides an introduction into the project. The online session following this skill session provides self-paced activities that lead to face-to-face session three with the last “Course execute” and “Course terminate” parts. The last face-to-face session gives the learners the opportunity to present their solutions of the assigned projects and a group discussion wraps up the topic. In the discussion following the presentations the advantages and disadvantages of the presented project solutions can be debated. The final activities are the in-class assessment and the collection of the informal feedback. Figure 6-2 shows the structure of the guidebook example as a mind map.

While following these structures the student’s learning style can be constantly assessed through the monitoring of the activities (Batatia, Piombo and Ayache 2006). The results of this monitoring can be used for the selection of suitable self-paced or blended activities and the tools most suitable for the student.

To accommodate the needs of today’s learners, a mapping of social media tools and learning styles (Baird and Fisher 2005) has to be considered. Baird and Fisher outline in a recent publication a mapping between social tools for Gardner’s multiple intelligences (1993). These can also be applied to the guidebook structure, thereby improving the quality of the learning for different learners. A similar approach for other learning style concepts can easily be adapted.

The guidebook is part of a tool set for blended learning (Moebs, Piombo, Batatia and Weibelzahl 2007), developed as part of the Up2UML project. The tool set combines the estimation of learning styles based on a Bayesian network and the blended pedagogical design methodology, developed by the French project partners, with the guidebook structure and a checklist for blended learning courses derived from the results of the Delphi study described here.

7. Case Study: Stakeholders of Blended Learning and their Selection of Decision Criteria

7.1. Purpose and Rationale of the Case Study

The main goal of this case study is to offer a second perspective on the research question and to find out whether the validity of both the results of the Delphi study and the guidebook development can be confirmed. The case study aims to acquire an in-depth understanding of the selection criteria of the different stakeholder groups in the Delphi study, obtaining feedback on the blend in the Up2UML course and finding out how trainers can be supported by a guidebook - thereby supporting a successful blend.

7.2. Case Study Strategy

The procedure outlined below follows the recommendations for case study research as outlined by Denscombe (2003). The case study strategy was selected to test if the results of the Delphi study can be confirmed through triangulation and to get a better understanding of the whole selection and decision process of learners in SMEs, trainers and providers. It takes a holistic view of the whole situation instead of concentrating on isolated factors. The case study includes various data sources such as interviews, information from the company websites, and information from online research.

7.2.1. Interview Procedure

The interviewees are selected following the selection criteria for the participants of the Delphi study. They are typical examples of their peers, so results can be used for generalisation, within the typical limitations of generalisation. The interviewee group includes two learners from SMEs, one trainer, and one provider of blended learning.

The selection criteria for the different stakeholder groups were

- for SMEs
 - Employee of an SME, a company which employs 1-249 persons
 - Employee of an SME either in tourism or IT
 - Interest in or experience with blended learning or e-learning
 - Internet access, preferably broadband
 - Team leader, project manager, department head
- for trainers
 - Trainer in blended learning or e-learning program
 - Internet access, preferably broadband

- for providers
 - Provider of e-learning or blended learning programs
 - Internet access, preferably broadband
 - Experience in instructional design

7.2.2. Tool Set

To do the case study we used semi-structured interviews, supported by a set of interview tools. These tools include:

- Concise guidelines for the interviewer
- A questionnaire with a specific set of questions for each of the sub-panels
- The list of sub-panel input from round 1 of the Delphi study
- A trainer guidebook developed for the Up2UML course
- A mind map of the guidebook structure
- Access to the e-learning part of the Up2UML course

The tool set had a twofold significance for the case study research. Preparing the materials for the tool set enforced thorough preparation for the case study interviews and guaranteed a similar interview procedure with each interviewee. Obviously the tool set also supported the interview itself, as it provided comparable documents such as the guidebook and access to prototype of the UML e-learning course.

The guidelines for the interviewer contained a checklist with the following items:

- The general purpose of the interview and why it is important
- How the interview data will be used
- The extent to which the interview data will be treated as confidential
- The type of incentive, if any, being offered for participation
- The method by which you would like to record the interview
- The approximate length of time it will take to complete the interview

The questionnaire for each interviewee was generated as appropriate from the catalogue of questions shown in Table 7-1.

Table 7-1 Catalogue of Case Study Interview Questions

	Group	Questions
1	Provider, IT SME, Trainer	What is your interest in blended learning? What experiences do you have in the area of blended learning or with blended learning?
2	Provider, Trainer	Considering the aspects mentioned in question 1, which are the Top 5 of the aspects listed in annex 1? (Annex 1)
3	IT SME	Which of the aspects from the list are important for a successful blended learning in SMEs? (Annex 1)
4	Provider, Trainer	(Guidebook + Mind map) How can these aspects find consideration in a guidebook for trainers? <ul style="list-style-type: none"> • Level of detail? • A complete manual? • Predefined sessions? • Should activities be assigned to certain sections or specific sessions? Building manual or construction kit?
5	IT SME	Are these requirements fulfilled? How can this be improved? (Example: Up2UML)
6	Provider, IT SME	How important are trainers for <ul style="list-style-type: none"> • Learning on-line and • Face-to-face learning? • Role definition?

The lists of sub-panel input from round 1 of the Delphi study from the respective sub-panels are provided in Appendix G. The documents for the case study tool set are provided in Appendix I. The specific sub-panel lists were used to explore whether the interviewees would choose aspects that were selected among the TOP 10 in the final round of the Delphi study. The interviewees were not given the full list of 58 aspects but only the panel input. Providing the full list of 58 aspects would have made the case study results incomparable with the Delphi results.

The guidebook was developed as part of the work in the Up2UML project as an initial document for the Beta version of the Up2UML course. It provided information on course activities, session planning, and meta information such as course duration, learner effort, learning objective, target groups, course requirements, and marking scheme. It exemplified guidebooks as appropriate

for discussing guidebooks in general in the interviews, but especially to discuss questions 4 and 6 from the catalogue of questions. The guidebook can be found in Appendix I.

The mind map of guidebook structure (see Figure 7-1), turned out to be very helpful in discussing the structure of guidebooks and the level of detail of information given.

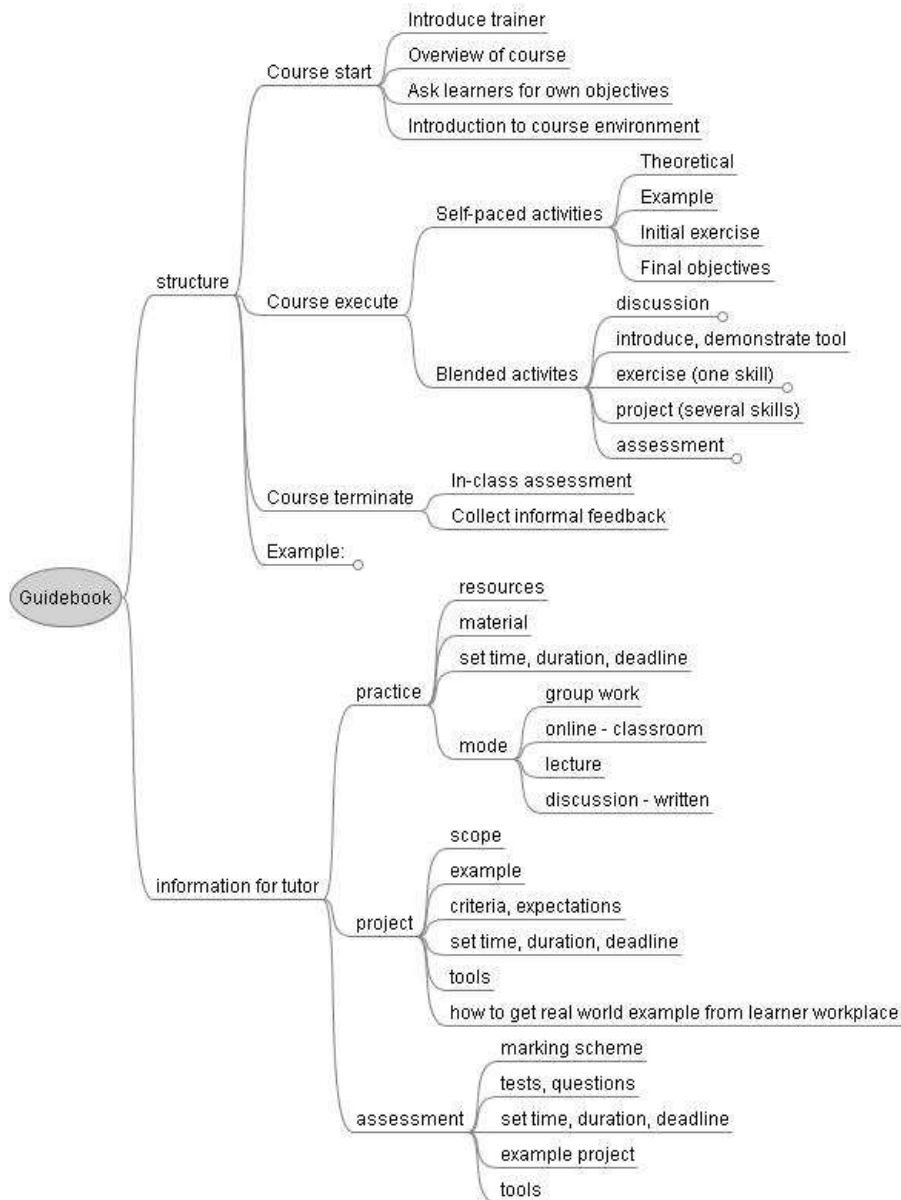


Figure 7-1 Mind Map of the Guidebook Structure

7.2.3. Preliminary information

The first contact with the participant was through a phone call using Skype, a voice over IP peer-to-peer Internet telephony network. During the phone call, the reason for the case study was explained to the interviewees. Then a brief

overview of the planned activities was given. If the person contacted was available for an interview, a date was agreed. Participants then received an email containing the confirmation of the agreed date and the login details for the Up2UML course.

At the start of the interviews, the interviewees received a hard copy of the questionnaire with a specific set of questions for each of the sub-panels, the list of sub-panel input from round 1 of the Delphi study, a draft of a trainer guidebook developed for the Up2UML course and a mind map of the guidebook structure. The interviews with the four interviewees were all conducted during one week.

7.3. Findings

The findings are presented as answers to the questions on the questionnaire. The discussion of the results will be part of the final discussion of the results of the Delphi study and the case study in chapter 8.

To give a better understanding of the different interviewees, a short characterization of each follows before the respective findings are presented.

7.3.1. Company 1

Company 1 - SME	
Interviewee	The first interviewee from the SME group is from a small company with less than 10 employees. She is the managing director, between 25 and 35 years old, and she founded the company together with two business partners five years ago.
Company Services	The company provides services in the areas of software development, introduction of groupware on the basis of LotusNotes, workflow consulting, integration of heterogeneous environments, and business process optimisation. The company started as one of the first providers in the region with individualized solutions on the basis of LotusNotes and managed to acquire contracts with several big regional companies from the automotive and engineering industry.
Interview Location	The interview took place on the company's premises in an open-plan office with eight workspaces. Continuous update of knowledge and training of the employees is essential for the company, and the company uses a variety of options for facilitating this, including blended learning and e-learning.

Question 1: What is your interest in blended learning?

The interviewee typically uses the training courses provided by IBM for its business partners. She is mainly interested in certified courses which are closely related to the company's area of expertise, and in keeping their knowledge up to date. The IBM courses are blended learning courses combining interactive e-learning and 1-day seminars. The interviewee usually only relies on the blended learning options, because they are free of cost. To take the same courses in a complete face-to-face mode is very expensive. She finds the blended learning option more interesting, because on one hand it provides the chance to exchange ideas and discuss problems with others online and whereas the face-to-face lecturing helps learners to learn more quickly compared to self-paced learning. The face-to-face components also offer the opportunity to meet new people and hear new ideas. The downside is that, in general, there are only few blended courses available as yet.

Question 2: Which of the aspects from the list are important for successful blended learning in SMEs?

- Support Mechanisms
- Content Design

- Mix of Methods and Media
- Student Interaction
- Self-Paced Learning

Comments about the selected aspects were as follows.

Support mechanisms It is essential to have a person to contact to get professional feedback; otherwise taking a course is not necessary and an online tutorial will be just as helpful. The questions that usually come up are mainly of a technical nature. Another area for feedback is qualified feedback for assessments and exercises.

Content design It is important that the design shows that some time was spent working on a usable design. Good design and usability is essential for the learning results. Good navigation on the website helps to orientate oneself in the course and on the individual pages. Good orientation makes it easier to focus on the actual content rather than on figuring out how the learning system works. It also makes it easier to find course materials. It is very motivating to work with a well-designed course and website. Good design also includes a reasoned blend of the content, and a comprehensible allocation of online and face-to-face content.

Mix of Methods and Media The interviewee prefers to be able to study anywhere, anytime. This requires different media for materials. For example this includes materials that can be read offline on the laptop, while other materials can be perhaps available via the internet from any computer. This requires the learning management system (LMS) to be fully functioning on any computer with internet access, without the necessity to download LMS-specific software. In other words, it should be fully web-based.

Individual contact with a trainer or tutor does not necessarily have to be face-to-face, it can be done online e.g. a meeting or tutorial session on Skype. It is more important that there is a possibility for one-to-one support. If face-to-face sessions are included, the interviewee prefers a four-day seminar to a schedule with two hours per week over a period of eight weeks. A four day seminar is a

lot easier to organize, because it is easier to be absent for four days than to block two hours every week over a longer period of time.

Student interaction It is important to know or to notice the other participants' questions and comments. The option to ask questions in a public forum but also in a private chat room is very important. Otherwise some questions will not be asked. This may be because one does not feel comfortable asking them, in case they expose the lack of knowledge, or simply because there might be competitors among the fellow students.

Self-paced learning The interviewee does not like to be told what and when to learn. She successfully completed secondary school a long time ago. She now needs to be self-organized to do her job. She feels she cannot go back to the learning style of a student in secondary education – that is not suitable for self-selected professional training. Every learner is different and has a different learning style and a different approach to learning. Face-to-face sessions at the start and as the final session are very much favoured. Face-to-face sessions during the course should be offered with alternatives. This could be online streaming, following the sessions using a blog, or simply reading session protocols or other course materials.

Question 3: Are these requirements fulfilled? How can this be improved? (Example: Up2UML)

- Support Mechanisms

The navigation on the website is not clear.

- Content Design

The administrative text at the beginning is a bit too long. Request for error reporting right at the beginning seems too early. Underlined words indicate hyperlinks, but they are just underlined words.

- Mix of Methods and Media

The course is made up of small units, but there is no interactivity such as a quiz or questions. A podcast with different speakers would be good for the text-based parts of the course. The course gives the impression of a good UML

dictionary. The QuickTime plug-in is not mentioned in the text, it surprises the user.

- Student Interaction

The chat room and the discussion forum provide possibilities for student interaction.

- Self-Paced Learning

Some of the functionalities that could support self-paced learning do not work, for instance the pop-ups in the use case diagrams. The course structure is not followed on the activities page; this is not comprehensible.

Question 4: How important are trainers for learning on-line and face-to-face learning? Role definition?

The trainer is there to impart knowledge and to be asked questions directly. The trainer is a “real” contact person. The trainer brings competence and new knowledge to the program or supports reflection and consolidation of knowledge.

The trainer role is defined by her expertise, didactic abilities, and the ability to be able to explain concepts in different ways. She has to react to the learners’ problems and has to motivate and arouse interest and curiosity in the learners.

7.3.2. Company 2

Company 2 – SME

Interviewee	The interviewee from the second SME is from a small company with less than 10 employees. She is e-commerce project manager for a regional tourism organisation, between 25 and 35 years old and has been working in that area of expertise for eight years.
Company Services	The company provides services in the areas of tourism consulting for e-commerce, eCRM, intranet and extranet development. The company is the only provider with that specialization in the region. Continuous knowledge update and training of the employees is essential for the company, and the company also organizes training for the tourism companies in the region.
Interview Location	The interview took place in the interviewee's home office from where she works two days a week.

Question 1: What is your interest in blended learning?

The current project “e-fitness” is a full face-to-face training program. By transforming it into a blended course she hopes to give some of the responsibility for the training back to the beneficiaries, the learners in SMEs. The face-to-face sessions can be used to provide the learners with tool skills and to show ways to independently use the regional resources to train themselves. Face-to-face is still necessary “to get people started” and to provide the social environment.

The e-learning can provide permanent availability of the learning resources. Printed learning material in combination with online resources enables independent or self-paced learning. This way the dissemination of knowledge and the exchange of experience would be encouraged, and the benchmarking between the companies would become simpler.

The “e-fitness” platform can function as a distributor and an information base about the relevant contact partners. These contact partners need to be credible and have good relationships within the regional business community and should serve to challenge the learners sometimes.

The program cannot be free of cost – freebies are not worth spending the time to deal with them.

Question 2: Which of the aspects from the list are important for a successful blended learning in SMEs?

- Support Mechanisms
- Flexibility
- Intelligent Systems
- Results Measurement
- Mix of Methods and Media

Comments about the selected aspects were as follows.

Support Mechanisms Support is helpful for reaching the learning objectives and figuring out the knowledge gaps. Support helps to build up the necessary commitment to do the work necessary; it provides a timetable and deadlines. The support can either be provided by the tutor, or by the system, for items such as reminders for deadlines for example. The support mechanisms can be helpful in finding or exploring alternatives to an initial approach.

Flexibility This includes time flexibility, flexibility where to learn, and the ability to learn offline. Flexibility also includes the possibility of always being able to contact colleagues or tutors. It also includes the option to use different media like telephone, internet, and remote control support.

Intelligent Systems The presentation of content and the structure of the system have to be easy to grasp for the learner. A number of functionalities are essential, such as dialogs with suggestions, network-compatibility, separation of content and design, single sign-on, a simple, efficient search function, and clear web navigation. The use of open source systems provides good opportunities for individual development of the system, whereas proprietary systems have very slow reaction time to user suggestions.

Results Measurement Immediate feedback for tests is important. Tests can be done with a sense of humour. "One-word-a-day" is a good example for this.

Mix of Methods and Media Sustainability is important for learner access to learning materials during and after the course. Also materials should not be very

complex. Trouble shooting needs to be supported and the course should cover problem solving rather than providing solutions all the time.

**Question 3: Are these requirements fulfilled? How can this be improved?
(Example: Up2UML)**

- Support Mechanisms

Very impersonal support system: empty forum or chat pages do not invite one to submit the first posting.

- Flexibility

Forum and chat can provide time flexibility, and of course the course content is available. It is not clear what the tutor response time is.

- Intelligent Systems

Navigation is not clear, "bread crumbs" are missing and the navigation jumps around on the page. A search function is missing. A lot of clicking is necessary to reach where the user wants to go.

- Results Measurement

No clear definition of the learning objectives. The final test shows an English page in the German version.

- Mix of Methods and Media

The text is monotonous; almost empty pages are irritating; and the quiz is confusing, because it is not clear what to do.

Question 4: How important are trainers for learning on-line and face-to-face learning? Role definition?

A trainer is important for both e-learning and face-to-face teaching, but the tutor has different functions in each mode. For the e-learning tutor it is extremely important to be able to communicate clearly, be rhetorically trained, and to act on eye-level with the learners. A background in pedagogics and experience as a trainer is helpful. The trainer is a motivator and supporter of the learner. Accessibility is very important; online and possibly on the phone, e.g. on Skype at agreed times.

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The face-to-face trainer's success is determined by her personality and voice, but by also rhetoric and didactic skills. The face-to-face trainer always partially acts as a coach for the learner and this requires the ability in the trainer to define the scope of their role in a course and to communicate that to the learners.

Experience is important for e-learning as well as face-to-face learning.

7.3.3. Company 3

Company 3 – Trainer	
Interviewee	The interviewee from the trainer group is from a small one-person company. She is the owner, between 36 and 45 years old and she has been working as a freelance trainer for seven years.
Company Services	The company provides IT training services. The company usually gets contracts with big telecommunications and production companies in the region. The company offers services similar to its competition, except for the technical expertise of the interviewee. She holds a Masters degree in Informatics, has several years of programming experience and a number of years experience in IT project management.
Interview Location	The interview took place in the company's office which is part of the family home. The little daughter of the interviewee attended and entertained during most of the interview. Blended learning has not been in big demand so far, but the company has done a few pilot projects with some of the customers.

Question 1: What is your interest in blended learning? Which experiences do you have in the area of blended learning or with blended learning?

The interviewee thinks that blended learning will be in demand in the future. Currently, most training courses are still face-to-face, because of the customers' preferences. For trainers currently offering face-to-face training, the development of blended learning is a financial burden. The customers are usually not willing to pay for individual course development; using standardized training courses, on the other hand, is not specific enough. There have been requests for e-learning. The training program "women online" enabled some experience with an individualized and customized blended learning development, but this was only possible with EU funding. It also showed that most learners still don't factor on online or blended learning when they look for course options. The interviewee was trained as an online tutor in an established postgraduate program almost ten years ago, but hasn't had many chances to apply this knowledge.

Question 2: Considering the aspects mentioned in question 1, which are the Top 5 of the aspects listed in annex 1? (Annex 1)

- Adaptability
- Student Interaction

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- Mix of Methods and Media
- Geographical Independence
- Time Flexibility

Comments about the selected aspects were as follows.

Adaptability The use of existing documents enables the tutor to develop customized material for the trainer sessions. This requires the development of a material database that has to be updated continuously. Adaptability is very much dependent on the experience of the trainer.

Student Interaction Student interaction should be supported where possible, because it changes the role of the student from a consumer to an active participant. The trainer can manipulate this by setting group work exercises and dividing the course into groups.

Mix of Methods and Media The possible mix of simulations, 3-D images, and hands-on exercises is very exciting. It can activate the trainer's and the students' curiosity to explore and play with new things. On the other hand there is the danger of both just providing slides and PDF documents, or of starting out big and then realizing that the funds are not sufficient to use all the new technical possibilities.

Geographical Independence It is extremely important that the systems are truly web-based systems that don't require the download of any parts of the LMS to a specific computer. Single sign-on systems are also important, because long log-in procedures can be very time consuming and costly when using the system abroad. If the course also contains content to be read on mobile phones, the structure of the course has to be adapted. Mobile learning can be easily used for short drills though, like "one-word-a-day" for example.

Time Flexibility This is mainly important for the learner. It enables her to adapt learning to everyday routines, rather than the other way around, and thus enables learning in a lot of previously challenging learning situations, for example at home. The tutor can use asynchronous communication and this enables them to actually summarize answers to questions from various students. On the other hand, time flexibility requires scheduled modules to

provide some structure for the learner, because otherwise the learners might lose track of the learning process and miss approaching deadlines and so on.

Question 3: (Guidebook + Mind map)

How can these aspects find consideration in a guidebook for trainers?

- **Level of detail?**
- **A complete manual?**
- **Predefined sessions?**

Should activities be assigned to certain sections or specific sessions?

Building manual or construction kit?

A guidebook can be both irritating and helpful. It guarantees the same course content, though, and makes quality management easier. It also takes a lot of responsibility away from the trainer, which again can make room for other activities or restrict them. The interviewee pointed out that she considers it more suitable for short courses of up to 1 week, whereas longer courses have to be more flexible for the trainer.

Question 4: How important are trainers for learning on-line and face-to-face learning? Role definition?

From the interviewee's perspective a trainer can help to reduce initial inhibitions of the learner, and can motivate the learners. The trainer is also "the face" of the course, the personality of the trainer can influence whether training is successful or not. The trainer is more important for blended courses than for pure face-to-face training courses, because in a blended course the "get-to-know" phase is much shorter and activities have to be moderated more intensely to get the same interaction started. In any face-to-face situation, the expertise of the trainer is very important, because learners usually figure out very quickly how far ahead of them the trainer is. The trainer should be more like a learning companion rather than an instructor, giving guidance when it gets difficult and providing support rather than the solution to problems.

7.3.4. Company 4

Company 4 Provider	
Interviewee	The interviewee from the provider group is from a small company with less than 10 employees. She is the managing director, between 56 and 65 years old and she has been working in the area for seven years.
Company Services	The company provides blended learning, but mainly e-learning in the areas of e-learning training, e-learning standards, curriculum development, and working with rapid authoring tools. The company usually gets contracts with big telecommunications companies. The company is specialized as an e-learning training provider and is very active in a number of professional and federal organizations dealing with the issues of e-learning standards.
Interview Location	The interview took place in the company's office. Blended learning has not been in big demand lately, but the company does offer blended courses for its customers.

Question 1: What is your interest in blended learning? Which experiences do you have in the area of blended learning or with blended learning?

Blend is a very complex term. It can be discussed from very different perspectives, for example teaching and learning methods. For the interviewee it is one possible option for learning. Blended learning has been around for almost 20 years, according to her perception, and the mix between face-to-face and e-learning is just one of the many aspects. She is providing training for trainees in the travel industry among others. The traditional school system is complemented by e-learning modules. The traditional way of continuously training travel agents has not changed much, and is still mainly in the form of pure face-to-face seminars; although a lot of the travel information could be delivered in a mix of face-to-face and online.

Blended learning is used very often to bridge the gap between face-to-face and e-learning. The interviewee points out that the most important aspect for a decision about which blend to use and how to blend depends on the situation of the learner and what suits him or her.

Question 2: Considering the aspects mentioned in question 1, which are the Top 5 of the aspects listed in annex 1? (Annex 1)

- Support Mechanism
- Content Design

- Relevance of Content
- Sustainability
- Mix of Methods and Media

Question 3: (Guidebook + Mind map)

How can these aspects find consideration in a guidebook for trainers?

- Level of detail?
- A complete manual?
- Predefined sessions?

Should activities be assigned to certain sections or specific sessions?

Building manual or construction kit?

The interviewee has very precise suggestions. She usually hands out detailed trainer information with information on the use of the LMS, a detailed schedule, and a list document or presentation material. She recommends very strict tutor instruction. This includes instructions on when to use which material and what to use it for. She also provides one detailed example for each session; but the actual session structure is left to the tutor. The detailed structure of the courses has the big advantage that it is possible to tell a potential customer exactly what to expect. Therefore the company looking for a training course is able to make an informed decision as to whether the training suits their needs or not, and a course can start immediately. Nevertheless she points out that courses have to be flexible enough to be adapted to a company's schedule. Therefore she recommends strict guidelines for the course design and flexibility for the more detailed session design.

Question 4: How important are trainers for learning on-line and face-to-face learning? Role definition?

The trainer is important for a course, because she builds trust in the course, the learning environment, and the training provider. Usually the trainer conducts the test on learning styles. There is no one-size-fits-all recipe; but a trainer always guides a learner group through the course. The initial contact, including such things as voice and appearance, has a big impact on the success of the course. The trainer has to be able to recognize the learners' needs. The interviewee actually thinks that this is the core competence of a good trainer. She also points out, that supporting student development as an online trainer needs

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training as well: is not a given. The interviewee points out that expertise, media literacy and didactic has to be learned when moving on from working as a face-to-face lecturer to an online trainer.

7.4. Case Study Data Analysis and Discussion

Nielsen's heuristics have been used to structure the feedback on the UML course.

The data analysis uses the method of categorisation introduced for the Delphi study above and the categories defined there. The analysis reviews whether or not the case study confirms a selection of similar aspects and categories as the final round of the Delphi study for the Delphi panel. It looks at whether or not the selection of categories and aspects match the selection in the respective sub-panels.

The feedback on the guidebooks is summarized and the main ideas are extracted.

7.4.1. Categorisation

The interviewees were selected as typical examples from the sub-panels: IT SME learners, trainers and providers. The concept maps from the Delphi study for these sub-panels are compared directly with the concept maps from the case study results. The figures of this section are printed in a bigger size and can be found in Appendix K.

When comparing the results it has to be taken into account that the case study asked for the five most important aspects whereas the Delphi study concept map shows the final TOP 10. A total agreement would be extremely unlikely. The comparison can show though, whether the case study interviewees confirm the categories selected in the Delphi study by the respective sub-panel.

IT SME learners

The two concept maps both show a selection of the categories design, skill-driven learning, access to knowledge and quality assurance. Social interaction has been selected by the case study interviewees, whereas it did not make it into the final TOP 10 of the Delphi study. Cost effectiveness was among the Delphi Top 10, but was not selected at all by the interviewees. Intelligent systems is an aspect that was selected by the case study interviewees, but was not selected in round two or three of the Delphi study and therefore was not assigned to any category. The comparison for the IT SME learners is shown in Figure 7-2 and Figure 7-3.

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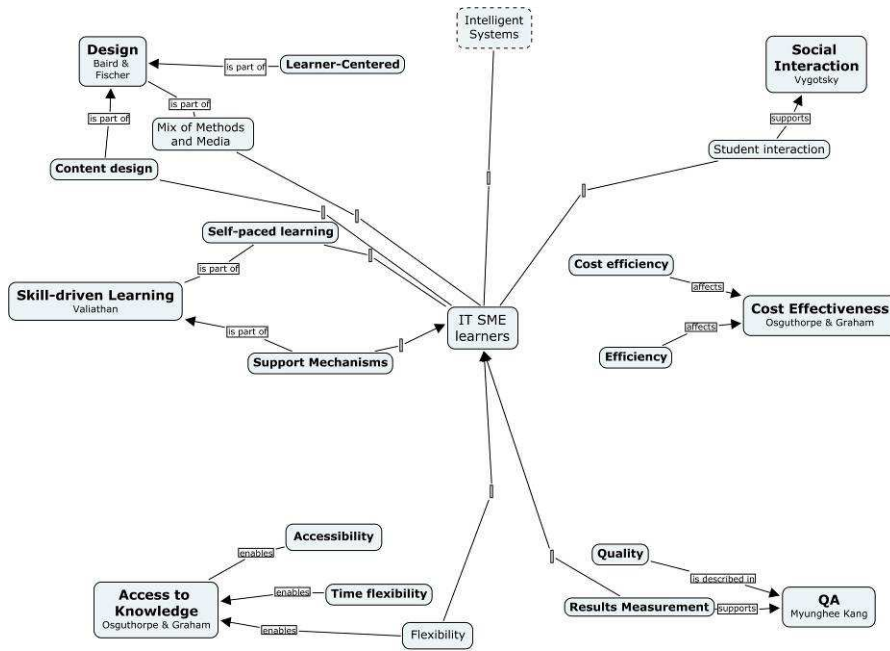


Figure 7-2 IT SME Learners Case Study

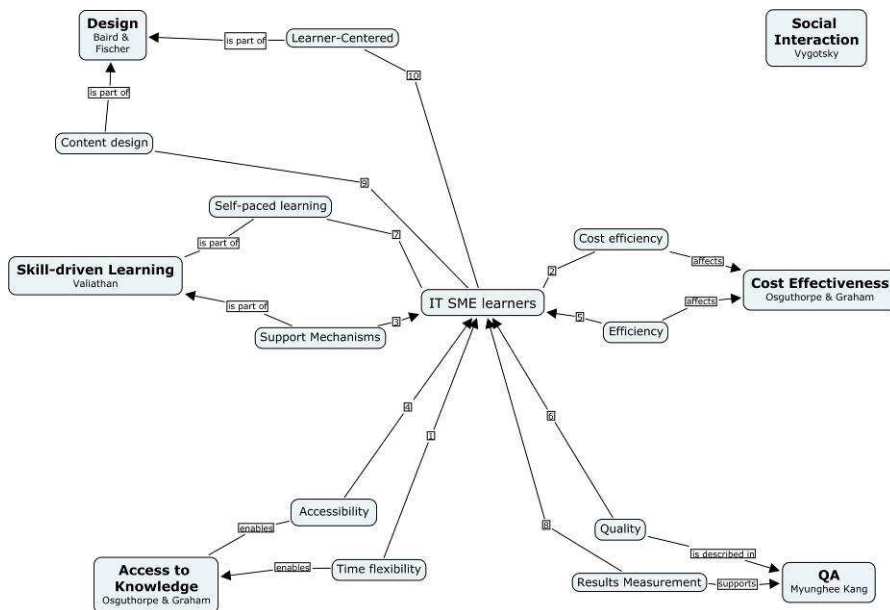


Figure 7-3 IT SME Learners Delphi Study

Trainer

The two concept maps both show a selection of the categories design, skill-driven learning, access to knowledge and social interaction and both interviewees and panelists did not select the category quality assurance. Cost effectiveness, one of the categories selected in the Delphi study, was not considered by the case study interviewees. Both concept maps look very

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similar, and show an almost identical selection of categories. The comparison for the trainers is shown in Figure 7-4 and Figure 7-5.

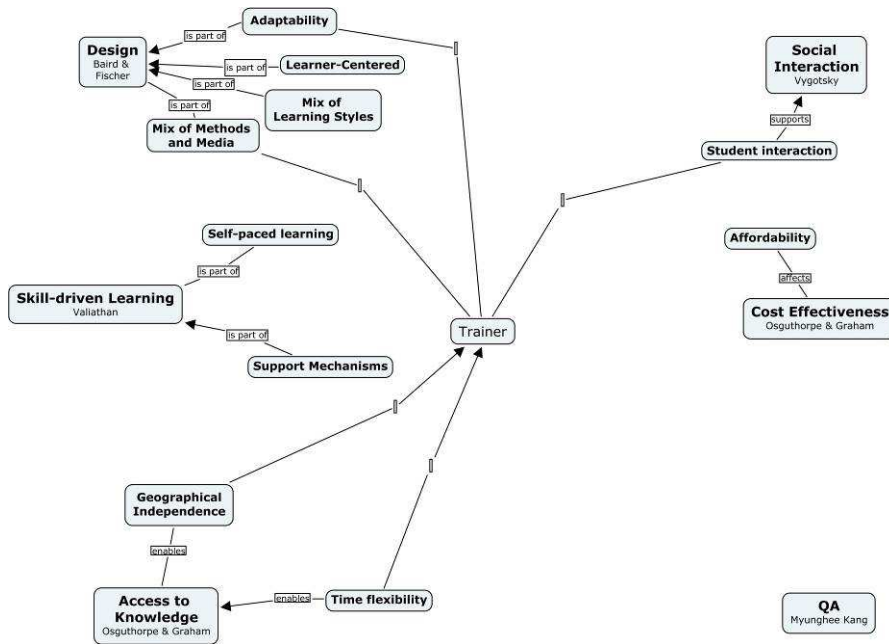


Figure 7-4 Trainer Case Study

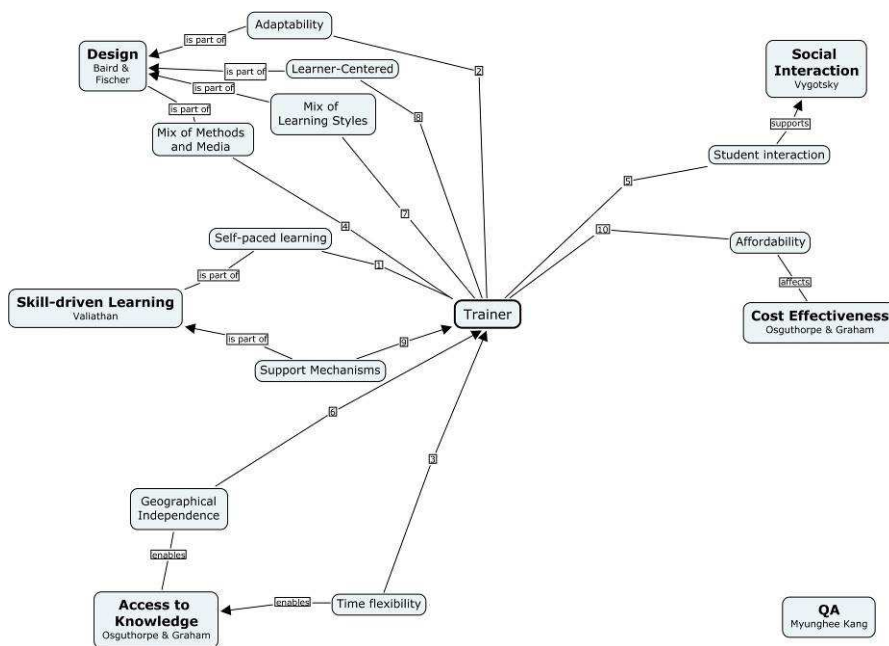


Figure 7-5 Trainer Delphi Study

Provider

The concept map for the provider interview shows the most obvious difference to the concept map with the results of the Delphi study, at closer look though the differences are not quite as big. Both the Delphi panel and the interviewee

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selected most aspects from the two categories design and skill-driven learning. The emphasis of these two categories is identical. The Delphi panel also selected all other categories, whereas the interviewee did not select any other categories. The interviewee selected the aspect sustainability, which was not selected among the TOP 10 in the Delphi study. The comparison for the providers is shown in Figure 7-6 and Figure 7-7.

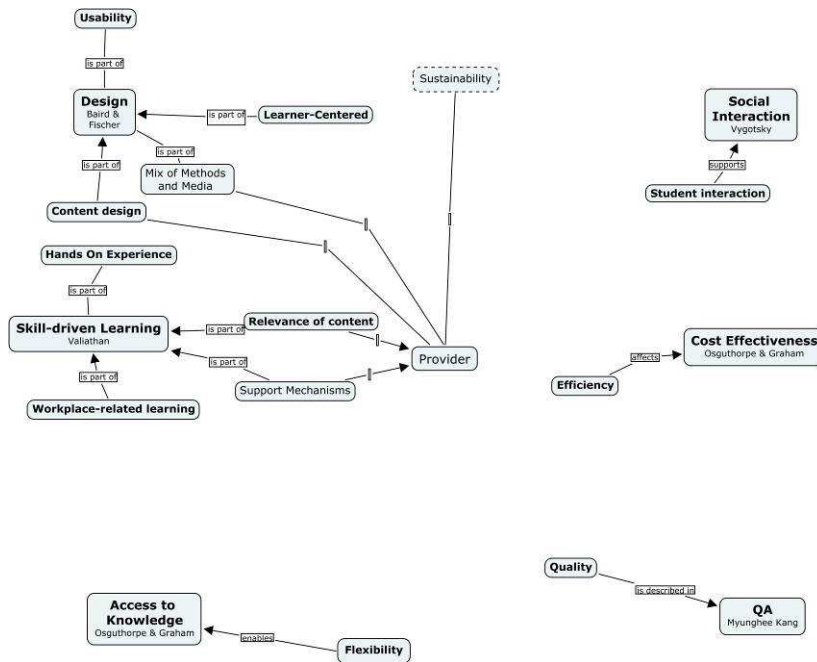


Figure 7-6 Provider Case Study

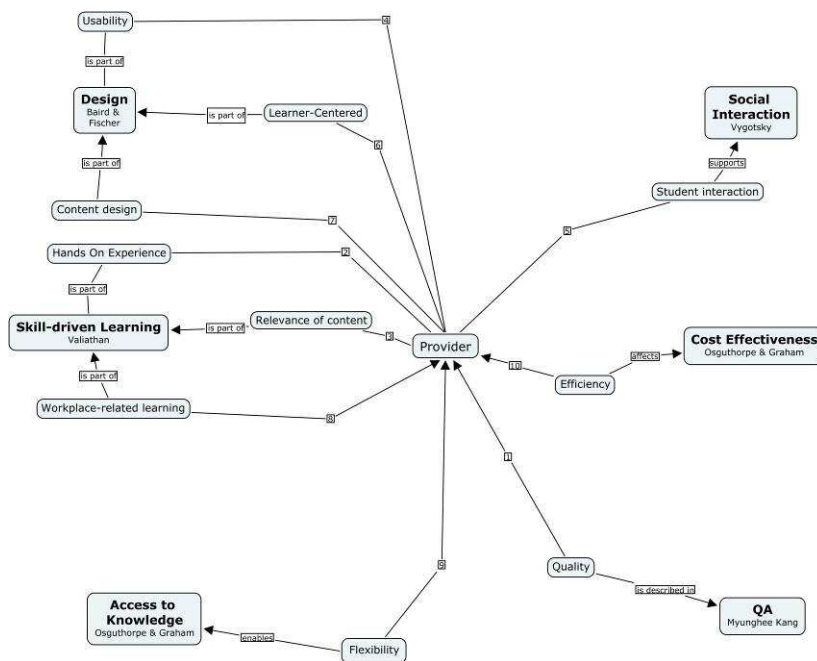


Figure 7-7 Providers Delphi Study

7.4.2. Summary of the Results for the Guidebook and the Role of the Trainer

The interviewees agreed in general with the recommended structure of the guidebook (see Figure 6-1).

The guidebook can be very detailed; including technical information for the trainer about the learning technologies used and detailed information on the materials to be used and a structure for each session. The provider interviewee went so far as to actually use the guidebook to instruct the tutors in detail as to which materials to use when and how to conduct the sessions. From the trainer perspective it is helpful to have a guidebook as a support, as it takes away responsibility from the individual trainer, but these guidelines being very restrictive and limiting the trainer in their individual choices is the other side of the coin.

Both groups agree, though, that a guidebook can help in providing constant quality for the delivery of the face-to-face sessions and the blended course in general.

The role of the trainer has been looked at from a variety of considerations. The trainer has the role of the “face” of the course and most interviewees agreed that technical expertise, experience as a trainer and a background in pedagogy is helpful for face-to-face and blended learning trainers. Trainers have to be able to recognize the learners’ needs and react to that.

There was also agreement that the tutor or trainer has different functions depending on the delivery mode of the course. In the online parts of the blended learning the ability to communicate clearly is very important, whereas in face-to-face teaching the personality and voice of the trainer determines the success of the teaching.

The trainer is always seen as a motivator and a guide through the learning process. The trainer can reduce initial inhibitions and effectively moderate the “get-to-know” phase which is much shorter in a blended setting compared to face-to-face teaching. All this leads to the final result: supporting student development as an online trainer needs training.

8. Discussion of Findings, Conclusions and Recommendations

8.1. Discussion of Findings

The research is, unlike most of the research discussed in chapter 2, not focussed on a particular topic, but is intentionally very open to exploring the topic. We addressed the research question with a Delphi study and a case study, both including selected participants from the stakeholder groups of learners in SMEs from the tourism and the IT industry, learners from large companies and trainers and providers of blended learning, initially identified in the pre-study.

The Delphi study provided us with the results of the TOP 10 aspects of blended learning for all the sub-panels. A comparison of these TOP 10 outlined the differences or similarities in preference for certain aspects.

The case study enabled deeper insights into the reasons for selecting the TOP 10 and also validated the results of the Delphi study.

A guidebook for blended learning was developed based on the results of the Delphi study and used for discussing the role of the trainer during the semi-structured case study interviews.

The results show little or no interest in design aspects from the SME learners. This contradicts the strong focus on the topic by trainers and providers as well as the findings of Baird and Fisher (2006) for the neomillennial learner.

“Skill-driven learning” as described by Valiathan (2002) together with “access to knowledge” and “cost effectiveness” as outlined by Osguthorpe and Graham (2003), turned out to be the categories selected mostly by SME learners.

“Social interaction” as outlined by Vygotsky (Lefrancois 2006) was preferred by learners in large companies. “Quality assurance” as outlined by Jones (2002) was not selected at all by trainers and only sparsely considered by all other sub-panels. This contradicts the importance of quality issues as outlined in previous research (Connolly, Jones and O’Shea 2005; Jones, Morgan and Turner 2002). The example shows that the results of the Delphi study can not be taken as an indication that aspects are not important if not selected among the TOP 10. The selection of aspects on the list state that these are important aspects, but it is

not possible to reverse this and interpret that aspects not selected are not important.

8.2. Conclusions

8.2.1. Data Collection

The online survey proved to be the right method. Although with limited resources the research could be done within the time frame. The time needed for consolidation between round one and two was underestimated. Round 1 clearly required more time to process than the two following rounds.

To do the study using an online questionnaire proved to be of benefit to the results. It was one fairly important criteria for the selection pattern that sorted out candidates with insufficient previous exposure to online learning.

8.2.2. Recruiting Participants

The recruitment of participants and the connection to the main target group, learners in SMEs, can be intensified for Ireland if research can be organized in cooperation with one or several of the Irish organizations listed in Appendix C. The impact on the SMEs could be improved that way as well whereas now, a special effort has to be made to bring the research to the attention of the SMEs.

Although the initial numbers of 50 participants as well as the final 29 represented a fairly big sample according to the literature, we got the impression that the division into the sub-panel made those too small. The sub-panels should be bigger: perhaps with approximately 15 panelists after an inevitable dropout of panelists.

The general procedure of collecting suitable addresses, calling people first, then sending the panel profile questionnaire and the timely invitations for the rounds and reminders when the deadlines approached seems to have been very successful. Some participants commented positively on the procedure and said that it helped them to stay in the study.

8.2.3. Different Definitions for Blended Learning

The variety of definitions makes the whole topic slightly hazy, but for the future, the term blended learning might disappear, as the use of ICT with face-to-face teaching or else the supplement of online learning with face-to-face sessions evolve towards the continuum of blended learning as outlined by Jones (2007).

8.2.4. Limitation of Scope

Adding another round to the Delphi study might have made the result more stable and then showing more sustainable values for W. The first round was actually a topic collection, rather than a ranking round.

Due to the early disintegration of the research panel the input from the research perspective is missing.

The dropout rate was within acceptable limits, except for the research panel.

8.2.5. Delphi as Explorative Study

The decision to explore the topic in a very open way with a Delphi study turned out to be the right decision. It enabled a very open approach and the study can be seen as an initial study that indicates a few areas for future research.

8.3. Research Results

The study contributes to the currently fairly small body of knowledge of blended learning in SMEs.

The TOP 10 of the final rounds show very different foci for the different sub-panels. This confirms the presumption of previous research that one of the reasons for SMEs not taking up blended learning or e-learning as much as expected are due to providers and trainers not “speaking the same language” as the SME learners (Beer, Hamburg and Paul 2006).

The TOP 10 for the different sub-panels can be used as short checklists for blended learning development, as outlined in the tool set for blended learning (Moebs, Piombo, Batatia and Weibelzahl 2007).

The research question was: “What are relevant characteristics for successful blended learning for learners in SMEs?”

We were able to extract a list of distinct TOP 10 aspects for the sub-panels SME learners, trainers and providers. The TOP 10 aspects from the SME learner sub-panel show relevant characteristics for successful blended learning for learners in SMEs.

The difference between the SME learner groups tourism and IT were not very big, as shown in the radar chart analysis, see Figure 5-13. Further research

could clarify whether the industry has a strong impact on the successful mix for blended learning.

The difference between the SME learners and learners from large organizations is fairly big, as shown in the radar chart analysis, see Figure 5-14. The foci of the two learner groups are very different and there are only very few common preferences. The size of the organization seems to have a strong impact on the aspects for a successful mix in blended learning.

A comparison between the preferences of IT SME learners and trainers as well as a comparison between SME learners and providers of blended learning also shows big differences, see Figure 5-15 and Figure 5-16.

The results from the study give some indication of how to improve the uptake of blended learning by SME learners.

The case study confirmed the findings of the Delphi study and also provided further input for the guidebook structure. Another main result of the case study is the role of the tutor or trainer. All interviewees pointed out the importance of a personal touch for a successful blended learning scenario.

8.4. Recommendations

8.4.1. Recommendations for Providers and Trainers

The results give some indication to which preferences exist among SME learners. Providers can apply these aspects for their product development. For example “student interaction” is among the TOP 10 from the provider sub-panel, whereas the SME sub-panels did not select the social interaction-related aspects at all, preferring feasibility and individuality. This gives some indication that providers should include feasibility and individuality as requirements for their development in addition to features that enable student interaction.

Trainers put a strong focus on design-related aspects, which are not in high demand with the SME sub-panels. Support mechanisms and self-paced learning are much more important to the learners according to our results. This is also confirmed by the results of the case study in regard to the role of the trainers. Emphasizing the support and enabling self-paced learning should not replace the design aspects though. But if in doubt, the SME-selected aspects should be preferred.

8.4.2. Recommendations for SMEs

The results show that providers and trainers interested in blended learning for SMEs have a highly different view on the topic. There is an opportunity for SMEs to get into a dialogue with providers, and trainers where possible, to change their approach to blended learning. This might not be feasible for the individual SME; however most companies are members of some of the organizations listed in Appendix C and can transport their view of the topic through these communication channels.

Another option would be openness towards new learning technologies. A lot of the implementations that enable, for example the individuality of social interaction or the time flexibility for access to knowledge are based on new technologies, often web 2.0-based. An openness to using these learning technologies can easily bring together the diverging approaches of SME learners and trainers or providers.

8.4.3. Future Perspectives

This research is focused on finding SME-specific aspects for blended learning. The research was limited in the number of participants. A larger Delphi study with a bigger panel could show whether the results can still be confirmed. Another option could be quantitative studies within the different stakeholder groups to validate the sub-panel specific results. The results of the Delphi study can be taken as initial research for follow-up research. One research project has started to emerge already with the contact organization for most of the tourism SME panelists. The project aims at investigating further whether the TOP 10 for the tourism SME panel are valid. Currently a quantitative study with a larger sample is being discussed.

The study outlines a number of issues (aspects) nevertheless ways of actual implementation of the aspects have been largely neglected. It would be interesting to investigate in more detail how the aspects self-paced and workplace-related learning can be implemented for blended learning for this highly heterogeneous learner group. Another research aspect would be the development of frameworks to implement skill-driven learning for SME learners in cost efficient solutions.

Moreover, a further question would be whether initial training to improve the digital literacy within the SME learner group could open up the possibility to make new learning technologies available in remote areas and thus improve self-paced and workplace-related learning.

Apart from the more practical implementation issues outlined above it would be interesting to do more detailed research, which learning theories can support the SME learners' preferences best.

Learning styles were hardly selected by the SME learners. If the results for the SME learner panels can be validated by follow-up research it would be interesting to investigate whether SME employees have similar learning styles. If employees in SMEs choose this size of organization for work, because they have a common set of interests, values and possibly learning styles, this would make this highly heterogeneous group more easily tangible.

8.5. Summary of Conclusions and Recommendations

What is a successful mix for learners in SMEs from the IT sector in blended learning?

The final "Top 10" characteristics for successful blended learning in SMEs from the IT sector are in this order: time flexibility, cost efficiency, support mechanisms, accessibility, efficiency, quality, self-paced learning, results measurement, content design and learner-centeredness. These characteristics put a balanced emphasis on the areas design, skill-driven learning, and the access to knowledge, quality assurance and cost effectiveness. Surprisingly social interaction was not selected.

Does this mix vary depending on the industry and the size of the company?

In comparison the sub-panel tourism SMEs selected social interaction as an important area, whereas design was not selected.

The large companies sub-panel choose clearly different areas, compared to the IT SME sub-panel. There was a strong emphasis on design and social

interaction, whereas cost effectiveness was not considered important. Skill-driven learning and quality assurance only show a weak consideration.

Which recommendations can be given in regard to the adaptation of blended learning and SME learners needs?

A sound approach for blended learning in SMEs should consider the “Top 10” aspects selected and the characteristics outlined above in combination with the results of the case study, which showed the importance of the role of the tutor or trainer. All interviewees pointed out the importance of a personal touch for a successful blended learning scenario.

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Appendices

Appendix A

Workshop Proposal EC-TEL 2006

Appendix B

Call for Papers: Workshop EC-TEL 2006

Appendix C

Short description of Organizations and Networks

Appendix D

Panel Profile Form

Appendix E

Invitation Delphi Rounds

Appendix F

Tracing of Input from Round 1 to Round 2 of the Delphi Study

Appendix G

Mapping of Consolidated List of Aspects and Sub-panel Input

Appendix H

Results Delphi Study Round 3

Appendix I

Case Study Tool Set

Appendix J

Delphi Study Concept Maps and Radar Charts

Appendix K

Case Study Concept Maps

Appendix L

Poster Summary Up2UML

Appendix M

Modified Formula