

Bernd Hilgarth

The Systemic Cognition of
E-Learning Success
in Internationally Operating
Organizations



JYVÄSKYLÄ STUDIES IN COMPUTING 147

Bernd Hilgarth

The Systemic Cognition of E-Learning Success in Internationally Operating Organizations

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Editors

Seppo Puuronen

Department of Computer Science and Information Systems, University of Jyväskylä

Pekka Olsbo

Publishing Unit, University Library of Jyväskylä

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ABSTRACT

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Finnish Summary

Knowledge plays a key role in our increasingly globalised business world. Sustained management of knowledge becomes a tremendous task for organisations do act in international markets. Traditional training degenerates in the time of the Internet and online communication more and more to a *luxury good*. E-Learning, which is not an emerging concept, addresses also the issues of flexible and open learning. But over the last two decades this form of education became more and more professionalised in the application of higher education. Considering it in the context of internationally operating organisations, which are characterised by distributed and heterogeneously target groups, e-Learning may be seen as an effective concept, but lacks in the efficiency of deploying and managing. The goal of the research activities at hand is the creation of a holistic management reference model which addresses these issues of e-Learning over its life-cycle in distributed workforces of globally acting organisations. In general, the research activities go beyond the simple investigation of one specific issue. More than this, the overall intention is to identify and address the whole complex of e-Learning in non-professionalised training organisations. Reaching this goal depends on different factors: first, the review of existing theories and knowledge is handled in multi-disciplinary and peer-reviewed scientific literature regarding e-Learning success dimensions, influencing factors as well as indicators for successful e-Learning and not least on theories and approaches for the management of it; secondly, the rigorous identification of the general classes of problems (e.g. cultural differences) are observable in a representative empirical environment; thirdly, the formulation of a reference model which will direct this class of problem(s) which is testable in similar empirical situations. *Action Design Research* was chosen as the adequate methodological framework in this work. The central research result is the *Cybernetic e-Learning Management Model* for this. It subsumes the *technological, institutional, pedagogical* as well as *socio-ethical* success domains and the complexity of e-Learning deployment. The model's final assessment performed in the context of reference model evaluation shows the basic maturity and relevance as well as starting point for future research in this field.

Keywords: e-Learning, internationally operating organisation, success management, Cybernetic e-Learning Management Model

Author's address Bernd Hilgarth
University of Jyväskylä
Dept. of Computer Science and Information Systems
P.O. BOX 35, 40014 Jyväskylä, Finland
Email: bernd.hilgarth@jyu.fi

Supervisors Professor, Dr.Tech., Pasi Tyrväinen
Dept. of Computer Science and Information Systems
University of Jyväskylä, Finland
Email: pasi.tyrvainen@jyu.fi

Professor, Ph.D., Päivi Häkkinen
Institute for Educational Research
University of Jyväskylä, Finland
Email: paivi.hakkinen@ktl.jyu.fi

Reviewers Professor Dr., Johann Strassl
University of Applied Sciences Amberg-Weiden
Email: j.strassl@haw-aw.de

Professor, Ph.D., Jari Multisilta
CICERO Learning Network
University of Helsinki
Email: jari.multisilta@helsinki.fi

Opponent Professor, Dr., Freimut Bodendorf
Dept. Computer Science
University of Erlangen-Nuremberg, Germany
Email: freimut.bodendorf@wiso.uni-erlangen.de

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*“Bedenke, dass du nur Schauspieler bist in einem Stücke,
dass der Spielleiter bestimmt.”*
(Epiktet)

Doing research in the environment with the entitlement this work intends to fulfil, requires the support of so many different persons and institutions. The simple but strange question in this context is: where to begin and where to end?

Let's start at the point where all this research began: this was with colleagues at BMW Group who gave inspiration and freedom to pursue the investigation also in situations where it was not clearly defined what benefits there will be. The colleagues Alexander Berlenbach, Bernhard Graf and Peter Hammer always gave trust in my ideas and provided me with the necessary space for creativity in research. They encouraged me indirectly and directly to follow this path with high motivation and fun without any restrictions. This was all done without any obligations to do so outside my job description at BMW Group.

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2. Hilgarth, B. 2010. E-Learning Success in Action! A case study research on e-Learning success in internationally operating organization. In M. B. Nunes & P. Powell (Eds.) Proceedings of the International Association for Development (IADIS) of the e-Learning (eL) 2010 conference (pp. 348-356). Freiburg, Germany: IADIS Press.
3. Hilgarth, B. 2011. Cybernetic e-Learning Management Model – managing e-Learning in internationally operating organisations. In M. B. Nunes & P. Powell (Eds.) Proceedings of the International Association for Development (IADIS) of the Information Systems (IS) 2011 conference (pp. 61-69). Ávila, Spain: IADIS Press.
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7. Kröckel, J., Hilgarth, B. 2011. BPM@KMU - Designing e-Learning for the Introduction of BPM in Small- and Medium-sized Enterprises. In S-BPM ONE - Learning by Doing - Doing by Learning, Proceedings of the Third International Conference S-BPM ONE 2011 (pp. 34-47). Berlin/Heidelberg, Germany: Springer.
8. Hilgarth, B., Pawlowski, J. 2011. The Cybernetic e-Learning Management Model: Evaluation of an Action Design Research artefact in the domain of e-Learning. In IEEE Transactions on Learning Technologies, submitted.

LIST OF ACRONYMS

A	Article
ADR	Action Design Research
CS	Computer Science
CeLMM	Cybernetic e-Learning Management Model
eL-CSF	e-Learning Critical Success Factors means the handling of identified factors which influence successful or failed e-Learning.
eL-KPI	e-Learning Key Performance Indicators means indicators which show successful or failed e-Learning.
HR	Human Resources
IS	Information System
ISD	Information System Design
RQ	Research Question

1 INTRODUCTION

The world is transforming into a global village with the rapid development of information and communication technology.

- Adam, Awerbuch, Slonim, Wegner and Yesha 1997

This document serves as the introduction and summary of the research activities which were carried out throughout the past five years. Research regarding the impact of real existing world problems and issues on organisations, as well as the use of organisational and technological concepts to counter these requirements, shows the central mission in *information system* research. As Checkland and Holwell (2002) states, *information systems exist (...) to serve, help or support people taking action in the real world*. Considering the discipline of *information systems* and its role (Mertens, Bodendorf, König, Picot, Schumann & Hess 2005) in the scientific world, it is characterised as an *all-rounder* and an holistic discipline with respect to its specific context in the issues of *economics, informatics, technology* and, from the point of view of this work, also of *human & arts* disciplines. FIGURE 1 depicts the integrated, global view about the role of the discipline of *information system* (in orientation to Mertens *et al.* 2005).

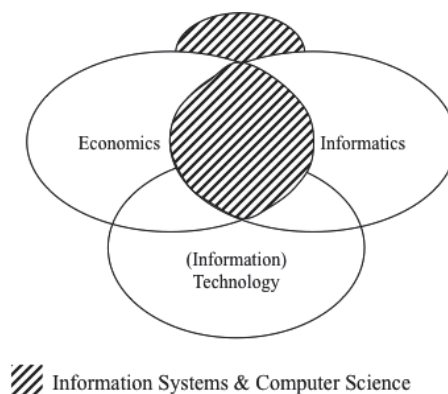


FIGURE 1 Placement of the disciplines of IS and CS (Mertens *et al.* 2005, p. 5)

As FIGURE 2 shows, research in this field means to maintain balance between *theories* and the *practice* they serve or originate from (according to Checkland & Holwell 2002).

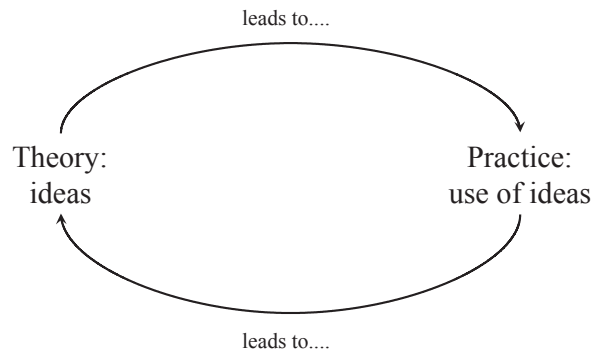


FIGURE 2 Learning cycle in Information Systems

e-Learning success management is a concept or standing term which is rarely or never defined. It follows the idea of Khan (2005) to investigate all the issues (processes, people and products/tools) which might be considered for a successful decision, design, implementation and use of e-Learning in organisations, especially in organisations which are working with a distributed workforce.

Considering the context of e-Learning in general, and as described in the following chapters specifically in the complex of managing e-Learning in internationally operating organisations, Information Systems & Computer Science provide the basis for research in this field. The existence of a globally distributed workforce motivates organisations to react on the need to deliver just-in-time training as a means of cost-effectiveness (Urdan & Weggen 2000). From the various aspects of e-Learning and its management, it might not be considered to meet the characteristics of the Information Systems and Computer Science Systems discipline; the intersection of (information) technology, informatics, economics and, in a supplementary manner, human & arts aspects. To put it simply, researching e-Learning might get a broad focus which follows the basic philosophies of the Information Systems & Computer Science discipline mentioned by Mertens *et al.* (ibid). Secondly, for researching in this field, it seems also to be more fruitful to follow the views of Checkland and Holwell (ibid) by respecting both; the interplay between e-Learning theories and knowledge in existing literature with its usage.

The current research therefore fully follows these basic principles given by Information Systems & Computer Science mentioned above. As is depicted in the following subsections, this research work was initiated firstly by reviewing existing literature in the domain of e-Learning and secondly by reflecting on the handling (use) of e-Learning programs in real existing cases, that is, in practice. Existing theories provide a multifaceted knowledge on strategy decision, design, use and evaluation of e-Learning. Insights and details emerging from this litera-

ture review (Hilgarth 2010a), as well as the long-term case study at BMW Group (Hilgarth 2010b) on the handling and management of e-Learning in an internationally operating organisation, had shown the initial points for defining the research questions and its follow-up work. Chapter 1.1 will first provide the core insights coming from contemporary theories and its purposes for future research in the field of e-Learning management gained from a profound literature review; chapter 1.2 describes then the central outcomes from the case study at BMW Group and is matched to the need for researching the field in more detail because of issues identified in practice. Chapter 1.3 summarises both strands of analysis to a comprehensive problem formulation as the basis for the current research and its results described in the rest of this document.

1.1 Contemporary theories on e-Learning success management

E-Learning became a hype topic in the last decade for all sorts of organisations, especially in times of increased globalised business processes. It might be seen as an *economical, educational, socio-ethical* and *technological* concept as well as a solution that belongs not only but mainly to the *Information Systems* and *Computer Science* discipline. Different terminology is used for e-Learning in different scientific disciplines. *Information scientists* as well as researchers in the disciplines of *economics, information technology, educational research* or *society and culture* investigate e-Learning with different purposes and from different points of view. The existing literature in the domain of e-Learning and its successful management in globally operating organisations (see also Hilgarth 2010a; Appendix 5 TABLE 13; Appendix 6 TABLE 14; Appendix) was selected and considered from different scientific disciplines. The central goals of reviewing the literature were to (a) ascertain the current status of the complex of success management of e-Learning in general, (b) gain knowledge about elements and dimensions of successful e-Learning in such organisations and (c) to combine existing questions for further research arising from the literature as a basis for further research work touched on by these research activities.

To focus the search and selection procedure of relevant literature, the search terms illustrated in TABLE 14 (Appendix 6) were identified and used in identifying the different literature databases. Terms which were used for the search are also derived from other contexts, disciplines or concepts existing as known paradigms. For example, the concept of critical success factors has a long tradition in IS research (see Amberg, Fischl, Wiener 2005). Similarly, the use of the term key performance indicators is based on a general knowledge in the field of IS management (Parmenter 2010). The terms were applied to the search of literature titles, keywords and abstracts. Finally, the search process resulted in 204 documents which were reviewed in detail. 48 documents were identified as key or very relevant literature (see Appendix , TABLE 15) for further reflection.

Reviewing this literature was mainly guided by three central questions:

- a) What is the current understanding for the success objects and goals of e-Learning in existing literature?
- b) What explicit influencing factors and indicators are mentioned in e-Learning literature and how are these structured?
- c) What is the understanding of e-Learning management literature?

The first question is aimed at the general position of the existing literature towards the objects and goals which they see as successes in e-Learning. Question two deals with the success criteria and indicators for e-Learning described in the chosen literature. Finally, question three analyses the approaches, methods and models related to the management (and evaluation) of e-Learning. Each question was addressed based on the in-depth content analysis of the key literature documents. Therefore the state-of-the-art theory concerning e-Learning and its management in globally acting organisations was the focus of the review.

Article 1 (Hilgarth 2010a; Appendix) summarises these three questions in the identified key literature. In the next three sub-sections of this chapter, the main insights will be described in an extended manner to Article 1.

1.1.1 Heterogenous understanding of successful e-Learning

The review aimed to reflect the understanding of successful e-Learning in globally acting organisations provided by existing literature. Here we can state that the definition of the success and goal for e-Learning depends on the author's research focus (see also TABLE 15). In general, it also might be mentioned that the aims assigned to e-Learning in the literature are not only focused on organisations working in such distributed environments. They range from primary to secondary school education (Shee & Wang Yi-Shun 2008) till higher education and universities (Dyson & Campello 2003; Doyle & Hogan 2004; Selim 2007) as well as training with e-Learning in profit-organisations (Sun & Cheng 2007; Andreu & Jáuregui 2005) and both the *academic* and *business worlds* (Miller & Husmann 1996).

To bring some structure to the insights gained about the meaning of e-Learning success, how the success is considered, measured or observed will be differentiated by individual (I) and collective (C) levels. Another structure categorises success according to its domain or dimension (according to Khan 2005); technology (T), pedagogical (P), institutional-economical (I-E) or socio-ethical (S-E) are mainly mentioned here. Some of the success objects mentioned might be seen under more than one of these aspects. TABLE 1 illustrates the summary for the existing understanding of e-Learning success. This summary provides beside the *e-Learning success object* the mapping to the author(s), a brief description of the *meaning*, the *level* the specific object is observable or can be measured as well as the *domain* it joins.

TABLE 1 e-Learning success in literature and its characteristics

e-Learning success object	Authors	Meaning	Level(s)	Domain(s)
Learner success	Edmundson 2006 Sun 2007 Leyking and Chilkova 2007	Describes the individual benefits which might be reached through the use of e-Learning and includes the improvement of individual business performance.	I	I-E, P, S-E
(e-)learner, technology and course satisfaction	Shee & Wang Yi-Shun 2008 Sun 2007 Wang 2003 Wentling, Waight, Gallaher, La Fleur, Wang, Kanfer 2000 Choi, Kim & Kim 2007 Levy 2006	Stands for the degree of satisfaction of the learner when using e-Learning. As Choi <i>et al.</i> 2007 mentioned, this also includes aspects of the learning flow. Course evaluations are often used for measuring. Levy developed a Learners' Value Index of Satisfaction (LeVIS).	I	T, P, S-E
e-Learning (systems) success and performance	Shih, Muñoz & Sánchez 2006 Andreu & Jáuregui 2005 Dyson & Campello 2003 Selim 2007 Sun & Cheng 2007 Lim & Lee 2007	Learning success and performance might be considered in contrast to <i>learner success</i> , the success e-Learning programs may bring also on the collective level. In general, this success is quite broad and is described for different domains. Also, the technological and design aspects are included in this kind of description (see Wang 2003)	I, C	P, S-E, T, I-E
e-Learning effectiveness/ Cost effectiveness	Johnson, Hornik & Salas 2007 Seibt 2004 Spitzer 2004 Tzeng 2007 Scigliano & Dringus 2000 Selim 2007 Wang 2003 Bartley & Golek 2004 Govindasamy 2001 Littlejohn, Falconer & McGill 2008 Wentling <i>et al.</i> 2000 Lim & Lee 2007 Schank 2002	This quite broad understanding of e-Learning success does combine different levels as well as all domains. It ranges from the degree of how effective instructions can be delivered to the economical metric of how e-Learning decreases costs for training as well as to the idea of how e-Learning might effectively support the idea of increased instructional quality.	C, I	I-E, P, S-E, T

(continues)

TABLE 1 (continues)

Quality (incl. of educational programs)	Fresen 2007 DIN 2004 Berger 2004 Ehlers & Goertz 2004 Wessler 1999 Kirkpatrick 1996 Dittön 1999 Sanders 2006	Quality as success objects is seen in different aspects (domains); it combines the understanding of increased instructional quality through the use of e-Learning as well as the expression of the quality of e-Learning systems and technology.	C	P, T
Return on Investment (ROI)	Marengo & Marengo 2005 Phillips & Phillips 2004 Spitzer 2004	The ROI is a very specific economical concept of locating the success of e-Learning. It shows the combined consideration of quantifiable costs vs. benefits e-Learning induces in a specific organisational context.	C	I-E
Efficiency and appropriateness	Tzeng 2007 Keltomäki 2001	This quite detailed understanding of e-Learning success is described in literature and is located mainly on the level of individual teaching-learning processes.	I	I-E, P, S-E
Economical benefits	Bartley & Golek 2004 Marengo & Marengo 2005	Similar to added-value concept, this is a collective and economical goal for e-Learning consisting quantitative (e.g. ROI) as well as qualitative (e.g. increased product quality) benefits.	C	I-E

(continues)

TABLE 1 (continues)

Organisational success & benefits	Doyle & Hogan 2004 Govindasamy 2001 Marengo & Marengo 2005	This goal describes the successful implementation of e-Learning in organisation. It is described as a collective issue which touches the different domains of economics (e.g. good ROI), pedagogics (e.g. meets the learning culture of a specific organisation), technology (e.g. e-Learning system and infrastructure are well implemented) and socio-ethical (e.g. respecting cultural differences) issues.	C	I-E, P, S-E, T
Pedagogical Usability	Dyson & Campello 2003 Romiszowski 2004 Tsinakos 2004 Nokelainen 2006 Doyle & Hogan 2004	Aims to improve educational and instructional processes in the organisation. E-Learning allows for example concepts of collaborative learning over geographical distances and different time zones.	C	P, T
Added-value	Back 2004 Sanders 2006 Forsblom & Silius 2002 Wentling <i>et al.</i> 2000	This concept of e-Learning success finds different descriptions in the literature. It similarly shows a <i>collection basin</i> for different aspects on an organisational-strategical level. E-Learning is therefore seen as a concept which can contribute to reaching corporate mid- and long-term strategies in the field of human resources and skills.	C	I-E, P, S-E, T

(continues)

TABLE 1 (continues)

Cultural Success	Wentling <i>et al.</i> 2000 Kamentz & Mandl 2002 Khan 2005 Blanchard & Frasson 2005	Show a very detailed and focused definition which e-Learning can contribute to. It combines positive effects for the individual learning process as well as the collective success of an organisation in respecting differences in language, society, school background, learning style etc. Successful e-Learning can react in its design and infrastructure to these issues.	I, C	S-E, P
Usefulness & continuance	Silius, Tervakari & Pohjolainen 2003 Khan 2005 Roca, Chiu & Martínez 2006 Miller & Husmann 1996	This is, from the authors point of view, a similar understanding to effectiveness which meets a broad and open definition of e-Learning success. Khan (2005) describes this as a meaningful, open, flexible and distributed Learning environment. It also includes the concept of program ecology described by Miller and Husmann (1996)	I, C	I-E, P, T, S-E

Derived from this inconsistent understanding of e-Learning success, it is necessary to identify an overall structure or framework which will allow the inclusion of all aspects, the management of e-Learning to satisfy individual as well as collective expectations, and which will include with this the different domains. Forsblom and Silius (2002) mentioned this need for further research and structuring of the understanding of e-Learning success and its management, also when limited to the area of higher education. Khan (2005) in his work also focuses on a very open and comprehensive definition of e-Learning success with a meaningful, open, flexible and distributed learning environment. The review led to the conclusions, that (a) in the reviewed literature and scientific disciplines there exists different wording for the success objectives and goals of e-Learning; and (b) even though different wording is used, there is an identifiable similarity in the understanding of e-Learning success in the literature. Research in this field might focus on the creation of a common framework which will include the different aspects for e-Learning success (levels and domains) as an open space for the future harmonisation of the different wordings and partly for understanding across the different scientific disciplines.

1.1.2 Nonuniform set of influencing factors & success indicators

Another insight is that the concepts of influencing factors and indicators are provided in an unstructured and heterogeneous way. Derived from the inconsistent understanding of e-Learning success, the influencing factors as well as the measurable indicators are described in a nonuniform way. Both *critical success factors* as well as *key performance indicators* are mentioned with different granularity (from very detailed consideration of one factor or indicator versus the consideration of a set of factors or indicators) and partly in different contexts and structures. This leads at least to the status, that there is no standard or reference set of e-Learning *critical success factors* and its related *key performance indicators* are derived from a specific situation, discipline or domain (see also Selim 2007). 302 influencing factors and 133 indicators were identified within the literature under review. From this point of view it might be necessary to investigate these issues in further research in more detail. Firstly therefore, it is necessary to create a framework for a structured identification of the factors, indicators and the relationship between both. Selim (ibid) sees the need for further research on *critical success factors* in the development of a structural model, as well as in checking success factors for e-Learning in the context of its application to different countries. On the other hand, the use and research on *key performance indicators* and their relations to the influencing factors might be structured in such a structured space or framework.

1.1.3 Heterogeneous ideas about e-Learning management

The review at least aimed to evaluate the transparency of existing methods, and model approaches regarding the management and evaluation of e-Learning in internationally operating organisations. Management of e-Learning regards to all the activities are necessary for deciding, planning, designing, implementing, and evaluating of e-Learning in organisational context. The goal of reviewing this context is to gain transparency and knowledge about frameworks which allow one to structure, understand and treat e-Learning in globally acting organisations and it could help to structure the success issues identified in previous review points at different levels, in different domains as well as the logical order of critical success factors and key performance indicators.

Especially the work of Khan (2005), the review report of Wentling *et al.* (2000) as well as the *Public Available Standard (PAS) 1032-1* (DIN 2004) might be considered as the most complete approaches as regards summaries for this. Considering Khan's work, he identified eight dimensions for the management of e-Learning: *pedagogical, technological, interface design, evaluation, management, resource support, ethical, and institutional*. The focus of his work is not directed at any specific kind of education. It is guided by management activities in the typical e-Learning steps of *planning, design, development, evaluation, delivery and maintenance* as well as the *instruction stage* and *marketing*. With his *e-Learning 3-P Model*, Khan combines these steps with the necessary *people*, describing the required teams and competences as well as the *products* which describe the re-

quired instruments and tools (Khan 2004). The model firstly shows a good framework for structuring and harmonising the understanding of success as well as finding order for manageable success factors and measurable performance indicators. Both documents of Khan (2004; 2005), the book as well as the paper provided about the management of e-Learning, stop with its logical model at the level of identified processes, roles (persons) and instruments. Here a link might be seen for further research and development of a holistic, systemic (or cybernetic) e-Learning management model which includes the different components of processes, roles, domains, success factors and indicators as well as instruments and management methods.

Wentling *et al.* (2000), on the other hand, does not offer a framework or methodological instrument like Khan. The work of the authors already in the year 2000 aimed for a broad set of information regarding e-Learning in organisations. It considered the interplay of e-Learning with...

- a) the organisational strategy, the need to respect organisational culture for successful e-Learning;
- b) the understanding of the role of trainers as well as learner groups' expectations when working when distributed;
- c) the influence of global issues for e-Learning design, learning and teaching styles; as well as
- d) as well as the need for accompanying communication and interaction in intercultural heterogeneous organisations as well as the topic of standards (resp. technological nature) in the e-Learning industry.

As mentioned already, Wentling *et al.* (2000) does not provide a framework in the sense of a logically interrelated concept for managing e-Learning. This might still be a task for further research.

The *Public Available Specification (PAS) 1032-1* (DIN 2004) or its actual published *ISO/IEC 19796-1* (ISO 2005) specification does show another kind of framework for the intended management of e-Learning in internationally operating organisations. Both specifications consist of a reference model and its accompanying standards for e-Learning processes, roles and responsibilities. The goals of these reference models are to raise the quality in the processes of *planning, development, realisation* and *evaluation* of e-Learning. They were created through the cooperation of different institutions. With this it combines a *descriptive model* which offers process descriptions and objectives for the process, actors involved, methods and expected outputs, metrics and indicators, referenced standards and examples for each *sub-process* or *sub-aspect*. This specification and its standardised process-model offer a great basis for further research of an e-Learning management model in internationally operating organisations. In the case of this framework, it should be mentioned that it mainly concerns the quality aspect of e-Learning solutions. Considering this

further, the interplay between organisational as well as individual expectations for e-Learning in context of highly distributed workforce has to be verified.

As illustrated in TABLE 15, the other key literature also provided aspects of e-Learning management or evaluation. But the above mentioned and that mentioned by Khan (*ibid*), Wentling *et al.* (2000) as well as the description provided by the DIN/ISO (DIN 2004; ISO 2005) organisation in the literature may be seen as the most comprehensive and complete concepts.

The purpose of the work at hand and its results is to catch all of these different scientific aspects and address the central issue of the holistic and systemic management of the deployment processes as well as the use of e-Learning in internationally operating organisations. With the aim of focusing more on the *problem definition* (see Ch. 2.3.1, FIGURE 3, Step 1) and the research questions for this work, in the next step of this early stage on the knowledge about the existing understanding of success in the literature, the set of influencing factors and indicators provided as well as the concepts and models for the management of e-Learning were validated with the observations and results from the long-term case study on e-Learning planning, design, implementation, use and evaluation in BMW Group's international after-sales organisation. The main insights of this reflection process (see also Article 2, Hilgarth 2010b) are described in the following chapter and, after the *theory-ingrained motivation* for research in this chapter, might provide the reader with a quite detailed idea about the initiation and goal of the research at hand, which is *practice-inspired*.

1.2 Internationally operating organisations and e-Learning success

In times of globalising working and business processes it is hard to define the difference between locally and internationally (or globally) acting organisations. The research described within this work comes from and is aimed mainly at the target group of internationally operating business organisations. These organisations are characterised by distributed working processes and responsibilities are shown by the involvement of different divisions with different geographical locations (i.e. headquarters, sales regions or markets as well as manufacturing locations), different functional responsibilities (i.e. HR Management, Business Management or Product Management) as well as differences in its *socio-ethical* or cultural background. Focussing on these kinds of organisations will not restrict or exclude the research results (especially the *Cybernetic e-Learning Management Model* illustrated later) and its application in organisations or institutions is not addressed by the aforementioned characteristic. As illustrated in the previous chapter 1.1, the existing literature does provide a different understanding for successful e-Learning, an unstructured set of influencing factors (in the sense of *critical success factors*) or success indicators (in the sense of *key per-*

formance indicators) and heterogeneous ideas, but great ideas for management methods for e-Learning.

With the research activities in this early stage, it was important to identify and validate these existing ideas and issues for further research within a real existing case through the use of a case study research in an internationally operating organisation. The goal of carrying out this validation lay in the idea of focusing further research activities regarding an e-Learning management model characterised holistically and systemically and to re-use existing knowledge as far it fits to this specific context. For all this, during the literature review, information collected on success objects, critical success factors, key performance indicators, management and evaluation frameworks (e.g. process model, dimensions, levels) were structured in an analysis database. This database, which was created with the Microsoft AccessTM software includes tables for the identified success factors, success indicators. It serves as tool for the tracking and journalizing of the observations. The observations were made during the two e-Learning use cases in the internationally operating organisation, BMW Group, and were structured after so called use case events (see also Article 2, Hilgarth 2010b, chapter 2) and then mapped to the analysis database by using an analysis questionnaire or form within this database. The role as embedded observer (in the sense of the research activities) combined with the responsibilities as e-Learning project manager or stakeholder also allowed interventions in the different phases of the two e-Learning projects and trainings as well as reflection on the knowledge coming from the literature by doing interviews and analysing field notes.

The reflection process was guided by the following set of questions:

- a) What is the observable success (as well as are the observable problems/issues) seen in planning, designing, implementing, use as well as evaluating e-Learning in the use cases investigated?
- b) Does the case study provide evidence of the existence of success in different phases, processes, domains and levels? Are critical success factors and/or key performance indicators observable?
- c) If critical success factors were observable, what factors identified in the literature review fit to the observations?
- d) If key performance indicators were observable, what indicators identified in the literature review fit to the observations?
- e) If evidence for critical success factors and key performance indicators exist in the two use cases, how do the interviewed practitioners rate the correlation and interdependence of factors and indicators or is it able to observe interdependences in real existing cases?

- f) Does the need exist for a holistic/systemic management and evaluation framework in the analysed use cases? If yes, is the need to include all the identified components of phases, processes, domains, levels, critical success factors and key performance indicators also observable; and what does a first estimation about the applicability of such a model look like?

The case study conducted, which includes two use cases, found initial answers to each of the questions and helped therefore to focus the relevant aspects for designing and testing a systemic e-Learning management model which is both *theory-ingrained* and *practice-inspired*. Of course, the number of cases is not comparable with a long-term study, for example over a greater number of such organisations. On the other hand, the selected organisation and its characteristics as a global brand and with an internationally operating workforce, might be seen as a representative working basis for this research. The results of the case study were published with Article 2 and Article 5.

1.3 Researching e-Learning as a systemic management issue

Summarising this first research step of the *problem-formulation* (see Ch. 2.3.1, FIGURE 3) in these research activities leads to the insight that management of e-Learning in globally acting organisations might be considered as a multi-complex issue. The lack of an existing and comprehensive e-Learning management model for internationally operating organisations in the literature as well as the need for such a model arising from case study research at BMW Group, leads to the conclusion that further research is required on such a model.

In the style of the *Global Knowledge Management Framework* (Pawlowski and Bick 2011) the management of e-Learning involves different domains, processes, roles, responsibilities, levels, instruments and tools in a holistic way. The work is guided by the philosophical understanding of *systems theory* (or cybernetic). Following Järvinen (2004) the focus of the work is therefore not only one spot or concentrated on one specific issue with e-Learning. Contrary to this more traditional understanding of research, it includes the problem of such organisations with e-Learning not only as a local problem with technology, administrative settings, instructional strategies or intercultural differences, but also in the sense of considering it as a whole thing it *will be greater as the sum of their parts*. The whole research was designed with regard to the principles of the *viable systems model* (Beer 2003) or the *management cybernetics of evolutionary systems* provided in the literature by Malik (2006). Ensure these authors, two strategies exist for the successful management of complexity; first through *order* and secondly through *problem-solving and decision* processes. Complexity in terms of the *system-theorist* or *cyberneticist* can be handled through the cognition about the *variety* a situation or context may take (i.e. the introduction of e-Learning into a globally acting sales organisation). Because of the limitations of knowing all the conditions

which a complex situation may take, it seems to be logical to reduce them to an evolutionary *problem-solving and decision process* (in an incremental or comprehensive manner), which is expressed through permanent management of it. The deployment of e-Learning in internationally operating organisations, as the context of this work, shows a typical task for *cybernetic-systemic* management. The terms *cybernetic* and *systemic* are used in this work as synonyms for the description of a holistic and comprehensive way of thinking and acting in the e-Learning management context as focussed in globally acting organisations. As provided by the research results in this work and in the articles published over the time of investigation, the main result is that the management model brings a) *order* into the typical elements of e-Learning management in such organisations previously identified and b) provides the *space* for *problem-solving* and *decision making* in an evolutionary way. The evaluation of the model indicates *openness* and *flexibility* for the integration of existing and upcoming standards and reference models in the *e-Learning* domain and offers therefore the basis for future *problem-solving* processes which will enable future practitioners and researchers to understand and manage e-Learning with higher efficiency.

The *systemic cognition of e-Learning success in internationally operating organisations* represents nothing more than a first result of research which is a combination between *practice-inspired* and *theory-ingrained* research. At least it purposes lasting effects in the cognition of the domain of *e-Learning*. Cognition therefore means to know or to have an idea of how to get known issues about e-Learning into such specific contexts. It shows a multi-perspective investigation as well as theory-creation which is rooted in the *Information Systems Design (ISD)* discipline. Prospective practitioners and managers searching for a model, tool or something similar which might improve their decisions on the deployment of e-Learning, may find it in its initial maturity with this work. The basis for further research on this model is grounded in research question number three (see Ch. 2.2).

2 RESEARCH MOTIVATION, METHODS AND DESIGN

2.1 Research motivation

Knowing is not enough, we must apply.
Willing is not enough, we must do.

(Johann Wolfgang von Goethe, 1749-1832)

Following the philosophical attitude of the German writer and polymath Johann Wolfgang von Goethe, research and its outcome is also comparative to its theoretical establishment and empirical rootedness. Daily life in a multi-cultural and globalised society makes it necessary to investigate situations as much as possible with a multi-faceted scope.

Research means to find an answer to a question or phenomena which has happened or will happen again. The motivation for doing this investigation lies first in the unsatisfactory experience when deploying e-Learning within such an internationally operating organisation. This was the initial point for the decision to explore the reasons for this situation and to establish an idea; a concept may help facilitate others to avoid such an experience. This motivation rose following completion of the first steps of investigations; especially afterwards seeing that the existing literature (see Hilgarth 2010a) in different disciplines does not provide a comprehensive description and explanation for the phenomena. Therefore in this work there was also *a priori a personal motivation* and experience (Järvinen 2004) to start this research without having any initiation from the professional organisation it was to be conducted in or the university in which the research activities were located. No, it was the mere interest and curiosity to do so. Of course, having already started the investigation helped lead to the decision to do it in a professional manner, writing a dissertation in the context of doing a Ph.D.

At least a comprehensive and tested theoretical reference model might illuminate and bring consciousness into this multi-disciplinary topic and will show the basis for future research activities in this field.

2.2 Research questions

Considering the motivation for doing this research and respecting the previous insights analysed from the initial *problem-definition* phase, the in TABLE 2 illustrated set of research questions were formulated:

TABLE 2 Overall research questions and intention

Id	Question	Intention of Question
RQ1	What is the success or failure of e-Learning in internationally operating organisations?	To identify understanding about e-Learning success in the literature and in the practice of internationally operating organisations..
RQ2	Why does success or failure occur and which reasons are observable for it?	To identify the influencing factors and indicators for e-Learning success or failure in internationally operating organisations.
RQ3	What means are used to influence or control e-Learning in daily operations in internationally operating organisations throughout its different situations and readiness regarding e-Learning?	To design and test an appropriate e-Learning management model which might serve as a reference for average situations.

2.3 Research methods

Basically, research in the context of e-Learning and its use in internationally operating organisations can follow two different philosophical strands: *qualitative* or *quantitative*. The decision was made to follow the *qualitative* strand for the research strategy and the methodologies involved. At the time of starting research activities, the role as employee offered the chance for embedded research in the BMW Group (see Hilgarth 2010b). With this, the field for investigating e-Learning from the decision till the use of it in two different cases was formed and investigated in an international context. Bringing it to the point, the methodological research goal is to observe and investigate the field as natural as possible (and as much as possible) to conclude and address a general class of problems using an e-Learning success management framework for internationally operating organisations. Not having an explicit duty and project order for research activity, it was possible to reduce hurdles for interviews with partners and experts. They talked with me about the pressure points of e-Learning and

its success or failure. To quote Mathiassen (2002, p. 8) in this point the “(...) *the researcher observe and interpret the actions and beliefs of practitioners and the practitioners do not take an active part in the research process*”. On the other hand, being in this role with a defined business goal and budget for the development of e-Learning training modules and carrying out training allowed me to make worldwide field observations and notes.

Before going into the descriptions of the overall research framework as well as the instruments used, the central question of how the methodologies deployed served to create knowledge about the context of e-Learning management, and how therefore some previous unknowns were made to justify valid and reliable new information? TABLE 3 offers an overview of the methods used, their specific function for the creation of knowledge and the main result came from using it in the context of these research activities.

TABLE 3 Research methods and their function for knowledge creation

Method	Method of knowledge creation	Result(s)
Action Design Research	creation of innovative artefacts which serve a general class of problems	<ul style="list-style-type: none"> • disertation and summary of all following results
Literature Review	collection and systematic analysis of existing theory	<ul style="list-style-type: none"> • insights about e-Learning management theory and further fields for investigation • increasing internal validity, generalisability for the <i>Cybernetic e-Learning Management Model (CeLMM)</i>
Case Study Research	Inquiring about existing knowledge about theories in real contexts and systematic analysis and reporting of results	<ul style="list-style-type: none"> • reflection report about as-is situation regarding e-Learning success in internationally actin organisations • information about the need for improving the situation
Theory-creation	creation of a new or enhanced theoretical construct, model or method	<ul style="list-style-type: none"> • theoretical model <i>CeLMM</i>
Theory-testing case research	Inquiring about the created <i>CeLMM</i> theory in real application/in real contexts after its applicability and deriving issues for further research	<ul style="list-style-type: none"> • report about applicability of <i>CeLMM</i> • Insights into <i>empirical validity, logical consistency, relative predictive power as well as falsifiability</i>
Reference Model Evaluation	Inquiring about the created <i>CeLMM</i> theory by using a systematic formal evaluation process for an identified set of criteria (see Article 8)	<ul style="list-style-type: none"> • scheme and criteria for evaluation of <i>CeLMM</i> method • information on model maturity • information on future research issues for <i>CeLMM</i>

The following chapter will introduce the mixed-mode of methodologies which were used within these research activities.

2.3.1 Action Design Research (ADR) as the research framework

Action Design Research is research which combines philosophy and methods from *Action Research* (Baskerville 1999) and *Design Research* (March & Smith 1995; Hevner, March, Park & Ram 2004). With this it also combines the advantages of both strands; first, the creation of innovative artefacts (like models, theories or prototypical systems) in the design sense and, secondly, the action that embeds it in the conditions of the behaviour sense (Sein, Henfridsson, Purao, Rossi & Lindgren 2011). As Lee (2004) stated, IS research respects technological issues in combination with its socio-ethical setting in which it is used or will be deployed and applied. The interaction between both, the technology and the socio-ethical setting, might be seen as a source of rich phenomena for the field of IS research. The *Action Research Design* method therefore follows on a dual contribution: academia and practice (Cole, Purao, Rossi & Sein 2005). As in FIGURE 3 (Sein *et al.* 2011, p. 11) illustrated the ADR approach addresses problems existing in practice and improves specific organisations by cyclical change activities (see FIGURE 3, step 1 to 3) but also leads to the creation of innovative artefacts (see FIGURE 3, step 4) which serve a general class of problems in a specific problem context for all organisations or a specific cluster of organisations.

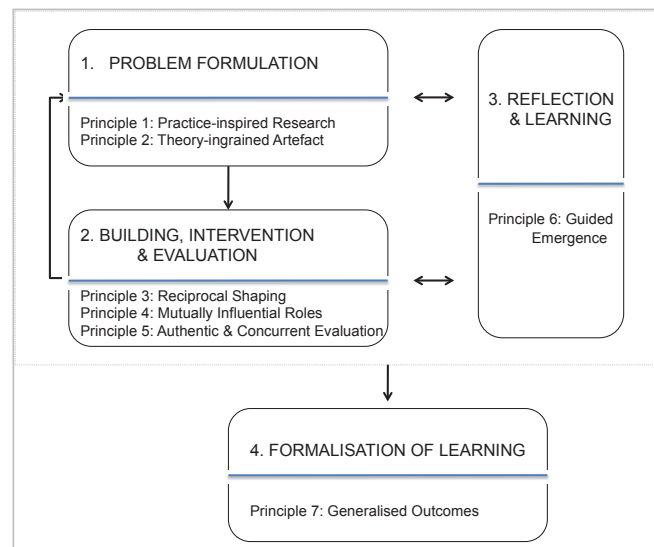


FIGURE 3 Cyclical Research Process of ADR

Using this ADR framework does also need to briefly describe the artefacts which are the central objects of the research. The construct of the IT artefact in this research has to be seen as a substitute for the goal setting e-Learning success management mentioned and the evaluation framework for internationally operating organisations which addresses the class of problems typified by the situation encountered. In the following the term IT artefact will be used with the understanding of this substitution by the framework.

Next, the ADR principles in the research setting presented will be illustrated and illuminated regarding its adequateness.

- **Step 1 - Problem Formulation**

Within the first step, the *Problem Formulation* (Sein *et al.* 2011) sees two principles for the motivation for and initiation of the research activity. In the following, these two principles are aligned with the research activities.

Principle 1: Practice-inspired Research

This principle emphasizes viewing field problems (as opposed to theoretical puzzles) as knowledge-creation opportunities. (Sein *et al.* *ibid*) The involvement in and observation of two different e-Learning projects (Hilgarth 2010b) had shown a lack of an overall guideline for effective planning, design, use and evaluation of e-Learning in practice. This was the inspiration to do research, starting with the issue in practical environments. The first principle is therefore fulfilled.

Principle 2: Theory-ingrained Artefact

This principle emphasizes that the ensemble of artefacts created and evaluated via the ADR result from theories as well as generating or testing theories (Sein *et al.* *ibid*) by doing a comprehensive literature review (see Hilgarth 2010a) on the theories existing for the management of e-Learning in a multi-disciplinary scientific publications. Theories from this different literature were used in the research activities for designing an overall guiding e-Learning success management and evaluation framework theory. Therefore the research setting fulfils this ADR principle.

- **Step 2 - Building, Intervention & Evaluation**

The second step after the ADR research approach is the *Building, Intervention & Evaluation (BIE)* activities in the research. In the sense of the research setup, the building, intervention and evaluation activities were focussed on the creation of the generally applicable e-Learning success management and evaluation framework theory that addresses the general problems found in step 1. Sein *et al.* (*ibid*) described a continuum between *Organisational-dominant* and *IT-dominant BIE* approaches and distinguished it with the starting point in BIE step. In the following, the principles are accompanied with this research step and aligned with the case study done for the research.

Principle 3: Reciprocal Shaping

This principle emphasizes the inseparable influences mutually exerted by the two domains: the IS artefact and the organisational context. (Sein *et al.* *ibid*) Considering the above-mentioned e-Learning success management and evaluation framework as the artefact, it has to respect the different domains touched upon and the above-mentioned domains: Information Systems, Arts and Humanities, Information Technology, Social Sciences and Business, Economy and

Management. The research activities done within this second step had the clear intention to improve the current situation with e-Learning by carrying out an iterative process between the artefact and the organisational context. This means that with the cases, the framework (artefact) was build, used and evaluated in a reciprocal way. Following Sein *et al.* (ibid), the setting has to be seen as Organisation-dominant BIE. Therefore, at the centre of the first research steps was the use of organisational participants' existing ideas and assumptions about the use of e-Learning for the training of internationally distributed target groups, specific business process improvements and newly created software. The aim in this step was therefore to find and create the best design for e-Learning in general. With the first step it also became clear that the design of the framework could not be separated from the influences of the organisational domains (and its interrelated and above-mentioned domains). A third case at another, but also internationally operating organisation (adidas Group), the kind of BIE was artefact-dominant because the framework from case one and two was used as a guideline for deciding the design of e-Learning in that organisation. Considering this history of the case study and the chosen and completed approach, it meets the third principle of Action Design Research.

Principle 4: Mutually Influential Roles

This principle points to the importance of mutual learning among the different project participants. (Sein *et al.* ibid) Within the case study, the roles of the design researcher and the practitioner can be identified. Following Mathiasen (2002) both roles worked in a complementary manner. Because of the fact that both roles were partly played in one person and were distributed to more than one individual, the role setting and definition were not mutually exclusive. All the time it was possible to differ between the roles. The knowledge concerning e-Learning in theory came from the design researcher and was combined with the practical insights and knowledge concerning organisational work practices from the practitioner(s). ADR principle 4 is therefore also fulfilled with this work.

Principle 5: Authentic and Concurrent Evaluation

This principle emphasizes a key characteristic of ADR: evaluation is not a separate stage of the research process that follows building. (Sein *et al.* ibid) During all cases, the formative, permanent and concurrent evaluation of the e-Learning success management and evaluation framework and its effects on the organisational setting was carried out. This formative and continuous check allows the research goals and intention of the several research and project activities within each case to be refined. These evaluation activities were carried out more or less as an accompaniment to project work and the analysis of observations and the collected data (e.g. field notes, reports, interview reports) in the specific case studies (Hilgarth 2010b; Hilgarth 2011b; Kröckel & Hilgarth 2011). At the end of each case, the research activity was closed by a summative evaluation step. Expert interviews and discussions of the case results with the

management and representatives of the target group were used as instruments for this. All in all, the evaluation was quite natural and authentic since it was done entirely as an embedded observer and member of the projects. Principle 5 is therefore fulfilled by the research.

- **Step 3 – Reflection & Learning**

Principle 6: Guided Emergence

The terms design and emergence seem antithetical because the former implies external, intentional intervention, whereas the latter conveys a sense of organic evolution. This principle therefore uses the term ‘guided emergence’ to capture a vital trait of ADR: the interplay between the two seemingly conflicting perspectives. Sein *et al.* (ibid) describe the third step and therefore this principle as the continuous activities of reflection and learning which are parallel to the problem formulation and building, intervention and evaluation activities. Similar to the activities of formative and summative evaluation described in principle 5, the goals of this explicit step are to make expansive changes in the research course by designing and creating the e-Learning software system or organisational setting. Within the case study, which includes three cases, the most prominent reflection was the change in the BIE approach between cases from being organisational-dominant to artefact-dominant. This leads to the lesson that with each new e-Learning project in internationally operating organisations, a comprehensive check of the organisational and technological maturity should show a mandatory first step in designing effective e-Learning solutions. Continuous reflection and learning over the first two steps in the research activities is an ambitious challenge which carries the danger of departing from a structured research path and plan. But by respecting a disciplined research process, the results do show that a general and broader class of problems is more adequate for the successful design and use of e-Learning in internationally operating organisations. The research activities therefore meet the ADR principle 6.

- **Step 4 – Formulation of Learning**

Principle 7: Generalized Outcomes

Generalisation is challenging because of the highly placed nature of ADR outcomes that include organisational change along with the implementation of an IT artefact. (Sein *et al.* ibid) This last principle includes the task of abstracting the learning over the research and bringing it into a concept which generally meets this class of field problems with holistic success management of e-Learning in internationally operating organisations. This generalisation was done with the design and definition of the e-Learning management and evaluation framework. The framework was discussed with field experts at BMW Group and adidas Group. The approach was also published in diverse journals (see Ch. 3.1) directed at e-Learning practitioners. The framework shows the ar-

tication exists in the light of theories in related literature. The formalised theory consists of design principles for guidelines of how to use the framework (artefact) as a utility for the end-users. The research activity also meets this last ADR principle.

In general, using Action Design Research as research methodology does meet the basic intention of doing the research in a setup which is “*as natural as possible*”. This applied, qualitative social research might be categorised as decision-driven or problem-solving social research, which aims to solve a general class of problems existing in the field. With all the activities carried out in this research setup, the ethical principles of social research were fulfilled. The chosen methodology and its instruments (see following two sections) assure the validity and reliability of the outcomes. Instruments which were used within the research are described in detail in each article but will also be handled in short in the following sub-chapters. The basic instruments are a *literature review* (including database search and document review), *case study research* (including interviews, participatory observations, field notes, data analysis), *theory-creation* and *theory-testing with case-research*. Next, the research instruments and techniques used are described in a detailed manner.

2.3.2 Literature review

A first research instrument used in this context is the *literature review*. The goal of using this instrument was to evaluate existing and reliable scientific articles, studies and books in the focused scientific disciplines. Literature was selected from following academic disciplines:

- *Arts & Humanities* including the sub-disciplines *Education & Careers* and *Society & Culture*.
- In *IT* discipline the sub-disciplines *Computer Science*, *Information Systems*, *Internet*, *Multimedia*, *Computer Security Confidentiality and Cybernetics* are included.
- *Business, Economy & Management* includes the sub-disciplines *Economics*, *Quality Management*, *Organisational Change*, *Organisational Psychology* as well as *Personal Management & Training*.
- *Social Sciences*, which contains the sub-disciplines *Behavioural Sciences*, and *Cultural and ethnic studies*.

The review was done through (1) the definition of the review database; (2) the definition of search criteria; (3) the filtering of titles; (4) the filtering of abstracts and keywords; (5) the content review of pre-selected articles and textbook chapters; (6) the consolidation and categorisation of review insights; and (7) the identification and discussion of implications for future research. The focus was on the review of peer-reviewed documents provided by scientific journals, books, conferences and trustful sources like university studies and work papers. Finally, the review database included 44 journals, 9 books and 15 other sources.

Appendix 5 gives an overview for these scientific databases. Appendix 6 shows the search words and terms applied for the review process.

Filtering the results of the research database leads to 204 (see Hilgarth 2010a) documents which were investigated and influenced the further research activities and its underlying research questions (see Ch. 2.2.). Out of this, 48 documents were identified as key literature. Appendix provides the list of references of the reviewed documents. Appendix gives a statistic for the literature and its allocation to its joining scientific discipline.

2.3.3 Case Study Research

Explanatory as well as *narrative case studies* (Järvinen 2004) are the core instruments in these investigations. Three case studies were designed, including four use cases. Two out of the three case studies were conducted within the target group of internationally operating organisations: the case studies at BMW Group (Hilgarth 2010b) and adidas Group (Hilgarth 2011b). The last case study, BPM@KMU (Kröckel & Hilgarth 2011), was conducted in the context of the development and design of e-Learning in small- and medium-sized enterprises (SME's). The design and deployment of the specific case studies is described in detail in Article 2, Article 4 and Article 7. The following TABLE 4 provides an overview of the case studies conducted and their characteristics, its type (see Järvinen 2004, pp. 78-79) as well as mapping to the related scientific article (see Ch. 3).

All case studies follow the understanding and explanations provided by Yin (2002). The case studies show an *empirical inquiry* that aims to investigate a *contemporary phenomenon in real life*: the success management of e-Learning. It is further used in situation, where *the boundaries between (this) phenomenon and (its) context are not clearly evident*. The strategy for the use of case studies, regarding the research goals at hand, is to serve the purposes of the ADR steps of *problem formulation, building, intervention and evaluation* as well as *reflection and learning*. The general deployment follows the work of Eisenhardt (1989) and the process is illustrated in FIGURE 4 he mentioned (see Järvinen 2004, p. 76). This process was used to conduct each case in each of the case studies (Hilgarth 2010b; Hilgarth 2011b; Kröckel & Hilgarth 2011) in an individual way.

TABLE 4 Overview of case studies, goals and characterisation

Case Study	Character, Goal & Intention	Type of case study	Regards to article(s)
Case Study #1 "BMW Group"	<ul style="list-style-type: none"> • number of cases: 2 • from 2003 to 2009 • context: international aftersales area with ca. 3,300 retail shops, 10 sales regions, 34 subsidiaries • sample size: 8 regions; 17 subsidiaries • goal(s): answer research questions regarding e-Learning success in structured events. Analyse and show evidence for research issues coming from literature review 	narrative, explanatory	2, 3, 5, 6
Case Study #2 "adidas Group"	<ul style="list-style-type: none"> • number of cases: 1 • from 2009 to 2010 • context: international retail training and HR area, 56 subsidiaries, 5 regions • sample size: all regions • goal: testing the <i>Cybernetic e-Learning Management Model</i> 	explanatory	4, 8
Case Study #3 "BPM@KMU"	<ul style="list-style-type: none"> • number of cases: 1 • 2011 • goal: test of the <i>Cybernetic e-Learning Management Model</i> 	explanatory	7, 8

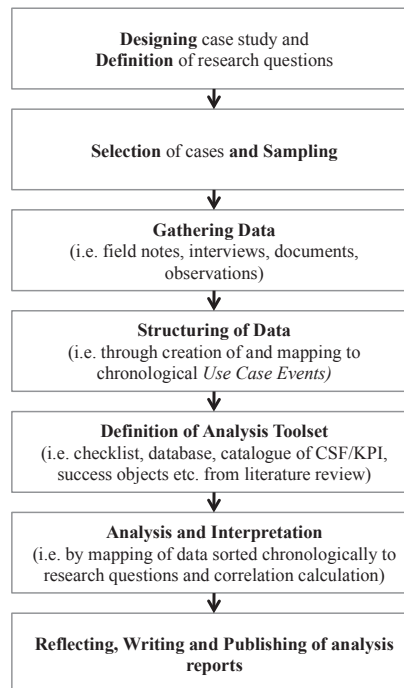


FIGURE 4 Process for case studies conducted according to Eisenhardt (1989, p. 588)

Because qualitative research was conducted using a lot of *participatory observations, interviews, field notes and documents*, the way of transforming this gathered data into an *analysable* and structured mass of information for later investigation might be explained in more detail in case of the first, and therefore biggest, case study #1 “BMW Group”.

TABLE 5 provides an example for the gathering, structuring, analysis as well as interpretation work was done in the BMW Group case study. Final and detailed results for this case study are described in Article 2 (Hilgarth 2010b).

TABLE 5 Data gathering and analysis in BMW Group case study

Case Study Activity	Description (instruments and output)
Data Gathering, Structuring of Data & Toolset	<p>Through accompanying the use cases and journalising all relevant observed as well as quantitative tracked event data was gathered in a structured process. The author therefore acted as project manager, project member, business stakeholder or mere observer. Instruments used for conducting the case study are participatory observation as well as the collection of electronic data in different formats and from different sources. Data gathered is classified into different types: memos on meetings, expert discussions and observation minutes, training reports and happiness sheets, feedback notes, emails, MS Outlook™ appointments as well as concept documents and the e-Learning program itself as the resulting training materials from the project work in the use cases. All the data gathered was chronologically structured and stored after use case events (e.g. in style of 2004_strategy definition for ETK Blended e-Learning program or 2008_Project escalation concerning translation quality). These use case events (UC) show situations exposed at an explicit time and subsume all data clearly adjunct to it within the progress of each use case. Finally, the raw data sourced 1.2GB of file space.</p>
Analysis & Interpretation	<p>40 relevant use cases from the data gathered were identified and used for further analysis. Figure 5 (Hilgarth 2010b) illustrates the tool was used in the process of analysis and interpretation in this case study. With the data record sheet the gathered data were matched to the identified research questions was created in the database. Finally, this technique allows for the analysis of all events in each use case as well as of all use cases and makes the results comparable and internally as well as externally valid. To analyse data, several statistical methods (reliability analysis, frequency, main, correlation etc.) were applied by using SPSS software. In the end, this data analysis will be used to interpret the results in a qualitative way respecting the overall research goals and using “quantification of use case observations” as much as possible.</p>

Data_gathering_form_use_case_events

ID: Use Case: [ETK Blended] Date: 21.03.2003 Data type: [eMail] Use Case Event: [2003_Alignment_discussic]

Observation:

Q1: What is success (as well as the problems/issues) in planning, designing, implementing, usage as well as evaluating e-Learning is shown in the investigated use cases? Remarks Q:

Success Objects: [organisational success - successful implementation of e-learning in organisation; effective e-l]

H8: [yes] H14: [yes]

Q2: [yes] Does the case study provide evidence for hypothesis 1 of the existence of theory with its elements phases, processes, domains, concernment levels, e-Learning Critical Success Factors (eL-CSF) as well as e-Learning Key Performance Indicators (eL-KPI)? Remarks Q:

Phase: [pre-usage] Process: [k] Domain: [institutional] Level: [collective]

eL_KPI: [y] eL-CSF: [y] H1: [yes to all] H2: [yes]

Q3: If eL-CSF can be observed, what are the main e-Learning Critical Success Factors do drive success/failure of e-Learning in the use cases? Remarks Q:

eL-CSF1:	<input type="text" value="y"/>	<input type="text"/>
eL-CSF2:	<input type="text"/>	18
eL-CSF3:	<input type="text"/>	32
eL-CSF4:	<input type="text"/>	90
eL-CSF5:	<input type="text"/>	142

1 adequate: [yes]
2 adequate: [yes]
3 adequate: [yes]
4 adequate: [yes]
5 adequate: [yes]

H4: [yes] H5: [no]

FIGURE 5 Data record & analysis sheet

To summarise, the case study research approach used within this overall investigation intended to a) analyse the existing situation for the success and the management of e-Learning in organisations; b) provide the space and information for the creation of the *Cybernetic e-Learning Management Model* theory; and c) offer space for testing the theory. In the next section the method of *theory-testing case-research* will briefly be reflected.

2.3.4 Theory-creation

Theory-creation is the specific methodological instrument used especially after conducting the case studies. Following Gilbert's (2002) philosophy for explanation, theory was created in an induction manner. This means that the insights coming from a comprehensive and focused literature review (see Ch. 1.1 and Ch. 2.3.2) as well as from long-term embedded observation within the case study at BMW Group (Hilgarth 2010b) serve as the basis for the creation of the general theory named the *Cybernetic e-Learning Management Model*. The creation of the theory in the *Action Design Research* overall approach described by Sein *et al.* (2011) and in Ch. 2.3.1 serves to evaluate and identify the general class of the issue of *e-Learning management* observed for e-Learning by using it in the internationally operating organisation. The theory of the *Cybernetic e-Learning Management Model* is described in Ch. 4.2.

2.3.5 Theory-testing case research

As described before, the case study research was used for different purposes: one was the creation of theory, and the other aspect is the *theory-testing* issue. This follows the basic methodological understanding of “*theory-testing case-research*” described by Järvinen (2004, p. 58). Respecting given (and maybe already occurring) problems, the understanding does exist when using case studies to test the *Cybernetic e-Learning Management Model* (i.e. lack of *controlled observations* or *lack of controlled deductions*) the case study conducted at adidas Group (Article 4, Hilgarth 2011b) helped to find answers on *empirical validity*, *logical consistency*, *relative predictive power* as well as *falsifiability* of the model. The main criterion for the reflection was *applicability*.

2.3.6 Reference Model Evaluation

Another aspect within the overall research was to show the maturity of the created *Cybernetic e-Learning Management Model* in the sense of *reference model evaluation* (see Frank 2007, Pawlowski & Kozlov 2010). Following this work - which is described in detail in Article 8 - the evaluation of the CeLMM as an ISD artefact is a multi-perspective assessment. The goal of it was “(...) *the more or less impartial assessment of the general application and adequateness of the business-driven management model from the practitioner’s point of view as well as from the research point of view*”. (Hilgarth & Pawlowski 2011, p. 15) Deploying the reference model worked in three main steps; (1) *adaption of the RMAG/reference model evaluation framework (including the selection of the relevant evaluation perspectives; the identification of evaluation aspects and deduction of relevant evaluation criteria dependent on selected perspectives; prioritisation of criteria; and the creation of the questionnaire for the step-by-step evaluation process)*; (2) *the assessment itself by answering the questionnaire developed*; and (3) *the feedback and validation step*. At the end the evaluation was conducted with respect to 18 evaluation aspects provided by the *reference model evaluation framework*, which gives regard to 46 criteria and metrics. As mentioned before, the results of the assessment are described in Article 8.

The aim of this chapter was to represent and describe the research methodologies used and the reasoning for using them. Each article contains the detailed description of the instantiated method in its context. In the following Ch. 2.4 the overall research design and chronological steps are covered.

2.4 Research design and process

As shown in Appendix 4 , a research plan was designed for the overall research activities. Also, considering the accompanying Ph.D. study activities and formal steps of defending the dissertation, the main research steps (aligned with the *ADR* research cycle) were; (1) *analysis*, (2) *theory-creation* and (3) *theory-testing* (including *reference model evaluation*). TABLE 6 gives an overview for the steps, and their purposes

TABLE 6 Research steps, purposes, period and resulting article

Research Step	ADR step	Purpose	Period	Resulting article
Analysis	Problem Formulation	Knowledge about multidisciplinary factors, indicators and methods are important for successful e-Learning in internationally operating organisations.	2003 - 2010	1, 2, 5, 6
Theory-creation	Building, Intervention & Evaluation	Building of holistic model and sub-theories coming from phase one to a theoretical management model.	2010	3
Theory-testing & evaluation	Reflection & Learning, Formulation of Learning	Testing of generic theoretic e-learning management model (<i>CeLMM</i>) in empirical context as well as via reference model evaluation.	2009 - 2011	4, 7, 8

With the description of the research plan, design and its steps, this chapter ends in the context of the research methodology. The following Ch. 3 includes the introduction for how each article was written and published under the research purposes mentioned up to this point.

3 ARTICLES AND PUBLICATIONS

3.1 Article 1: "Successful e-Learning? A multidisciplinary review on e-Learning success" - (A1)

Hilgarth, B. 2010. Successful e-Learning? A multidisciplinary review on e-Learning success. In M. B. Nunes & P. Powell (Eds.) Proceedings of the International Association for Development (IADIS) of the Information Systems (IS) 2010 conference (pp. 583-587). Porto, Portugal: IADIS Press.

ABSTRACT

The present paper offers a literature review that aims at the transparency and categorisation of e-Learning research in the context of success management and evaluation literature. The articles are classified by their acknowledged scientific disciplines of Arts & Humanities, Information Technology, Business, Economy and Management, and Social Sciences. The key insights of this review are: (a) each scientific discipline deals with successful e-Learning from a different point of view; (b) e-Learning success underlies an interrelated construct of typical phases/processes, success levels, domains, and criteria; (c) the literature does not provide a common set of criteria for managing and evaluating e-Learning success and; (d) no framework for a holistic management and evaluation was found. The conclusion summarises the review insights; 11 hypotheses formulate the basis for further research in this field in the context of the author's Ph.D. research.

KEYWORDS

e-Learning; success evaluation; success management; multidisciplinary literature review; key-performance-indicator (eL- KPI); critical success factors (eL-CSF)

3.2 Article 2: "E-Learning Success in Action! A case study research on e-Learning success in internationally operating organisations" - (A2)

Hilgarth, B. 2010. E-Learning Success in Action! A case study research on e-Learning success in internationally operating organization. In M. B. Nunes & P. Powell (Eds.) Proceedings of the International Association for Development (IADIS) of the e-Learning (eL) 2010 conference (pp. 348-356). Freiburg, Germany: IADIS Press.

ABSTRACT

This paper reports the use of e-Learning in practice based on a structured and embedded participatory observation and the tracking of activities by conducting a case study including two cases in an international environment at BMW Group as an internationally operating organisation. The observations aimed at two different research goals: first, to identify real existing problems and therefore the need for action when using e-Learning in a professional organisational context; secondly, to observe and analyse structures supporting successful e-Learning based on the conclusions and research hypotheses produced in previous literature reviews (Hilgarth 2010a). Key insights of the case study conducted on the success and problems of e-Learning in an empirical context are: (1) all e-Learning success dimensions assumed can be observed within the two empirical cases; and (2) correlations between the e-Learning success dimensions (especially e-Learning critical success factors and e-Learning key performance indicators) were tested and found. This empirical research shows a possible baseline for creating an e-Learning success management and evaluation framework in future research.

KEYWORDS

e-Learning; success evaluation; success management; case study research; BMW Group; e-Learning success management and evaluation framework

3.3 Article 3: "Cybernetic e-Learning Management Model - managing e-Learning in internationally operating organisations" - (A3)

Hilgarth, B. 2011. Cybernetic e-Learning Management Model - managing e-Learning in internationally operating organisations. In M. B. Nunes & P. Powell (Eds.) Proceedings of the International Association for Development (IADIS) of the Information Systems (IS) 2011 conference (pp. 61-69). Ávila, Spain: IADIS Press.

ABSTRACT

The success of e-Learning in internationally operating organisations is a multi-faceted topic. It is observable that the decision, introduction and long-term use of e-Learning often do not bring the expected effects, especially in complex organisational situations like multi-cultural target groups. A common and justified question of the business management as well as the human resource management in these organisations is how to address the issues of e-Learning in a multi-national and socio-ethically (culturally) diverse organisational context. This paper offers the description of a theoretical framework which was created within an *Action Design Research* stack, respecting the output of case study research previously done with BMW Group in its international sales organisation from 2003 to 2009 (see Hilgarth 2010b). The Cybernetic e-Learning Management Model offers a holistic theory concerning the different complexes with the target of providing the roles responsible and involved in the decision, design, production, launch, usage as well as evaluation of e-Learning programs with the focus on international application. The main structuring element of the model, and therefore the main framing element, shows a process model for e-Learning covering the decision to the evaluation phase. Success domains and concernment levels represent subsequent structures of the model. The empirical investigation underlying the model also shows that each of the eight main process steps do offer the opportunity to influence the success of e-Learning by treating specific issues in each phase. Anchoring this, in previous case study research e-Learning Success Paths were identified and analysed by statistical correlation calculations. As a result, this paper gives an overview for the whole model and its basic logic, using it in different situations when e-Learning programs will be intended for international use. A consequent step to the description of the model in this paper is to test its applicability in a similar organisational setup and to illustrate the results in a future scientific publication.

KEYWORDS

Cybernetic e-Learning Management Model, e-Learning Success Path; e-Learning Critical Success Factors; e-Learning Key Performance Indicators

3.4 Article 4: "Cybernetic e-Learning Management Model - on theory-testing by case-research at adidas Group" - (A4)

Hilgarth, B. 2011. Cybernetic e-Learning Management Model - on theory-testing by case-research at adidas Group. In M. B. Nunes & P. Powell (Eds.) Proceedings of the International Association for Development (IADIS) of the e-Society (eS) 2011 conference (pp. 35-42). Ávila, Spain: IADIS Press.

ABSTRACT

With this paper, the application of the Cybernetic e-Learning Management Model will be described by the theory-testing case research (Järvinen 2004) that was done in the real-life context of adidas Group. The Cybernetic e-Learning Management Model (Hilgarth 2011a) claims a holistic management approach for e-Learning in internationally operating organisations. Respecting the basic principles of the systemic-evolutionary management of complex organisational situations, the model provides an e-Learning framework for structuring and preparing decisions in an early stage situation (first move & setup stages). It might help to manage the effectiveness and efficiency of e-Learning operations (incremental stage) and it is designed to support the activities in the re-design stage for e-Learning in internationally operating organisations. With its elements and basic philosophical logic, it might cover the demand for a comprehensive instrument in the management of e-Learning in the complex situation of internationally focused and operating institutions. Adidas Group and its internationally distributed retail shop network cover this situation.

The project, including a readiness check with 26 interviews with experts on HR, IT and Organisation distributed internationally in the adidas Group, confirms the need for the method the Cybernetic e-Learning Management Model offers in the *first move & setup* stages to identify the maturity of the organisation with respect to the introduction of e-Learning. Secondly, the investigation shows the applicability of the model.

KEYWORDS

Cybernetic e-Learning Management Model, adidas Group; Action Design Research; Theory-Testing; Case-Research

3.5 Article 5: "E-Learning Success in Action - from case study research to the creation of the Cybernetic e-Learning Management Model" - (A5)

Hilgarth, B. 2011. E-Learning Success in Action - from case study research to the creation of the Cybernetic e-Learning Management Model. International Journal of Computer Information Systems and Industrial Management (IJCISIM) 3 (46), 415-426.

ABSTRACT

This paper reports the use of e-Learning in practice based on a structured and embedded participatory observation and tracking of activities by conducting a case study including two cases in an international environment at BMW Group as an internationally operating organisation. The observations aimed at two different research goals: first, to identify real existing problems and therefore the need for action when using e-Learning in a professional organisational con-

text; secondly, to observe and analyse structures supporting successful e-Learning based on the conclusions and research hypotheses produced in the previous literature review (Hilgarth 2010a). The key insights of the case study conducted on the success and problems of e-Learning in an empirical context are: (1) all e-Learning success dimensions assumed (Hilgarth *ibid*) can be observed within the two empirical cases at BMW Group (Hilgarth 2010b); and (2) correlations between the e-Learning success dimensions (especially e-Learning critical success factors and e-Learning key performance indicators) were tested and found. The second part of this paper consists of the description of the Cybernetic e-Learning Management Model which is derived from the insights gained by the previously mentioned case study.

KEYWORDS

e-Learning success management, case study research, BMW Group, Cybernetic e-Learning Management Model

3.6 Article 6: "Socio-Ethical Success Path of e-Learning – an analysis report on case study research of e-Learning management" – (A6)

Hilgarth, B. 2011. Socio-Ethical Success Path of e-Learning – an analysis report on case study research of e-Learning management. In M. B. Nunes & P. Powell (Eds.) Proceedings of the International Association for Development (IADIS) of the e-Learning (eL) 2011 conference (pp. 63-71). Rom, Italy: IADIS Press.

ABSTRACT

E-Learning offers a solution with high potential for cost-effective and high quality training in internationally operating organisations like BMW Group. Continuing from the previous research work, this paper offers the results of an in-depth investigation of the influencing factors observed within an Action Design Research; the output of the Case Study research was carried out with BMW Group in its international sales organisation from 2003 to 2009 (see Hilgarth 2010b). The observations and interpretations described herein are subsumed in so-called Success Paths for e-Learning as part of the overall Cybernetic e-Learning Management Model (Hilgarth 2011a) which provides the framing theory. The goal of this work is to describe the concept of e-Learning Success Paths in general as well as to create awareness about the importance of influencing factors in the socio-ethical domain. An e-Learning Success Path is a typical cause-effect chain which belongs to the design, production, launch, execution and evaluation of e-Learning. The underlying case study analysis provided 3,290 correlated pairs between observed influencing factors (so-called e-Learning Critical Success Factors) and success indicators (so-called e-Learning Key Performance Indicators) in four domains: institutional, technological,

pedagogical as well as socio-ethical. Only 71 out of the 3,300 total calculated pairs (2.2%) show high correlation (Pearson $r > .600$) with high significance (significant at the <0.01 level - 2-tailed). Out of this set of correlations, 7 influencing factors are identified as relevant for the Socio-ethical Success Path.

KEYWORDS

e-Learning Success Path; eL-CSF; eL-KPI; Case Study Research; e-Learning success management and evaluation model

3.7 Article 7: "BPM@KMU - designing e-Learning for the introduction of BPM in small- and medium-sized enterprises" - (A7)

Kröckel, J., Hilgarth, B. 2011. BPM@KMU - Designing e-Learning for the Introduction of BPM in Small- and Medium-sized Enterprises. In S-BPM ONE - Learning by Doing - Doing by Learning, Proceedings of the Third International Conference S-BPM ONE 2011 (pp. 34-47). Berlin/Heidelberg, Germany: Springer.

ABSTRACT

Business Process Management (BPM) is also becoming more and more relevant for small- and medium-sized companies (SME's). Today's strategies and approaches for the implementation of BPM rely on methods and tools mainly developed by and focused on large enterprises, but less on the needs of small- and mid-sized organisations. With the BPM@KMU project, the Institute of Information Systems of a Bavarian university conducts a project which aims to efficiently implement BPM in such organisations together with the Virtual University of Bavaria (VHB) and a set of SME's. Considering e-Learning as an enabler or tool which meets existing barriers for the implementation of Business Process Management, this paper offers a case study report on the observations made when designing and implementing the BPM@KMU e-Learning program guided by the Cybernetic e-Learning Management Model. The paper first considers project results and shows that e-Learning can address the heterogeneous maturity and previous knowledge about BPM by an adequate set of instructional as well as technological strategies and concepts.

KEYWORDS

Business Process Management; e-Learning; BPM@KMU; Case Study; Case Adaption

3.8 Article 8: "The Cybernetic e-Learning Management Model: Evaluation of an ADR artefact in e-Learning domain" - (A8)

Hilgarth, B., Pawlowski, J.M. 2011, Cybernetic e-Learning Management Model - On the evaluation of an Action Design Research artefact in the domain of e-Learning. In progress

ABSTRACT

The Cybernetic e-Learning Management Model (CeLMM) is a model for planning, designing, implementation, production and launch, usage as well as evaluation of e-Learning in internationally acting organizations. We show the methodology and results of an evaluation of the (CeLMM) which represents an artefact of Action Design Research (ADR) activities in e-Learning and IS research context. Artefacts coming from ADR research are characterized by action and design theory type. The assessment focuses on two different aspects; first the applicability of the model in action and secondly the assessment of the maturity in sense of methodological and design aspects. The first part is tackled by using Feature-based Evaluation Case Studies method and the use of the artefact in two case studies. For the second evaluation goal a specific evaluation grid was developed in advance to this work. The CeLMM as the artefact and object of this evaluation work is the output of an Action Design Research line of research which combines the widely known understanding of Action Research and Design Research in Information Systems discipline. The evaluation was accompanied by two case studies were conducted at adidas Group as well as an SME-focused project coordinated by the Virtual University of Bavaria. The main results of our paper are (a) the illustration of the assessment results of CeLMM and; (b) the reflection of the application of an evaluation grid / method for ADR artefacts in the e-learning domain.

KEYWORDS

H.1.1 Systems and Information Theory; CeLMM; Cybernetic e-Learning Management Model; Reference Model Evaluation; Action Design Research; ADR; Reference Model Analysis Grid; RMAG; Feature-based Evaluation Case Study

3.9 Summary and discussion of the articles

Through publishing the articles in different international communities, all research questions, which were mainly defined in the *Problem Formulation* step, are addressed in the end with the literature review as well as with the first case study at BMW Group. In sum, with these publications and presentations an attempt has been made to represent the knowledge about the *Cybernetic e-Learning Management Model* which allows for sufficient management of e-

Learning by respecting scientific standards (i.e. double blind reviews for articles and conference proceedings), resulting in a reliable, acknowledged and valid research work. In one publication (Kröckel & Hilgarth 2011) the author worked as co-author with the goal to integrate the methodology and knowledge regarding the *CeLMM* in the case study work. Because of restrictions in the kind of use cases (case studies at BMW Group, adidas Group and BPM@KMU), there is of course some *space for improvement* for future research. The detailed results of these future research issues are addressed in chapter 4.

4 RESULTS AND FUTURE RESEARCH

God, grant me the serenity to accept the things I cannot change,
courage to change the things I can,
and wisdom to know the difference.

- Reinhold Niebuhr, 1941/1942

Considering the results of this research, the central research questions might be reflected upon first. Because the articles covered in Ch. 3 contain the research results for the different steps, this chapter offers an overall result summary of the whole work regarding its achievements and issues for future research.

4.1 Reflection of research questions and contribution

As described in Ch. 2.1, this investigation is guided by three central research questions. The following is a summary of these questions:

RQ1 What is the success or failure of e-Learning in internationally operating organisations?

The success or failure of e-Learning depends a great deal on the expectations and goals of the organisation as well as individuals. Taking the observations made in the different case studies mentioned above, as well as considering existing literature in different scientific field, leads to the objects of success illustrated in TABLE 7.

TABLE 7 Observed and clustered objects of e-Learning success or failure

Cluster of e-Learning success	Description
Strategy & Sustainability	<ul style="list-style-type: none"> • Adequate and feasible e-Learning strategy based on transparency in organisational context. • Common mindset and understanding of e-Learning goals. • e-Learning continuance; the instructional, technological as well as organisational solutions will play a decisive role in mid- and long-termed organisational education. • e-Learning meets (completely or partly) different learning strategies of target group.
Cultural Acceptance	<ul style="list-style-type: none"> • e-Learning system addresses or covers existing cross-cultural differences in individual organisational settings (i.e. shows a comprehensive system.) • e-Learning respects existing cultural issues on stereotypical and/or individual level (i.e. issues of gender, educational background in primary, secondary or high school).
Effectiveness & Efficiency	<ul style="list-style-type: none"> • Positive impact on business process performance and costs • Technological effectiveness; effective learning resources. • Appropriateness of e-Learning for individual and organisational learning styles. • Improved individual business performance and individual satisfaction. • E-Learning will be deployed in an efficient way.
Quality	<ul style="list-style-type: none"> • Improved training and instructional quality. • Quality assurance processes are clear and efficient. • Quality of contents is high. • Contents are up-to-date.
Availability	<ul style="list-style-type: none"> • Training material is available and widely communicated. • Awareness of contents and its availability in the target group is high. • Meaningful, open, flexible and distributed e-Learning environment (i.e. Flexible Learning Management System provides easy access for target group).

Concluding this analysis, e-Learning success is a multidimensional issue. It is rooted in the following dimensions: (1) the general maturity of the organisation regarding the deployment of e-Learning which might be described through its existing *stadium* (or situation); (2) therefore what the *phase and processes* are; (3) the provision for different *domains*, which are *pedagogical, institutional, technological* and *socio-ethical*.

For this the research at hand contributes in the way that the understanding for e-Learning and its use in internationally operating workforces is sharpened. On the one hand the confirms and tries to structure the heterogeneously knowledge and understanding about e-Learning success in general; on the other hand it reflects this broad knowledge against the context of internationally and highly distributed working organisations. This goes in line with Khan (2005) work that aims on the management of e-Learning leads to a *meaningful, open, flexible and distributed learning environment*. Additionally the results of the

work imply that in the domain of e-Learning the scientific work might (also) stress the holistic research on the successful decision, design, implementation, introduction as well evaluation of e-Learning in organisations work or will work in a globalized multicultural manner. Therefore this work addresses the existing *inconsistent and heterogeneous focus and understanding for successful e-Learning* (see Ch. 1.1.1) especially in context of its use in internationally operating workforces.

RQ2 Why does success or failure occur and which reasons for it can be observed?

Developing the research further using the insights gained by investigating and analysing the understanding and expectations of the success of e-Learning, research question two aimed to observe reasons for failure or success. The following classes of reasons for successful or unsatisfactory e-Learning were derived from the observations made for this research:

- ***Factual or external constraints:*** each individual organisation consists of circumstances (or conditions) it is not able to change directly using its own strength (i.e. availability of low performance internet/network infrastructure). These types of dependencies might be considered as reasonable for success or failure.
- ***Readiness of organisation for e-Learning:*** beside such external constraints, the understanding, acceptance and internal culture regarding technology in educational processes or education also plays an important role in the success or failure of e-Learning in the organisation. Highly efficient technological solutions and best practice instructional concepts and designs with high quality contents will show neither the success of the organisation nor willingness to use e-Learning.
- ***Management of e-Learning:*** during the observations, it became clear that the (failure or) success of e-Learning also results from (mis-)management of factors which can be influenced by the organisation itself. The “*manageable*” factors relate to different domains, which are *congruent* with the *success domains* identified.

The conclusion to this question is that external pressures and restrictions as well as the internal attitudes towards e-Learning in particular all play an important role for the success or failure of e-Learning. On the other hand, there are factors which can be influenced by the organisation through managing e-Learning; using this opportunity to control these fields which are found in the decision, design and implementation, launch and use as well as evaluation of e-Learning will enhance the feasibility of successful (effective, efficient, sustainable, quality-truth, available and accepted) e-Learning.

Considering these research results in the light of previously done research as well as regarding its contribution to the scientific community it meets the need formulated by Selim (2007) to structure and consolidate the *unstructured*

set of influencing factors and success indicators. With the concept of *e-Learning Success Paths* beside transparency about the huge number of factors and indicators also its interdependences is in focus of this work. Also here this happened in the focus of internationally acting workforces. This contribution might serve the scientific community in the domain of e-Learning management to follow up the ideas of cause-effect chains between *e-Learning Critical Success Factors* and *e-Learning Key Performance Indicators* in its future research activities. On the other hand the work provides a first proved set of factors and indicators for the practitioners.

RQ3 What means are used to influence or control e-Learning in the daily operation of international organisations?

The central answer to this question is provided through the creation of the *Cybernetic e-Learning Management Model*. Focussing on the manageable factors for e-Learning, allowing for their complexity, shows that organisations acting in international organisations would feasibly deploy e-Learning as an accelerator for their business and knowledge management processes.

What is the contribution of this work for the scientific community considering this third central research question? Firstly also here the work contributes with its review of existing literature and knowledge regarding e-Learning management to the aspect of transparency in this field. Secondly the work follows the line of the existing descriptions of e-Learning reference models (like the *Public Available Specification (PAS) 1032-1* provided by the DIN 2004) or the actually published *ISO/IEC 19796-1* specification (ISO 2005) or management approaches (see Khan 2005) which do obviously do not meet (completely) the needs are shown by internationally operating organisations. With this research work a management model was created might act for the scientific community to research further on the contributions of e-Learning to society as well as it is shows a first guideline for practitioners to get the whole *beast* of e-Learning in different kinds of organisational settings. Because of the focus of the work is not narrowed to specific scientific disciplines intentions and goals on e-Learning research the model can support the ideas of a *systemic, logically interrelated concept for managing e-Learning* as it is not yet provided by existing theories.

4.2 Results at a glance

Different results followed from the research. Knowledge about the understanding of the success of e-Learning, its elements *situation, phases, processes, success levels, domains, success influencing factors (e-Learning Critical success factors)* as well as *success indicators (e-Learning Key Performance Indicators)*, which try to cover the complexity, exist when using e-Learning in globally acting organisations. Catching all this, the central result might be seen in the reference model, the *Cybernetic e-Learning Management Model (CeLMM)* which combines the analysis results with the goal of offering a generally applicable framework for the management of e-Learning. In this chapter, the reference model with its elements will be introduced in a condensed form. Details on it are handled in and published with Article 3 and Article 5 (see Ch. 3).

4.2.1 Graphical visualisations of the CeLMM

The following illustration (FIGURE 6) provides the graphical visualisation of the elements of the CeLMM reference model in its process-oriented type.

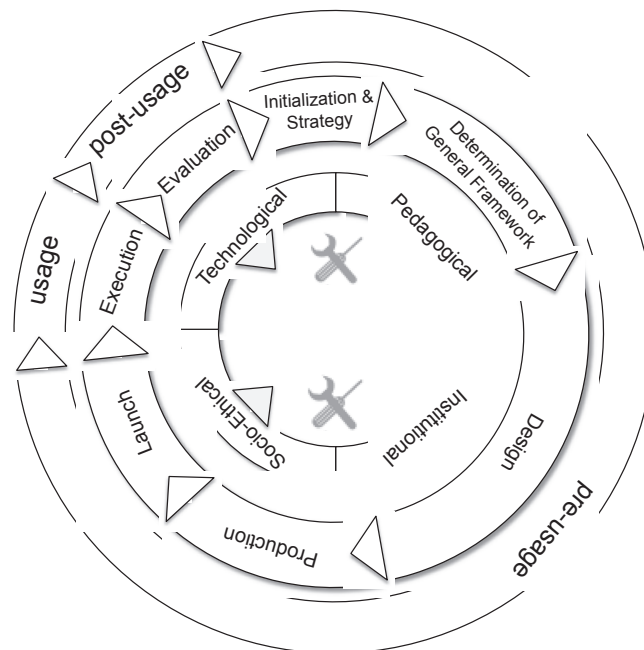


FIGURE 6 Graphical visualisation of CeLMM

As a second model illustration FIGURE 7 covers the logical visualisation of the *Cybernetic e-Learning Management Model*.

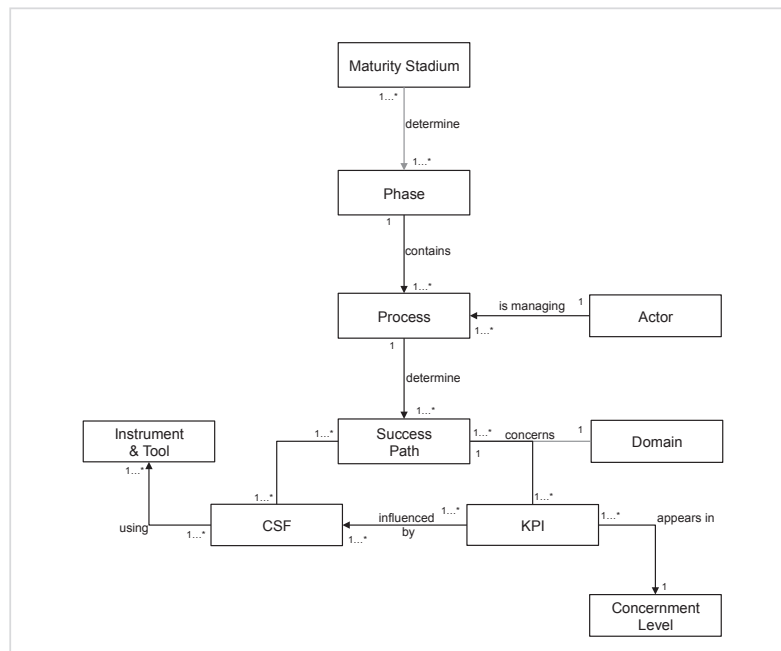


FIGURE 7 Logic Model of the *Cybernetic e-Learning Management Model*

4.2.2 Core concepts of the Management Model

The *Cybernetic e-Learning Management Model* combines the following existing concepts:

- ***Viable-system orientation & dynamic decision-making***: focusing on the viable system model theory (Beer 2003; Malik 2006), the purpose is that with the model it is possible to react to the dynamics of different autonomous organisational systems. This allows for the CeLMM reference model to be applied to "regulate/manage" a broad set of different situations which exist with e-Learning in target organisations.
- ***Process-orientation***: this design helps to create a clear structure for the situation and activities needed for the treatment and management of e-Learning in such organisations. It introduces the basis for activities, sequences, decisions, roles, stakeholders, responsibilities, conjunctive success domains, success paths (factors and related indicators) as well as success concernment levels and required tools.
- ***Principle of cause and effects***: the third basic principle of the *Cybernetic e-Learning Management Model* is the logical and consistent interdependence between the model's elements. This is described in detail in Article 8 (Hilgarth & Pawlowski 2011).

4.2.3 Elements of the Cybernetic e-Learning Management Model

This sub-chapter aims at the description of the elements of CeLMM artefact. TABLE 8 illustrates this elements with its hierarchical level and description.

TABLE 8 Levels and Elements of CeLMM

Level	CeLMM element	Element description
0	e-Learning Management Stadium (or situation)	The management of e-Learning may occur in different situations existing in organisations. Three different e-Learning Management Stadia are observable; (1.) <i>First Decision & Setup Stadium</i> (2.) <i>Incremental Stadium</i> (3.) <i>Re-Design Stadium</i>
1	e-Learning Phase, Process and Actor	After establishing the situation exists for e-Learning in the organisation, e-Learning directs different phases and processes of a typical e-Learning life cycle. These elements are referenced in the existing <i>ISO/IEC 19796-1:2005</i> (ISO 2005) standard.
2	e-Learning Success Domain	E-Learning management is a multi-faceted topic. It relates (respecting the specific situation or stadium, phase and processes) to different domains. These are <i>institutional</i> issues (e.g. involvement of management), <i>pedagogical</i> issues (e.g. instructional design), <i>technological</i> issues (e.g. hardware and software infrastructure) as well as <i>socio-ethical</i> issues (e.g. intercultural differences).
3	e-Learning Success Path	With respect to the first elements prescribed in levels 0 to 2, the management occurs on an explicit and descriptive set of success paths. These paths, which exist for each domain, show interdependences between manageable success influencing factors (eL-CSF), the observable or measureable success indicators (eL-KPI) and the success concernment level they depends on. (see also Appendix 3 As in TABLE 12 illustrated, the interdependences are expressed by the <i>Pearson correlation coefficient</i> (denoted by r). It is the measure of the correlation (linear dependence) between the two <i>variables</i> eL-CSF and eL-KPI (for process of data collection see Hilgarth 2010b) and measures the strength of linear dependence between both. Two kinds of correlation calculations were conducted; the analysis of the general degree of correlation between the two elements as well as (2) the consideration of the pair wise correlation of the observed eL-CSF with the observed eL-KPI. (see Hilgarth <i>ibid</i>)
4a	e-Learning Critical Success Factor (eL-CSF)	One part of the <i>e-Learning Success Paths</i> is the consideration of critical success factors. The literature delivers a lot of factors which are not aligned over the different disciplines to handle e-Learning in that context. With the existing maturity of the CeLMM, a set of observed eL-CSF's was identified within two case studies. (see also Appendix /TABLE 10)

continues

TABLE 8 (continues)

4b	e-Learning Key Performance Indicator (eL-KPI)	The second element of the <i>e-Learning Success Paths</i> is the consideration of related success indicators. Similar to the success factors, the existing literature delivers a huge number of indicators to express success of e-Learning (management). With the existing maturity of the CeLMM a set of observed eL-KPI's was identified within two case studies. (see Appendix / TABLE 11)
5a	e-Learning Success Concernment Level	The third sub-element of the <i>e-Learning Success Paths</i> is the concept of <i>e-Learning Success Concernment Levels</i> . This theoretical element describes the level (person or institution) which is or will be affected by e-Learning and its management.
5b	e-Learning Management Instrument and Tool	The last element in dependency to the level 4a element (eL-CSF) is the <i>e-Learning Management Instruments and Tools</i> which address "how" to manage e-Learning with efficient techniques.

4.2.4 The deployment process of the CeLMM

Deploying the *CeLMM* in a real situation shows TABLE 9:

TABLE 9 Deployment process of the CeLMM

#	Step	Description
1	Determination of initial e-Learning situation and <i>CeLMM</i> entry	Checklist consists of predefined questionnaire which will determine the existing situation in an individual organisation. Result is an analysis report on the initial situation, the directed processes, and the actors involved as well as for the overall domain-related complexity of the situation.
2	Identification of domain-related e-Learning <i>Success-Paths</i>	The <i>Success-Paths</i> concerned are identified with the Zwicky-box (Zwicky 1959) instrument With this the related <i>e-Learning Critical Success Paths</i> and the interdependent <i>e-Learning Key Performance Indicators</i> will be identified.
3	Deriving the organisation-specific activity plan and necessary toolset	With this activity plan there is transparency on the to-do's, and its allocated responsible role as well as the due date can be determined. This is part of <i>project management</i> . Another issue is the determination and preparation of necessary management tools (i.e. strategy management, Business Process Management).

continues

TABLE 9 (continues)

4	Work off and tracking the activity plan	Working off the appointed activities which are determined by the specific situation, phases and processes. Here the different management tools prepared can be used.
5	Measuring success with eL-KPI metrics	Measuring effects by completion or progress of activities. Possible tools are <i>project controlling</i> and usual <i>performance measurement</i> tools.
6	Controlling, Tracking and Reporting	The deployment of e-Learning is a long-term activity which needs cyclical controlling, tracking and reporting. The reporting of the progress and/or performance of e-Learning might be addressed to all stakeholders involved.

As the description in this section illustrates, the deployment of the CeLMM is defined by six steps which embodies a project-oriented approach.

5 CONCLUSIONS AND FUTURE RESEARCH

The research presented here offers a first step in a fundamental work for improving the deployment and management situation for e-Learning, especially in internationally operating organisations.

In the sense of Checkland and Holwell (2002) the *interplay* between theory and practice leads to the research described by this work. The discipline of *Information Systems* and the set of fruitful real-life contexts offered the basis for it, achieving a systemic knowledge of the success of e-Learning in organisations with globally distributed workforces. Creating a framework for its management might help future decision-makers and managers to make competent decisions and solve existing problems or problems which will arise with e-Learning. Rooted in reliable and valid research methods, the results show a good basis for future investigations.

Embedded and long-term observations provided fruitful contexts that are necessary to understand the needs for a management model like the *Cybernetic e-Learning Management Framework*. Reflecting the results of the work at hand, it has to be stated that it is quite far away from being complete. But it also has to be mentioned that the results provide the necessary first piece of the bigger puzzle for researching in that context. By testing and evaluating the model as a reference model, a number of improvements and issues for future research arose. As already stated in Article 8, (...) *consequent, consistent and structured further research for the model will bring it to a higher level of maturity*. A list of 15 future research activities identified as important might structure and prioritize future progress in researching this context. These are clustered into four central fields of further research; (1) *researching and consolidating of e-Learning Success-Paths*; (2) *continuously investigating and improving practicability and efficiency of Cybernetic e-Learning Management Model*; (3) *fostering of further reference model integration and business model development*; and (4) *periodical model evaluation and assessment*. (see Article 8)

Besides reflecting the research results in the previous paragraph, the discussion of the research process at the end of this dissertation aims finally to provide learning and recommendations for other researchers to improve future

research in this field. Firstly, aspects of *scientific relevance*, the subjective feeling of the *innovative character* as well as the *practice-orientation* of the current research will be reflected upon. Having not found this aspect of a systemic and comprehensive work on the issues of e-Learning in internationally operating organisations after reviewing the existing literature or from the feedback from the reviewer of the published articles and papers is immediately suggestive of the work's scientific relevance. The innovative character of the work, especially of the *CeLMM* model, has to be considered in a differentiated manner. On the one hand, the work respects a lot of existing and scientifically valid theories and ideas about e-Learning provided by existing literature. On the other, the creation of the systemic model might be seen as the innovation of this work. Considering this last aspect, the work is highly practice-oriented because of its origin and reflection in existing real-world contexts (cases in the conducted case studies). The work shows a balance of these three aspects.

The following is a reflection on the chosen *Action Design Research* framework and its scientific function. At least working within the cyclic ADR framework with different methods and instruments, the research created knowledge about the understanding of e-Learning's success in internationally operating organisations as well as a model that might support the management of it to avoid failure. As quoted in Bird's (2005, p.3) work *Philosophy of Science*, scientific theory "(...) has the following features:

- *It is guided by natural law.*
- *It has to be explanatory by reference to natural law.*
- *It is testable against the empirical world.*
- *Its conclusions are tentative, i.e. are not necessarily the final word.*
- *It is falsifiable. (...)"*

Doing this research in a qualitative-interpretative and social-scientific manner, the terms of natural law do not fit. But it is submitted that the research in terms of *Action Design Research* combined many of these *rigorous* expectations for scientific work. The research presented here follows the principles of logical conjunctions and the understanding of causes and effects; also here. The whole work aims to explain the real-world situation "e-Learning in globally acting organisations" and the context of influencing and measuring it. During the research, path ideas and especially the model created were tested against the *empirical world*. Of course here the number of cases in which the *Cybernetic e-Learning Management Model* will be tested can be elaborated by future research activities. Conclusions from this research are *tentative*. Future research (as described in Article 8) can build on these first results. Taking these criteria, respective parts of the scientific theory of e-Learning success are falsifiable. Considering this reflection of using the *ADR* approach from a logical and structural point of view, it provides a transparent and flexible framework for research and allows transparency and guidance for the research process as well as consistency for the creation of valid research results.

Assessing in more detail the research activities conducted and their extent, the following conclusion and critique can be made:

- A broad literature review was carried out. With the structured search and filtering process a huge number of documents were reviewed. This process shows limitations: firstly, the search criteria were selected faithfully and reasonably, but shows more or less a subjective decision process. The opinion and understanding of others may differ from the selection and search focus. Secondly, the in-depth review of identified literature is also subjective and can show failings.
- Different case studies were conducted within this overall research. Choosing and organising cases in the context of representative target organisations like BMW Group, adidas Group or a huge collection of small- and medium-sized enterprises is not easily done. Time and budget restrictions had to be respected when designing and conducting the case studies. These restrictions led to limitations in the comparability of the three cases. In future research this aspect should be further stressed in the selection and organisation of case studies to make results more *generalisable*. A second aspect in the context of the case studies is the discussion of the role and the ability for interventions by the researcher. Being an embedded observer, as in the first two cases and the in the long-term case study at BMW Group, brings enormous advantages because a natural and non-artificial research field is preserved. Performing interventions as researcher in such a case study might be done carefully or by doing it covertly. In doing so one must weigh the ethical principles of doing scientific research and the issue of informing the observed person or object against the aspect of obtaining as much *natural* information as possible.

Some words on the decision to do the research using a cumulative technique and not as a monograph: first, seeing that the research activities were done over a period of nearly five years, writing and publishing emerging results in conference papers and journal articles was helpful. All the papers were published at *IS* or *Social Sciences* related conferences and journals within the subject field of e-Learning and its organisational treatment. Limitations for this can be seen in the selection of the conferences rated according to their specific scientific impact factor. Future research should show deliberateness in this regard. Secondly, I am not a native English speaker. All the scientific documents and reports were written solely in the English language. The help of a professional lecturer helped to improve this weakness, but in some cases this led to limitations for the work.

Hopefully others will take the ideas and results of this work along with the identified limitations and will improve this field of e-Learning management. The globalisation of the working world and the inherent situation of globally distributed workforces require this.

YHTEENVETO (FINNISH SUMMARY)

Kokonaisvaltainen käsitys e-oppimisen menestyksestä kansainvälisissä organisaatioissa

Tietämyksellä on avainrooli alati kansainvälistyvässä liikemaailmassa. Kestävä tietämyksenhallinta muodostaa valtavan tehtävän kansainvälisillä markkinoilla toimiville organisaatioille. Perinteinen koulutus vähenee ja siitä tulee Internetin ja verkkoviestinnän aikakaudella ylellisyyttä.

E-oppiminen ei ole enää uusi käsite ja se kattaa myös joustavan ja avoimen oppimisen ongelmat. Mutta viimeisen parin vuosikymmenen aikana tämä koulutuksen muoto on muodostunut enenevässä määrin ammattimaiseksi lähinnä korkeammassa koulutuksessa. Kun sitä tarkastellaan kansainvälisesti toimivien organisaatioiden kannalta, joita luonnehtivat hajanaiset ja heterogeeniset kohderyhmät, e-oppiminen voidaan nähdä vaikuttavana keinona, mutta sen soveltamisen ja hallinnan tehokkuuden kannalta puutteellisenä.

Tämän tutkimuksen tarkoituksena on luoda kokonaisvaltainen hallinnan viitemalli näille e-oppimisen piirteille yli e-oppimisen elinkaaren kun sitä sovelletaan hajautetusti toimivien globaalien organisaatioiden työntekijöihin. Tämä tutkimus ei paneudu yksittäisten tekijöiden analysointiin. Sen sijaan tavoitteena on tunnistaa ja ottaa haltuun koko monimutkainen e-oppimisen kokonaisuus koulutusalan ulkopuolella toimivissa organisaatioissa. Tämän tavoitteen saavuttaminen riippu useista tekijöistä. Ensinnäkin, olemassaolevia teorioita ja tietämystä on käsitelty monitieteisessä ja vertaisarvioidussa tieteellisessä kirjallisuudessa koskien e-oppimisen menestymisen ulottuvuuksia, menestykseen vaikuttavia tekijöitä sekä e-oppimisen menestymisen indikaattoreita eikä vähiten, näiden hallintaa koskevista teorioista ja lähestymistavoista. Toiseksi, e-oppimisen hallintaa ei helposti havaita ongelmana kansainvälisissä ympäristöissä ja ongelmien täsmällinen tunnistettavuus empiirisessä havainnoinnissa on vaikeaa. Kolmanneksi, ongelmaluokkia ohjaavan viitemallin muodostaminen, joka on testattavissa samankaltaisissa empiirisissä ympäristöissä.

Suunnittelutoimintatutkimus soveltuu tämän kaltaiseen tutkimukseen ja se valittiin käytettäväksi tutkimuksen menetelmäkehikseksi. Tämän tutkimuksen keskeisenä tuloksena on kyberneettinen e-oppimisen hallintamalli, joka sisältää teknologisten, institutionaalisten, pedagogisten sekä sosio-eettisten näkökulmien menestystekijöiden määrittelyn ja moniulotteisen e-oppimisen soveltamisen monimutkaisuuden.

Viitemallin arvioinnissa toteutettu lopuarviointi toi esille mallin peruskypsyyden ja relevanssin sekä aihepiirin jatkokehitystarpeita. Tässä esitetty mallin viimeisin versio ei suinkaan ole täydellinen. Tätä voitaneenkin pitää keskustelun avauksena työn tulosten yleistettävyydelle.

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APPENDIX 1 - LIST OF EL-CSF

TABLE 10 Observed eL-CSF sorted according to its absolute frequency

Id	Name of eL-CSF	Source	Domain
311	Professional (project) management	Hilgarth 2010b	Institutional
142	Language differential	Wang, Chun-Min, 2006	Socio-ethical
42	Cooperative/Collaborative Learning	Doyle, J.; Hogan, M. 2004 Wentling <i>et al</i> 2000	Pedagogical
317	Direct communication to and feedback from target group	Hilgarth 2010b	Pedagogical
16	Audience analysis	Marengo, A.; Marengo, V. 2005	Pedagogical
316	Involvement of powerful organisational instances into communication, definition, development and launch process	Romiszowski, A. 2004	Institutional
319	Availability of high-quality material by using ICT and distribution channels	Hilgarth 2010b	Technological
324	Continuous management of content currentness as well as of communication and marketing	Hilgarth 2010b	Institutional
32	Content analysis, accuracy of content	Andreu, R; Jáuregui, K. 2005	Institutional
51	Respecting cultural diversity	Edmundson, A.; 2006 Wentling <i>et al</i> 2000	Socio-ethical
139	Interaction and Communication	Dyson, M. C.; Campello, S. B. 2003	Pedagogical
11	Authentic and adequate learning material for the learners' needs	Nokelainen, P. 2006	Pedagogical
87	Evaluation and assessment	Govindasamy, T.; 2001	Institutional
108	Respecting geographical diversity	Chen, Ai-Yen; Mashhadi, Azam; Ang, Danie; Hakrider, Nancy 1999	Socio-ethical
209	Respecting politics	Romiszowski, A. 2004	Socio-ethical
310	Creation of holistic eLearning strategy including domain-specific issues	Khan, B.H.; 2005 Hilgarth 2010b	Institutional
312	Concepts respecting adequate pedagogical and technical aspects are in time, budget and quality for implementation	Hilgarth 2010b	Pedagogical
313	Transferring/Using knowledge direct from context expert	Hilgarth 2010b	Institutional
314	Adequate competencies for implementation, quality assurance and degree of communication with concept team	Hilgarth 2010b Wentling <i>et al</i> 2000	Institutional
315	Meaningful and timely communication and launch process	Hilgarth 2010b	Institutional

(continues)

TABLE 10 (continues)

322	Appropriateness of training in organisational context	Hilgarth 2010b	Institutional
3	Access to course material	Forsblom, N.; Silius, K. 2002	Institutional
18	Basic assumptions about e-Learning and training in organisation	Selim, H. M. 2007	Institutional
90	Exogenous factors (i.e. stability of national telecommunications infrastructure; class size; work load of clients; recognition and incentives for lecturers)	Fresen, J. 2007	Institutional
120	Maturity of Information Technology (i.e. infrastructure is rich, reliable and provides tools; network bandwidth, network security, network accessibility, audio/video plugin)	Selim, H. M. 2007	Technological
122	Innovative use of ICT	Forsblom, N.; Silius, K. 2002	Technological
168	Competencies and roles in management team	Romiszowski, A. 2004	Institutional
193	Organisational issues	Romiszowski, A. 2004	Institutional
248	Selection of adequate didactic combinations and documents	Marengo, A.; Marengo, V. 2005	Pedagogical
287	The definition of program goals and planning approach	Nokelainen, P. 2006 Doyle, J.; Hogan, M. 2004	Institutional
318	Following the KISS concept (i.e. keep it simple and stupid concepts for authoring, content management, content adaption)	Hilgarth 2010b	Pedagogical
320	Making marketing for e-Learning material with integrated communication strategy	Hilgarth 2010b	Institutional
321	Continuous review of concept respecting all domains	Hilgarth 2010b	Institutional
5	Accommodation of individual differences (i.e. different learning styles)	Edmundson, A. 2006	Socio-ethical
7	Adequate interactive content for audience and appropriate degree of excitement is given	Marengo, A.; Marengo, V. 2005	Pedagogical
8	Administrative affairs (i.e. lecturer management)	Khan, B.H. 2005	Pedagogical
19	Quality of course material	Forsblom, N.; Silius, K. 2002	Pedagogical
27	Coding and information of e-Learning software and systems	Roca, J. C.; Chiu, Chao-Min; Martínez, F. J. 2006	Technological
34	Content development process	Selim, H. M. 2007	Institutional
35	Content is easy to understand (learner interface)	Khan, B.H. 2005	Pedagogical
45	Course Delivery	Miller, M. T.; Husmann, D. E. 1996	Institutional
48	Course material produced by specialists	Romiszowski, A. 2004	Institutional
55	Deduction of e-learning directly from business process and competencies	Leyking, K.; Chilkova, P. 2007	Institutional

(continues)

TABLE 10 (continues)

76	Effiacy studies	Tzeng Gwo-Hshiang 2007	Socio-ethical
94	Facility support	Govindasamy, T. 2001	Institutional
107	General technical support (i.e. multimedia support; working without connection; content in CD-rom version; use of metadata; multi-language support; help files and tutorials; standardisation of courses)	Tsinakos, A. 2004	Technological
109	Availability of training plan for effective and efficient solutions	Marengo,A.; Marengo,V. 2005	Institutional
111	Goal orientation (i.e. explicit training and e-Learning goals)	Nokelainen,P. 2006	Institutional
118	Information quality (i.e. content is highly relevant and correct)	Roca,J. C.; Chiu,Chao-Min; Martínez,F. J. 2006	Institutional
130	Instructional implementation: precise adaption of the teaching methods to specific context	Ehlers, U.-D.; Goertz, L. 2004	Pedagogical
132	Instructional Quality	Miller, M. T.; Husmann, D. E. 1996	Pedagogical
133	Instructional strategies	Khan, B.H. 2005	Pedagogical
165	Legal issues (i.e. respecting intellectual properties, personal rights etc.)	Littlejohn, A.; Falconer, I.; McGill, L. 2008	Socio-ethical
191	Use of open quality standards	Ehlers, U.-D. 2004	Institutional
195	Organisational environment (support from senior trainers; reliable continuous learning culture; possibility for consistent learning)	Lim, Hyochang; Lee, Sang-Gun Lee 2007	Institutional
197	Organisational level (management support, reward structure, internal marketing, quality of learning environment and equipment, support, time for on-the-job training, learning culture)	Romiszowski, A. 2004	Institutional
229	Quality development must be designed jointly by all those involved;	Ehlers, U.-D. 2004	Institutional
231	Quality must play a central role in education and training policy;	Ehlers, U.-D. 2004	Institutional
241	Resources are available at appropriate costs	Littlejohn, A.; Falconer, I.; McGill, L. 2008	Institutional
249	Self-efficacy (i.e. in terms of using computer and internet for learning)	Tsinakos, A. 2004 Lim, Hyochang; Lee, Sang-Gun Lee 2007	Technological
283	Technology issues (learning environment; interface design)	Selim, H. M. 2007	Technological
325	Respecting content differential in different cultural and local settings	Hilgarth 2010b	Socio-ethical
326	Adequate, state-of-the-art and easy-to-use set of authoring tools and systems (incl. reusability aspects of contents)	Hilgarth 2010b	Technological

APPENDIX 2 - LIST OF EL-KPI

TABLE 11 Observed eL-KPI and its domain (order: absolute frequency)

Id	Name of eL-KPI	Source	Domain	Success Level
5	Effectiveness; the contribution of e-Learning (object/program) to reaching goals (i.e. cost effectiveness and training effectiveness)	Wesseler, M. 1999	Institutional	all
2	E-learner satisfaction (ELS)	Wang, Yi-Shun 2003	Pedagogical	Individual
6	Effects on business processes	Back, A. 2004 Spitzer, D. R. 2004	Institutional	Collective
61	Reaction, Learning, Behaviour & Results	Kirkpatrick, D. L. 1996	Pedagogical / Institutional	Individual
118	Cost-to-benefit ratio (CBR - benefits/costs)	Wentling <i>et al</i> 2000 Seibt, D. 2004 Annand, D. 2002	Institutional	Collective
7	Efficiency; tracking economical effort regarding the object/program in context of the degree of goal-reaching	Bartley, S. J.; Golek, J.H. 2004 Wesseler, M. 1999	Pedagogical / Institutional	Collective
119	Costs	Back, A. 2004 Ehlers, U.-D.; Goertz, L. 2004 Phillips, J.; Phillips, P. P. 2004 Wentling <i>et al</i> 2000 Bartley, S. J.; Golek, J.H. 2004 Kirkpatrick, D. L. 1996	Institutional	All
40	Material stimulates lively and interactive learning processes	Ehlers, U.-D.; Goertz, L. 2004	Pedagogical	Individual
136	Project progress and project costs, time and quality running status	Hilgarth 2010b	Institutional	Collective

(continues)

TABLE 11 (continues)

139	Confirmation of receipt of information	Hilgarth 2010b	Institutional	Collective
142	Long-term and continuous access to learning material	Hilgarth 2010b	Institutional	Individual
13	Functionality	Scigliano, J. A.; Dringus, L. P. 2000	Technological	Individual
32	Learning outcome	Johnson, R. D.; Hornik, S.; Salas, E. 2007 Wentling <i>et al</i> 2000 Dyson, M. C.; Campello, S. B.; 2003	Institutional	All
135	E-Learning strategy discussed, aligned and described in detail, including holistic aspects (i. sense of all domain aspects)	Hilgarth 2010b	Institutional	Collective
138	Existence of expected materials in time, budget and quality	Hilgarth 2010b	Institutional	Collective
66	Reduction of failures (error rate before and afterwards) – internal processes	Back, A. 2004	Institutional / Pedagogical	All
89	System use	Wang, Yi-Shun 2003	Technological	Individual
109	Availability	Khan, B. H. 2005	Technological	Collective
137	Existence of adequate, quality-assured concept paper	Hilgarth 2010b	Institutional	Collective
140	Number of adaptations in coordination with best-practice organisation	Hilgarth 2010b	Institutional	Collective
141	Number of information events	Hilgarth 2010b	Institutional	Collective
143	Acknowledgment of availability of material	Hilgarth 2010b	Institutional	Individual
9	Extendability of e-Learning program	Wentling <i>et al</i> 2000	Technological	Collective

(continues)

TABLE 11 (continues)

12	Flexible organisation of learning	Forsblom, N.; Silius, K. 2002	Pedagogical	Collective
17	Improvement of teaching quality	Forsblom, N.; Silius, K. 2002	Pedagogical	Collective
27	Learners' goals and motivation structures	Ehlers, U.-D.; Goertz, L. 2004	Pedagogical	Individual
36	Learning score	Silius, K.; Tervakari, A.-M.; Pohjolainen, S. 2003	Pedagogical	Individual
48	Pedagogical usability of learning material	Nokelainen, P.; 2006	Pedagogical	Collective
83	Serviceability	Khan, B.H. 2005	Technological	Collective
94	Time spent for travelling	Wentling <i>et al</i> 2000	Institutional	Collective
95	Timely content	Shee, D. Y.; Wang, Yi-Shun; 2008	Institutional	Collective
128	Cultural elements change	Wentling <i>et al</i> 2000	Socio-ethical	Collective
129	Customer satisfaction (Indexes coming from customer survey)	Back, A. 2004 Phillips, J.; Phillips, P. P. 2004 Kirkpatrick, D. L. 1996	Institutional	Collective

APPENDIX 3 - LIST OF SUCCESS PATHS

TABLE 12 Success-Paths after domain and correlation eL-CSF and eL-KPI

CSF domain	eL-CSF Id	eL-KPI Id	KPI domain	Pearson correlation
Institutional	87	129	Institutional	.892
	168	5	Institutional	.698
	197	5	Institutional	.698
	287	5	Institutional	.698
	90	6	Institutional	.698
	94	61	Institutional	.698
	197	66	Institutional	.698
	287	129	Institutional	.698
	34	137	Institutional	.698
	118	137	Institutional	.698
	229	137	Institutional	.698
	197	143	Institutional	.698
	313	5	Institutional	.640
	310	135	Institutional	.640
	314	138	Institutional	.640
	324	142	Institutional	.630
	316	140	Institutional	.607
	3	61	Institutional	1
	241	94	Institutional	1
	Pedagogical	3	12	Pedagogical
94		12	Pedagogical	.698
45		109	Technological	.698
42		6	Institutional	.728
132		61	Institutional	.698
248		66	Institutional	.698
35		137	Institutional	.698
139		61	Institutional	.688
318		139	Institutional	.688
16		61	Institutional	.607
Socio-ethical	248	61	Institutional	1
	7	27	Pedagogical	1
	76	142	Institutional	.698
	51	5	Institutional	.698
	165	137	Institutional	.698
	76	48	Pedagogical	1
	325	109	Technological	.698
76	9	Technological	1	

(continues)

TABLE 12 (continues)

	120	61	Institutional	.698
	120	95	Institutional	.698
	122	95	Institutional	.698
	283	137	Institutional	.698
	107	142	Institutional	.698
Technological	120	142	Institutional	.688
	319	142	Institutional	.630
	326	138	Institutional	1
	120	12	Pedagogical	.698
	120	12	Pedagogical	.698
	107	48	Pedagogical	1
	122	9	Technological	.698
	107	9	Technological	1

Step	Ph.D. Studies	Analysis	Theory-creation	Theory-test	Summarizing & Writing	Conclusion & Defending
Goal	Finished study & detailed plan for research activity	Knowledge about multidisciplinary factors, indicators and methods are important for successful e-learning in international acting organizations.	Building of holistic model and sub-theories coming from phase one to a theoretical management model.	Testing of generic theoretic e-learning management model in empirical context as well as via reference model evaluation.	Outline of insights and papers for phases and conclusion concerning research question	Scientific acceptance of research insights as well as generic theoretic evaluation model
Input	Requirements for Ph.D. studies, 2006	Literatur in disciplines - Economics, Business Adm. - Computer Science - Educational Research - Intercultural Research	Insights coming from literature review and case study at BMW Group	- Coherent, generic management model is documented as output in phase three - e-Learning project context at adidas Group	Analysis results and insights from phase two to four.	Published Articles and Conference Papers
Activities	- Creation of Study Plan - Selection and Registration of/for courses - Creation of Research Plan - Discussion of Study and Research Plan with Past - Passing of courses	- Selection of literature - Review of literature - Participation of congresses - Interviewing/discussion with experts for each relevant discipline - Documentation/Paper writing and publishing	- Creation and documentation of generic theoretical model - Paper writing and publishing - Presentation of model in seminars, workshops or congress	- Use of model in real situations - Tracking of adoptions are necessary for the existing model - Collection and evaluation of empirical data - Documentation and publishing of insights. - Deployment of reference model evaluation	- Answering of research question - Outline documentation of all written papers - Abstract of core insights from research activities - Description of used method - Writing and discussion - Formalism	- Writing & Publishing of dissertation paper - Defending, debating and discussion of dissertation work with experts in relevant disciplines. - Close of research work
Action Design Research Phase					Discussion of results and defension of dissertation with Supervisor, Reviewers and Opponent	
Result	63 out of 60 ECTS credits	Literature Review BMW Group Case Study	Cybernetic e-Learning Management Model Theory of e-Learning Success Path	adidas Group Case Study Reference Model evaluation for OeLMM	6 Conference Papers 3 Journal Articles	Doctorate Work and Publish in Series of "Jyväskylä Studies in Computing"
References	XEN0021 - Fluency in Academic Writing XEN0022 - Academic Reading XEN0024 - Grammar f. Writing FIL0402 - Philosophy - General Theory o. Science f. Graduate Students KASP094 - EDU - Research Methods in Education I KASP091 - EDU - INTRODUCTION TO EDUCATION AND ADULT EDUCATION KASP092 - EDU - INTRODUCTION TO THE PSYCHOLOGY OF EDUCATION TIES462 - IT - Virtual Learning Environments TUT0815 Information Systems Research Methods TUT0690 Postgraduate Seminars Abroad TUT0761 Postgraduate Studies Reports TUT0599 Business Models of Software Companies TUT0860 Software and Services Sourcing ICSP101 Intercultural Communication ICSP304 International Management Ext - Service Management course	SUCCESSFUL E-LEARNING? A MULTIDISCIPLINARY LITERATURE REVIEW ON E-LEARNING SUCCESS, IADIS International Conference Information Systems 2010, Porto E-LEARNING SUCCESS IN ACTION! A CASE STUDY RESEARCH ON E-LEARNING SUCCESS IN INTERNATIONAL ACTING ORGANIZATION, IADIS International Conference e-Learning 2010, Freiburg CYBERNETIC E-LEARNING MANAGEMENT MODEL – MANAGING E-LEARNING IN INTERNATIONAL ACTING ORGANIZATIONS, IADIS International Conference Information Systems 2011, Avila CYBERNETIC E-LEARNING MANAGEMENT MODEL - ON THEORY TESTING BY CASE-RESEARCH AT ADIDAS GROUP, IADIS International Conference e-Society 2011, Avila SOCIO-ETHICAL SUCCESS PATH OF E-LEARNING – AN ANALYSIS REPORT ON CASE STUDY RESEARCH OF E-LEARNING MANAGEMENT, IADIS International Conference e-Learning 2011, Rom CYBERNETIC E-LEARNING MANAGEMENT MODEL - ADDRESSING EXISTING PROBLEMS WITH E-LEARNING IMPLEMENTATION IN INTERNATIONAL ACTING ORGANIZATION OF BMW GROUP & adidas GROUP, IJCSIM Journal 2011 PROCESS MANAGEMENT FOR E-LEARNING - MANAGING E-LEARNING BY STRUCTURED BUSINESS PROCESS MANAGEMENT IN EDUCATIONAL PROCESSES OF INTERNATIONAL ACTING ORGANIZATIONS LIKE BMW GROUP, Ingolstadt Reference Model Evaluation in Action Design Research: Part 1: On the development of an evaluation grid for the Action Design Research artefact "Cybernetic e-Learning Management Model", in progress Reference Model Evaluation in Action Design Research: Part 2: On the assessment of the ADR artefact "Cybernetic e-Learning Management Model", in progress	2003-2011	2010-2011	2011	
Time	2006-2011					

APPENDIX 5 - LIST OF REVIEW DATABASES

TABLE 13 Overview database for the literature review

#	Name of database	Type of database
1	Academic Radiology	Journal
2	AJET - Australasian Journal of Educational Technology	Journal
3	American Educational Research Journal	Journal
4	BJET - British Journal of Educational Technology	Journal
5	Computer Law & Security Report	Journal
6	Computer law and security report	Journal
7	Computer networks and ISDN systems	Journal
8	Computers and Composition	Journal
9	Computers and Education	Journal
10	Computers in Human Behavior	Journal
11	e-JIST - E-journal of instructional science and technology	Journal
12	Economics of Education Review	Journal
13	Educational and Psychological Measurement	Journal
14	Educational Technology & Society	Journal
15	EJEL - Electronic Journal of e-learning	Journal
16	eled - E-learning and education	Journal
17	EURDOL - European journal of open, distance and e-learning	Journal
18	European Management Journal	Journal
19	Evaluation and Program Planning	Journal
20	Expert systems with applications	Journal

(continues)

TABLE 13 (continues)

21	Harvard Educational Review	Journal
22	HMD - Handbuch der maschinellen Datenverarbeitung	Journal
23	IHSTEI - International Journal of Human-Computer Studies	Journal
24	IIER - Issues in educational research	Journal
25	IJEL - International Journal on E-Learning	Journal
26	Information & management	Journal
27	Information Sciences	Journal
28	Information Technology: General and Others	Journal
29	Internation Journal of Human-Computers Studies	Journal
30	International Journal of Information Management	Journal
31	JITECS - Journal of Information Technology Education	Journal
32	Journal of Computer Assisted Learning	Journal
33	Journal of educational technology & society	Journal
34	Journal of Network and Computer Applications	Journal
35	JTLA - The journal of technology, learning, and assessment	Journal
36	Medical engineering & phsysics	Journal
37	Mind Culture and Activity	Journal
38	MIS Quarterly	Journal
39	Quality and Quantity	Journal
40	Review of Education Pedagogy & Cultural	Journal
41	SLEID - Studies in learning, evaluation, innovation and development	Journal
42	Studies in Educational Evaluation	Journal
43	System (An International Journal of Educational Technology and Applied Linguistics)	Journal

(continues)

TABLE 13 (continues)

44	The Internet and Higher Education	Journal
45	Edmundson, A.; Globalized E-Learning Cultural Challenges	Book
46	Ehlers, U.-D.: Bildungcontrolling im E-Learning	Book
47	Ehlers, U.-D.: Handbook on Quality and Standardisation in E-Learning	Book
48	Kirkpatrick, D.: Evaluating Training Programs - The Four Levels	Book
49	Sanders, J.: The Program Evaluation Standards	Book
50	Schank, R.: Designing World-Class e-learning	Book
51	Tippelt, R.: Handbuch der Bildungsforschung	Book
52	Tippelt, R.: Handbuch Erwachsenenbildung/Weiterbildung	Book
53	Khan, B.H.: Managing E-Learning Strategies - Design, Delivery, Implementation and Evaluation	Book
54	International Conference on Artificial Intelligence	Conference Proceedings
55	Learning for the future - Proceedings of the Learning Conference	Conference Proceedings
56	ITForum Paper	Conference Proceedings
57	JTAP	Conference Proceedings
58	EURODOL	Conference Proceedings
59	IWIPS, Berlin	Conference Proceedings
60	11th international PEG conference	Conference Proceedings
61	EUN Conference 2000	Conference Proceedings
62	ICEIS 2003	Conference Proceedings
63	DIN Deutsches Institut für Normung e.V. - Stabsabteilung Technik	Public Available Specification
64	Wirtschaftsinformatik der Produktionsunternehmen - Universität Duisburg-Essen	University Research Report
65	Helsinki School of Economics and Business Administration ITP 2001 Electronic Business Track	University Research Report
66	Università degli Studi di Cagliari, Facoltà di Scienze della Formazione;*Università Politecnica delle Marche, Facoltà di Ingegneria, DEIT	University Research Report

(continues)

TABLE 13 (continues)

67	University of Illinois at Urbana-Champaign	University Research Report
68	University of Erlangen-Nürnberg, Wirtschaftsinformatik II	University Research Report

APPENDIX 6 – SEARCH CRITERIA AND MEANING

TABLE 14 Literature review – search terms and goal

Primary Search Term	Alternative Search Terms	Goal
e-Learning	<ul style="list-style-type: none"> • eLearning • E-Learning • Online Learning • Web-based Learning • Distributed Learning • Virtual Learning • Technology-enhanced Learning • Distance Learning 	<p>Main terms for the literature search. Goal is to catch as many of the different terms which exist as possible to reflect on the meaning of e-Learning. Following Wentling <i>et al.</i> (2000) "<i>e-learning is the acquisition and use of knowledge distributed and facilitated primarily by electronic means. This form of learning currently depends on networks and computers but will likely evolve into systems consisting of a variety of channels (e.g., wireless, satellite), and technologies (e.g., cellular phones, PDA's) as they are developed and adopted. E-learning can take the form of courses as well as modules and smaller learning objects. e-learning may incorporate synchronous or asynchronous access and may be distributed geographically with varied limits of time.</i>"</p>
Success	<ul style="list-style-type: none"> • successful • benefits • effectiveness • efficiency • failure 	<p>Aims, in combination with the term e-Learning (and alternative terms), to find literature which reflects explicitly or implicitly on the understanding of success of e-Learning in organisations. This also subsumes literature with the opposite meaning (e.g. case study reports on failure of e-Learning)</p>
Critical Success Factors	<ul style="list-style-type: none"> • criteria • factor(s) • parameters 	<p>Searching with this term aims to find literature which handles <i>critical success factors</i> (one or a set of factors) for e-Learning in internationally operating organisations. This means the handling of identified factors which will influence or have influenced successful or failed e-Learning.</p>

(continues)

TABLE 14 (continues)

Key Performance Indicators	<ul style="list-style-type: none"> • indicator(s) 	Searching with this term aims to find literature which handles <i>key performance indicators</i> (one or a set of indicators) for e-Learning in internationally operating organisations. This means the handling of identified indicators which will show or have shown successful or failed e-Learning.
Systemic	<ul style="list-style-type: none"> • multidisiplinary • interdisciplinary • holistic • cybernetic 	The search combined with this term aimed to find literature which explicitly handles e-Learning management in a comprehensive way. This means respecting different disciplinary views or complexes.
Evaluation	<ul style="list-style-type: none"> • evaluation framework • evaluation model • evaluation method • evaluation approach 	Literature databases were searched according to explicit evaluation theories. Theories which include instruments, methods, models, approaches or metrics which will show the status for a specific indicator.
Management	<ul style="list-style-type: none"> • management framework • management model • management method • management approach 	Literature databases were searched according to explicit management theories. Theories which include instruments, methods, models, approaches or metrics which will help influence the progress of e-Learning in different stadia.

APPENDIX 7 - LIST OF REVIEWED LITERATURE

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APPENDIX 8 - REVIEW SUMMARY

TABLE 15 Summary for identified key literature

Q1: eLearning success object	Author	Q2		Q3	
		CSF	KPI	M	E
<i>Discipline: Information Technology, Information Systems and Computer Sciences</i>					
added-value to corporation targets	Back, A., 2004			x	
quality	Berger, Th., 2004	x		x	
flow	Choi,D.H.; Kim,J.; Kim,S.H., 2007	x			x
quality	Ehlers, U.-D.; Goertz, L., 2004	x	x		
quality	Ehlers,U.-D., 2004	x	x	x	
added-value	Forsblom, N.; Silius, K., 2002	x	x		
e-learning effectiveness	Johnson,R.D.; Hornik,S.; Salas,E., 2007	x	x		
respecting cultural issues (stereotype and individual)	Kamentz,E.; Mandl,Th., 2002	x			x
return on investment (ROI)	Phillips,J.; Phillips,P.P., 2004	x	x	x	
e-learning continuance	Roca,J. C.; Chiu,Chao-Min; Martínez,F. J., 2006	x	x		x
transfer of learned into doing	Schank, R., 2002	x	x		x
effectiveness	Seibt,D., 2004		x	x	
learner satisfaction	Shee, D. Y.; Wang, Yi-Shun, 2008	x	x		x
usefulness	Silius,K.; Tervakari, A.-M.; Pohjolainen,S., 2003	x	x		x
learning effectiveness & return on investment (ROI)	Spitzer,D.R., 2004		x		x
improvement of educational processes	Tsinakos,A., 2004	x			
e-learning effectiveness, efficiency & appropriateness	Tzeng Gwo-Hshiang, 2007	x	x		x
e-learner satisfaction (ELS)	Wang,Yi-Shun, 2003	x	x		x
cultural success, cost effectiveness, strategic value, learner & technology satisfaction	Wentling, T.L.; Waight, C.; Gallaher, J.; La Fleur, J.; Wang, C.; Kanfer, A., 2000	x	x	x	x
<i>Discipline: Arts & Humanities</i>					
learning success	Andreu, R; Jáuregui, K., 2005	x			
economical benefits & cost effectiveness	Bartley,S.J.; Golek,J.H., 2004		x		x
strengthen eLearning system through covering cross-cultural differences	Blanchard, E.;Frasson, C., 2005	x	x	x	
educational quality	Ditton,H., 1999			x	x
pedagogical success & organisational success	Doyle, J.; Hogan, M., 2004	x			
usability & learning success	Dyson,M. C.; Campello, S. B., 2003	x	x		x
learner success	Edmundson,A., 2006	x		x	
quality	Fresen, J., 2007	x	x	x	
organisational success successful implementation of e-learning in organisation; effective e-learning	Govindasamy,T., 2001	x			
quality of educational programs	Kirkpatrick,D. L., 1996		x		x

(continues)

TABLE 15 (continues)

improve individual business performance	Leyking,K.; Chilkova,P., 2007	x			
effective learning resources	Littlejohn,A.; Falconer,I.; McGill,L., 2008	x			
organisational success including economical benefits, return on investment (ROI) & organisational benefits	Marengo,A.; Marengo,V., 2005	x		x	
program ecology	Miller,M. T.; Husmann,D. E., 1996	x	x	x	x
pedagogical usability	Nokelainen, P., 2006	x	x	x	
successful use of eLearning in organizations	Romiszowski, A., 2004	x			
improving educational quality & value-add for organization as well as individuals	Sanders, J.R., 2006		x		x
effectiveness	Scigliano,J. A.; Dringus,L. P., 2000		x	x	x
effectiveness & success	Selim,H. M., 2007	x	x		x
learner success, learner satisfaction	Sun Pei-Chen, 2007	x	x		x
learning performance	Sun,Pei-Chen; Cheng,Hsing Kenny, 2007	x	x		x
effective eLearning quality	Wang, Chun-Min, 2006	x		x	
	Wesseler,M., 1999	x	x		x
<i>Discipline: Business, Economy & Management</i>					
quality	DIN, 2004	x		x	
efficiency in personal instruction	Keltomäki, E., 2001	x			x
performance & effectiveness	Lim, Hyochang; Lee,Sang-Gun Lee, 2007	x	x		
<i>Discipline: Social Sciences</i>					
meaningful, open, flexible and distributed eLearning environment	Khan, B.H., 2005	x	x	x	x
learning success	Shih,PC; Muñoz,D.; Sánchez,F., 2006	x	x		
e-learning systems success (ELSS) from learner perspective	Wang Yi-Shun, 2005	x	x		x

CSF = author provides information regarding Critical Success Factor(s)

KPI = author provides information regarding Key Performance Indicator(s)

M = author provides information regarding Management theory, model, approach

E = author provides information regarding Evaluation theory, model, approach

APPENDIX 9 - LITERATURE REVIEW STATISTIC

FIGURE 8 Allocation of literature database to scientific disciplines

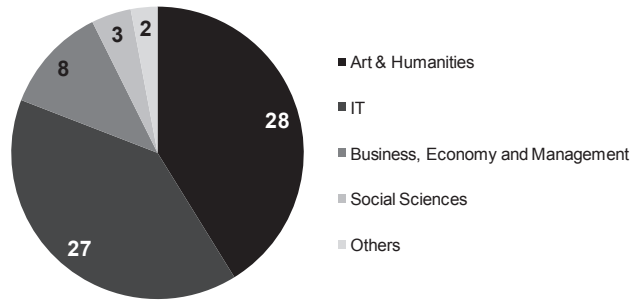


FIGURE 9 Allocation of documents document type

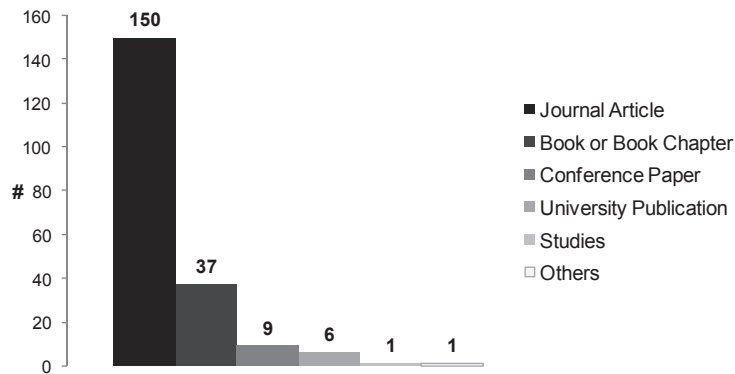
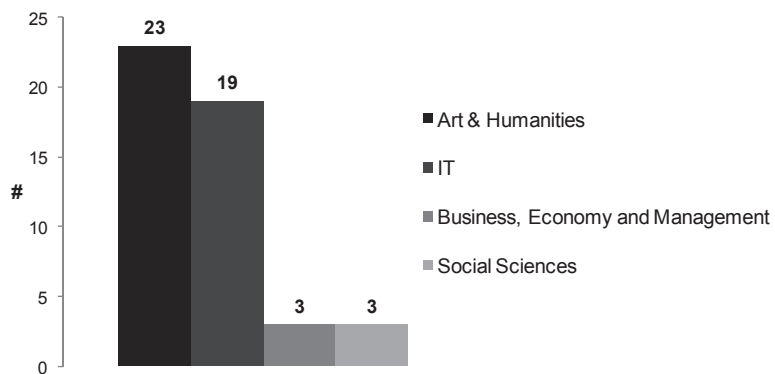


FIGURE 10 Allocation of key literature to scientific discipline



ORIGINAL PAPERS

I

**SUCCESSFUL E-LEARNING?
A MULTIDISCIPLINARY LITERATURE REVIEW ON
E-LEARNING SUCCESS**

by

Bernd Hilgarth 26.07.2010

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SUCCESSFUL E-LEARNING? A MULTIDISCIPLINARY LITERATURE REVIEW ON E-LEARNING SUCCESS

Bernd Hilgarth

*Department of Computer Science and Information Systems
Agora, 40014 University of Jyväskylä*

ABSTRACT

The present paper offers a literature review that aims at the transparency and categorization of e-Learning research in the context of success management and evaluation literature. The articles are classified by their acknowledged scientific disciplines *Arts & Humanities, Information Technology, Business, Economy and Management, and Social Sciences*. The key insights of this review are: (a) each scientific discipline deals with successful e-Learning from a different point of view; (b) e-Learning success underlies an interrelated construct of typical phases/processes, success levels, domains, and criteria; (c) the literature does not provide a common set of criteria for managing and evaluating e-Learning success and; (d) no framework for a holistic management and evaluation was found. The conclusion summarizes the review insights; 11 hypotheses formulate the basis for further research in this field in the context of the author's Ph.D. research.

KEYWORDS

e-Learning; success evaluation; success management; multidisciplinary literature review; key-performance-indicator (eL-KPI); critical success factors (eL-CSF)

1. INTRODUCTION

e-Learning – still a trend issue? With the ongoing discussion of globalization, e-Learning is also still in the focus of organizations as an activity for tackling the challenges faced in *globalized* education. The exciting question for this review, from a scientific and empirical standpoint, is how is e-Learning success defined, through which factors is it manageable, and what indicators make success measurable?

2. RESEARCH METHOD, DATABASE, SEARCH CRITERIA & RESULTS

2.1 Method and Review Steps

The literature review (see Table 1) is part of a line of qualitative research (Järvinen, 2003) activities.

Table 1. Review process, goals, activities, and results

Step	Definition Database	Definition Search Criteria	1st Search Step "machine-rank"	2nd Search Step "human-judge"	In-depth review of very-relevant literature	Consolidation of insights and hypotheses
Goal	Adequate and reputable literature database.	Comprehensive and focused set of search criteria reflecting eLearning in different disciplines.	First set of literature using search criteria.	Adequate and reputable set of literature reflecting research, respectively review goal.	Transparency over the very relevant ranked literature for tackling eLearning success over different disciplines in a holistic	Documented insights and research hypotheses for future research.
Activities	Inquiry, discussion and verification of database with Ph.D. supervisors and research peer group.	Pre-definition and verification criteria concerning discipline-specific conditions (e.g. different wordings).	Use of ScienceDirect search machine and re-combination using Boolean operation.	Scanning and Investigating of 204 hits and relevance categorization by criteria fulfillment, self-relevance, reputation of author.	Investigation of 46 very relevant documents after review questions (see Ch. 3).	Consolidation and verbalization of findings and definition of research hypotheses.
Resultful Outcome	42 Scientific Journals 9 Books 17 Other Sources	38 different search criteria allow 137 search combinations	220 hits incl. redundancies 294 hits distinct 188 Journal Articles 27 Book/Chapters 9 Conference Papers 6 University Publications 1 Study 1 Public Specification	46 very relevant literature 66 relevant literature 101 less relevant literature	Mapping of the literature to review questions (see Ch. 3.1)	1. Findings in Ch 3.2 - 3.4 2. Hypotheses in Ch 3

3. MULTIDISCIPLINARY INSIGHTS ON E-LEARNING SUCCESS

In reflecting on the allocation of this *very relevant* literature, it is obvious that the disciplines of *Arts & Humanities* as well as *IT* are the dominating disciplines. Three *research questions* guide the analysis of the *very relevant* literature in a qualitative manner. The selection of these guiding questions roots in the overall research goals:

1. What are the success dimensions and objects of e-Learning in the different disciplines? (Q1)
2. What explicit factors or indicators are mentioned in the literature for successful e-Learning? (Q2)
3. How is the success of e-Learning managed and evaluated in the literature? (Q3)

3.1 Summary - e-Learning Success Elements in the Literature

Table 2 shows the contributions of the analyzed literature at a glance. Sorted after the mentioned success objects, the analysed critical success factors and key performance indicators as well as the availability of management and evaluation theory is illustrated for each author.

Table 2. Review results regarding Q1 to Q3

	Q1: eLearning success object	Author	Q2		Q3		Q1: eLearning success object	Author	Q2		Q3	
			CSF	KPI	M	E			CSF	KPI	M	E
Arts & Humanities	learning success	Andreu, R. et al., 2005	x				added-value to corporation targets	Back, A., 2004				x
	economical benefits & cost effectiveness	Bartley, S. J. et al., 2004		x		x	quality	Berger, Th., 2004	x		x	
	strengthen e-learning system through covering cross-cultural differences	Blencham, F. et al., 2005	x	x	x		flow	Choi, D.H. et al., 2007	x			x
	educational quality	Dillon, H., 1990				x	quality	Ehlers, U.-D. et al., 2004	x	x		
	pedagogical success & organizational success	Doyle, J. et al., 2004	x				quality	Ehlers, U.-D., 2004	x	x	x	
	usability & learning success	Dyson, M. C. et al., 2003	x	x		x	added-value	Forstöm, N. et al., 2002	x	x		
	learner success	Edmundson, A., 2006	x		x		e-learning effectiveness	Johnson, R.D. et al., 2007	x	x		
	quality	Fresen, J., 2007	x	x	x		respecting cultural issues	Kamamba, E. et al., 2002	x			x
	organizational success: successful implementation of e-learning in organization; effective e-learning	Govindasamy, T., 2001	x				return on investment (ROI)	Phalips, J. et al., 2004	x	x	x	
	quality of educational programs	Kirkpatrick, D. L., 1996		x		x	e-learning continuance	Roca, J. C. et al., 2006	x	x	x	
	improve individual business performance	Leyking, K. et al., 2007	x				transfer of learned into doing	Schank, R., 2002	x	x	x	
	effective learning resources	Littjoch, A. et al., 2008	x				effectiveness	Sabb, D., 2006			x	x
	organizational success including economical benefits, return on investment (ROI) & organizational benefits	Marengo, A. et al., 2005	x		x		learner satisfaction	Shao, D. Y. et al., 2008	x	x	x	
	program coology	Miller, M. T. et al., 1996	x	x	x	x	usefulness	Silva, K. et al., 2003	x	x	x	
	pedagogical usability	Nokelainen, P., 2006	x	x	x		learning effectiveness & return on investment	Soltzer, D.R., 2004	x			x
	successful use of e-learning in organizations	Romiszowski, A., 2004	x				improvement of educational processes	Tahkonen, A., 2006	x			
	improving educational quality & value-add for organization & individuals	Sanders, J.R., 2008		x		x	effectiveness, efficiency & appropriateness	Tzeng Gwo-Hshiung, 2007	x	x		x
	effectiveness	Sogliano, J. A. et al., 2000		x	x	x	e-learner satisfaction (ELS)	Wang, Yi-Shun, 2005	x	x		x
	effectiveness & success	Selm, H.M., 2007	x	x	x		cultural success, cost effectiveness, strategic value, learner & technology satisfaction	Wentling, T.L. et al., 2000	x	x	x	x
	learner success, learner satisfaction	Sun, Pei-Chen, 2007	x	x	x		Information Technology	meaningful, open, flexible and distributed eLearning environment	Khan, B.H., 2006	x	x	x
learning performance	Sun, Pei-Chen et al., 2007	x	x	x		learning success			Shih, PC et al., 2006	x	x	
effective eLearning	Wang, Chun-Min, 2006	x		x		e-learning systems success (ELSS) from learner perspective	Wang Yi-Shun, 2005	x	x		x	
quality	Wesseler, M., 1999	x	x	x								
Business Information Systems	quality	DIN, 2004	x		x							
	efficiency in instruction	Ketomäki, E., 2001	x			x						
	performance & effectiveness	Lim, Hyochang, et al., 2007	x	x								

3.2 Success Dimensions: Findings and Hypotheses

The insight here is that multidisciplinary literature addresses e-Learning success objects in different ways (context, meaning, and wording). This may also depend on the specific disciplinary focus of the authors and their respective work. A major hypothesis (H1) from this review is that e-Learning success is located in different dimensions and is represented by different success objects that are equal, depending on the discipline. The author bases this hypothesis upon the following detailed findings:

- **Common e-Learning Phases and Processes determine success**

The review clearly shows that e-Learning success occurs in different phases and processes. A main differentiation can be made after the *pre-use*, *use*, and *post-use* phases. In addition, it is also clear that the success of e-Learning depends on the mode of this phase, which is specifiable after the *operation-like* and *project-like* phases. The public available specification 1032-1 (DIN, 2004) offers a reference process model that provides a comprehensive description.

- **e-Learning Success occurs at different Levels**

In considering the success objects in the literature (see Table 2), different levels that occur are observable; *individual level* (e.g. learner success), *instructional level* (e.g. educational quality) as well as *collective level* (e.g. return on investment). This leads to a specific hypothesis (H2), which is e-Learning success can be located at different *success levels*.

- **e-Learning is a multi-facet issue that needs treatment from multiple Success Domains**

The literature indicates that e-Learning success is influenced by, or joins to, different interwoven domains. Obviously, these domains are *technology*, *pedagogic*, *organization*, *quality*, *economics*, and *ethics*. e-Learning, therefore, is a multifaceted issue that requires a *systemic* treatment (H3) through respecting these *success domains*. By following this idea, e-Learning can be considered as a part of a *viable system* (Beer, 1985 that roots in *cybernetic thinking*).

3.3 Influencing Factors and Indicators

This section reflects on the second research question. It can be stated that the reviewed literature describes and handles the class of *influencing factors* (309 identified) as well as *indicating criteria* (133 identified). A general hypothesis (H4) from this review is that e-Learning success is manageable by a core set of influencing e-Learning Critical Success Factors (eL-CSF), and e-Learning Key Performance Indicators (eL-KPI) are located in the abovementioned *success dimensions*. The author bases this hypothesis upon the following detailed findings:

- **Different wording but similar understanding for eL-CSF and eL-KPI exist**

The different wording of the varying factors and indicators can be aligned over the different scientific disciplines. Aligning it would improve e-Learning in practice and science (H5).

- **Different degree of influence and weight of eL-CSF and eL-KPI**

The literature review shows a different degree of influence or importance of eL-CSF and eL-KPI for e-Learning success. It is also observable that not all of these factors and indicators are useful or adequate for all the existing e-Learning use cases. The derived hypothesis (H6), therefore, is that eL-CSF and eL-KPI can be hierarchically structured and weighted. Secondly (H7), the application of it has to be customized for a specific situation.

- **Correlation between the factors, indicators, and success dimensions**

The author assumes a correlation between eL-CSFs and eL-KPIs. The literature shows no investigation in this direction. The verification of the correlation between the criteria and the abovementioned *success dimensions* (also its *MECE* - *mutually exclusive and collectively exhaustive* - status) is necessary (H8).

3.4 Success Management and Evaluation Models, Methods, and Theories

The review leads to the conclusion that approaches, techniques, and methods for the management and evaluation of e-Learning success exist, but do not respect a *holistic* orientation. This leads to the following findings:

1. By using the positive effects of e-Learning systems for a target organization, the permanent management and evaluation of it becomes necessary (H9).
2. Management and Evaluation presumes a holistic model comprising the described success dimensions, actors, factors, and indicators for e-Learning (H10).
3. The holistic model might show applicability in average situations (H11).

4. CONCLUSION

The bottom-line that this literature review shows is the gap in the existing literature and the need for a *holistic* framework for *e-Learning success management and evaluation*. A consolidation over the different scientific disciplines will bring forth improvements for practitioners and scientists alike. For this, the following research steps are planned: (1) verification of the research hypothesis in an adequate empirical case

study, (2) development of a holistic e-Learning success framework and (3) verification of the framework in an empirical context.

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ORIGINAL PAPERS

II

**E-LEARNING SUCCESS IN ACTION!
A CASE STUDY RESEARCH ON E-LEARNING SUCCESS IN IN-
TERNATIONAL ACTING ORGANIZATION**

by

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E-LEARNING SUCCESS IN ACTION! A CASE STUDY RESEARCH ON E-LEARNING SUCCESS IN INTERNATIONAL ACTING ORGANIZATION

Bernd Hilgarth

*Department of Computer Science and Information Systems
Agora, 40014 University of Jyväskylä*

ABSTRACT

This paper reports the use of e-Learning in practice based on a structured and embedded *participatory observation* and the tracking of activities by conducting a case study including two cases in an international environment of BMW Group as international acting organization. The observations aimed at two different research goals; first, to identify real existing problems and therefore the *need-for-action* when using e-Learning in professional organizational context; secondly, to observe and analyse structures supporting successful e-Learning based on the conclusions and research hypotheses produced in previous literature review (Hilgarth, 2010). Key insights of the conducted case study on the success and problems of e-Learning in empirical context are; (1) all e-Learning success dimensions were assumed (see also Hilgarth, 2010) can be observed within the two empirical cases; and (2) correlations between the e-Learning success dimensions (especially e-Learning critical success factors and e-Learning key performance indicators) were tested and found. This empirical research shows a possible baseline for creating an e-Learning success management and evaluation framework in future research.

KEYWORDS

e-Learning; success evaluation; success management; case study research; BMW Group; e-Learning success management and evaluation framework

1. INTRODUCTION

Derived from previous literature review in the field of e-Learning success management and evaluation (Hilgarth, 2010), this documents shows the results and insights of research in this field by doing a case study at BMW Group. Conducting research in the field of e-Learning effectiveness and efficacy makes, from the authors point of view only sense when combining it with real existing, empirical context. For this a case study was designed and conducted by using two different cases within the international activities of BMW Group. Goals for this are, (a) the long-term gathering of data for analysis of success and problem issues of e-Learning in professional organizational context and (b) testing the research hypotheses described by Hilgarth on e-Learning success management and evaluation.

Table 1. Research Hypotheses – guideline for research on e-Learning success management and evaluation (Source: Hilgarth, 2010)

#	Hypothesis
H1	e-Learning success is located in different dimensions and is represented by different indicators that are equal independent on the scientific discipline.
H2	e-Learning success occurs at different Levels;
H3	e-Learning is a multi-facet issue that needs <i>(systemic)</i> treatment from multiple success domains <i>technology, pedagogic, organization, quality, economics and ethics.</i>
H4	e-Learning success (performance) is manageable by a core set of influencing e-Learning Critical Success Factors (eL-CSF), and e-Learning Key Performance Indicators (eL-KPI) are located in the different success dimensions.
H5	The different, often in the wording varying criteria and factors can be aligned over the different scientific disciplines.
H6	Success criteria and factors consists of a hierarchical structure and weighting. This means that not all mentioned factors/criteria do have the same degree of influence and importance in the success of e-Learning.
H7	Not all the mentioned eL-CSF and eL-KPI are adequate or useful for all existing cases of eLearning. The use of it has to be customized for a specific situation.
H8	Correlation between the factors, indicators and other success dimensions exist.
H9	The permanent management and evaluation of it (eL-CSF & eL-KPI) becomes necessary.
H10	Management and Evaluation presumes a holistic model comprising the described success dimensions, actors, factors, and indicators for e-Learning.
H11	The holistic model might show applicability in average situations.
H12	Not all indicators can be measured, intangible indicators plays a role for obtaining success.

2. RESEARCH METHOD

The underlying research method does follow different research strategies derived from the questions are addressed to it. *Case study* research in manner of qualitative research is the dominating research strategy of this work. Reaching the goal of valid and reliable results, *data* as well as *methodology triangulation* was used. This means the use of different data sources (two in length and situation varying cases) as well as mixed methods/techniques (participatory observation, interviews, statistical analysis, taking field notes etc.) for investigation of intended research question. Chapter 0 offers information about the done research process, the case study design as well as the used instruments and techniques for data gathering and analysis.

2.1 Research Process

Table 2 shows the steps, goals and activities characterize the research process was done.

Table 2. Research process, goals and activities

Step	Design Case Study	Setup of Case Study with organization	Data Gathering	Data Consolidation to case events	In-depth analysis of case events	Interpretation & deriving of implications for further research
Goal	Design of valid and reliable case study research	Safe and feasible field of investigation in empirical, organizational setup is defined.	All possible data can be achieved within the cases are gathered and centrally stored in databases.	Gathered data are consolidated in a way they can be analyzed and interpreted under the aspects of reliability and validity.	Consolidated data are analyzed in direction of research hypotheses by using central research questions.	Documented insights and research hypotheses for future research.
Activities	Definition of research question Check of different research strategies and techniques Decision of case study and instruments	Definition of cases with partners in organization Clarification of feasibility of case study research with management	- participatory observation - conducting interviews - making field notes - conducting pilots - recording documents - recording own actions - acquiring software products	- Development of database - Structuring of raw data - Deriving of case events - Reading and commenting data - Mapping of data to events - Verification with experts	- qualitative interpretation - correlation measurement - reliability check - documentation	- Interpretation of results - Alignment with hypotheses - Research implications
Regular Milestone	Decision for case study design with a minimum of two cases using the instruments of participatory observation, interviewing and doing field notes.	Case Study was approved by BMW Group management. Two Cases were identified for period of 2004 till 2008: - ETK Blended Learning (2004-2008) - ETK-2 Training (2007-2008)	1.2 GB file space - 2 e-Learning programs - 178 project meetings - 14 expert interviews - 650 e-mails - 581 documents - 14 training reports	48 chronological sorted case events in research database	1 analysis report including all calculations as well as reports in SPSS software	Conclusions and implications for further research defined.
Time	2003	2003/2008	2004-2008	2008	2008-2010	2010

2.2 Case Study Design

The author started in 2003 with the case study by guiding and observing e-Learning projects in international business context. The all-over goal of the case study is the gathering of sufficient data for the investigation of e-Learning maturity and success management and evaluation. For this the case study was designed with *multiple cases*, which were started at different times with different target groups, different instructional

designs but with common business goals and context. The first relevant eLearning case, the *ETK Blended Learning* program, was started in 2003 and observed till spring 2009. Within this time the second case, the *IPAC-Qualification (IPAC-Q)* program found its setup in 2006 and under observation till the end of 2009. Both programs are embedded into the training and e-Learning environment of BMW Group Aftersales. This professional environment covers beside a general *D&T framework* (in sense of development and training curriculum) also the introduction of a learning management system (LMS) *TRIAS* (Training In AfterSales). Both e-Learning programs were started with the intention to support international roll-out of Information System software in estimated 3.300 BMW Group licensed retail shops worldwide with training of functional/technical as well as soft skills. In practice, international roll-out means heterogeneous environment in sense of language, culture, user experience and educational background in common as well as specific technical domain. These two cases offers a wide field to a range of aspects relevant for designing, implementing, operating and evaluating (including teaching and learning processes) e-Learning in organizational context as well as considering its value-add (or effectiveness and efficacy) for the stakeholders. In sense of *data triangulation* both cases contributes to the initial research goal of investigation of e-Learning success in empirical, organizational context.

2.3 Instruments and Techniques

2.3.1 Data Gathering

Through accompanying the cases and journalizing all relevant observations (interviews etc.), case data were gathered in a structured process. Main instruments (resp. techniques) for this data gathering process were *participatory observation* (see also Bell, 1993) with making of *field notes* or *recording own actions* for occurrences (178 project meetings, 560 eMail conversations, 14 trainings instructions) in project work as well as usage of training material in live situation and *piloting* (1 pilot of IPAC-Q) as well as planning and conducting of *subject matter expert interviews* (14 interviews with domain specialists, instructors, learners, business management). In addition to these all relevant *documents* and *software products* were acquired. All data gathered were classified and stored within a central database.

The author acted as project manager, project member, business stakeholder or mere embedded observer. With the opportunity for the author guiding the projects and learning and teaching processes in both cases as *embedded observer*, the gathering of data over nearly six years has to be seen as optimal because of reaching a broad database. An existing difference in the setup (e.g. goal-setting, readiness of environment/infrastructure and mindset for eLearning in target group etc) of the two cases is seen as realistic but challenging for data consolidation over the whole case study. But having these differences in the case setups offered also the opportunity for gathering information over different aspects are real existent. Also the mentioned research design and position of the author allowed a more “*natural*” observation than explicitly conducting of *quasi-experimental* research. All the gathered data were chronologically structured and stored after *case events*. These *case events* shows exposed situations at an explicit point of time and subsumes all data are clearly adjunct to it. Exposed describes difficult situations in the projects, exceptions to the planned and expected attitudes, progress in project as well as expected results, and use of the e-Learning programs as well as milestones were typically occur. All data were digitalized (e.g. from notes on discussions till log files and Microsoft Office® documents) and administered in a database for analysis. Finally the raw data sourced an amount of 1.2GB file space. Through the structuring of the data by the *case event classification*, 40 samples (29 in ETK Blended Learning, 11 in IPAC-Q) exist for further analysis.

2.3.2 Analysis

For further analysis the 40 relevant case events were used. After mapping the research hypotheses (see Table 1) with the research questions (see Ch.3) a data record sheet for entering the case events and aligning it with the research questions and hypotheses was created in the database. Figure 1 shows an example for recording each use case event.

Data_gathering_form_case_events

ID: 1 Use Case: [TK Blended] Date: 21/03/2003 Data type: [Alfa] Use Case Event: [2003_Alignment_discussio...]

Observation: IMPLEMENTING E-LEARNING FOR THE SPECIFIC BUSINESS PROJECT IN INTERNATIONAL CONTEXT HAS TO BE ALIGNED WITH THE ORGANIZATION'S STRUCTURE, RESPONSIBILITIES, ANNUAL BUDGET PLANNINGS AND GOAL SETTINGS.

Q1: []
 What is success (as well as the problems/issues) in planning, designing, implementing, usage as well as evaluating eLearning is shown in the investigated use cases? Remarks Q1: [] also can be added-value to comp. Target:

Success Objects: [organizational success - successful implementation of e-learning in organisation effective e-lear...]
 H2: [] H3: []

Q2: []
 Does the case study provide evidence for hypothesis 1 of the existence of theory with its elements phases, processes, domains, concernment levels, eLearning Critical Success Factors (eL-CSF) as well as eLearning Key Performance Indicators (eL-KPI)? Remarks Q2: []

Phase: [pre-usage] Process: [] Domain: [institutional] Level: [collective]
 eL-KPI: [] eL-CSF: [] H1: [] H4: []

Q3: []
 If eL-CSF can be observed, what are the main eLearning Critical Success Factors do drive successful use of eLearning in the use cases? Remarks Q3: [] organizational issues is high level and cons...

Figure 1. Data record sheet "case event"

Research instrument is adopted from previous research (literature review) by integration of all found e-Learning success dimensions and its values. Next each case event was checked for its contribution to each of the six research questions (see Ch.3). Finally this allows the analysis over all events in each specific case as well as over all cases and makes the results comparable and internal as well as external *valid*. For analysis of data several statistical methods (*reliability analysis, correlation measurement, frequency, main*) by using of SPSS software were applied. Altogether this data analysis was used for interpreting the results in qualitative way and using as much as possible via "quantification of use case observations". Results of this *case event analysis* are described in chapter 3.

3. RESEARCH RESULTS AND INSIGHTS

The research is driven by the question after *how strongly does the situation marked in the literature from successful e-Learning with the reality to observable cases coincide?* Next a set of seven sub-questions was defined for operational and detailed investigation. Table 3 shows the mapping of the research hypothesis to the tangible sub-question.

Table 3. Mapping of research hypothesis to research sub-questions

#	Hypothesis	Mapping	Research Sub-Questions	#	
H1	e-Learning success is located in different dimensions and is represented by different indicators that are equal independent on the scientific discipline.		What is the observable success (as well as are the observable problems/issues) seen in planning, designing, implementing, usage as well as evaluating eLearning the investigated cases?	Q1	
H2	e-Learning success occurs at different Levels;		Does the case study provide evidence of the existence of success in multiple alternative (and co-existing?) dimensions phases, processes, domains, concernment levels, eLearning Critical Success Factors (eL-CSF) as well as eLearning Key Performance Indicators (eL-KPI)?	Q2	
H3	e-Learning is a multi-facet issue that needs (systemic) treatment from multiple success domains technology, pedagogic, organization, quality, economics and ethics.		If eL-CSF can be observed, what factors are mainly observed in the cases?	Q3	
H4	e-Learning success (performance) is manageable by a core set of Influencing e-Learning Critical Success Factors (eL-CSF), and e-Learning Key Performance Indicators (eL-KPI) are located in the		If eL-KPI can be observed, what indicators are mainly observed in the cases?	Q4	
H5	The different, often in the wording varying criteria and factors can be aligned over the different scientific disciplines.		If evidence for eL-CSF and eL-KPI is observed in the two cases, what degree of correlation can be observed between eL-CSF and eL-KPI?	Q5	
H6	Success criteria and factors consists of a hierarchical structure and weighting. This means that not all mentioned factors/criteria do have the same degree of influence and importance to the success of		Does the need for an all-over, holistic framework respecting all those dimensions for the management and evaluation of successful eLearning in practice exist and does it seem to be applicable in the context of the cases in hand?	Q6	
H7	Not all the mentioned eL-CSF and eL-KPI are adequate or useful for all existing cases of eLearning. The use of it has to be customized for a specific situation.				
H8	Correlation between the factors, indicators and other success dimensions exist.				
H9	The permanent management and evaluation of it (eL-CSF & eL-KPI) becomes necessary.				
H10	Management and Evaluation presumes a holistic model comprising the described success dimensions, actors, factors, and indicators for e-Learning.				
H11	The holistic model might show applicability in average situations.				
H12	Not all indicators can be measured, intangible indicators plays a role for obtaining success.				

With exception of hypothesis five (H5), all hypotheses are addressed within this analysis. Hypothesis five can not be investigated in this case study set-up; the effects of standardization for wording over the different scientific disciplines might be addressed in another research step afterwards a first attempt was done. In the following sections each sub-question and its accompanying results are illustrated. The purpose of this chapter is the report of results and its discussion. This chapter reflects therefore on the quantitative analysis of structured case study data (so far it isn't restricted through the use of qualitative research method) and the qualitatively interpretation of results for answering the defined research questions. Each research question is represented in a sub-chapter.

3.1 Observed Success, Problems and Issues for e-Learning in Empirical Context

This section addresses the issues of the underlying research sub-question one (Q1). Therefore it concerns on the observable success, failure and problem issues in the underlying cases. Analyzing the two independent cases following conclusions were phrased:

- **An enhancement of the, in literature mentioned success is necessary**

With the previous review of theory and literature (Hilgarth, 2010) concerning this context of successful eLearning 48 (not distinct) descriptions for success were identified. With analyzing the above described cases, additional five such success objects for eLearning were identified. These are (1) *adequate and feasible e-Learning strategy based on transparency in organizational context*; (2) *availability of training material is widely communicated*; (3) *awareness of content and availability of training material*; (4) *up-to-datedness of e-Learning content*; and (5) *common mindset and understanding of e-Learning goals*.

- **Not all success mentioned in investigated literature has been shown in the cases**

27 out of 48 former identified success descriptions were not observed within the case study. Reasons lay (1) that some of the success described in literature are simply not relevant or do not represent the real existing understanding; (2) the in literature described success is also adequate for empirical context but not for the investigated case setup; and (3) the 48 former identified success descriptions are unadjusted and shows redundancies in the meaning of it with different wording.

- **e-Learning success do not exclusively interrelate to one e-Learning phase or process**

With the analysis it became obvious that the success objects of e-Learning don't exclusively interrelate (in sense of the MECE principle) to one specific e-Learning phase or process. Therefore e-Learning seems to be treated at multi points of time in its lifecycle for becoming successful.

- **Success occurs on different granularity and hierarchical placements (H2)**

The analysis of the 40 case events shows full evidence for the hypothesis that eLearning success occurs with different granularity and in different hierarchical placements. In 40 out of 40 events the objects are obviously in hierarchical structure and on different granularity level. Condensing the results of the observation of the cases the success of e-Learning obviously can be categorized into *organizational success*, *pedagogical success*, *cultural success* and *technological success*. The overall structuring element (top of hierarchy) for the success of e-Learning is from the author's point of view the *effectiveness* and *quality*. The observations were made in both cases within the case study with a almost similar set-up. On this *synchronic reliability* (Järvinen, 2004) the evidence can be considered as general applicable.

- **Successful e-Learning is a management issue (H9)**

With this research also clear evidence for previous formulated hypothesis 14 is given. All success descriptions were observed within the 40 case events can be influenced by singular or permanent treatment over the e-Learning lifecycle. Therefore e-Learning success is not a mere "product" of technical solutions or quality of contents and its production. It is an issue for management and evaluation.

3.2 Existence of eLearning Phases/Processes, Domains, Concernment Levels, eL-CSF and eL-KPI

In the centre of this section stands the description of the results were achieved through investigation of sub-question two (Q2). Investigation of this question addresses beside hypothesis one (H1) also hypothesis two (H2). Following key insights were derived from case study analysis:

- **e-Learning and its typical lifecycle in sense of phases and processes**

Reviewing each case event, comparing both cases results and analyzing the all-over case study results shows clear evidence for H1 (mean of .0974 with “yes, the hypothesis 1 will be fulfilled with case event observation”). Looking at the frequency of the variable *e-Learning phases* this means 65% of the case events were dedicated to the *pre-usage*, 25% to *usage* and 10% to the *post-usage* e-Learning phases. Main processes were observed are in following sequence: (1) *analysis and determination of general framework*; (2) *conducting project management and controlling*; (3) *e-Learning initialization and strategy*; (4) *e-Learning design*; (5) *e-Learning production*; (6) *e-Learning launching*; (7) *e-Learning execution*; and (8) *e-Learning evaluation*. The processes *e-Learning content translation*, *predefine content with subject matter experts* and *conducting project management and controlling* were, especially important for international acting organizations, additionally observed to identified processes in literature.

- **Correlation between eLearning phases and processes**

Considering the relationship between the observed eLearning *phases* and *processes*, a correlation between both variables obviously exists. Analyzing this obvious relationship using the *Pearson-correlation* method results in a significant value of .618. Therefore evidence for hypothesis H8 is given.

- **e-Learning success domains – a multi-facet issue**

Next the existence of the, in the literature review emerged dimension of e-Learning success domains were proofed concerning its existence in the investigated cases. The analysis shows the existence of following domains in the cases:

Table 4. Observed e-Learning success domains

e-Learning success domain
Institutional
Technological
Pedagogical
Socio-Ethical

Not in both cases always all domains are observable. Therefore the variable *domain* shows different parameter values, e.g. *all* when all domains observable in the considered use case event, *institutional (etc)* when exactly the domain *institutional (etc)* is observable or *institutional & socio-ethical (etc)* when exactly the domain-combination of *institutional* and *socio-ethical (etc)* are observable. Considering the frequency of observation the domains are ranked with (1) *institutional*, (2) *technological*, (3) *pedagogical* and (4) *socio-ethical*.

- **Allocation of domains to e-Learning phases**

Next interesting aspect (H8) considering the domain dimension in the investigation is, how are these observed *domains* allocated to previous considered *e-Learning phases*. First there is a relation between the *phase* and *domain* dimension observably; secondly in the phase *pre-usage* the domain *institutional* is mainly observed (followed by *technological*, *pedagogical* and *socio-ethical*). In the phase *usage* the allocation looks like these: (1) *institutional*, (2) *pedagogical*, (3) *technological* and (4) *socio-ethical*. At least in the *post-usage* phase the allocation analysis shows that there are not all domains represented and observed (*institutional* and *technological* were observable). The question, if the main focus of e-Learning lays at the *institutional* issues can also be answered with *yes* when looking at this allocation. This insight is also interesting reply to the often-existing meaning, e-Learning is a pure technological topic with respect to pedagogical issues.

- **Concernment level – success or failure is not always a general issue**

The hypothesis two (H2) includes as another aspect that the success of e-Learning concerns to one of these levels: *individual level*; *collective level* or *instructional level*. The idea behind this was, when e-Learning success/failure occurs it will be on the level of all stakeholders in sum (*collective*, e.g. the whole organization is effected through not having accessing to eLearning module), for one or some stakeholder party (*individual*, e.g. the failure/success causes in individual reasons and regards to a partly of the stakeholders) or in the relationship between instructor and learner (*instructional*, e.g. learner failure is caused in missed communication and scaffolding activities from the instructor) localized. First, the above mentioned *concernment levels* for success or failure were observed in both cases. Secondly some of the case events had shown, that success or failure is on all levels at the same time. This leads to the conclusion that e-Learning is successful or failures not always in a comprehensive way and proves the formulated hypothesis two.

- **Success or failure of e-Learning is influenced by a core set of critical success factors**

With investigation of sub-question one (Q1), also the existence of e-Learning critical success factors was investigated. In general this question can be answered with *yes*. 97.5% of the observed case events do show one or more of the in literature identified influencing factors.

- **Key Performance Indicators for e-Learning**

Analogue to the analysis of the case events concerning the influencing factors, finding an answer to the research hypothesis 1 does also include the investigation after the existence of success indicating factors. In general this question can be answered with *yes*. 97.5% of the observed case events do show one or more of the in literature identified indicator.

3.3 eL-CSF – observed e-Learning Critical Success Factors within Case Study

Having found evidence for the existence of so-called e-Learning Critical Success Factors (also eL-CSF) within the both investigated cases, this sub-chapter does handle the sub-question three (Q3) and its accompanied hypotheses H4 and H5. Therefore the aim of this chapter is the illustration of the observed factors influencing success through the observations in the cases (respecting existing literature material), the consideration of hypothesis that these eL-CSF consists of *hierarchical structures* and therefore different *success influence levels* (H4), the consideration of *adequateness* of the complete set of *eL-CSF* for all kind of case events where investigated (H5) as well as the investigation of the relation between eL-CSF and the above described *e-Learning phases and processes*.

- **Observed eL-CSF**

The cases show the existence of *eL-CSF*; these existing, success influencing factors are “(...) *ex-ante or at runtime manageable for actively influencing the success of eLearning (...)*” (Hilgarth, 2010). With the literature review (Hilgarth, 2009) a set of 309 factors was identified and documented. In total 70 *eL-CSF* were observed in both cases. Table 5 offers the top-ten most observed factors in case study.

Table 5. Most observed eL-CSF

e-Learning Critical Success Factor
Professional (Project) Management
Language differential
Cooperative/Collaborative Learning
Direct communication to and feedback from target group
Audience analysis
Involvement of powerful organizational instances into communication, definition, development and launch process
Availability of high-quality material by using ICT and distribution channels
Continuous management of content up-to-datedness as well as of communication and marketing
Content analysis
Cultural diversity

With using two use cases the question after the *reliability* in the case study structure at this point might be considered as important for the *generalizability* of the results were analyzed here. Using *reliability analysis* after Cronbach (Cronbach, 1980), a resulting $\alpha = .468$. Because of the restriction of investigated two cases, from the author’s point of view further, long-termed investigation for stabilization of reliability of results is necessary.

- **Hierarchical eL-CSF structure - on the observed power and influence of factors**

Another related question is; does a hierarchical structure in the observed eL-CSF exist (H4)? During gathering of the data in case events with the above mentioned data collection database sheet, the author gave each observed *eL-CSF* item a hierarchical level and mapped it to the *e-Learning processes* for later analysis of observable structures. Avoiding high complexity, a maximum of two levels were defined for this mapping during the observation. For the mapping multiple allocations to each process were allowed. Respecting this *two-dimensional-structure-observation* helps first to identify the importance (in sense of influence and power) of each item as well as to answer the question about the existence of *granularity level*. Bringing it to the point, *management of e-Learning, definition of e-Learning strategy, treating of organizational politics*

concerning e-Learning, the availability of necessary e-Learning competencies and resources, making marketing and communication for e-Learning in organizations, respecting administrative affairs, respecting cultural aspects, having an adequate and excellent instructional strategy, reaching a high level of qualitative standards as well as using adequate and efficient technology are the top-level success factors. All other observed factors might play a subordinate role. Evidence for H4 is proven.

3.4 eL-KPI – observed eLearning Key Performance Indicators within case study

The purpose of this sub-chapter is, based on the general observation of eLearning Key Performance Indicators (eL-KPI) the test of hypothesis H4, H7 and H12.

- **Observed eL-KPI**

The cases show the existence of eL-KPI; these existing indicators “(...) inherent ex-post indication of the success or failure of e-Learning (...)” (Hilgarth, 2010). In sum 142 success indicators have been gathered, 133 of which from the literature and further 9 indicators were observed within this research and added to the catalogue of eL-KPIs for further data analysis.

Table 6. Most observed eL-KPI

e-Learning Critical Success Factor
Effectiveness; the contribution of eLearning (object/program) to the degree of goal reaching
Costs (incl. project costs)
Satisfaction (incl. e-Learning satisfaction ELS, reaction and satisfaction)
Effects on business processes
Cost-Benefit-Ratio
Efficiency; tracking economical effort regarding the e-Learning program
Material stimulate lively and interactive learning processes
Project progress
Learning outcome

Similar to *eL-CSF* the question after the reliability of the case study setup regarding the *generalizability* of the analysis results might be asked here. Applying the *reliability analysis* after Cronbach (Cronbach, 1980) the $\alpha = .742$ indicates reliability for the research construct. Therefore from the author’s point of view with this case study setup up are the results of analysis of *eL-KPI* in general valid. Also here further long-termed investigation (also in different contextual setting) might be conducted for manifestation of these results.

- **Intangible eL-KPI – not all success indicators are of quantitative nature**

Often the requirements in today business world are after the quantification of success in best case expressed through monetary measures. With hypothesis twelve (H12) it is assumed that not all indicators are measurable because of its nature. Looking first at the observation of *measurability* in the 40 case events 40,3% was ranked as “*non-measurable*” (or *intangible*) and 59,7% as “*measurable*” indicators. Considering the measurability at the level of the indicators, and therefore at the 47 distinct observed *eL-KPI*s, 15 (31,9%) indicators are as “*non-measurable*”, 32 (68,1%) indicators are as “*measurable*” identified. The shifting of the ratio comes from the fact, that some of the *eL-KPI* were partly identified as non-measurable at the level of use case events but do not show this attribute by consolidating observations on the level of each indicator. Typical intangible indicators are the *effects on business processes* or *material stimulate lively and interactive learning processes*. This observation provides evidence for H12.

- **Usefulness of eL-KPI**

Considering the list of 142 *eL-KPI* and reviewing it after the question of usefulness for possible empirical e-Learning cases, the two cases support fully the hypothesis that not all *eL-KPI* are useful. However, this hypothesis cannot be validated based on only two cases in this underlying case study. Under the line no general evidence for H7 is shown by the case study setup.

3.5 Correlation of eL-CSF and eL-KPI

Not only from the point of view of the argumentation in the last sub-chapter, the question regarding the dependency of the elements eL-CSF and eL-KPI through the analysis of the case events has to be seen as interesting. This chapter aims at hypothesis H8 and will test in two different ways: (1) the analysis of the general degree of correlation between the two elements as well as (2) the consideration of the *pair wise* correlation of the observed *eL-CSF* with the observed *eL-KPI*.

- **General correlation**

This trivial correlation calculation shows significant general evidence for the existence of correlation between observed eL-CSF and eL-KPI (H8) over all case events with Pearson Correlation value of .746.

- **Pairwise correlation**

Out of the 3.290 total pairs a set of 186 (5,65%) show correlation (*Pearson* > .410) with high significance (significant at the <0.01 level – 2-tailed) and 101 (3,00%) show correlation between .320 and .409 *Pearson correlation* factor (*Pearson*; significant at the 0.05 level - 2-tailed). This calculation shows a more focused correlation of eL-CSF and eL-KPI. A set of 20 pairs shows full correlation (*Pearson* = 1) *selection of adequate didactic combinations and documents* (eL-CSF #248) with *course satisfaction* (eL-KPI #127)). Also with this investigation the hypothesis H8 is proven and the basis for further interpretation is given.

3.6 Conclusions for a Holistic Elearning Maturity and Success Management Framework

Within this last sub-chapter the all-over question after the need for a holistic, all above considered elements including e-Learning management and evaluation framework (H11) will be discussed based on the observation and experience of the embedded observer through uses cases are in the centre of interest. In 97,5% of case events the need for creating and validating a framework or theory that concerns on the success of eLearning was observed.

4. CONCLUSION

The mid-termed case study research which insights and results are expressed through this document might be seen as a good progress for the overall research goal of investigating the success of e-Learning and derived methods and instruments for science and practice. Further research in this field might create the above-mentioned holistic *eLearning Success Management and Evaluation Framework* as a consequent step and has to test it in a further case study. Limitations for the results because of the restrictions in possible cases should be addressed in further research in this direction.

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ORIGINAL PAPERS

III

**CYBERNETIC E-LEARNING MANAGEMENT MODEL -
MANAGING E-LEARNING IN INTERNATIONAL ACTING
ORGANIZATIONS**

by

Bernd Hilgarth 11.03.2011

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CYBERNETIC E-LEARNING MANAGEMENT MODEL – MANAGING E-LEARNING IN INTERNATIONAL ACTING ORGANIZATIONS

Bernd Hilgarth

*Department of Computer Science and Information Systems
Agora, 40014 University of Jyväskylä*

ABSTRACT

The success of e-Learning in international acting organizations is a multi-facet topic. It is observable that the decision, introduction and long-termed use of e-Learning brings often not the expected effects especially in complex organizational situations like multi-cultural target groups. An often and entitled question of the business management as well as the human resource management in this organizations is how to address the issues of e-Learning in multi-national and socio-ethical (cultural) diverse organizational context. This paper offers the description of a theoretical framework, which was created within an *Action Design Research* stack respecting the output of case study research was previously done with BMW Group in its international sales organization from 2003 till 2009 (see Hilgarth, 2010). The *Cybernetic e-Learning Management Model* offers a holistic theory concerns on the different complexes with the target providing the roles are responsible and involved into the decision, design, production, launch, usage as well as evaluation of e-Learning programs with the focus of international focusing. Main structuring element of the model, and therefore mainly framing one, shows a process model for e-Learning covering from the decision to the evaluation phase. Success domains and concernment levels represent subsequent structure of the model. The empirical investigation underlies the model does also show, that each of the eight main process steps do offer the opportunity for influencing the success of e-Learning by treatment of specific issues in each phase. Anchoring this, in previous case study research *e-Learning Success Paths* were identified and analyzed by statistical correlation calculations. As result this paper gives an overview for the whole model and its basic logic using it in different situations when e-Learning programs will be intended for international use. A consequent step to the description of the model in this paper is the test of its applicability in a similar organizational setup and the illustration of the results in a future scientific publication.

KEYWORDS

Cybernetic e-Learning Management Model, e-Learning Success Path; e-Learning Critical Success Factors; e-Learning Key Performance Indicators

1. INTRODUCTION

Within a globalized and fast moving business world international acting organizations do search after effective and efficient strategies, processes and tools for transferring knowledge from different sources with different contexts. e-Learning is handled in scientific community as well as in the world of business organizations as a concept offers the opportunity for handling this situation. International acting organizations are characterized by distributed working organization where the bulk of employees belong to their individual countries, societies and cultures. Investigations on two e-Learning programs within a case study at BMW Group and its international acting sales organization has shown, that the success of e-Learning will be expressed by different facets in different subject matter and scientific domains. This previous research led to following hypothesis concerning (Hilgarth, 2010) the need for the design of the model like described in this document.

- The management and evaluation of e-Learning presumes a holistic/systemic model comprising different success domains, actors, factors and indicators.
- The holistic model might show applicability in average situations.

Bundling the experience and insights from the case study research, within this research paper the *Cybernetic e-Learning Management Model* will be presented as an overall framework may serve for later practical use. The next chapter briefly describes the research method underlies the creation of the model. Chapter 3 gives an overview over the model as well as a detailed description on its elements. At least a brief discussion on the implications, opportunities and limitations will find space within this paper. Issues for further research will close down this last chapter.

2. RESEARCH METHOD

Basically this scientific document includes the theory is part of an overall *Action Design Research – ADR* (Rossi *et al*, 2010) path. This approach offers the opportunity for the investigation of real existing situation, the creation of a theory addressing a general class of problem identified as well it offers space for the test of the theory in similar problem context. e-Learning is a subject which shows an embedded concept of social life due to its application in international acting organizations. *ADR* does meet the main criteria of researching social life context (Gilbert, 2002) and therefore it matches perfect for reaching overall research goals. *Theory-creation* is the specific methodological instrument used especially in this phase of the research. Following Gilberts philosophy for explanation here, theory was created in an *induction* kind. This means that the insights coming from the long-termed *embedded observation* within the case study at BMW Group serves as basis for the creation of the general theory *Cybernetic e-Learning Management Model*. The creation of the theory in the, by Rossi described *Action Design Research* overall approach serves also the evaluation and identification of the general class of the issue was observed for e-Learning by using it in the international acting organization. The theory of the *Cybernetic e-Learning Management Model* will be tested in future step by further case study research at a similar organizational situation.

3. CYBERNETIC E-LEARNING MANAGEMENT MODEL

The *Cybernetic e-Learning Management Model* does provide a theoretical framework which aims on transparency of typically *e-Learning phases & processes, domains, success paths* as well as the needed management *methods* and *instruments* for e-Learning in international acting organizations. In the following all these mentioned *elements* of the theory are described.

3.1 General Characteristic, Terms & Overview

The *Cybernetic e-Learning Management Model* shows the general characteristic of a management approach which follows the basic understanding of *systemic-evolutionary* management of complex situations for e-Learning in international acting organizations (Malik, 2006). e-Learning in international acting organizations shows complexity and needs the management amongst the lack of all information are needed for management without uncertainty. The philosophical goal of e-Learning as part of an organizational system is to support the *economic viability* of the organization. Therefore e-Learning is part of the viable system which follows *rules*. The *Cybernetic e-Learning Management Model* described in this document shows these rules. The model consists of different elements will be described in the following sections of this chapter. With the pre-positated literature review and case study research a comprehensive view on existing theories as well as on the need for such a model were analyzed, identified and committed by different subject matter experts as well as in the scientific community by accepting submitted papers on this research and its outcome. The model is directed by the typical steps, phases and activities (processes) were found in literature (see DIN Organization, Public Available Specification #1032-1, 2004) as well as were observed in case study research at international acting organization BMW Group (Hilgarth, 2010). An impressive theoretical work in that context is provided by Khan (2005) with the *e-Learning framework*. A first main difference of the model described within this paper compared to Khan's model is, that he sees the management of e-Learning focused on the "*maintenance of learning environment and distribution of information*" (Khan, 2005). With the here described model the *management* activities will be handled as the central concept for a multi-facet and

continuously treatment e-Learning in international acting organizations in sense of *sine qua non*. The dimensions are illustrated by Khan's work will be fully respected within the model is described here. The *Cybernetic e-Learning Management Model* might be understood as an extension and evolution of this previous work and not as a substitution of it. e-Learning in international acting organizations is a multi-facet topic which has to be handled in times of first implementation but also in sense of life-cycle in a continuously manner. e-Learning (and its substituting terms) in the context of the here described model subsumes it as a *technological software solution*, a *pedagogical-didactical concept*, an *instrument for knowledge management*, a specific *e-Learning program* and/or as an *Information System solution* like a *Learning Management System*.

Figure 1 gives an overview for the elements of the *Cybernetic e-Learning Management Model* on a high level.

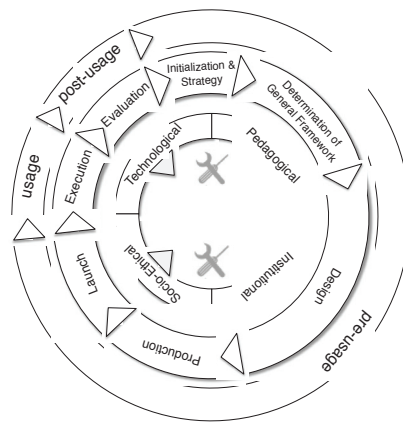


Figure 1. Elements of the Cybernetic e-Learning Management Model

3.2 e-Learning Phases, Process Model, Roles & Responsibilities

As mentioned the model is guided in a chronological order by the use of typically *phases* and *processes* for e-Learning in organizations do act in international scope. In general the activities concerning it can be divided into three major phases; *pre-usage*, *usage* and *post-usage*. Activities within the *pre-usage* phase are the *initialization and strategy finding* processes; the *determination of the general framework*; the *design* of the e-Learning solution (platform, program or module); the *production* of the e-Learning content (program or module) as well as the *launch* of it within the user context (teacher and learner target group).

Next phase is the *usage* phase of the launched e-Learning program that includes the timely independent process of the e-Learning *execution*. It does concentrate nothing less than on the complex issues of teaching and learning by using the new media-driven solutions and concepts e-Learning provide. In advance it has to be said, that it is difficult to determine exact activities and order of it in highly individual teaching and learning processes. In fact it is interesting to address activities like *administration*, *conducting training sessions* and *assessment of learning transfer* by these sessions. All these activities seem equal and necessary for the execution of professional training session. The end of an e-Learning life cycle show the post-usage phase which mainly concentrates on the evaluation activities for e-Learning.

provides the process model in an addition detail level and shows the hierarchical relation of it to the described main process steps.



Figure 2. E-Learning Process Model on Detail Level 1 and 2

Combined are *roles* and *responsibilities* do come along with the *phases & processes*. The case study research as well as the previous literature review shows the following roles are accomplished with the above-shown processes:

- **Owner**; business owner who is interest in solving operational problems by using e-Learning in the organization.
- **Sponsor**; business management which supports the project in the management of the organization.
- **Analyst**; methodologist and business context specialist who analyzes the existing situation and maps it to exact e-Learning scenarios.
- **Subject Matter Expert**; knows the context and content which is object for the e-Learning problem.
- **Designer**; translate the e-Learning scenarios and subject matter to a technical, media-driven and learn-pedagogical solution. Is responsible for the functional specifications for the later e-Learning program.
- **Author**; translates and describes the context and content in learning modules and chapters. The result of his work is the storyboard.
- **Implementer**; programs the pedagogical-technical as well content specifications into the e-Learning solution.
- **Instructor**; administrates and teaches with e-Learning program in different pedagogical settings (e.g. scaffolding; collaborative learning, blended learning etc.)
- **Learner**; learns with e-Learning program in different pedagogical settings (e.g. collaborative learning, blended learning etc.)
- **Evaluator**; evaluates the overall correctness and effectiveness of e-Learning processes and its outcome.

These roles take different responsibilities for the processes. These responsibilities are:

1. **in authority for activity and its outcome** (a)
2. **conducting activity** (c)

3. *supporting activity* (s)

4. *being informed about progress and result* (i)

Table 1 provides a mapping of the processes (detail level 1 shown in) to the above-described roles.

Table 1. e-Learning Process-Role-Responsibility matrix

Process	Roles									
	Owner	Sponsor	Analyst	Subject Matter Expert	Designer	Author	Implementer	Instructor	Learner	Evaluator
eLearning Initialization and Strategy	a	s	c	s	s	s	s	s	s	s
Analysis and determination of general framework	a	i	c	s	c	c	c	s	s	s
eLearning Design	a	i	i	s	c	c	s	s	s	s
eLearning Production	a	i	s	s	s	s	c	-	-	s
eLearning Launching	a/c	s	-	i	-	-	s	i	i	s
eLearning Execution	i	i	-	-	-	-	a	c	-	-
eLearning Evaluation	a	i	i	i	i	i	i	i	i	c

3.3 Success Domains

Beside the typically occurring processes, which might be seen in a life-cycle manner, a main element for managing e-Learning in international acting organization is the construct of *e-Learning Success Domains*. A success domain shows a *specific sphere of knowledge* which is needed to respect for implementing and operating e-Learning in a successful manner. From the previous research activities following *domains* were identified as relevant for the management of e-Learning in the described specific situation. (Hilgarth, 2010)

Table 2. Observed e-Learning success domains

e-Learning success domain
Institutional
Technological
Pedagogical
Socio-Ethical

The *institutional* domain does consist the issues and knowledge is relevant concerning the target institution e-Learning is intended to introduce, is introduced, is in use or has to be evaluated within. Orienting on Khan, this domain does consist of the categories *administrative affairs* (e.g. *financials, budgets, marketing and communication*), *academic affairs* (e.g. *development & training framework*), *student services* (Khan, 2005) as well as *management-political affairs* (e.g. *stakeholder & management attention and its involvement, management team, management tools, quality management*). From the authors point of view also, the by Khan separate handled context of the *resource support issues* (e.g. *availability of resources*) and *evaluation* should be part of this domain because of both issues will be in the decision of the organization which uses e-Learning.

The *technological* domain subsumes the activities and knowledge regards to the *technology-infrastructure* as well as *Information System-oriented* facets of e-Learning in international distributed organizations. Following Khan within this area the focus is on *infrastructure* (e.g. *technological and technical capabilities, standardized interface descriptions*), *hardware* (e.g. *computers, servers, wireless devices*), *software* (e.g. *learning management system software, authoring tools*) as well as *Information System design* (e.g. *usability issues, information support design, interface design*) topics. The analysis of the case study shows especially the need for dealing with *collaborative usability* of e-Learning in design and production as well as learning and teaching situation.

The *pedagogical* domain directs the issues are driven by *psychology in education* (e.g. *basic concepts on learning, instructional strategies*), *adult education* (e.g. *curriculum*) as well as by *pedagogical concepts in context of teaching and learning with new media* (e.g. *Blended Learning*). It fully respects Khan's topics like

content and audience analysis, media analysis as well as the design approach. From the author's point of view

At least the *socio-ethical* deals with socio-, individual- and culture-driven issues do influence the usage and the effectiveness of e-Learning programs in international acting organizations. It is logical to imagine that this domain does have enormous influence especially by using e-Learning programs for international trainings as done in the analyzed cases within the BMW Group. Topics are seen within this area follows the basic investigations of Hofstede (2001) and his understanding of *cultural consequences* do exist by differences in values, behaviors, institutions for organizations across nations. In time of *globalization* and the progress of using collaborative media like Internet or Twitter issues like the *digital literacy* should be minimized but still are existent for respecting it in deciding and designing of e-Learning programs. The case study underlies the research here has shown that socio-ethical differences like *language-differential, learner diversity, educational culture differential, learning style differential, reasoning pattern differential, high-and low-context differential* or *social context differential* influences the effectiveness for e-Learning (Edmundson *et al*, 2007). Also in this domain Khan's findings and topics (*social and political influence, cultural diversity, bias, geographical diversity, learner diversity, digital divide, etiquette, legal issues*) show fully adequateness. It might be stated that the socio-ethical diversities may occur on different levels.

3.4 e-Learning Success Paths

One of the core insights the conducted case study research brings is the existence of *e-Learning Success Paths*. These success paths do show the heart of the maturity and management framework. An *e-Learning Success Path* is a typical *cause-effect-chain* for successful design, production, launch, execution and evaluation of e-Learning in international acting organizations. Knowing the success paths existing in general and individually for *effective and efficient* use of e-Learning in such organizations will offer a *crank* to manage and control it over its different life cycle stages and processes. The concept of a success path respects the elements *critical success factor, key performance indicators, concernment levels* as well as *methods and instruments* for the operative management of it. A number of 71 different success paths were observed within a previous case study research. The observation and mapping of real life situations happened on reviewed and mentioned catalogue of factors and indicators (Hilgarth, 2010) exist in multi-discipline literature about e-Learning. Figure 3 provides an overview for the basic theory of *e-Learning Success Paths*.

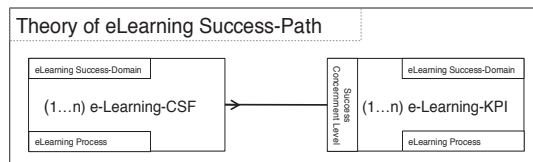


Figure 3. Basic theory of e-Learning Success Paths

In general this theory bases on the principles of *cause-effect-chains*. The causes are expressed by so called *e-Learning Critical Success Factors* which regards to one or more processes (see Ch. 3.2) and domains (see Ch. 3.3) and influence directly or indirectly one or more *e-Learning Key Performance Indicators*. Each of these indicators does also regard to one (or more) processes (see Ch. 3.2) and domains (see Ch. 3.3). Additionally the effect of treating an influencing factor (is shown in the indicators status) might be differentiated after different *Success Concernment Levels*. A concernment level offers the classification after *individual, institutional or instructional* success or failure. Concept behind this is to make a difference of the impact of managing a success path has to be made (also in political sense). For example neglecting the concept of *collaborative learning* had shown negative effects on the *individual satisfaction* of the learners but also shows effects on the *institutional business process performance*. Within the case study a set of 71 (out of 3.290) cause-effect-correlation pairs were observed which can be clustered after the four domains; *institutional* (29), *pedagogical* (13), *technological* (14), *socio-ethical* (12) and *general* (not directly to one of the domains concerning cause-effect-chain, 3). The previous research (Hilgarth, 2010) provides following summarizing statements on the domain-specific success paths.

General Success Path

1. It can be argued that a general *goal-setting* for the intended e-Learning program *from all stakeholders and customers* (learners and instructors) point of views does have *influence* on the immediate transparency of the e-Learning project as well it guides the whole project and usage processes and brings therefore benefits for.

2. The observations show, so clear the intentions, goals and planning so higher is the degree of general customer *satisfaction* concerning the effectiveness the e-Learning program.

Institutional Success Path

1. e-Learning as an educational method and solution is an issue which success depends on the organization *management attention*.

2. e-Learning management might consider the a general institutional treatment in sense of *macro management* of it as a concept for general training and knowledge management.

3. e-Learning management does have a *micro management* component which occurs on each individual e-Learning program.

4. The availability of e-Learning programs is not a pure technological issue; within the *organizational structures and communication* channels e-Learning has to find its permanent standing.

5. Respecting the *influence of the institutional* issues offers the opportunity for increased efficiency in time, quality and cost in the business processes.

6. Respecting the *institutional aspects* does show effects in *pedagogical, institutional* and/or *technological domain*.

Pedagogical Success Path

1. *Collaboration, communication* and *interaction* as well as the *in-depth analysis of the audience* in the investigated organisational learning processes leads to positive effects like course *satisfaction* and *improvement of business processes*.

2. The *selection of the content* as well as the *professionalism of the content development process* is shown by the existence of excellent concept (storybook) documents and results in *high information quality*.

3. The choice of *adequate instructional design* (esp. in intercultural context) and *high instructional quality* leads to *improvement of daily activities* by *reduction of failures* and *positive reaction of international audience*.

4. At least the *reduction of complexity in e-Learning concepts* and solutions in direction of pedagogical issues leads a *better transfer of information* to the audience.

Technological Success Path

1. *Information Technology* is an *enabler for pedagogical concepts*.

2. It enables *flexible learning organizations* and does have *influence on existing spendings for travelling* by access to learning material.

3. It *influences the learning score*.

4. *Infrastructural differential*

5. *Authoring Tools* enables an *efficient content development process*.

6. *Technological issues* are part of and *influence the quality of e-Learning concept papers*.

7. The basic attitude of learners concerning Information Technology (*digital literacy*) use in learning and teaching processes influences the reaction and acceptance of learning materials created this way.

Socio-Ethical Success Path

1. Especially in international acting organizations the *concept and content of e-Learning programs* might respect *cultural and individual learner differences*.

2. Modern Information & Communication Technology might be used to enable *adapation activities* (minimum for contents, maximum for teaching and learning styles) covering these diversities.

3. The effects of *respecting content and cultural differences* are the *availability of adequate content and training material* which leads to *training effectiveness* for the whole organization.

3.5 Methods & Instruments

Beside the previous description of the basic elements this document also offers a description of the management *methods* are from the authors point of view adequate in the complexity of international acting organizations. *Methods* (e.g. capability maturity management, performance measurement, balanced scorecard, process management, project management) means the general logical concept for the management of the complex of e-Learning processes domains and success paths whereas *instruments* actually describes tools (e.g. guidelines, how-tos, FAQ, checklists, reports, software) for the actual and operative realization. The model concentrates on the *management* of e-Learning as a comprehensive concept for international acting profit organizations. General and basic question for the *methods* and *instruments* in that complex is; which kind is compatible to the practical management behavior in today's professional profit-organization and which fits into specific process and time sequence of e-Learning. Bringing transparency into this question first it is necessary to differ with e-Learning between three different use cases (stadia):

- **First Decision & Set-up stadium:** Within this stadium the organization has not implemented and used e-Learning to the point of time evaluating it as solution for future knowledge management, development and training within the international acting organization. In that entity the management of e-Learning in *macro* (e.g. setup of whole infrastructure, decision for basic curricula as well as institutional, technological, pedagogical and socio-ethical basic assumptions) as well as the *micro* management (e.g. selection of specific contents and context, design of e-Learning programs till usage and assessment of it) is necessary.
- **Incremental stadium:** Within this stadium the organization still has implemented the basic infrastructure for e-Learning and adds new e-Learning programs or adapts existing one. The characteristic in that stadium is, that the system still runs and the management is mainly needed in the *micro*-sense, e.g. for re-implementing parts of the existing e-Learning programs or producing new e-Learning programs.
- **Re-design stadium:** Also in this stadium the organization still has implemented e-Learning and operates it over a critical sequence of time. Similar to the *first move stadium* the management concentrates on the *macro* as well as *micro* management issues entirely. In sense of the *macro* management all e-Learning assumptions within the specific organization finds an comprehensive assessment and re-design not at least because of general re-orientation and business re-design in the target organization. This may also lead to the re-design of specific e-Learning programs as well as *micro* management approaches and assumptions.

Considering these stadia, it is obvious that the need for a *mixture of methods* and therefore for the *instruments* exists. Abstract management *methods* and their relating *instruments* are in focus of the *Cybernetic e-Learning Management Model* are *Strategy Management, Process Management, Project Management, Maturity Management, Controlling* and *Quality Management*.

Table 3 gives an overview over the mapping of these methods, the relating instruments with the use cases e-Learning management is typically applied in.

Table 3. Mapping of management methods to use cases, goals and instruments

Management Method	First Move & Set-up stadium			Goals	Instruments
	First Move	Set-up	Re-design		
Strategy Management	y	n	y	Definition of the e-Learning Strategy for reaching the overall organizational goals.	- D&T Strategy & Curriculum - Instructional Strategy - Technology Roadmap - Service Sourcing Strategy
Business Process Management	y	y	y	Definition of activities, responsibilities and interfaces (organizational & activity-driven) for the, for e-Learning necessary activities.	- Individual e-Learning Process Model - e-Learning Organization - Analysis - Optimisation - Performance Measurement
Project Management	y	y	y	Management of e-Learning activities under consideration of time and budget goals.	- Activity Planning and Time Scheduling - Resource Management - Project Review - Budget and Result Tracking - Project Meetings and Gate Way Management - Change Control Board
e-Learning Maturity Model	y	y	y	Measurement of capabilities and maturity of e-Learning in the specific organizational setting.	- ex-post measurement of e-Learning situation - Benchmark of maturity - Deduction of optimisation activities
Balanced Scorecard	y	y	y	Reporting of performance of e-Learning and simulation of e-Learning performance by changing assumptions and planning parameters.	- ROI calculation - Reporting - Simulation
Quality Management	n	y	y	Management of the e-Learning content as well as system quality.	- Quality Gate Ways - Quality Measurement - Quality Reporting

4. FURTHER RESEARCH & CONCLUSION

The *Cybernetic e-Learning Management Model* covers a framework for the straight handling of e-Learning as a complex issue in a complex world of international acting organizations. It respects the fundamental elements, addresses the complexity of reality and directs this to *manageable* success paths. This document shows the creation of the model. In further research

- the model might be tested for applicability and further detailing in its elements (especially on the instruments and tools level) as well as proving the general approach,
- the constructs of the mentioned success paths has to be investigated in further detail which will be respected in future releases of the *Cybernetic e-Learning Management Model*.

With the created model for organizations do show the character of international acting and complex facets in socio-ethical, technical, institutional as well as pedagogical field can use this model for improving there e-Learning in different stadia by using the structure and insights comes from this research.

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ORIGINAL PAPERS

IV

**CYBERNETIC E-LEARNING MANAGEMENT MODEL ON THEO-
RY-TESTING BY CASE RESEARCH
AT ADIDAS GROUP**

by

Bernd Hilgarth 12.03.2011

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CYBERNETIC E-LEARNING MANAGEMENT MODEL ON THEORY-TESTING BY CASE RESEARCH AT ADIDAS GROUP

Bernd Hilgarth

Department of Computer Science and Information Systems - Agora, 40014 University of Jyväskylä

ABSTRACT

With this paper the application of the *Cybernetic e-Learning Management Model* will be described by the theory-testing case research (Järvinen, 2004) that was done in the real-life context of adidas Group. The *Cybernetic e-Learning Management Model* (Hilgarth, 2011) claims a holistic management approach for e-Learning in internationally operating organizations. Respecting the basic principles of *systemic-evolutionary* management of complex organizational situations, the model provides an e-Learning framework for structuring and preparing decisions in an early stage situation (*first move & setup stages*). It might help to manage the effectiveness and efficiency in the case of e-Learning operations (*incremental stage*) and it is designed to support the activities in the *re-design stage* for e-Learning in internationally operating organizations. With its elements and basic philosophical logic it might cover the demand for a comprehensive instrument in the management of e-Learning in the complex situation of internationally focused and operating institutions. adidas Group and its internationally distributed retail shop network cover this situation.

The project, including a readiness check with 26 interviews with internationally distributed subject matter experts on HR, IT and Organization in the adidas Group, confirms the need of the method the *Cybernetic e-Learning Management Model* offers in the *firstmove & setup stages* to identify the maturity of the organization with respect to the introduction of e-Learning. Secondly, the investigation shows the applicability of the model.

KEYWORDS

Cybernetic e-Learning Management Model, adidas Group; Action Design Research; Theory-Testing Case Research

1. INTRODUCTION

e-Learning (with respect to alternative terms like online learning, distributed learning etc.) does offer far-reaching opportunities for organizations to act in an international context. Within the globalized and fast-moving business world, internationally operating organizations do search for effective and efficient strategies, processes and tools for transferring knowledge from different sources with different contexts. e-Learning is handled in the scientific community as well as in the world of business organizations as a concept that offers the opportunity for handling this situation.

Previous research on the context of e-Learning success management leads to the formulation of the *Cybernetic e-Learning Management Model*, which covers an overall theoretical framework supporting later practical situations. This scientific paper is on the testing of this theory (Hilgarth, 2011) at the internationally operating retail organization of adidas Group with the goal of investigating its general applicability as well as gaining other details on its elements.

Based on the underlying research goals (Hilgarth, 2010) this research focuses on proving the following two hypotheses:

- Management and evaluation presumes a holistic model comprising the described success dimensions, actors, factors, and indicators for e-Learning (hypothesis #10).
- The holistic model might show applicability (*empirical validity*) in average situations (hypothesis #11).

This work aims at presenting the results of testing the *Cybernetic e-Learning Management Model* in the context of the adidas Group case study. It contains (Ch. 2) the description of the underlying research method *Action Design Research* with the applied research process and the case design and field for the case study;

(Ch. 3) the description of the case study process and results; as well as the (Ch. 4) reflection and summary for the test of the *Cybernetic e-Learning Management Model* theory.

2. RESEARCH METHOD

2.1 General Approach “Action Design Research”

Basically, this scientific document includes a created theory as part of an overall *Action Design Research* (Rossi *et al.*, 2005) process. This approach offers the opportunity for the investigation of an actual existing situation, the creation of a theory addressing a general class of problem identified and it offers space for the test of the theory in a similar problem context. E-Learning is a subject which in fact has to be seen as an embedded concept of social life due to its application in international organizations. *ADR* does meet the main criteria of researching social life context (Gilbert *et al.*, 2002) and therefore it is a perfect match for reaching the overall research goals. *Theory-testing* is the specific methodological instrument which is combined with the principles and methods of doing case study research.

Following this *Action Design Research* approach (see Rossi *et al.*, 2005), this research examines the *evaluation, reflection & learning* step. It meets the principles of *authentic & concurrent evaluation* (principle 5 – *research is not a separate step of the research process*, rather than evaluation as a continuous and collateral activity in the theory-creating process) as well as the *guided emergency* (principle 6 – *combining the perspectives of design and application/emergency to learn essentials from both*).

This research step does therefore reflect both, the insights from the theory-creating process as well as the *theory-testing* of the *Cybernetic e-Learning Management Model*.

2.2 Research Process

Figure 1 shows the applied research process structured by steps, the specific goal for each step, the activities performed as well as the results for each step.

Step	Design Case Study	Setup of Case Study with adidas Group	Data Gathering	Data Consolidation	Data Analysis	Interpretation & summarizing implications for theory-test
Goal	Design of valid and reliable case study research	Safe and feasible field of investigation in empirical, organizational setup at adidas Group is defined.	All possible data can be achieved within the cases are gathered and centrally stored in database.	Gathered data are consolidated in a way they can be analyzed and interpreted under the aspects of reliability and validity.	Consolidated data are analyzed in direction of research hypotheses by using central research questions.	Documented insights and research hypotheses for future research.
Activities	-Definition of research hypothesis. - Check of different research strategies and techniques. - Decision of case study and instruments.	- Definition of cases with partners in organization. - Clarification of feasibility of case study research with management.	- Observation/field notes - Conducting interviews - Acquiring documents - Recording own actions	- Development of database - Structuring of raw data - Reading and commenting data - Verification with experts	- Qualitative interpretation	- Interpretation of results - Alignment with hypotheses - Research implications
Results/ Outcome	Decision for case study design using the instruments <i>interviews, observations and field notes</i> .	Case Study was approved by adidas Retail HR management. Case "eLearning@adidas Retail: Readiness Check & Business Case" defined and scheduled	- Questionnaire with 54 questions - 26 interviewees - 6 workshops - 1.334 answered questions	Data Base including answered questionnaires and data coding	Project Summary Report Value Case Calculation	Scientific paper including description of case study research and results on checking underlying hypotheses.
Time	08/2009	08/2009	09/2009	10-11/2009	12/2009	01/2010

Figure 1. Research process, goals & activities for theory-testing case-research at adidas group

2.3 Theory-testing Case-Research Design and Instruments

The case research started in the summer of 2009 at the request of adidas management after the investigation of e-Learning as a concept for training in the context of the existing *global retail development & training framework*. It lasted six month. The field for investigation was the internationally distributed network of retail shops as well as the management organization for retail development and business derived from the organizational disciplines *Information Technology (IT)*, *Human Resources (HR)* as well as *Business*

Operations (Ops). The investigated and involved target group represents the development of the retail shop business in five world regions (EMEA, CIS, ASPA, LAM and NAM), 56 subsidiaries as well as the development of around 16,500 employees. 29 experts and managers were involved in the case study by interviews. It was designed as a project with the goal to analyze and report the *maturity* of the above-mentioned field for the use of e-Learning. With the gained insights the possible implementation scenarios might be developed and evaluated according to feasibility, requirements & activities as well as cost-benefit ratio.

The design shows the fulfillment of the *Four-Design-Test* (Yin, 2003) combined with the additional criterion as mentioned by Järvinen (2004) for *system-determined Theory-Testing Case Research*:

Table 1. Case study tactics and four-design test combined with criteria for theory-testing case research

Criteria	Case Study Tactic	Status	Remarks
Construct Validity (Yin)	<ul style="list-style-type: none"> - Use of multiple sources - Establish chain of evidence - Review by key informants 	✓	This case study is part of the overall approach of Action Design Research (ADR) which subsumes multiple sources; it establish a chain of evidence for the theory. All reports are reviewed with key informants.
Internal Validity (Yin & Järvinen)	<ul style="list-style-type: none"> - Do explanation-building - Address rival explanations - Use logic model 	✓	Within this case study (as part of the chain of research) explanations for the in previous research created <i>Cybernetic e-Learning Management Model</i> were investigated. Rival explanations for effects were observed within the case study were discussed with the subject matter experts.
External Validity (Yin)	<ul style="list-style-type: none"> - Use replication logic in multiple-case studies 	✓	As mentioned, this single-case study is part of the Action Design Research includes another multiple-case study. The way of replication logic is, that in this case study the model will be tested in similar setup.
Reliability (Yin)	<ul style="list-style-type: none"> - Use case study protocol - Develop case-study database 	✓	Case study activities are protocolled and gathered data are stored within the database.
Empirical Validity (Järvinen)	<ul style="list-style-type: none"> - Test of created theory in empirical context 	✓	Use of previously created <i>Cybernetic e-Learning Management Model</i> at adidas Group context.

The chosen sampling method is *small-scale sampling* (Gilbert *et al.*, 2002). The following instruments were used for *data gathering*: *document analysis* (*budget planning, D&T concepts etc.*); *interviews* (*29 interviews, 54 questions, 1,334 answers*); and *observations* (*field notes on six project meetings and twelve project meetings & workshops*). All data are consolidated and stored in a central database for the analysis step. Data were *analyzed* in a *qualitative-interpretative* way. The subject matter expert and key informants reviewed and verified conclusions derived from the analysis.

3. CASE STUDY PROCESS & RESULTS

The *Cybernetic e-Learning Management Model* as described by Hilgarth (Hilgarth, 2011) covers a framework for the management of e-Learning in the complex of internationally operating organizations. It aims for transparency of typical *e-Learning phases & processes, domains, success paths* as well as the needed management *methods and instruments* for e-Learning. Addressing this complex, the basic philosophical understanding of the management model is a *systemic-evolutionary* (Malik, 2006) one. Therefore, e-Learning is seen as part of the organizational system with the task to support and enable the *economic viability* of the organization.

3.1 Setup - Checklist, Initial Situation and Determination of Model Entry

Testing the model within a real existing situation, it was applied by respecting the specific organizational goals of adidas Group. The goals at the time the case study (for the adidas project) begun were as follows:

- Gain transparency on the status-quo (maturity) of the organization (respect the retail organization) concerning the use of e-Learning for development and training of retail shop employees throughout the subsidiaries and therefore the markets. The key informants and roles have to be involved in the analysis.
- Based on the as-is analysis, the multi-facet respective scenarios for implementation have to be developed.

- Each scenario has to be evaluated concerning technological, pedagogical, socio-ethical and economical requirements.
- A management summary has to be written for a decision pro or against e-Learning usage in retail organizations in the future.

A meta-checklist was developed to structure the (management) activities directed at achieving the above listed goals through the use of the Cybernetic e-Learning Management Model. This checklist takes into account, on the one hand, the necessary steps that must be implemented and, on the other hand, the elements involved and its necessary characteristics. Table 2 shows the generic checklist sorted by steps, goals and intention as well as guiding questions for the start of the project.

Table 2. Checklist for pre-determination of e-learning management activities for the start of the project

Focus	Goal & Intention	Question/Task	Consequences for Management Activities
Setup	Determination of initial situation for first filtering of management activities.	Is e-Learning new for the organization is in focus; or is e-Learning still an existing concept (or do e-Learning programs exist there)?	Different Stadia: Answer #1: First Decision & Setup stadium Answer #2: Incremental stadium Answer #3: Re-design stadium
Setup	Determination of processes are involved into the found stadium	Which main processes in which phase are addressed by the predominant situation?	Selection of phases and conjunct processes are listed for later analysis and determination of management activities.
Setup	Determination of involved roles and persons in the organization	Dependent from the situation you are and the processes are pre-selected what are the roles and concerned persons in the organization are responsible for the processes and or can decide activities for e-Learning?	With this the persons are transparent for later analysis and activities.
Setup	Location of the existing complexity which affects e-Learning from multi-domain point of view	Here following questions might be answered: #1: Does the situation show high institutional complexity (e.g. complex organizational structures, highly ruled working environment, strong requirements after business progression, need for cost-benefit-calculation)? #2: Does the situation show complexity for technological issues (e.g. highly distributed workforce with restricted access to central network; lack in IT infrastructure in target group)? #3: How complex seems the situation be concerning socio-ethical issues (differences in language, time, national cultures, learning cultures, human resource development, professional career, education)? #4: How complex is the observed situation in sense of pedagogical, educational sense (e.g. high degree of literacy; balance between working and learning time; experience with D&T framework, curriculum, use of innovative pedagogical-instructional concepts)?	With the selection of the domains are relevant for the given situation, the success paths are predefined for further analysis.

Using the checklist shown above, its questions serve to localize the complexity of the situation at adidas Group. Figure 2 shows the mapping of the adidas-specific situation to the *Cybernetic e-Learning Management Model* (Hilgarth, 2011):

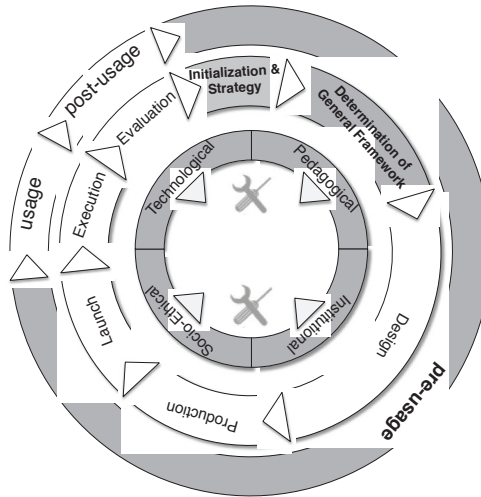


Figure 2. Focus in *Cybernetic e-Learning Management Model* for the adidas-specific situation

The focus using the *Cybernetic e-Learning Management Model* therefore can be summarized as follows, mapped to its elements. Figure 3 shows the principle using the methodology of *morphological analysis* or *Zwicky-box* (Zwicky, 1959). This method offers the opportunity to find the *multiple-item operation sequence* and therefore a profile for the project (case study), depending on the existing situation at adidas Group.

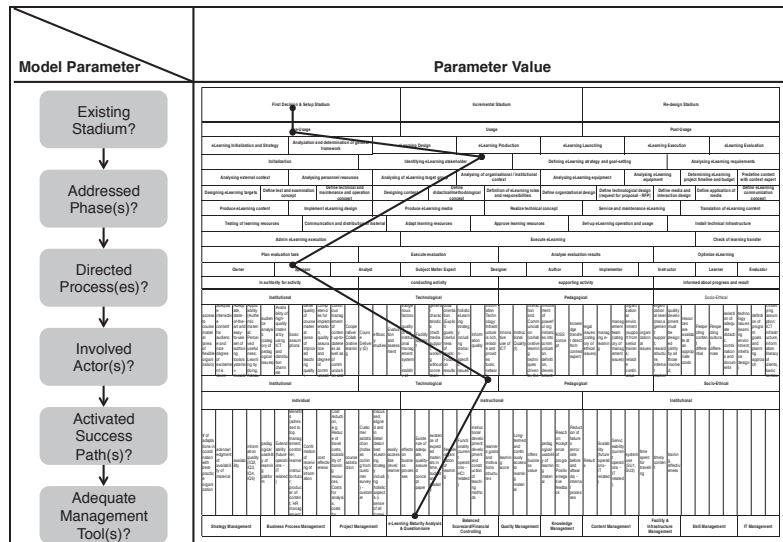


Figure 3. Example for situational analysis with morphological analysis for determination of e-Learning management activities at adidas

The initial analysis at the beginning helped to focus the activities and offered the necessary information on the relevant success paths with regard to this stage. The project at adidas therefore shows the following characteristics (highlighted boxes in Figure 3):

1. adidas Retail HR organization is in the stage of *first decision & setup* for e-Learning.
2. Therefore...
 - a. the organization is in the phase of *pre-usage* of e-Learning development and training in the internationally operating target group.
 - b. the process groups of *e-Learning Initialization & Strategy* as well as *Analyzing & determination of general framework* are the focus of this situation and project work. This means the goal of the activities in this situation is to decide pro or against e-Learning use.
 - c. affected roles are persons and groups of retail operations (*sponsor & subject matter experts*), retail HR and D&T, regional retail HR and D&T design and delivery (*owner*) as well as the external consultants from BIK (*analyst*).
 - d. the *success paths* that are directed and might be considered for e-Learning are: *General Success Path*, *Institutional Success Path*, *Pedagogical Success Path*, *Technological Success Path* and *Socio-Ethical Success Path*.
 - e. the necessary *management tools* within this situation are *Project Management*, *e-Learning Maturity Analysis & Questionnaire*, *Financial Controlling Instruments* (e.g. *Net Present Value Calculation*), *IT Management* as well as *Facility & Infrastructure Management*

3.2 Activities & Results in the eLearning@adidas Retail Project

Using the *Cybernetic e-Learning Management Model* for identification of the predominate situation leads to the determination of the necessary and individual fields of activity within the existing project goals. In

summary, four central activities were identified. These activities were always compared to the model-recommended *success paths* and the therefore combined *critical success factors*.

Readiness Check

The central activity in the project was the readiness check of adidas Retail HR and of the community for e-Learning. Guided by the principles of *capability maturity models* (Albenau, 2009) and the *e-Learning Success Paths* predefined by the *Cybernetic e-Learning Management Model* (Hilgarth, 2011), a questionnaire addressing the necessary roles and multi-facet issues was developed. Questions were also derived from Khan (Khan, 2005) and his work *Managing e-Learning*. The goal of the questionnaire was to identify the *institutional, pedagogical, technological* as well as *socio-ethical* as-is situation in the international retail organization. A catalogue with 54 questions was directed within 26 interviews to the different roles (see above). 1,334 answers were given to these from representatives coming from all relevant world regions *North America (NAM), Latin America (LAM), Asia Pacific (ASPA) and Europe-Middle East-Africa (EMEA incl. Russia/CIS)*. At least the 54 questions were filtered to the 15 *must-have* questions to represent the readiness maturity for the adidas retail organization. Table 3 shows, as an example, the rating of the readiness as identified in the case study at adidas Group.

Table 3. Example of the result of the readiness check matched to *success path*

Success Path	Question	Intention	Readiness conclusion
1 Institutional	Are resources/ budgets necessary to implement and maintain e-learning aligned with regional Retail IT's strategy?	If regions have no budget for e-learning planned, it isn't possible to implement eLearning immediately and budgets have to be fixed for next fiscal period.	ready
2 Institutional	How would you rate the review / quality assurance process of training materials during their development?	This question is regarding quality and assurance process organisation of training materials. If there is no quality management yet, readiness does not exist. Setting up must be considered in cost and effort estimation.	ready
3 Institutional	What is regional Retail Management's attitude towards e-learning?	Are there any political issues that could prevent the success of e-learning? If question is answered with "negative" readiness is not given. If this will be case, what can be done to handle this issue? If positive answering, the management attention in organization is given and supports the eLearning implementation.	ready
4 Institutional	Does adidas have adequate basic infrastructure (e.g. room furnishing, PCs, mobile devices, etc.) to support the e-learning initiative?	This question is meant to figure out the current IT equipment at the stores. If answered with no, readiness does not exist. Equipping stores with required computers etc. has to be included in estimation of costs and efforts for implementation of eLearning.	not ready
5 Institutional	How would you rate the extent to which new store associates provided with HR development information (career paths, training schedules, training modules, required skills...)?	Answering this questions gives input the basic assumptions of Retail HR core strategy and it's current settlement. If rating is average or below average the introduction of eLearning is not recommendable with this status; therefore readiness not given. Answers also brings up requirements for further plannings implementing eLearning.	not ready
6 Institutional	Is Global Retail IT prepared to offer technical support related to eLearning to all stores?	Technical support is needed as education level of store staff is unknown in terms of computer skills. If no, learner can not be supported and will completely lose satisfaction. No effectiveness of eLearning because it will not be used if no support will be provided. If no, additional support personnel costs have to be considered. No means no readiness.	not ready
7 Pedagogical	Do retail training contents fit e-learning ideas (methods)?	Especially the reason why not gives information on required features, technologies and concept for e-learning in retail and if it is suitable at all. If "no", readiness is not given because of lacking structure and content concept or content is too complex (e.g. behavioral/psychological trainings) for transporting it via electronically supported learning media. No means no readiness.	ready
8 Pedagogical	Does a modular training curriculum, featuring a given hierarchy and sequence for training modules, currently exist?	This question is regarding the readiness of HR strategy/ curriculum for e-learning. If no, readiness for eLearning implementation is not given. If no, creating a training modules curriculum must be included in costs and efforts estimation.	ready
9 Pedagogical	To what extent are Regions/ Areas involved in content definition for global retail training?	This is important to see the regional commitment and attitude towards e-learning as well as indicator for the existence of common implemented processes for pedagogical design, quality assurance, translation, adaptations, communication. Rating of "less than 50% of time" has to be interpreted as "not ready" because of lacking of interest and/or processes above mentioned.	not ready
10 Socio-Ethical	Is global training material/ content existing?	This question is regarding the readiness existence of content material which can be used for creating eLearning contents at retail level. If no, adidas shows no readiness for immediate eLearning implementation.	ready
11 Socio-Ethical	What percentage of training content do you believe can be globally relevant (without needing adaptation)?	If no, creating training materials must be included in cost and effort estimation. If globally content exist this question does aim to the insight if this content is culturally critical training material and to what degree of adaptation this has to be addressed. If existing materials are less than 50% relevant for global use the readiness is not given because less synergy through using eLearning.	ready
12 Technological	Are training materials stored in a central, globally accessible repository/ database?	Are global training materials really globally available? Do all users of training materials have access to the same status of materials?	ready
13 Technological	Check the availability of appropriate hardware and software at adidas for eLearning. - Servers	Are hardware or software already existing at adidas retail that could be used for an elearning requirement? Readiness is not given in case of SAP as well as a learning management system is not in place. If yes, this could reduce acquisition costs for e-learning hardware/software.	ready
14 Technological	Do all retail field employees have user accounts in the central adidas user administration database?	Is there a way, that e-learning attendees can identify for training lessons? If no adidas retail is not ready because of no ability for identification and authorisation of learner is possible. If no, setting up accounts has to be considered for cost and effort estimation.	not ready
15 Technological	Does adidas have a technology plan that clearly describes the process of acquiring, maintaining, and upgrading hardware and software required for e-learning?	This question analysis the long-termed plannings and intentions of Retail IT concerning the operation of adequate technological infrastructure for eLearning. If no plans do exist, adidas is not ready because of lacking a sustainable environment for eLearning.	not ready

Scenario building and business strategy alignment

The following different scenarios, derived from readiness for the implementation of e-Learning, were developed. Influencing factors for the scenario creation were the availability and the focus on the content, coverage of the scenario of markets by implementation with different language settings, the operator model for the expected *Learning Management System* as well as respecting the activities running parallel for e-

Learning introduction in the adidas overall organization. Criteria for the assessment of the five developed scenarios (*do nothing, full blown, single language, solving problems and economies of scale*) are *speed-of-realization expected benefits by e-Learning* and a first approximated *cost-benefit ratio*.

The most attractive scenario, derived from readiness check and goal-setting is the economies of scale scenario. This scenario does have the following characteristics: *all existing retail academy content is a focus; content will be translated into the most relevant and covered languages EN, RU and ES; e-Learning Management System will temporarily be hosted and later switched to its own infrastructure by starting overall activities in parallel*. The scenario has to respect all the identified gaps (not ready issues) by further future project work while involving the necessary disciplines and responsibilities.

Requirement clustering

Derived from the decision to start e-Learning with a hosted (outsourced) infrastructure, there are requirements for basic LMS and infrastructure. This leads to a classical *Request for Proposal* approach, which will be used in the context of IT management for selecting the application service provider or standard software.

Cost-Benefit Analysis

With all the information about the scenario as well as the requirements and further activities needed for e-Learning implementation, a detailed *cost-benefit analysis* was conducted next. This analysis took into account two different and polarizing considerations. First, the *cost savings & return on investment calculation* should bring transparency to the costs for implementation and the expected savings. The indicator for this analysis should be the *Net Present Value (NPV)*. In the second stage based on this calculation, the *opportunities for the sales activities* and therefore for turnover because of increasing performance (efficiency) by using e-Learning in retail training and development was considered. Table 4 provides an overview for *costs/investments* as well as *savings/benefits* that were identified respectively for e-Learning in the case organization.

Table 4. Identified costs/investments and savings/sales benefits for e-Learning

Costs&Investment	Savings&Benefits
Retail IT Infrastructure Investment (Computer Procurement, Network Infrastructure)	Reducing Costs per year SM or IST preparing and imparting training to their store staffs
Retail Physical Investments (Back or Stock Room)	Reducing Local Content Production, Translation and Distribution Costs
Costs for Internet Provider	Reducing Travel Costs for Core Training regarding Store Staff and In-Store Trainer
Costs for Learning Management System software as a Service	Reducing total Training Costs for SA due to Staff turnover reduction
HR Resources & Learner Support Costs	Reducing non-productive payroll due to off the sales floor training
IT Resources & Technical Support Costs	Increasing sales per Sales Associate because trade-off off-time to productive time
Initial Content Production and Translation costs	Increasing sales per Store Manager / IST because trade-off off-time to productive time
Internal Project Management GIT (SaaS setup, Retail Infrastructure)	
Internal Project Management Global HR (Content Production etc.)	

The calculation premisses were 3 years consideration with an *internal rate of return (IRR)* specific for investments of 10%. The calculation results in the first step to a positive *NPV* value with an break-even point in the first year. In the second stage, a huge potential for the existing business was identified. e-Learning therefore leads to a yearly reduction in *Development & Training Spending* of approximately 24%. This helps adidas Group to reduce overall retail costs and will help to increase competitiveness in this industry.

Management Summary Report and Presentation

At the end of the project, a management summary report as well as a presentation summarize all analysis information, scenarios and necessary management activities. This project concludes with this document and notification of the stakeholder and management team.

4. THEORY-TESTING REFLECTION

Basically, the interpretation of the case study progress and its results provides evidence for the *Cybernetic e-Learning Management Model*. The following insights can be stated:

1. The model provides a basic structure for the organization of the e-Learning project setup; in the present case for the *first decision & setup stage*. It helps to identify the necessary fields for investigation (*processes, actors* as well as *success paths*). It shows applicability for that situation.
2. The model meets the multi-disciplinary and holistic characteristic of e-Learning in internationally operating organizations.
3. The provided *success paths* and its accompanying catalogue of *e-Learning Critical Success Factors* and *e-Learning Key Performance Indicators* help to focus the analysis. The case study also showed that

continuous development of the success paths and its relationship to the situation, phases and processes through future research is necessary. Specific results in that case concerning the *success paths* are:

a. The discussion of the general goal-setting for e-Learning leads to a common understanding and efficient project work. (general success path)

b. The involvement of top management supports the project with the necessary attention and priority. (institutional success path)

c. Aspects are inherent in organizational structures and processes that influence feasibility for pedagogical and technological issues. (institutional success path)

d. The discussion and choice of the future instructional design shows in that case the influence on expected costs and investment. (pedagogical success path)

e. Respecting intercultural differences like (simply) language, computer literacy or basic education does influence the decision for instructional design. (socio-ethical success path)

f. The infrastructural differences in the internationally operating sub-organizations (regions, markets and retail shops) influence the costs for e-Learning introduction and give restrictions for planned instructional designs. (technological success path)

4. The model provides transparency and direct paths to the necessary methods and management tools are adequate for the existing situation. It makes clear that e-Learning is not primarily an *IT management* topic. *Strategy Management, Project Management, e-Learning Maturity Analysis & Questionnaire* and *Financial Controlling Instruments* were used in the described case.

5. CONCLUSION & FURTHER RESEARCH

The present case offered the opportunity for testing the theory of the *Cybernetic e-Learning Management Model* in a real existing context and the given need for action. The *empirical validity* of the model is proved and the theory shows *logical consistency*. The limitations of the test lie in the point that not all *rival theories*, especially with respect to *success paths*, can be completely excluded. Also, the check of *falsifiability* (possible cases and situations where the model is not applicable) was not performed to the last detail. Addressing these existing limitations, the *theory-testing by longitudinal studies* in future research has to be seen as a necessary and subsequent step.

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**E-LEARNING SUCCESS IN ACTION!
FROM CASE STUDY RESEARCH TO THE CREATION OF THE
CYBERNETIC E-LEARNING MANAGEMENT MODEL**

by

Bernd Hilgarth 2011

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E-Learning Success in Action!

From Case Study Research to the creation of the Cybernetic e-Learning Management Model

Bernd Hilgarth

¹ Department of Computer Science and Information Systems, University of Jyväskylä,
 Agora, 40014 University of Jyväskylä, Finland
 Bernd.Hilgarth@jyu.fi

Abstract: This paper reports the use of e-Learning in practice based on a structured and embedded *participatory observation* and the tracking of activities by conducting a case study including two cases in an international environment of BMW Group as an international acting organization. The observations aimed at two different research goals; first, to identify real existing problems and therefore the *need-for-action* when using e-Learning in professional organizational context; secondly, to observe and analyse structures supporting successful e-Learning based on the conclusions and research hypotheses produced in previous literature review [3]. Key insights of the conducted case study on the success and problems of e-Learning in empirical context are; (1) all e-Learning success dimensions were assumed [3] can be observed within the two empirical cases at BMW Group; and (2) correlations between the e-Learning success dimensions (especially e-Learning critical success factors and e-Learning key performance indicators) were tested and found. The second part of this paper consists of the description of the *Cybernetic e-Learning Management Model* which is derived from the insights are gained by the previous mentioned case study.

Keywords: e-Learning success management, case study research, BMW Group, Cybernetic e-Learning Management Model

I. Introduction

e-Learning seems to be an adequate answer to the need for training and education in increasing globalized working environment [15]. Derived from previous literature review in the field of e-Learning success management and evaluation [3], this documents shows the results and insights of research in this field by doing a case study at BMW Group. Conducting research in the field of e-Learning effectiveness and efficacy makes, from the authors point of view only sense when combining it with real existing, empirical context. For this a case study was designed and conducted by using two different cases within the international activities of BMW Group. Goals for this are, (a) the long-term gathering of data for analysis of success and problem issues of e- Learning in professional organizational context and (b) testing the research hypotheses described by Hilgarth [3] on e-Learning success management and evaluation.

#	Hypothesis
H1	e-Learning success is located in different dimensions and is represented by different indicators that are equal independent on the scientific discipline.
H2	e-Learning success occurs at different Levels;
H3	e-Learning is a multi-facet issue that needs <i>(systemic)</i> treatment from multiple success domains <i>technology, pedagogic, organization, quality, economics and ethics.</i>
H4	e-Learning success (performance) is manageable by a core set of influencing e-Learning Critical Success Factors (eL-CSF), and e-Learning Key Performance Indicators (eL-KPI) are located in the different success dimensions.
H5	The different, often in the wording varying criteria and factors can be aligned over the different scientific disciplines.
H6	Success criteria and factors consists of a hierarchical structure and weighting. This means that not all mentioned factors/criteria do have the same degree of influence and importance to the success of eLearning.
H7	Not all the mentioned eL-CSF and eL-KPI are adequate or useful for all existing cases of eLearning. The use of it has to be customized for a specific situation.
H8	Correlation between the factors, indicators and other success dimensions exist.
H9	The permanent management and evaluation of it (eL-CSF & eL-KPI) becomes necessary.
H10	Management and Evaluation presumes a holistic model comprising the described success dimensions, actors, factors, and indicators for e-Learning.
H11	The holistic model might show applicability in average situations.
H12	Not all indicators can be measured, intangible indicators plays a role for obtaining success.

Table 1. Research Hypotheses - guideline for research on e-Learning success management and evaluation [3]

Respecting the insights coming from the case study the article introduces in the theory of the *Cybernetic e-Learning Management Model*. This model shows the consequent step for the insights are gained in the case study research.

The paper is structured after the applied research, the illustration of the case study results, the illustration of the derived and created *Cybernetic e-Learning Management Model* theory as well as the conclusion and discussion of the further research.

II. Action Design Research Method

The underlying research method does follow different research strategies derived from the questions are addressed to it. For this the overall research strategy follows the steps of *Action Design Research* as described by Rossi *et al* [5] and shown in Figure 1.

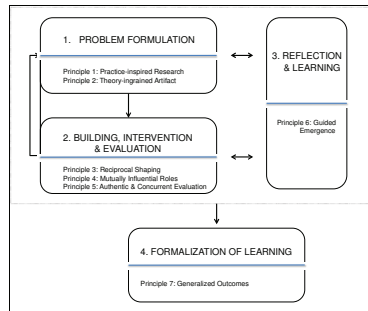


Figure 1. Life Cycle of Action Design Research [5]

This approach offers the opportunity for the investigation of real existing situation, the creation of a theory addressing a general class of problem identified as well it offers space for the test of the theory in similar problem context. E-Learning is a subject, which shows an embedded concept of social life due to its application in international acting organizations. *ADR* does meet the main criteria of researching social life context [6] and therefore it matches perfect for reaching overall research goals.

A. Research Process

Table 2 shows explicitly the steps, goals and activities characterize the research process respectively for the case study and theory-creation described within this article. Reflecting the in Figure 1 shown steps of the *ADR* approach this address the steps (1) *problem formulation*, (2) *building, intervention & evaluation* as well as (3) *reflection and learning*. Additionally to this article several publications were completing this overall research life cycle (see [7], [8]).

Step	Design Case Study	Setup of Case Study	Data Gathering	Data Consolidation	In-depth analysis of data	Interpretation & deriving of theory
Goal	Design of valid and reliable case study research	Safe and feasible field of investigation in empirical, organizational setup is defined.	All possible data can be achieved within the cases and are gathered and centrally stored in database.	Gathered data are consolidated in a way they can be analyzed and interpreted under the aspects of reliability and validity.	Consolidated data are analyzed in direction of research hypotheses by using central research questions.	Documented insights and research hypotheses for future research.
Activities	Definition of research question Check of different research strategies and techniques Decision of case study and instruments	Definition of cases with partners in organization Clearification of feasibility of case study research with management	- participatory observation - interviews - field notes - pilot study - acquiring documents - recording own actions - acquiring software products	- Development of database - Structuring of raw data - Deriving of case events - Reading and commenting data - Mapping of data to events - Verification with experts	- qualitative interpretation - correlation measurement - reliability check - documentation	- Interpretation of results - Alignment with hypotheses - Creation of "Cyclematic e-Learning Management Model" Theory
Results/Outcome	Decision for case study design with a minimum of two cases using the instruments of participatory observation, interviewing and doing field notes.	Case Study was approved by BMW Group management. Two Cases: - ETK Blended Learning (2004-2009) - IPAC-Q Training (2007-2009)	12 GB file space - 2 e-Learning programs - 178 project meetings - 14 expert interviews - 560 emails - 981 documents - 14 training reports	40 chronological sorted case events in research database	1 analysis report including all calculations as well as reports in SPSS software	Research implications & Cyclematic e-Learning Management Model
Time	2003	2003-2006	2004-2009	2009	2009-2010	2010-2011

Table 2. Research Process – goals, activities and results

B. Case Study Design, Data Gathering and Analysis

Case study research in manner of qualitative research is the dominating method of this research. Reaching the goal of valid and reliable results, *data and methodology triangulation* [4] was used. This means the use of different data sources (two in

length and situation varying cases) as well as mixed methods/techniques (participatory observation, interviews, statistical analysis, taking field notes etc.) for investigation of intended research question.

1) Case Study Design

The author started in 2003 with the case study by guiding and observing e-Learning projects in international business context. The all-over goal of the case study is the gathering of sufficient data for the investigation of e-Learning maturity and success management and evaluation. For this the case study was designed with *multiple cases*, which were started at different times with different target groups, different instructional designs but with common business goals and context. The first relevant e-Learning case, the *ETK Blended Learning* program, was started in 2003 and observed till spring 2009. Within this time the second case, the *IPAC-Qualification (IPAC-Q)* program found its setup in 2006 and under observation till the end of 2009. Both programs are embedded into the training and e-Learning environment of BMW Group Aftersales. This professional environment covers beside a general *D&T framework* (in sense of development and training curriculum) also the introduction of a learning management system (LMS) *TRIAS* (Training In AfterSales). Both e-Learning programs were started with the intention to support international roll-out of Information System software in estimated 3,300 BMW Group licensed retail shops worldwide with training of functional/technical as well as soft skills. In practice, international rollout means heterogeneous environment in sense of language, culture, user experience and educational background in common as well as specific technical domain. These two cases offers a wide field to a range of aspects are relevant for designing, implementing, operating and evaluating (including teaching and learning processes) e-Learning in organizational context as well as considering its value-add (or effectiveness and efficacy) for the stakeholders. In sense of *data triangulation* both cases contributes to the initial research goal of investigation of e-Learning success in empirical, organizational context.

2) Data Gathering

Through accompanying the cases and journalizing all relevant observations (interviews etc.), case data were gathered in a structured process. Main instruments (resp. techniques) for this data gathering process were *participatory observation* [1] with making of *field notes* or *recording own actions* for occurrences (178 project meetings, 560 email conversations, 14 trainings instructions) in project work as well as usage of training material in live situation and *piloting* (1 pilot of IPAC-Q) as well as planning and conducting of *subject matter expert interviews* (14 interviews with domain specialists, instructors, learners, business management). In addition to these all relevant *documents* and *software products* were acquired. All data gathered were classified and stored within a central database.

The author acted as project manager, project member, business stakeholder or mere embedded observer. With the opportunity for the author guiding the projects and training processes in both cases as *embedded observer*, the gathering of data over nearly six years has to be seen as optimal because of reaching a broad database. An existing difference in the setup

(e.g. goal-setting, readiness of environment/infrastructure and mind-set for e-Learning in target group etc.) of the two cases is seen as realistic but challenging for data consolidation over the whole case study. But having these differences in the case setups offered also the opportunity for gathering information over different aspects are real existent. Also the mentioned research design and position of the author allowed a more “natural” observation than explicitly conducting of quasi-experimental research. All the gathered data were chronologically structured and stored after case events. These case events shows exposed situations at an explicit point of time and subsumes all data are clearly adjunct to it. Exposed describes difficult situations in the projects, exceptions to the planned and expected attitudes, progress in project as well as expected results, and use of the e-Learning programs as well as milestones were typically occur. All data were digitalized (e.g. from notes on discussions till log files and Microsoft Office® documents) and administered in a database for analysis. Finally the raw data sourced an amount of 1.2GB file space. Through the structuring of the data by the case event classification, 40 samples (29 in ETK Blended Learning, 11 in IPAC-Q) exist for further analysis.

3) Analysis

For further analysis the 40 relevant case events were used. After mapping the research hypotheses with the research questions (see Table 3) a data record sheet for entering the case events and aligning it with the research questions and hypotheses was created in the database. Figure 2 shows an example for recording each use case event.

Figure 2. Data record sheet “case event”

Research instrument is adopted from previous research (literature review) by integration of all found e-Learning success dimensions and its values. Next each case event was checked for its contribution to each of the six research questions (see Ch. III). Finally this allows the analysis over all events in each specific case as well as over all cases and makes the results comparable and internal as well as external valid. For analysis of data several statistical methods (reliability analysis, correlation measurement, frequency, main) by using of SPSS software were applied. Altogether this data analysis was used for interpreting the results in qualitative way and using as much as possible via “quantification of use case observations”. Results of this case event analysis are described in Ch. III, section A.

C. Theory Creation

Theory-creation is the specific methodological instrument used especially after doing the case study. Following Gilberts [6] philosophy for explanation here, theory was created in an induction kind. This means that the insights coming from the long-termed embedded observation within the case study at BMW Group serves as basis for the creation of the general theory named Cybernetic e-Learning Management Model. The creation of the theory in the, by Rossi [5] described Action Design Research overall approach serves for the evaluation and identification of the general class of the issue of e-Learning management was observed for e-Learning by using it in the international acting organization. The theory of the Cybernetic e-Learning Management Model is described in Ch. III, section B. The test of the model is planned for further case study research at a similar organizational situation.

III. Case Study Results and Theory creation

A. Case Study Results

The research is driven by the question after how strongly does the situation marked in the literature from successful e-Learning with the reality to observable cases coincide? Next a set of seven sub-questions was defined for operational and detailed investigation. Table 3 shows the mapping of the research hypothesis to the tangible sub-question.

#	Hypothesis	Mapping	Research Sub-Questions	#
H1	e-Learning success is located in different dimensions and is represented by different indicators that are equal independent on the scientific discipline.		What is the observable success (as well as are the observable problems/issues) seen in planning, designing, implementing, usage as well as evaluating e-Learning the investigated cases?	Q1
H2	e-Learning success occurs at different Levels.			
H3	e-Learning is a multi-facet issue that needs (systemic) treatment from multiple success domains: technology, pedagogic, organization, quality, economics and ethics.		Does the case study provide evidence of the existence of success in multiple alternative (and co-existing?) dimensions phases, processes, domains, concernment levels, e-Learning Critical Success Factors (eL-CSF) as well as e-Learning Key Performance Indicators (eL-KPI)?	Q2
H4	e-Learning success (performance) is manageable by a core set of influencing e-Learning Critical Success Factors (eL-CSF), and e-Learning Key Performance Indicators (eL-KPI) are located in the different success dimensions.			
H5	The different, often in the wording varying criteria and factors can be aligned over the different scientific disciplines.			
H6	Success criteria and factors consists of a hierarchical structure and weighting. This means that not all mentioned factors/criteria do have the same degree of influence and importance to the success of e-Learning.		If eL-CSF can be observed, what factors are mainly observed in the cases?	Q3
H7	Not all the mentioned eL-CSF and eL-KPI are adequate or useful for all existing cases of e-Learning. The use of it has to be customized for a specific situation.		If eL-KPI can be observed, what indicators are mainly observed in the cases?	Q4
H8	Correlation between the factors, indicators and other success dimensions exist.			
H9	The permanent management and evaluation of (eL-CSF & eL-KPI) becomes necessary.		If evidence for eL-CSF and eL-KPI is observed in the two cases, what degree of correlation can be observed between eL-CSF and eL-KPI?	Q5
H10	Management and Evaluation presumes a holistic model comprising the described success dimensions, actors, factors, and indicators for e-Learning.			
H11	The holistic model might show applicability in average situations.		Does the need for an all-over, holistic framework respecting all these dimensions for the management and evaluation of successful e-Learning in practice exist and does it seem to be applicable in the context of the cases in hand?	Q6
H12	Not all indicators can be measured, intangible indicators plays a role for obtaining success.			

Table 3. Mapping of research hypothesis with research questions for case study

With exception of hypothesis five (H5), all hypotheses are addressed within this case study analysis. Hypothesis five can not be investigated in this case study set-up; the effects of standardization for wording over the different scientific disciplines might be addressed in another research step afterwards a first attempt was done. In the following sections

each research question and its accompanying results are illustrated. The purpose of this chapter is the report of results and its discussion. This section reflects therefore on the quantitative analysis of structured case study data (so far it isn't restricted through the use of qualitative research method) and the qualitatively interpretation of results for answering the defined research questions. Each research question is represented in a sub-section.

1) **Question 1: Observed success, problems and issues of e-Learning in empirical context**

This section addresses the issues of the underlying research question one (Q1). Therefore it concerns on the observable success, failure and problem issues in the underlying cases. Analysing the two independent cases following conclusions were phrased:

• **An enhancement of the, in literature mentioned success is necessary**

With the previous review of theory and literature [3] concerning this context of successful e-Learning 48 (not distinct) descriptions for success were identified. With analysing the above described cases, additional five such success objects for e-Learning were identified. These are (1) *adequate and feasible e-Learning strategy based on transparency in organizational context*; (2) *availability of training material is widely communicated*; (3) *awareness of content and availability of training material*; (4) *up-to-datedness of e-Learning content*; and (5) *common mind-set and understanding of e-Learning goals*.

• **Not all success mentioned in investigated literature has been shown in the cases**

27 out of 48 former identified success descriptions were not observed within the case study. Reasons are (1) that some of the success described in literature are simply not relevant or do not represent the real existing understanding; (2) the in literature described success is also adequate for empirical context but not for the investigated case setup; and (3) the 48 former identified success descriptions are unadjusted and shows redundancies in the meaning of it with different wording.

• **E-Learning success do not exclusively interrelate to one e-Learning phase or process**

With the analysis it became obvious that the success objects of e-Learning don't exclusively interrelate (in sense of the MECE principle) to one specific e-Learning phase or process. Therefore e-Learning seems to be treated at multi points of time in its lifecycle for becoming successful.

• **Success occurs on different granularity and hierarchical placements (H2)**

The analysis of the 40 case events shows fully evidence for the hypothesis that e-Learning success occurs with different granularity and in different hierarchical placements. In 40 out of 40 events the objects are obviously in hierarchical structure and on different granularity level. Condensing the results of the observation of the cases the success of e-Learning obviously can be categorized into *organizational success*, *pedagogical success*, *cultural success* and *technological success*. The overall structuring element (top of hierarchy) for the success of e-Learning is from the author's point of view the *effectiveness and quality*. The observations were made in both

cases within the case study with an almost similar setup. On this *synchronic reliability* [4] the evidence can be considered as general applicable.

• **Successful e-Learning is a management issue (H9)**

With this research also clear evidence for previous formulated hypothesis 9 is given. All success descriptions were observed within the 40 case events can be influenced by singular or permanent treatment over the e-Learning lifecycle. Therefore e-Learning success is not a mere "product" of technical solutions or quality of contents and its production. It is an issue for management and evaluation.

2) **Question 2: Existence of e-Learning phases, processes, domains, concernment levels, eL-KPI's and eL-CSF**

In the centre of this section stands the description of the results were achieved through investigation of sub-question two (Q2). Investigation of this question addresses beside hypothesis one (H1) also hypothesis two (H2). Following key insights were derived from case study analysis:

• **E-Learning and its typical lifecycle in sense of phases and processes**

Reviewing each case event, comparing both cases results and analysing the all-over case study results shows clear evidence for H1 (mean of .0974 with "yes, the hypothesis 1 will be fulfilled with case event observation"). Looking at the frequency of the variable *e-Learning phases* this means 65% of the case events were dedicated to the *pre-usage*, 25% to *usage* and 10% to the *post-usage* e-Learning phases. Main processes were observed are in following sequence: (1) *analysis and determination of general framework*; (2) *conducting project management and controlling*; (3) *e-Learning initialization and strategy*; (4) *e-Learning design*; (5) *e-Learning production*; (6) *e-Learning launching*; (7) *e-Learning execution*; and (8) *e-Learning evaluation*. The processes *e-Learning content translation*, *predefine content with subject matter experts* and *conducting project management and controlling* were, especially important for international acting organizations, additionally observed to identified processes in literature.

• **Correlation between e-Learning phases and processes**

Considering the relationship between the observed e-Learning *phases* and *processes*, a correlation between both variables obviously exists. Analysing this obvious relationship using the *Pearson-correlation* method results in a significant value of .618. Therefore evidence for hypothesis H8 is given.

• **E-Learning success domains – a multi-facet issue**

Next the existence of the, in the literature review emerged dimension of e-Learning success domains were proofed concerning its existence in the investigated cases. The analysis shows the **existence of following domains in the cases:**

<u>E-Learning success domain</u>
Institutional
Technological
Pedagogical
Socio-Ethical

Table 4. Observed e-Learning success domains

Not in both cases always all domains are observable. Therefore the variable *domain* shows different parameter values, e.g. *all* when all domains observable in the considered use case event, *institutional (etc.)* when exactly the domain *institutional (etc.)* is observable or *institutional & socio-ethical (etc.)* when exactly the domain-combination of *institutional* and *socio-ethical (etc.)* are observable. Considering the frequency of observation the domains are ranked with (1) *institutional*, (2) *technological*, (3) *pedagogical* and (4) *socio-ethical*.

- **Allocation of domains to e-Learning phases**

Next interesting aspect (H8) considering the domain dimension in the investigation is how are these observed *domains* allocated to previous considered *e-Learning phases*. First there is a relation between the *phase* and *domain* dimension observably; secondly in the phase *pre-usage* the domain *institutional* is mainly observed (followed by *technological*, *pedagogical* and *socio-ethical*). In the phase *usage* the allocation looks like these: (1) *institutional*, (2) *pedagogical*, (3) *technological* and (4) *socio-ethical*. At least in the *post-usage* phase the allocation analysis shows that there are not all domains represented and observed (*institutional* and *technological* were observable). The question, if the main focus of e-Learning lays at the *institutional* issues can also be answered with *yes* when looking at this allocation. This insight is also interesting reply to the often-existing meaning, e-Learning is a pure technological topic with respect to pedagogical issues.

- **Concernment level – success or failure is not always a general issue**

The hypothesis two (H2) includes as another aspect that the success of e-Learning concerns to one of these levels: *individual level*; *collective level or instructional level*. The idea behind this was, when e-Learning success/failure occurs it will be on the level of all stakeholders in sum (*collective*, e.g. the whole organization is effected through not having accessing to e-Learning module), for one or some stakeholder party (*individual*, e.g. the failure/success causes in individual reasons and regards to a partly of the stakeholders) or in the relationship between instructor and learner (*instructional*, e.g. learner failure is caused in missed communication and scaffolding activities from the instructor) localized. First, the above-mentioned *concernment levels* for success or failure were observed in both cases. Secondly some of the case events had shown, that success or failure is on all levels at the same time. This leads to the conclusion that e-Learning is successful or failures not always in a comprehensive way and proves the formulated hypothesis two.

- **Success or failure of e-Learning is influenced by a core set of critical success factors**

With investigation of sub-question one (Q1), also the existence of e-Learning critical success factors was investigated. In general this question can be answered with *yes*. 97.5% of the observed case events do show one or more of the in literature identified influencing factors.

- **Key Performance Indicators for e-Learning**

Analogue to the analysis of the case events concerning the influencing factors, finding an answer to the research hypothesis 1 does also include the investigation after the

existence of success indicating factors. In general this question can be answered with *yes*. 97.5% of the observed case events do show one or more of the in literature identified indicator.

3) **Question 3: Observed e-Learning Critical Success Factors (eL-CSF) within the case study**

Having found evidence for the existence of so-called e-Learning Critical Success Factors (also eL-CSF) within the both investigated cases, this sub-chapter does handle the sub-question three (Q3) and its accompanied hypotheses H4 and H5. Therefore the aim of this chapter is the illustration of the observed factors influencing success through the observations in the cases (respecting existing literature material), the consideration of hypothesis that these eL-CSF consists of *hierarchical structures* and therefore different *success influence levels* (H4), the consideration of *adequateness* of the complete set of *eL-CSF* for all kind of case events where investigated (H5) as well as the investigation of the relation between eL-CSF and the above described *e-Learning phases and processes*.

- **Observed eL-CSF**

The cases show the existence of *eL-CSF*; these existing, success influencing factors are “(...) *ex-ante or at runtime manageable for actively influencing the success of e-Learning (...)*” [3]. With the literature review [3] set of 309 factors was identified and documented. In total 70 *eL-CSF* were observed in both cases. *Table 5* offers the top-ten most observed factors in case study.

e-Learning Critical Success Factor
Professional (Project) Management
Language differential
Cooperative/Collaborative Learning
Direct communication to and feedback from target group
Audience analysis
Involvement of powerful organizational instances into communication, definition, development and launch process
Availability of high-quality material by using ICT and distribution channels
Continuous management of content up-to-datedness as well as of communication and marketing
Content analysis
Respecting cultural diversity

Table 5. Most observed eL-CSF

With using two use cases the question after the *reliability* in the case study structure at this point might be considered as important for the *generalizability* of the results were analysed here. Using *reliability analysis* after Cronbach [2], a resulting $\alpha = .468$. Because of the restriction of investigated two cases, from the author's point of view further, long-termed investigation for stabilization of reliability of results is necessary.

- **Hierarchical eL-CSF structure - on the observed power and influence of factors**

Another related question is; does a hierarchical structure in the observed eL-CSF exist (H4)? During gathering of the data in case events with the above mentioned data collection database sheet, the author gave each observed *eL-CSF* item a hierarchical level and mapped it to the *e-Learning processes*

for later analysis of observable structures. Avoiding high complexity, a maximum of two levels were defined for this mapping during the observation. For the mapping multiple allocations to each process were allowed. Respecting this *two-dimensional-structure-observation* helps first to identify the importance (in sense of influence and power) of each item as well as to answer the question about the existence of *granularity level*. Bringing it to the point, *management of e-Learning, definition of e-Learning strategy, treating of organizational politics concerning e-Learning, the availability of necessary e-Learning competencies and resources, making marketing and communication for e-Learning in organizations, respecting administrative affairs, respecting cultural aspects, having an adequate and excellent instructional strategy, reaching a high level of qualitative standards* as well as *using adequate and efficient technology* are the top-level success factors. All other observed factors might play a subordinate role. Evidence for H4 is proven.

4) **Question 4: Observed e-Learning Key Performance Indicators (eL-KPI) within the case study**

The purpose of this sub-chapter is, based on the general observation of e-Learning Key Performance Indicators (eL-KPI) the test of hypothesis H4, H7 and H12.

• **Observed eL-KPI**

The cases show the existence of eL-KPI; these existing indicators "(...) inherent ex-post indication of the success or failure of e-Learning (...)" [3]. In sum 142 success indicators have been gathered, 133 of which from the literature and further 9 indicators were observed within this research and added to the catalogue of eL-KPIs for further data analysis.

e-Learning Key Performance Indicators
Effectiveness; the contribution of e-Learning (object/program) to the degree of goal reaching
Costs (incl. project costs)
Satisfaction (incl. e-Learning satisfaction ELS, reaction and satisfaction)
Effects on business processes
Cost-Benefit-Ratio
Efficiency; tracking economical effort regarding the e-Learning program
Material stimulate lively and interactive learning processes
Project progress
Learning outcome

Table 6. Most observed eL-KPI

Similar to *eL-CSF* the question after the reliability of the case study setup regarding the *generalizability* of the analysis results might be asked here. Applying the *reliability analysis* after Cronbach [2] the $\alpha = .742$ indicates reliability for the research construct. Therefore from the author's point of view with this case study setup up are the results of analysis of *eL-KPI* in general valid. Also here further long-termed investigation (also in different contextual setting) might be conducted for manifestation of these results.

• **Intangible eL-KPI – not all success indicators are of quantitative nature**

Often the requirements in today business world are after the quantification of success in best case expressed through monetary measures. With hypothesis twelve (H12) it is assumed that not all indicators are measurable because of its nature. Looking first at the observation of *measurability* in the 40 case events 40,3% was ranked as "non-measurable" (or *intangible*) and 59,7% as "measurable" indicators. Considering the measurability at the level of the indicators, and therefore at the 47 distinct observed *eL-KPIs*, 15 (31,9%) indicators are as "non-measurable", 32 (68,1%) indicators are as "measurable" identified. The shifting of the ratio comes from the fact, that some of the *eL-KPI* were partly identified as non-measurable at the level of use case events but do not show this attribute by consolidating observations on the level of each indicator. Typical intangible indicators are the *effects on business processes* or *material stimulate lively and interactive learning processes*. This observation provides evidence for H12.

• **Usefulness of eL-KPI**

Considering the list of 142 *eL-KPI* and reviewing it after the question of usefulness for possible empirical e-Learning cases, the two cases support fully the hypothesis that not all *eL-KPI* are useful. However, this hypothesis cannot be validated based on only two cases in this underlying case study. Under the line no general evidence for H7 is shown by the case study setup.

5) **Question 5: Observed correlation between eL-CSF and eL-KPI**

Not only from the point of view of the argumentation in the last sub-chapter, the question regarding the dependency of the elements *eL-CSF* and *eL-KPI* through the analysis of the case events has to be seen as interesting. This chapter aims at hypothesis H8 and will test in two different ways: (1) the analysis of the general degree of correlation between the two elements as well as (2) the consideration of the *pair wise* correlation of the observed *eL-CSF* with the observed *eL-KPI*.

• **General correlation**

This trivial correlation calculation shows significant general evidence for the existence of correlation between observed *eL-CSF* and *eL-KPI* (H8) over all case events with Pearson Correlation value of .746.

• **Pairwise correlation**

Out of the 3.290 total pairs a set of 186 (5,65%) show correlation ($Pearson > .410$) with high significance (significant at the <0.01 level – 2-tailed) and 101 (3,00%) show correlation between .320 and .409 *Pearson correlation* factor ($Pearson$; significant at the 0.05 level - 2-tailed). This calculation shows a more focused correlation of *eL-CSF* and *eL-KPI*. A set of 20 pairs shows full correlation ($Pearson = 1$). Also with this investigation the hypothesis H8 is proven and the basis for further interpretation is given.

6) **Question 6: Conclusion for a holistic e-Learning maturity and success management framework coming from case study**

Within this last sub-chapter the all-over question after the need for a holistic, all above considered elements including e-Learning management and evaluation framework (H11) will be discussed based on the observation and experience of the embedded observer through uses cases are in the centre of

interest. In 97,5% of case events the need for creating and validating a framework or theory that concerns on the success of e-Learning was observed.

B. Cybernetic e-Learning Management Model

The *Cybernetic e-Learning Management Model* does provide a theoretical framework which aims on transparency of typically *e-Learning phases & processes, domains, success paths* as well as the needed *management methods and instruments* for e-Learning in international acting organizations. In the following all these mentioned *elements* of the theory are described.

1) General Characteristics, Terms & Model Overview

The *Cybernetic e-Learning Management Model* shows the general characteristic of a management approach that follows the basic understanding of *systemic-evolutionary* management of complex situations for e-Learning in international acting organizations [13]. E-Learning in international acting organizations shows complexity and needs the management amongst the lack of all information are needed for management without uncertainty. The philosophical goal of e-Learning as part of an organizational system is to support the *economic viability* of the organization. Therefore e-Learning is part of the viable system, which follows *rules*. The *Cybernetic e-Learning Management Model* described in this document shows these rules.

The model consists of different elements will be described in the following sections of this chapter. With the pre-posed literature review and case study research a comprehensive view on existing theories as well as on the need for such a model were analysed, identified and committed by different subject matter experts as well as in the scientific community by accepting submitted papers on this research and its outcome. The model is directed by the typical steps, phases and activities (processes) were found in literature [9] as well as were observed in the above described case study research at the international acting organization BMW Group. Khan [12] provides with his *e-Learning framework* an impressive theoretical work in that context. A first main difference of the model described within this paper compared to Khan's model is, that he sees the management of e-Learning focused on the "maintenance of learning environment and distribution of information" [12].

With the here described model the *management* activities will be handled as the central concept for a multi-facet and continuously treatment e-Learning in international acting organizations in sense of *sine qua non*. The dimensions are illustrated by Khan's work will be fully respected within the model is described here. The *Cybernetic e-Learning Management Model* might be understood as an extension and evolution of this previous work and not as a substitution of it. e-Learning in international acting organizations is a multi-facet topic which has to be handled in times of first implementation but also in sense of life-cycle in a continuously manner. e-Learning (and its substituting terms) in the context of the here described model subsumes it as a *technological software solution*, a *pedagogical-didactical concept*, an *instrument for knowledge management*, a specific *e-Learning program* and/or as an *Information System solution* like a *Learning Management System*. **Figure 3** gives an overview

for the elements of the *Cybernetic e-Learning Management Model* on a high level.

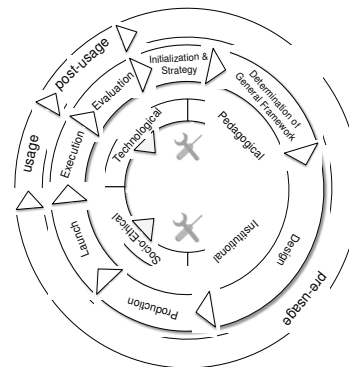


Figure 3. Elements of the *Cybernetic e-Learning Management Model*

2) Element 1: e-Learning Phases, Process Model, Roles & Responsibilities

As mentioned the model is guided in a chronological order by the use of typically *phases* and *processes* for e-Learning in organizations do act in international scope. In general the activities concerning it can be divided into three major phases; *pre-usage*, *usage* and *post-usage*. Activities within the *pre-usage* phase are the *initialization and strategy finding* processes; the *determination of the general framework*; the *design* of the e-Learning solution (platform, program or module); the *production* of the e-Learning content (program or module) as well as the *launch* of it within the user context (teacher and learner target group).

Next phase is the *usage* phase of the launched e-Learning program that includes the timely independent process of the e-Learning *execution*. It does concentrate nothing less than on the complex issues of teaching and learning by using the new media-driven solutions and concepts e-Learning provide. In advance it has to be said, that it is difficult to determine exact activities and order of it in highly individual teaching and learning processes. In fact it is interesting to address activities like *administration*, *conducting training sessions* and *assessment of learning transfer* by these sessions. All these activities seem equal and necessary for the execution of professional training session. The end of an e-Learning life cycle show the *post-usage* phase which mainly concentrates on the evaluation activities for e-Learning. **Figure 4** (a/b) provides the process model in an addition detail level and shows the hierarchical relation of it to the described main process steps.

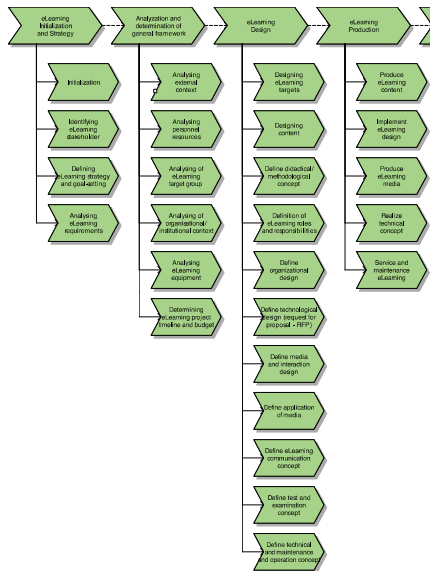


Figure 4(a). E-Learning Process Model with detail level 1 and 2 – Part I

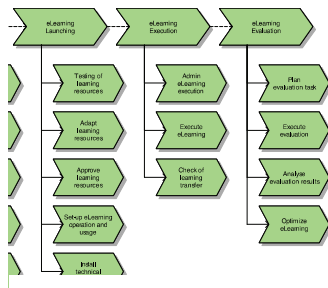


Figure 4(b). E-Learning Process Model with detail level 1 and 2 – Part II

Combined are *roles* and *responsibilities* do come along with the *phases & processes*. The case study research as well as the previous literature review shows the following roles are accomplished with the above-shown processes:

- **Owner**; business owner who is interest in solving operational problems by using e-Learning in the organization.
- **Sponsor**; business management which supports the project in the management of the organization.
- **Analyst**; methodologist and business context specialist who analyses the existing situation and maps it to exact e-Learning scenarios.
- **Subject Matter Expert**; knows the context and content which is object for the e-Learning problem.

- **Designer**; translate the e-Learning scenarios and subject matter to a technical, media-driven and learn-pedagogical solution. Is responsible for the functional specifications for the later e-Learning program.
- **Author**; translates and describes the context and content in learning modules and chapters. The result of his work is the storyboard.
- **Implementer**; programs the pedagogical-technical as well content specifications into the e-Learning solution.
- **Instructor**; administrates and teaches with e-Learning program in different pedagogical settings (e.g. scaffolding; collaborative learning, blended learning etc.)
- **Learner**; learns with e-Learning program in different pedagogical settings (e.g. collaborative learning, blended learning etc.)
- **Evaluator**; evaluates the overall correctness and effectiveness of e-Learning processes and its outcome.

These roles take different responsibilities for the processes. The responsibilities are:

1. **in authority for activity and its outcome (a)**
2. **conducting activity (c)**
3. **supporting activity (s)**
4. **being informed about progress and result (i)**

Table 7 provides a mapping of the processes (in detail level 1 as shown in Figure 4) to the above-described roles.

Process	R oles								
	Owner	Sponsor	Analyst	Subject Matter Expert	Designer	Author	Implementer	Instructor	Evaluator
eLearning Initialization and Strategy	a	s							
Analysis and determination of general framework	a	i	c	s	c	c	c	s	s
eLearning Design	a	i	i	s	c	c	s	s	s
eLearning Production	a	i	s	s	s	s	c	-	-
eLearning Launching	a	i	c	-	-	-	-	s	i
eLearning Execution	i	i	-	-	-	-	-	a	c
eLearning Evaluation	a	i	i	i	i	i	i	i	c

Table 7. e-Learning Process-Role-Responsibility Matrix

3) **Element 2: Success Domains**

Beside the typically occurring processes, which might be seen in a life-cycle manner, a main element for managing e-Learning in international acting organization is the construct of *e-Learning Success Domains*. A success domain shows a *specific sphere of knowledge* that is needed to respect for implementing and operating e-Learning in a successful manner. Table 4 shows these success domains. In the following each domain is characterized.

The *institutional* domain does consist the issues and knowledge is relevant concerning the target institution e-Learning is intended to introduce, is introduced, is in use or has to be evaluated within. Orienting on Khan, this domain does consist of the categories *administrative affairs (e.g. financials, budgets, marketing and communication), academic affairs (e.g. development & training framework), student services [12]* as well as *management-political affairs (e.g. stakeholder & management attention and its involvement, management team, management tools, quality*

management). From the authors point of view also, the by Khan separate handled context of the *resource support issues* (e.g. *availability of resources*) and *evaluation* should be part of this domain because of both issues will be in the decision of the organization which uses e-Learning.

The *technological* domain subsumes the activities and knowledge regards to the *technology-infrastructure* as well as *Information System-oriented* facets of e-Learning in international distributed organizations. Following Khan within this area the focus is on *infrastructure* (e.g. *technological and technical capabilities, standardized interface descriptions*), *hardware* (e.g. *computers, servers, wireless devices*), *software* (e.g. *learning management system software, authoring tools*) as well as *Information System design* (e.g. *usability issues, information support design, interface design*) topics. The analysis of the case study shows especially the need for dealing with *collaborative usability* of e-Learning in design and production as well as learning and teaching situation.

The *pedagogical* domain directs the issues are driven by *psychology in education* (e.g. *basic concepts on learning, instructional strategies*), *adult education* (e.g. *curriculum*) as well as by *pedagogical concepts in context of teaching and learning with new media* (e.g. *Blended Learning*). It fully respects Khan's topics like *content and audience analysis, media analysis* as well as the *design approach*. From the author's point of view

At least the *socio-ethical* deals with socio-, individual- and culture-driven issues do influence the usage and the effectiveness of e-Learning programs in international acting organizations. It is logical to imagine that this domain does have enormous influence especially by using e-Learning programs for international trainings as done in the analysed cases within the BMW Group. Topics are seen within this area follows the basic investigations of Hofstede [11] and his understanding of *cultural consequences* do exist by differences in values, behaviours, institutions for organizations across nations. In time of *globalization* and the progress of using collaborative media like Internet or Twitter issues like the *digital literacy* should be minimized but still are existent for respecting it in deciding and designing of e-Learning programs. The case study underlies the research here has shown that socio-ethical differences like *language-differential, learner diversity, educational culture differential, learning style differential, reasoning pattern differential, high-and low-context differential* or *social context differential* influences the effectiveness for e-Learning [10]. Also in this domain Khan's findings and topics (*social and political influence, cultural diversity, bias, geographical diversity, learner diversity, digital divide, etiquette, legal issues*) show fully adequateness. It might be stated that the socio-ethical diversities may occur on different levels.

4) Element 3: E-Learning Success Paths

One of the core insights the conducted case study research brings is the existence of *e-Learning Success Paths*. These success paths do show the heart of the maturity and management framework. An *e-Learning Success Path* is a typical *cause-effect-chain* for successful design, production, launch, execution and evaluation of e-Learning in international acting organizations. Knowing the success paths existing in general and individually for *effective and efficient* use of e-Learning in such organizations will offer a *crank* to

manage and control it over its different life cycle stages and processes. The concept of a success path respects the elements *critical success factor, key performance indicators, concernment levels* as well as *methods and instruments* for the operative management of it. A number of 71 different success paths where observed within a previous case study research. The observation and mapping of real life situations happened on reviewed and mentioned catalogue of factors and indicators [3] exist in multi-discipline literature about e-Learning. **Figure 5** provides an overview for the basic theory of *e-Learning Success Paths*.

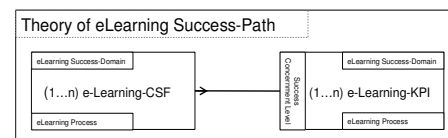


Figure 5. Basic theory of e-Learning Success Paths

In general this theory bases on the principles of *cause-effect-chains*. The causes are expressed by so called *e-Learning Critical Success Factors* which regards to one or more processes and domains and influence directly or indirectly one or more *e-Learning Key Performance Indicators*. Each of these indicators does also regard to one (or more) processes and domains. Additionally the effect of treating an influencing factor (is shown in the indicators status) might be differentiated after different *Success Concernment Levels*. A concernment level offers the classification after *individual, institutional* or *instructional* success or failure. Concept behind this is to make a difference of the impact of managing a success path has to be made (also in political sense). For example neglecting the concept of *collaborative learning* had shown negative effects on the *individual satisfaction* of the learners but also shows effects on the *institutional business process performance*. The above-described case study research provides following summarizing statements on the domain-specific success paths:

General Success Path

1. It can be argued that a general *goal-setting* for the intended e-Learning program *from all stakeholders and customers* (learners and instructors) point of views does have *influence* on the immediate transparency of the e-Learning project as well it guides the whole project and usage processes and brings therefore benefits for.
2. The observations show, so clear the intentions, goals and planning so higher is the degree of general customer *satisfaction* concerning the effectiveness the e-Learning program.

Institutional Success Path

1. E-Learning as an educational method and solution is an issue which success depends on the organization *management attention*.
2. E-Learning management might consider the general institutional treatment in sense of *macro management* of it as a concept for general training and knowledge management.
3. E-Learning management does have a *micro management* element, which occurs on each individual e-Learning program.
4. The availability of e-Learning programs is not a pure technological issue; within the *organizational structures and communication channels* e-Learning has to find its permanent standing.
5. Respecting the *influence of the institutional* issues offers the opportunity for increased efficiency in time, quality and cost in the business processes.
6. Respecting the *institutional aspects* does show effects in *pedagogical, institutional and/or technological domain*.

Pedagogical Success Path

1. *Collaboration, communication and interaction* as well as the *in-depth analysis of the audience* in the investigated organizational learning processes leads to positive effects like *course satisfaction and improvement of business processes*.
2. The *selection of the content* as well as the *professionalism of the content development process* is shown by the existence of excellent concept (storybook) documents and results in *high information quality*.
3. The choice of *adequate instructional design* (esp. in intercultural context) and *high instructional quality* leads to *improvement of daily activities by reduction of failures and positive reaction of international audience*.
4. At least the *reduction of complexity in e-Learning concepts* and solutions in direction of pedagogical issues leads a *better transfer of information* to the audience.

Technological Success Path

1. *Information Technology* is an *enabler for pedagogical concepts*.
2. It enables *flexible learning organizations* and does have *influence on existing spending for travelling* by access to learning material.
3. It *influences the learning score*.
4. Infrastructural differential
5. *Authoring Tools* enables an *efficient content development process*.
6. *Technological issues* are part of and *influence the quality of e-Learning concept papers*.
7. The basic attitude of learners concerning Information Technology (*digital literacy*) use in learning and teaching processes influences the reaction and acceptance of learning materials created this way.

Socio-Ethical Success Path

1. Especially in international acting organizations the *concept and content of e-Learning programs might respect cultural and individual learner differences*.

2. Modern Information & Communication Technology might be used to enable *adaptation activities* (minimum for contents, maximum for teaching and learning styles) covering these diversities.

The effects of *respecting content and cultural differences* are the *availability of adequate content and training material* which leads to *training effectiveness* for the whole organization.

5) Element 4: Management Methods and Instruments

Beside the previous description of the basic elements this document also offers a description of the management *methods* are from the authors point of view adequate in the complexity of international acting organizations. *Methods* (e.g. capability maturity management, performance measurement, balanced scorecard, process management, project management) mean the general logical concept for the management of the complex of e-Learning processes domains and success paths whereas *instruments* actually describe tools (e.g. guidelines, how-tos, FAQ, checklists, reports, software) for the actual and operative realization. The model concentrates on the *management* of e-Learning as a comprehensive concept for international acting profit organizations. General and basic question for the *methods* and *instruments* in that complex is; which kind is compatible to the practical management behaviour in today's professional profit-organization and which fits into specific process and time sequence of e-Learning. Bringing transparency into this question first it is necessary to differ with e-Learning between three different use cases (stadia):

- **First Decision & Set-up stadium:** Within this stadium the organization has not implemented and used e-Learning to the point of time evaluating it as solution for future knowledge management, development and training within the international acting organization. In that entity the management of e-Learning in *macro* (e.g. setup of whole infrastructure, decision for basic curricula as well as institutional, technological, pedagogical and socio-ethical basic assumptions) as well as the *micro* management (e.g. selection of specific contents and context, design of e-Learning programs till usage and assessment of it) is necessary.
- **Incremental stadium:** Within this stadium the organization still has implemented the basic infrastructure for e-Learning and adds new e-Learning programs or adapts existing one. The characteristic in that stadium is, that the system still runs and the management is mainly needed in the *micro*-sense, e.g. for re-implementing parts of the existing e-Learning programs or producing new e-Learning programs.
- **Re-design stadium:** Also in this stadium the organization still has implemented e-Learning and operates it over a critical sequence of time. Similar to the *first move stadium* the management concentrates on the *macro* as well as *micro* management issues entirely. In sense of the *macro* management all e-Learning assumptions within the specific organization finds an comprehensive assessment and re-design not at least because of general re-orientation and business re-design in the target organization. This may also lead

to the re-design of specific e-Learning programs as well as *micro* management approaches and assumptions.

Considering these stadia, it is obvious that the need for a *mixture of methods* and therefore for the *instruments* exists. Abstract management *methods* and their relating *instruments* are in focus of the *Cybernetic e-Learning Management Model* are *Strategy Management, Process Management, Project Management, Maturity Management, Controlling* and *Quality Management*. Table 8 gives an overview over the mapping of these methods, the relating instruments with the use cases e-Learning management is typically applied in.

Management Methode	First Movers		Goals	Instruments
	Yes	No		
Strategy Management	y	n	Definition of the e-Learning Strategy for reaching the overall organizational goals.	- D&T Strategy and Curriculum - Instructional Strategy - Technology Roadmap - Service Sourcing Strategy
Business Process Management	y	y	Definition of activities, responsibilities and interlocks (organizational & activity-driven) for the, for e-Learning necessary activities.	- Individual e-Learning Process Model - e-Learning Organization - Analysis - Optimization - Performance Measurement
Project Management	y	y	Management of e-Learning activities under consideration of time and budget goals	- Activity Planning and Time Scheduling - Resource Management - Project Review - Budget and Result Tracking - Project Meetings and Gate-way Management - Change Control Board
e-Learning Maturity Model	y	y	Measurement of capabilities and maturity of e-Learning in the specific organizational setting.	- ex post measurement of e-Learning situation - Benchmark of maturity - Deduction of optimisation activities
Balanced Scorecard	y	y	Reporting of performance of e-Learning and simulation of e-Learning performance by changing assumptions and learning parameters.	- ROI calculation - Reporting - Simulation
Quality Management	n	y	Management of the e-Learning content as well as system quality.	- Quality Gate-ways - Quality Measurement - Quality Reporting

Table 8. Mapping of management methods to use cases, goals and instruments

IV. Conclusion and Further Research

The mid-termed case study research which insights and results are expressed through this document might be seen as a good progress for the overall research goal of investigating the success of e-Learning and derived methods and instruments for science and practice.

The *Cybernetic e-Learning Management Model* provides a framework for the structured and straight handling of e-Learning as a complex issue in a complex world of international acting organizations. It respects the fundamental elements, addresses the complexity of reality and directs this to *manageable* success paths. This document shows the creation of the model. The created model is for organizations do show the character of international activities and complex facets in socio-ethical, technical, institutional as well as pedagogical field. The structure and insights coming from this research might the e-Learning approaches and systems exist in different stadia within such organizations.

In further research...

- the model might be tested for applicability and further detailing in its elements (especially on the instruments and tools level) as well as proving the general approach,
- the constructs of the mentioned success paths have to be investigated in further detail that will be respected in future releases of the Cybernetic e-Learning Management Model.

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Author Biography



Bernd Hilgarth did his diploma in business administration and computer science at the University of Applied Science Amberg-Weiden, Germany. Within his Ph.D. research he concentrated on the effectiveness of e-Learning and its management in international business organizations. He combines his profession as business consultant for large-sized and international acting companies with the research at the University of Jyväskylä/Finland (Dept. of Computer Science and Information System) since 2006.

ORIGINAL PAPERS

VI

SOCIO-ETHICAL SUCCESS PATH OF E-LEARNING - AN ANALYSIS REPORT ON CASE STUDY RESEARCH OF E-LEARNING MANAGEMENT

by

Bernd Hilgarth 20.07.2011

Proceedings of the IADIS International Conference
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SOCIO-ETHICAL SUCCESS PATH OF E-LEARNING – AN ANALYSIS REPORT ON CASE STUDY RESEARCH OF E-LEARNING MANAGEMENT

Bernd Hilgarth

Department of Computer Science and Information Systems
Agora, 40014 University of Jyväskylä

ABSTRACT

e-Learning offers a high potential solution for cost-effective and high quality training in international acting organizations like BMW Group. In continuous to the previous research work this paper offers the results on an in-depth investigation of the influencing factors were observed within an *Action Design Research* respectively the output of the *Case Study* research was done with BMW Group in its international sales organization from 2003 till 2009 (see Hilgarth, 2010-2). The herein described observations and interpretations are subsumed in so-called *Success Paths* for e-Learning as part of the overall *Cybernetic e-Learning Management Model* (Hilgarth, 2011) which provides the framing theory. The goal of this work is to describe the concept of *e-Learning Success Paths* in general as well as to make aware about the importance of influencing factors are in the *socio-ethical* domain. An *e-Learning Success Path* is a typical cause-effect-chain belongs to design, production, launch, execution and evaluation of e-Learning. The underlying case study analysis provided 3.290 pairs of correlation between observed influencing factors (so-called e-Learning Critical Success Factors) with success indicators (so-called e-Learning Key Performance Indicators) in four domains: *institutional, technological, pedagogical* as well as *socio-ethical*. Only 71 out of the 3.300 total calculated pairs (2,2%) show high correlation (*Pearson r > .600*) with high significance (significant at the <0.01 level – 2-tailed). Out of this set of correlations 7 influencing factors are identified as relevant for the *Socio-ethical Success Path*.

KEYWORDS

e-Learning Success Path; eL-CSF; eL-KPI; Case Study Research; e-Learning success management and evaluation model

1. INTRODUCTION

e-Learning and its use in international acting organisation show different success. Coming from a multidisciplinary standpoint the effects of e-Learning does depend on different elements might be respected in different steps and processes are typically for deciding, designing, implementing, using and assessing a technology enhanced educational solutions like e-Learning. Researching on the complex of e-Learning success management by doing *Action Design Research* (Rossi, 2005) and using a long-termed *Case Study Research* within BMW Group shows also the existence of a set of factors do influence the success (or failure) of e-Learning in the international context of distributed and multi-cultural target group. At the same time indicators are mentioned in multidisciplinary literature do exist and work as *barometer* for the success (or failure) of e-Learning in that situations (Hilgarth, 2010-1). The *Cybernetic e-Learning Management Model* as illustrated by Hilgarth (2011) provides a holistic and systematic framework for investigation and management of e-Learning in such organizations. It meets the general characteristic of a management approach which follows the basic understanding of *systemic-evolutionary* management of complex situations for e-Learning in international acting organizations (Malik, 2006). e-Learning in international acting organizations shows complexity and needs the management amongst the lack of all information is needed for management without uncertainty. The philosophical goal of e-Learning as part of an organizational system is to support the *economic viability* of the organization. The *Cybernetic e-Learning Management Model* underlies the further consideration of the idea of *e-Learning Success Paths* might be understood as an extension and evolution of this previous work and not as a substitution of it. e-Learning in international acting organizations is a multi-facet topic which has to be handled in times of first implementation but also in

sense of life-cycle in a continuously manner. e-Learning (and its substituting terms) in the context of the here described model subsumes it as a *technological software solution*, a *pedagogical-didactical concept*, an *instrument for knowledge management*, a specific *e-Learning program* and/or as an *Information System solution like a Learning Management System*. Considering *e-Learning Success Paths* are beside the typical *e-Learning Phases and Processes* as well as *e-Learning Success Domains* the core element of the model. The paper is structured after (Ch. 2) the description of the underlying research method, process and used instruments and techniques; (Ch. 3.1) the general introduction into the concept of *e-Learning Success Paths*; followed by (Ch. 3.2) the interpretation of observed *e-Learning Critical Success Factors* (eL-CSFs and its conjunction to *e-Learning Key Performance Indicators* (eL-KPIs)) within the *Socio-ethical Success Path* provided by the case study work. The document closes then (Ch 4) with a final discussion of limitations and need for further research in this field.

2. RESEARCH METHOD

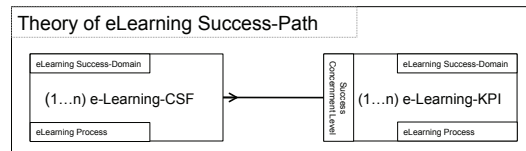
Case study research in manner of qualitative research is the dominating research strategy of this work. Reaching the goal of valid and reliable results, *data* as well as *methodology triangulation* was used. This means the use of different data sources (two in length and situation varying cases) as well as mixed methods/techniques (participatory observation, interviews, statistical analysis, taking field notes etc.) for investigation of intended research question. The research process started with a design phase, the initialization of the case study in the BMW Group organization, data gathering, the data consolidation step, the analysis as well as the interpretation of the gained information like described in chapter 3 of this paper. The case study design includes two use cases at above-mentioned organization in the time of 2003 till 2009. These use cases includes the activities within the international field of BMW Group including 3.300 licensed retail shops as well its sales organization with subsidiaries and sales regions. In sense of *data triangulation* two cases contributes to the initial research goal of investigation of e-Learning success in empirical, organizational context. Data gathering happens through accompanying the cases and journalizing all relevant observations (interviews, field notes etc.), case data were gathered in a structured process. Main instruments (resp. techniques) for this data gathering process were *participatory observation* (see also Bell, 1993) with making of *field notes* or *recording own actions* for occurrences (178 project meetings, 560 eMail conversations, 14 trainings instructions) in project work. The mentioned research design and position of the author allowed a more *“natural”* observation than explicitly conducting of *quasi-experimental* research. Finally the raw data sourced an amount of 1.2GB file space. Through the structuring of the data by the *case event classification*, 40 samples (29 in ETK Blended Learning, 11 in IPAC-Q) exist for further analysis. For doing this structuring a Microsoft Access™ database was used; the statistically analysis are done by using SPSS software. Altogether this data analysis was used for interpreting the results in qualitative way and using as much as possible via “quantification of use case observations”.

3. OBSERVATIONS AND RESEARCH RESULTS

3.1 Introduction into theory of e-Learning Success Paths

Knowing the existence of the above-mentioned elements of *eL-CSFs* (*critical success factor*) and *eL-KPIs* (*key performance indicator*) and its characteristics next its relationship is in the focus of this paper. This report provides information on so-called *eLearning Success Paths* (as element of the Cybernetic e-Learning Management Model) represents a consolidated view on *cause-effect-chains* between both elements. As in Figure 1 illustrated, an *e-Learning Success-Path* is a typical cause-effect-chain expressed through the calculated correlation and the characteristics of the factor and indicator pair. Therefore it shows a typical theory including concepts and relationships (Gilbert, 2002).

Figure 1: Basic theory of e-Learning Success Paths



A *e-Learning CSF* does logically relate to one *e-Learning Success Domain* and one or more than one (1...n) *e-Learning Phases and Processes*. The influencing factor relates to one or more than one (1...n) indicator expressed by a pre-defined metric. The theory concentrates on the core paths which will lead, based on the cognition provided by the case study work to success or failure of e-Learning. Further research the chains between these success chains might be considered. Within the case study a set of 71 cause-effect-correlation pairs were observed which can be clustered after the four domains; institutional (29), pedagogical (13), technological (14), socio-ethical (12) and general (not directly to one of the domains concerning cause-effect-chain, 3). Next the *Socio-Ethical Success Path* is described as one exciting field further investigation regarding e-Learning in international context.

3.2 Observations and Interpretations on the Socio-Ethical Success Path

The *socio-ethical* domain deals with *socio-, individual- and culture-driven* issues do influence the usage and the effectiveness of e-Learning programs in international acting organizations. It is logical to imagine that this domain does have enormously influence especially by using e-Learning programs for international trainings as done in the analyzed cases at the BMW Group. Topics are seen within this area follows the basic investigations of Hofstede (2001) and his understanding of *cultural consequences* do exist by differences in values, behaviors, institutions for organizations across nations. In time of *globalization* and the progress of using collaborative media like Internet or Twitter issues like the *digital literacy* should be minimized but still are existent for respecting it in deciding and designing of e-Learning programs. The case study underlies the research here has shown that socio-ethical differences like *language-differential, learner diversity, educational culture differential, learning style differential, reasoning pattern differential, high-and low-context differential or social context differential* influences the effectiveness for e-Learning (Edmundson *et al.*, 2006). Also in this domain Khan's findings and topics (*social and political influence, cultural diversity, bias, geographical diversity, learner diversity, digital divide, etiquette, legal issues*) show fully adequateness. It might be stated that the socio-ethical diversities may occur at the different levels of individuals or institutions. Twelve success paths are described and underpinned by examples coming from the observations and interviews for this *socio-ethical e-Learning Success-Path*.

- The creation of *adequate interactive content for the target group which consists of a nice degree of excitement* has shown effects on the later *learners goals and motivation* (#1) to use the e-learning course. For example in the observed cases participants and training manager judged contents without interactivity and references to real existing occurrences as less motivating for learning. Also does *adequate interactive content for the target group which consists of a nice degree of excitement* shows positive effects on the use of e-Learning and its *instructional designs and training methods* (#2) in the training processes. For example contents are presented in the type of animations and dynamic interactions helped trainers to use self-directed learning and blended learning.
- Using *efficacy studies* in context of international target group of e-Learning (instructor as well as learner) shows different influence on the *extendibility* (#3), the *pedagogical usability of learning material* in execution of the program (#4), the *serviceability* (#5) and therefore maintaining of the program over its lifecycle (e.g. content refinement etc.) as well as the *accessibility* (#6) of e-learning programs in the international distributed target group.
- *Goal orientation* in the e-Learning projects offers space for the technological *scalability* (#7) of the e-Learning programs. Also the *innovative use of Information and Communication Technology (ICT)* respecting the socio-ethical barriers do exist in such international acting organisation provides also this opportunity for the use of the e-Learning program in different number of users and technological settings in sense of scalability (#8).

- The *innovative use of ICT* on the other hand enables also the organisation and responsible role content maintenance to change and refresh contents in an easy way. For example this does reduce time for a re-production and publishing of *timely Content* (#9).
- Respecting *legal issues* like trademark and software licensing for used software elements within the e-Learning program in an early stage of e-Learning projects does show the *existence of adequate, quality-assured concept paper* (#10) address this issues to respect for launch and use.
- *Respecting content differential* coming from different subject matter understanding in different sub-organisations in e-Learning programs during the production or in the launch and adaptation phase, leads to observation of better *availability* (#11) of the e-Learning program in the organisation. Considering it in another way around, not respecting these content differentials led to the situation that the e-Learning program was not approved and published in some groups.
- *Respecting cultural differences* like language, educational background, power and distance, computer literacy in the framework, the design, the launch as well as the use of e-Learning programs for training has shown higher *training effectiveness* indicated by decreasing number of calls regarding the understandability of the e-Learning program (#12).

4. FURTHER RESEARCH & CONCLUSION

This research report attempts to bring in a first structure into the multi-complex issue of *success paths* as part of the *Cybernetic e-Learning Management Model*. Summarizing this, first especially in international acting organizations the *concept and content of e-Learning programs might respect cultural and individual learner differences*, secondly modern Information & Communication Technology might be used to enable *adaptation activities* (minimum for contents, maximum for teaching and learning styles) covering these diversities and at least (thirdly) the effects of *respecting content and cultural differences* are the *availability and acceptance of adequate content and training material* which leads to *training effectiveness* for the whole organization. The limitation of this work lays in the one-dimensional consideration of the success path from the *socio-ethical* point of view. For establishing the concept further research and cases are necessary.

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ORIGINAL PAPERS

VII

**BPM@KMU -
DESIGNING E-LEARNING FOR THE INTRODUCTION OF BPM IN
SMALL- AND MEDIUM-SIZED ENTERPRISES**

by

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BPM@KMU – Designing e-Learning for the Introduction of BPM in Small- and Medium-sized Enterprises

Johannes Kröckel¹, Bernd Hilgarth²,

¹ Institute of Information Systems, University of Erlangen-Nuremberg

² Department of Computer Science and Information Systems, University of Jyväskylä

Abstract. Business Process Management (BPM) becomes more and more relevant also for small- and medium-sized companies (SME's). Today's strategies and approaches for the implementation of BPM rely on methods and tools mainly developed by and focused on large enterprises but less on the needs of small- and mid-sized organisations. With the BPM@KMU project the Institute of Information Systems of a Bavarian university conducts together with the Virtual University of Bavaria (VHB) and a set of SMEs a project which aims on an efficient implementation of BPM in such organisations. Considering e-Learning as an enabler or tool which matches existing barriers for the implementation of Business Process Management, this paper offers a case study report on the observations when designing and implementing the BPM@KMU e-Learning program guided by the *Cybernetic e-Learning Management Model*. The paper considers first project results and shows, that e-Learning can address the heterogeneous maturity and previous knowledge about BPM by an adequate set of instructional as well as technological strategies and concepts.

Keywords: Business Process Management; e-Learning; BPM@KMU; Case Study; Case Adaption

1 Introduction

Business Process Management (BPM) encompasses and integrates a variety of concepts and methods for strategic alignment and operational improvement of business processes in enterprises. Since the implementation of comprehensive BPM is associated with high costs, especially large companies rely on BPM concepts. Besides missing means, these concepts are rarely considered by SMEs due to a lack of knowledge and experience. For that reason, a knowledge transfer project for SMEs funded by the European Union and the Free State of Bavaria is set up. Coordination is carried out by the Virtual University of Bavaria and the Institute of Information Systems of a Bavarian university.

The project BPM@KMU aims to convey an adapted, practice-oriented concept for Business Process Management in small- and medium-sized companies. Therefore, theoretical knowledge from academia and companies' best practice experiences are combined. For instance, following the IfM [14] statistics for existing SMEs in Germany, a number of nearly 3.7 million companies exist which can be reached best

by media-driven learning resources like e-Learning. Therefore, knowledge transfer will be carried out as a modular e-Learning course using a Moodle-based learning platform. This enables participants to access predefined resources as well as to develop and discuss new resources collaboratively. Thereby, theoretical and practical content will be offered as a basis for company- and sector-specific adaptations.

Existing drawbacks of e-Learning such as its anonymous instructional design and lack of socio-interactive elements (in sense of *Change Management*) will be compensated by a variety of instructional design approaches e.g. blended learning concepts [15], the use of collaborative learning concepts or social-media (e.g. discussion boards or videoconferencing) [16] as well as by other facilitating concepts like individual coaching.

The paper at hand aims to give an overview of experiences made throughout the first steps of the project. Therefore, the research design and the case setup are described, firstly (section two). Subsequently, an overview about hurdles and barriers being faced during the introduction of Business Process Management in small- and medium-sized companies is given (section three). Afterwards, the framework being used during the conception of the e-Learning program is introduced and adapted to the characteristics of the BPM@KMU project (section four). Last, a report on the recent results of the project is given (section 5).

2 Research Method and Design

This work shows a case study report. The instruments for data gathering within the case study are participatory observation, face-to-face meetings and interviews. In this context that means, that the project is observed during its first stages providing first experiences and results.

The project “BPM@KMU - Business Process Management for Small and Medium-Sized Enterprises” was accepted as a partial project for the 2010 funding round of the European Social Fond. The call for proposals addressed projects that support knowledge transfer between SMEs and academia. For Bavaria the lead partnership was transferred to the Virtual University of Bavaria (VHB) which is a merger of all Bavarian universities sharing e-Learning courses for a large variety of topics. A special focus was placed on SMEs with locations in less developed areas of Bavaria.

The proposal for BPM@KMU was submitted by a Bavarian university along with three Bavarian SMEs. One of them is a regional provider of asphalt concrete materials located in the north of Bavaria near the Czech boarder. The heads of the about 15 man in size company are very interested in testing the opportunities of BPM to analyze and improve internal processes. A second company based nearby Erlangen develops customized solutions and professional services related to IT. The third company is a manufacturer for all kinds of cables with about 20 employees located in Reichenbach, Upper Franconia. Both the IT service provider and the cable manufacturer have less experience in using Business Process Management and are interested in extending their knowledge.

Besides business intelligence and service science, BPM is one of the core competences of the Institute of Information Systems. The Institute has gathered years

of experience with it especially during inter-university projects like forFLEX as well as cooperation with providers for process management solutions.

Meanwhile a professor from the University of Applied Sciences, Amberg-Weiden as well as two further SMEs joined the project. One of them is a Pfaffenhofen based enterprise developing and providing BPM software with a special focus on subject-oriented BPM (S-BPM). The other one is a company operating in the fields of service engineering, software development processes and process maturity models located in Erlangen. Both companies have deep knowledge and experience in implementing and conducting Business Process Management. They are interested in working together with SMEs to see how they may improve their service offers.

3 Business Process Management for SME's

As described by Hammer and Champy [1] as well as Treacy and Wiersema [2] Business Process Management (BPM) is a structured method for organisations to get transparency on their own business for further improvements and optimizations. The fields of activities within the BPM approach are among others described by Hilgarth et al [12] and depicted in Fig. 1.

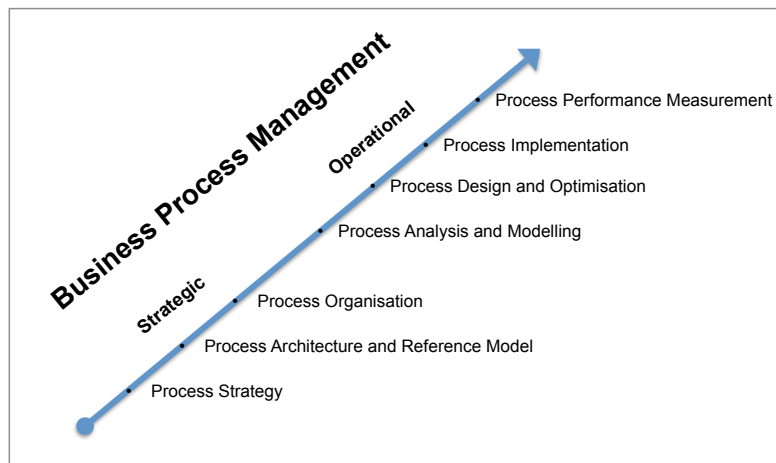


Fig. 1. BPM activity model

In large companies the activities and benefits of Business Process Management are perceived for some years. This also goes along with the understanding for *process-oriented management* in these organisations [7]. Besides the awareness of BPM numerous approaches for the implementation and operation of it have been developed over the years (e.g. KAIZEN, BPR, Lean Management, Total Quality Management – TQM). In addition to generic concepts companies like Siemens AG developed their own maturity and capability methods (e.g. CMMI [6]) for increasing the degree of BPM professionalism for all of their different business units. In contrast, BPM has rarely been considered or implemented in small and medium-sized enterprises. This

leads to questions like whether there is a minimum entry requirement or size for Business Process Management or whether advantages could also be achieved by SMEs. From the authors' point of view and experience BPM is also adequate for smaller organisations with a lower degree of professionalism. Especially when it comes to rising requirements given by cross-linked value chains in the markets (e.g. in Tier-2 mechanical engineering in automotive industry) and the needs for quality assurance and management certifications BPM can be an instrument for SMEs that meets existing requirements by balancing efforts and benefits. Regarding the statements listed in Fig. 1, in the area of strategic BPM the *Process Strategy* and *Architecture* might be considered as highly relevant; focusing on operational BPM all topics are important for SMEs. Besides, there are no limitations regarding size or characteristics given by the existing concepts of Business Process Management. As the authors experienced, BPM in SMEs shows basically the same character as in large-sized companies with exception that flat hierarchy structures allows fast decisions by the management while implementing it. Rather the limited knowledge about and the perception of BPM are the main reasons why BPM is not adopted by such organisations [8].

In addition Chong [8] describes some more constraints for the implementation of BPM in the area of SME (see **Table 1**).

Table 1. Barriers in SME for BPM implementation.

#	Factor
1	Lack of financial resources
2	Lack of time
3	Lack of support from senior management
4	Lack of information technology expertise
5	Poor knowledge of process-oriented approaches

While most business process concepts include a great variety of steps to be conducted by a company even during the implementation process they don't consider limited time and financial resources. Besides, due to the lack of business process experts and persons responsible for introducing and maintaining a business process implementation seems not to be feasible. Therefore, a lightweight variation of Business Process Management regarding the limited time and financial resources as well as the limited knowledge of employees has to be created.

Addressing the issues mentioned by Chong [8] four working hypotheses are stated:

- 1) An increased understanding of the benefits of BPM will support a successful implementation of Business Process Management (also) in small- and medium-sized organisations. Therefore, adequate information exchange and training about the *knowledge of process-oriented approaches* is required.
- 2) Besides a comprehensive understanding of Business Process Management respecting the circumstances of *time* and *financial resources* in SMEs is a crucial factor. Therefore, adapted concepts and technology-support for information and knowledge exchange have to be provided.

- 3) Stakeholder-specific reporting is important for achieving acceptance at hierarchical levels. For instance, the *senior management* might be addressed with a kind of *SME executive summary for BPM* which is transported by technology-driven knowledge and training material.
- 4) Using matured information technology is an important success factor for the implementation of Business Process Management. This means, that the introduction of Business Process Management should be accompanied by an adaption and optimization of the prevalent information technology infrastructure.

As a result of the four working hypothesis e-Learning or *Technology-Enhanced Learning* shows an adequate approach to address most of the existing barriers in an efficiently way. It should not be expected that a set of e-Learning modules summed up in a course may solve the entire existing issues that deter SMEs from implementing BPM. But it might be expected as one central concept for a structured information and communication policy while implementing and conducting BPM in SMEs. An adequate employee training program with e-Learning will show following benefits:

- 1) Using a web-based platform for providing the e-Learning contents enables designated employees of SMEs to access the BPM training program.
- 2) Module-oriented curriculum implementation allows target-specific learning paths, e.g. senior executive vs. employee-oriented curriculum.
- 3) By using an online available learning management system the inter-company exchange of BPM related information and collaboration for example through training exercises is possible.
- 4) Innovative e-Learning software tools (e.g. lecture-on-demand) help to address different types of learners (e.g. *visual* vs. *auditory*) and enables individual learning reflection.

Considering the barriers for SMEs as well as the opportunities provided by e-Learning, the project BPM@KMU was initiated a Bavarian university and the Virtual University of Bavaria (VHB) in association with local SMEs.

4 Adaption of the *Cybernetic e-Learning Management Model*

Using e-Learning for this specific subject of BPM in SMEs shows the need for structured and coordinated activities for the design, implementation and production of it. Beforehand describing the specific results of the BPM@KMU e-Learning solution in Ch. 5, this section aims on the description of the in Fig. 2 depicted *Cybernetic e-Learning Management Model (CeLMM)* as a descriptive framework [10] helps to identify and respect necessary and critical steps and influencing factors in the preparation phase.

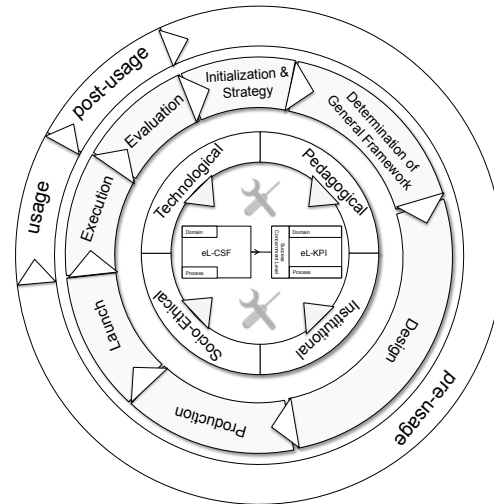


Fig. 2. Overview *Cybernetic e-Learning Management Model*

The *Cybernetic e-Learning Management Model* covers a framework for the management of e-Learning in organisations, mainly for internationally acting ones. It aims for transparency of typical e-Learning *phases & processes* [11], *success domains, success paths* as well as the needed management methods and instruments for e-Learning [10]. The model bases on a long-termed study and matches the need for professional e-Learning management in different situations.

Using the presented model helps the BPM@KMU project team to address relevant issues for *initialization, determination of the general framework and design* of the BPM e-Learning course. It shows a holistically bias by respecting issues for e-Learning in different *success domains* (e.g. *institutional, socio-ethical, pedagogical and technological*). During the phases of initiating, determining and designing of the e-Learning program, the e-Learning critical success factors listed in Table 2 should be considered. Therefore a learning path considering the critical success factors as well as the barriers of SMEs has to be developed.

Table 2. Typical e-Learning Critical Success Factors in Initiation, Determination and Design referring to Hilgarth [10]

e-Learning Critical Success Factor
• Professional e-Learning project management
• Respecting language differential in international target group
• Support cooperative and collaborative learning settings
• Respect direct communication to and feedback from target group
• Do comprehending audience analysis
• Involve powerful organisational instances in e-Learning process/project
• Make high-quality learning material available by adequate ICT
• Assure continuously management of content up-to-datedness as well as of communication and marketing for the e-Learning course

- Do content analysis with subject matter experts
 - Respect in general cultural diversity in target group
-

In the succeeding sections a closer looking is taken on the different critical success factors considering the BPM@KMU project clustered after its regarding *success domain*:

- ***Project management and organisational setting – institutional domain***

One important issue is a professional management of the e-Learning project similar to other organisational or IS projects. Another success driver for e-Learning – still existing in SMEs setting – is the consideration and involvement of powerful organisational instances like the senior management. This also includes the determination of clear responsibilities and roles within the project as well as recording a project and status report. Besides responsibilities for the initial project the role and organisational setting for continuously content update and management have to be determined.

- ***Respecting cultural and language diversity – socio-ethical domain***

E-Learning is often proposed for international target groups. For this, *language differences, content representation, content selection and adaptation processes* as well as *differences in educational and school background and learning style* might be respected in the early stages. For the BPM@KMU project in a first release German SMEs are addressed. Hence, no intercultural differences have to be addressed yet. Nevertheless, expanding especially for internationally operating companies should be considered. Besides, the different point of views of organisations of different branches, sizes and levels of experience have to be considered. This issue is regarded as one of the most critical success factors of the e-Learning program.

- ***Instructional settings and design – pedagogical domain***

One important way of interaction between students and advisors is the direct communication as well as direct feedback to actions performed by the participants. This type of communication provides a fast way of interaction which allows participants to get customized answers to their questions. A second way is the interaction between the participants. Previous research on e-Learning success in organisations shows the positive influence of collaborative aspects. Therefore, a platform allowing participants to communicate and work collaboratively is needed. Using such a platform enables participants to learn, discuss and develop their own adapted contents. This is especially important for the BPM@KMU project. While other e-Learning programs mostly focus on learning of facts the named project focuses on the creation of adapted way to introduces Business Process Management. Therefore, it is important for every participant to think about the best way for introducing BPM in his or her own company environment. On the one hand this requires to think about the characteristics of the own company. On the other hand it is especially important to share the experiences and ideas from different company environments for building up a company adapted best practice.

- ***Audience analysis and curriculum – institutional and socio-ethical domain***

The target group of the BPM@KMU e-Learning program are *senior executives* as well as *regular employees*. This is due to the fact that in smaller companies the senior management is much more involved in the implementation of Business Process Management than in larger enterprises. Besides, tasks are not well-defined in SMEs. That means employees have to fulfill a variety of strategic and operational tasks at the same time. Another issue is the companies structure itself. SMEs can show heterogeneously characters concerning the number of employees, its revenue structure as well as its business subjects. They act as profit organisations at local markets as well as within globalized partner networks (e.g. supply-chain networks with Asia-Pacific contractors). The internal organisational structures vary between flat hierarchy and highly functional structures. These facts should be considered while setting up the e-Learning program. Therefore it is important to create a program covering generic facts as well as an SME adapted way of implementing and conducting Business Process Management. The BPM@KMU project tries to address these issues by building up an e-Learning program allowing participants to enter the course contents where they experienced lacks of knowledge and where they find guidance to their problems. This means that not all contents of the course will be considered by all participants. Rather, the participants will be guided through their own learning paths by their needs.

- ***Content analysis and design – pedagogical domain***

The central subject of the e-Learning course is the introduction of Business Process Management. For this, the BPM activity model like the one illustrated in Ch. 3 offer a good general structure for the curriculum. The development of the content might respect the heterogeneous BPM experience in the target audience. A BPM subject expert with experience in small- and medium-sized organisations (e.g. a business consultant or a team consisting of BPM researchers and experienced BPM users/employees coming from a SME) might guide the content development process. Use cases and exercises should respect the mind-set and experience of the target group. In addition, a special focus should be set on the time restrictions named in Ch. 3. That means, the duration of the chapters should not exceed the participants time resources. Content has to be provided in a modular structure. This enables the participant to decide which chapters have a higher priority and which ones could be neglected. Contents should be provided in different formats. Besides textual contents visual and auditory ones have to be considered, too. A combination of all of them might result in a more varied course and therefore in a higher acceptance by the participants.

- ***Technology analysis and tool design – technological domain***

Because of the fact, that SMEs are not able to introduce their own learning management system (LMS) without any limitations of budget, time and knowledge, the e-Learning program should be operated at a hosted learning environment. Therefore, each organisation or specific learner has to have an internet access through a computer. The learning environment should be accessible outside a SME's local network. This allows employees to use the program from any place they want (e.g. at home after regular working time). This also means, that the e-Learning program

should be usable in an easy way to reduce time being spent learning how to use the e-Learning platform and its various tools.

For focusing the relevant aspects during the creation phase Table 3 shows a checklist was developed respecting the above-mentioned barriers for BPM introduction in SMEs. The checklist is structured after the typical e-Learning phases and processes which are mapped to the relevant activities and roles (responsible or involved). It aims as a structured guideline for the project team.

Table 3. Instantiated e-learning management checklist for BPM@KMU

Item	Process	Regarding sub-processes	Activities	Roles & Responsibilities			
				Owner	Process-Manager	Process-Performer	Invoiced
1	e-Learning Initialisation and Strategy	1.1 Initialisation 1.2 Identifying e-Learning Stakeholder 1.3 Defining e-Learning strategy and goal-setting 1.4 Analysing e-Learning requirements	1. Checking of participants and stakeholders in SME. 2. Writing a ESF request for BPM@KMU describing strategy and goal. 3. Write a first outline for the BPM contents. 4. Outlining of IT-technical e-Learning requirements.	SME Management	University Erlangen-Nuremberg/wi2	e-Learning Analyst	BPM Expert
2	Analyzation and determination of the General Framework	2.1 Analysing external context 2.2 Analysing personal resources 2.3 Analysing e-Learning target group 2.4 Analysing of institutional context 2.5 Analysing e-Learning equipment 2.6. Determining project timeline and budget	1. Identification, description and validation of external (law, economical, social, trends and policy of education) issues affecting eLearning and will be affected through eLearning. 2. Analysing (identification and description) of personnel resources (roles, competencies, skills, formal qualification and availability) are given in as-is situation and affected by eLearning or will affect eLearning concept. 3. Analysing of eLearning target group respecting socio-cultural and social factors, individual attitudes, motivation for using of eLearning, skills and previous knowledge, self-efficacy and role. 4. Analysing Organisational structures, process organisation, business model, internal politics and cultural issues, learning culture and significance of education and learning in eLearning target Organisation. 5. Analyzing the technical as well as infrastructural conditions are affected through or will affect the use of eLearning. 6. Conducting project planning for the eLearning project respecting the issues of time, financial budgets and contracting with vendors.	SME Management	University Erlangen-Nuremberg/WI2	e-Learning Analyst	SME management SME employees SME IT Management
3.	Designing e-Learning	3.1 Designing e-Learning targets 3.2 Designing content 3.3 Define didactical/methodological concept 3.4 Definition of e-Learning roles and responsibilities 3.5 Define Organisational design 3.6 Define technological design (request for proposal - RFP) 3.7 Define media and interaction design 3.8 Define application of media 3.9 Define e-Learning communication concept 3.10 Define test and examination concept 3.11 Define technical and maintenance and operation concept	1. Definition of BPM training targets and competency model. 2. Definition of BPM content including topics/courses, length and depth. 3. Selection and combination of didactical concepts, selection of adequate methodological concept. This includes instructional models, curriculum, learning scenarios as well as social interaction and collaboration methods for SMEs. 4. Definition of Organisational framework are relevant for educational processes. Includes components learning/teaching destination, time for learning as well as overall program length. 5. Definition and description of technical concept respectively of requirements for eLearning software, interfaces as well as definition of the involvement of given IT infrastructures of SMEs. 6. Definition of the design concept. These are media design, layout, color schemata as well as screen design. 7. Definition of media and its usage, functionalities, target group, learning targets, learning contents, rules and standards. Criteria for the usage of media are: a. presentation and distribution of information; b. collecting and filtering of information; c. processing of information and interaction; d. constructive illustration of learner-own results; e. performance too-set; f. communication. Methods are: effect analysis, working and learning place analysis. 8. Definition of communication and interaction concept for inter-company exchange.	SME Management	University Erlangen-Nuremberg/WI2	Content Author Content/Media	BPM Expert SME IT Expert

5 BPM@KMU – from the analysis to the e-Learning solution

This section describes the first results of the e-Learning program BPM@KMU. The report is structured after the three areas; the *institutional* issues by describing the project setup and determination of the organisational issues (1); the *pedagogical and technological* issues by illustrating the instructional design and the set of tools chosen for the program (2); and the *socio-ethical* issues addressing the heterogeneous setting of target group in SMEs by development of specific BPM curriculum (3).

(1) BPM@KMU – the organisational and project setup

Starting in January 2011 the project comprises a total duration of two years containing a start-up phase as well as two course terms divided by a course improvement phase. Last, an evaluation phase for analyzing the final outcomes is added. Especially the start-up phase requires a strong interaction between the university and the SMEs for building up an optimized learning program for the SMEs' needs.

At the preparation time of this paper a first meeting between representatives of all enterprises and the university has taken place. The meeting has shown that due to different demands of the SMEs a common understanding of Business Process Management and the course's goals has to be created first. Therefore, all parties agreed that the individual modules of the course are created under the leadership of the Institute of Information Systems and are subsequently discussed by the SMEs.

(2) Lecture-on-demand, exercises, face-to-face meetings and forum and chats

The e-Learning course is provided on a Moodle-based learning management platform containing a variety of resources and possibilities of collaborative cooperation. One of them are lecture-on-demand packages. For that, a player implemented by the Institute of Information Systems and tested during several semesters is deployed. It offers a synchronized combination of slides, lecturer video and table of contents. This enables users to navigate through the recording targeting specific topics. The player will be used as the main technology for the transfer of theoretical knowledge. Besides, the entire content will be provided as text documents and slide collections which allow the participants to print out the contents and take them away or write down their own notices on paper. While theoretical backgrounds will be kept as short as possible case studies are used to show participants the relevance of the learned topics. Therefore, case studies are applied to guide participants from the theoretical foundations to an adapted solution for their own company. The discussion of case studies will be carried out by a set of collaborative tools such as chats, real-time text editors and video conferences. Especially the basics of Business Process Management have to be understood clearly. Consequently a review of learned knowledge is in some parts of the e-Learning course mandatory. For this reason, checking of knowledge can be carried out by short-time online exercises. Proven free tools like Hot Potatoes are easily implementable and provide a wide range of exercise types. Following illustration provides an overview over the chosen pedagogical and technological e-Learning components.

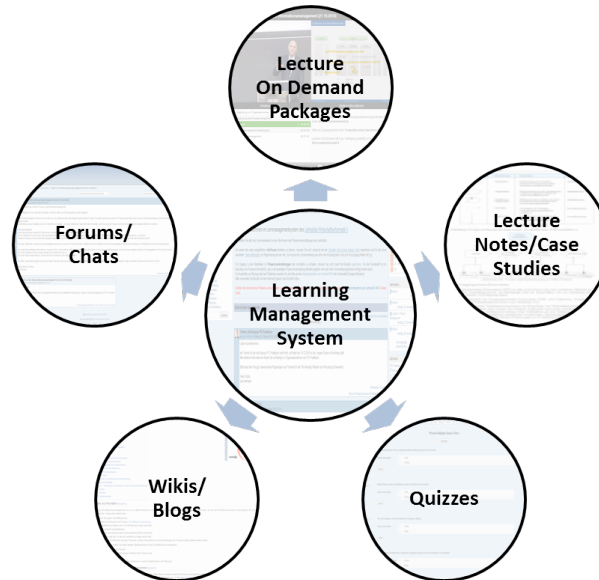


Fig. 3. Instructional-technological elements of BPM@KMU e-Learning

(3) Curriculum – BPM contents and target-specific entries

The learning program is separated into nine sections. The sections are depicted in Fig. 5.

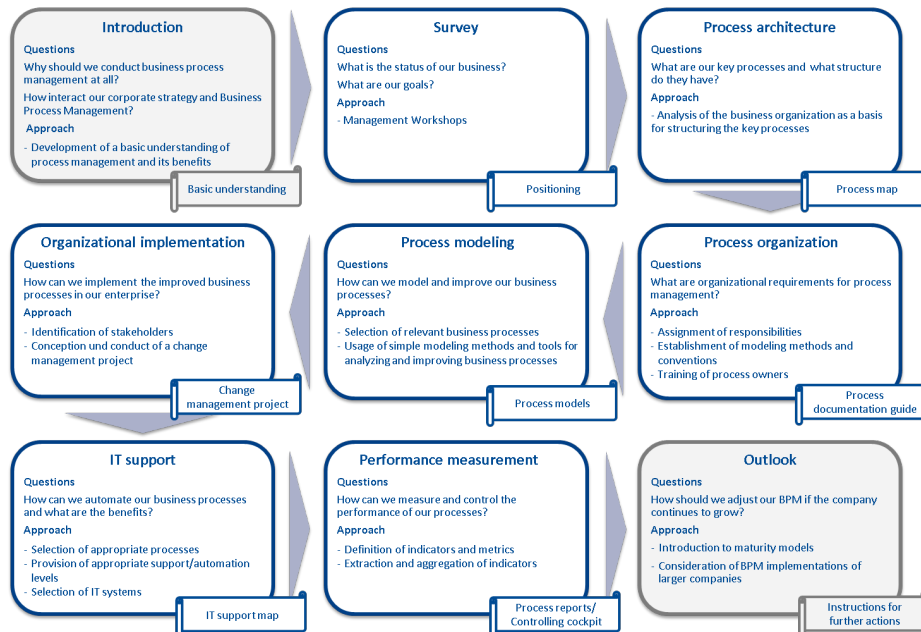


Fig. 4. Overview curriculum

The first section is an introductory chapter that imparts basic knowledge about Business Process Management. The section is especially suitable for participants having only less knowledge about BPM. After conducting a survey about the company's BPM readiness including the positioning of the company (section two), section three aims to provide participants information about the process architecture. Therefore, a clear understanding of the processes in the considered company as well as their structure is important. As a result of this section, a process map should be achievable. The section "process organisation" covers topics like the assignment of responsibilities and the selection of modeling methods and conventions. After working through this section a process manual containing information about the introduction of BPM can be created. Process modeling (section five) deals with the modeling and optimization of business processes. Therefore, relevant processes have to be identified and the methods for analyzing and optimizing business processes have to be applied. During the organisational implementation (section six) the newly modeled business processes have to be implemented in the company. This implies identifying the stakeholders and setting up a change management project. Subsequently, IT support for selected business processes has to be implemented (section seven). Hence, suitable automation approaches have to be chosen and the levels of automation must be determined. The section performance measurement will guide the participants during developing a small performance measurement that will help them to keep an eye on relevant business processes by continuous monitoring. Finally, a last section is set up, that sums up the learned content and gives a comprehensive overview on Business Process Management.

At this point should be noted, that the recommended curriculum developed during the first phase of the BPM@KMU project might be observed regarding its adequateness and completeness for the specific target group of SME's. If improvement potential is detected, the curriculum will be adjusted accordingly in subsequent phases.

6 Conclusion and further research

BPM comprises not only for large enterprises but also for SMEs a relevant set of methods and management instruments for the improvement of their business structure. Therefore, existing barriers for the implementation of BPM in small- and medium-sized enterprises need to be addressed by innovative approaches. This paper has shown how these issues might be addressed during the initiation, planning and design of an e-Learning program for BPM in SMEs. Regarding the current phase of the project a first reflection of the proposed four working hypotheses can be done:

- 1) E-Learning programs like BPM@KMU offer the space for an adequate information exchange and training about the knowledge of process-oriented approaches.
- 2) With the creation of centralized e-Learning solutions financial and time constraints for the implementation of BPM in small- and medium-sized organisations can be lessened. Learning about BPM therefore can happen in a

flexible way and mostly independent from timely restrictions or shortfalls through time consuming of face-to-face training sessions.

- 3) Especially during the planning and designing stage the need for target specific information transfer to the senior management of SMEs is a crucial factor. This is addressed by the programs different levels of detail. Role specific entries into the learning path as well as flexible technology like the lecture-on-demand are possible solutions for this.
- 4) A flexible and module-like design of the curriculum allows the inclusion and exclusion of specific topics like contents regarding information technology and its link to Business Process Management.

The illustrated *Cybernetic e-Learning Management Model* offers a pragmatic framework for the planning, designing and implementation of similar projects. On the one hand it provides a descriptive structure for the implementation of an e-Learning program. On the other hand typical success factors for e-Learning in heterogeneous target groups like the of the BPM@KMU project are provided. The use of supporting instruments like checklists facilitates the project team with its work.

In future research the effects of BPM@KMU should be observed via a mid-termed study of the management and learner experience as well as the change of the BPM maturity in the participated organisations. On the other hand some specific issues have to be observed in the project and might be improved in future releases of the BPM@KMU e-Learning program (e.g. the in Ch. 5 mentioned adequateness and completeness of the curriculum). The long-term duration of BPM@KMU provides possibilities for these investigations.

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