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Design of Customized Corporate E-Learning

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Abstract

Today's educational institutions deal increasingly with external commercial organizations in connection with e-learning deliveries. Production and delivery of e-learning to corporations is different from both traditional campus education and online distance education for independent online students. This study discusses challenges related to e-learning production and delivery for corporate customers. Consequently we have identified appropriate guiding principles that should contribute to the specification of a model for design of customized corporate e-learning. We place particular emphasis on collaboration and stakeholder involvement, formative evaluation, utilization of technological opportunities, and relevant training for all parties involved. Moreover, we propose to benefit from concurrent design principles to achieve effective and efficient multidisciplinary collaboration in the design process. The study is based on primary data from two different projects where an educational institution offers e-learning for external corporate customers. In addition we collect secondary data from available research literature on e-learning and supplementary data from colleagues with long experience in this field.

Keywords: Online distance learning, corporate e-learning, e-learning design, concurrent instructional design, stakeholder involvement, formative evaluation.

Introduction

Corporate e-learning can occur in different forms and there are several challenges to consider. How do we ensure that our customers get the e-learning program they want? At the same time, how should we fulfill the requirements for effective and efficient production and delivery, where sharing and reuse are means to achieve benefits?

In the e-learning business there are several market domains with different providers and customers. The e-learning providers emphasized in this study could be categorized as academic research and development institutions. This means that the e-learning provider has a focus on effective and efficient use of e-learning technology for rather complex educational programs. This is in some contrast to commercial e-learning providers who have to focus more on making profit (Hoppe & Breitner, 2004). In this study, the academic institution emphasizes production and delivery of e-learning education ordered by external organizations. The customers are external companies and organizations who want approved academic courses giving credits, but also a certain degree of business customization. In one of the cases we focus on, the customer wants vocational training in a non-academic context, e.g. without student credit points.

We use the term corporate e-learning to indicate that the deliveries are ordered by external commercial organizations. In the following reading, the external commercial organization will also be called customer or client.

We have collected primary data from two projects which are carried out by our academic institutions. These projects are both in the category of corporate e-learning, but they are quite different with respect to the customers' requirements. The assignment from one customer was to deliver self-paced e-learning for vocational training. The other customer requested a customized higher educational program at bachelor level with student credit.

The purpose of this study is to highlight what should be considered when an educational institution develops a model for customized corporate e-learning production and delivery. The study is based on three categories of research data: Primary data was collected from two projects briefly described in the method and material section, secondary data was taken from the e-learning literature and supplementary data was gathered using general knowledge and skills required through earlier production and delivery of e-learning at the academic institutions.

The study is exploratory and the empirical data are meant to illustrate some challenges that must be considered in the context of customized corporate e-learning production and delivery. We place particular emphasis on the stakeholder involvement, formative evaluation, collaborative processes and possible support tools. In the future, we plan to further describe and practically test procedures and processes to get more firsthand knowledge regarding a new model for design of customized corporate e-learning.
In this article, we start by describing the research method and material used in the study. This section contains a brief description of the involved academic institutions and the two current projects, as well as data collection and data analysis methods used in the study. Then, we have one section concerning production issues and one section concerning delivery issues related to customized corporate e-learning. Finally, we discuss what we should emphasize when the goal is to develop a design model for customized corporate e-learning.

Method and Material

This study uses a mixed method approach which emphasize on qualitative data collection (Creswell, 2003). Primary data were collected from two specific projects. TISIP research foundation and Faculty of Informatics and e-Learning at Sør-Trøndelag University College were the educational providers in the projects.

- The TISIP foundation was established in 1985. TISIP performs educational research and development work. TISIP offers courses to

corporations, public agencies and academic institutions. The foundation cooperates with the Faculty of Informatics and e-Learning at Sør-Trøndelag University College. TISIP is involved in several research projects regionally, nationally and internationally (TISIP, 2009).

- The Faculty of Informatics and e-Learning (AITeL) educates specialists within computer information technology. There are currently 475 students at the ordinary programs with 40 employees at the faculty level. AITeL is one of the largest Norwegian providers of distance learning university college courses via the Internet (Sør-Trøndelag University College, 2009).

Two Different Customized Corporate E-Learning Projects

Two projects (BITØK and ANIMALIA) are used as a basis to discuss challenges related to e-learning production and delivery in this study. These projects are very different when we consider what kind of e-learning solution the customers want. What they have in common is the fact that the customer is a commercial corporation or company who wants to buy customized e-learning from an academic institution.

- In the BITØK project the customer wanted the academic institution to develop and deliver eight customized e-learning courses. All eight courses had to be a part of an already existing bachelor degree, offered by the institution. It was also a demand from the customer that students who had completed all courses in the program should be able to continue on a full bachelor program afterwards. The idea behind customizing already existing bachelor courses was that this would help to make sure that the courses would be sustainable and reusable. The courses should be based on online synchronous lectures using web-conference software. The recordings of the lectures had to be available for streaming and downloading, together with text based training material and corresponding mandatory exercise work administrated by a learning management system (LMS). The LMS was used to present all learning material related to the courses. In addition the local corporate organizer had to set up an independent portal for administrative purposes. It was also important for the customer that the courses could be followed by the students in a flexible way, since most of the students were company employees with many job related tasks and limited spare time. The eight 7.5 credit courses were to be offered over a two year period, with two courses in parallel each semester.

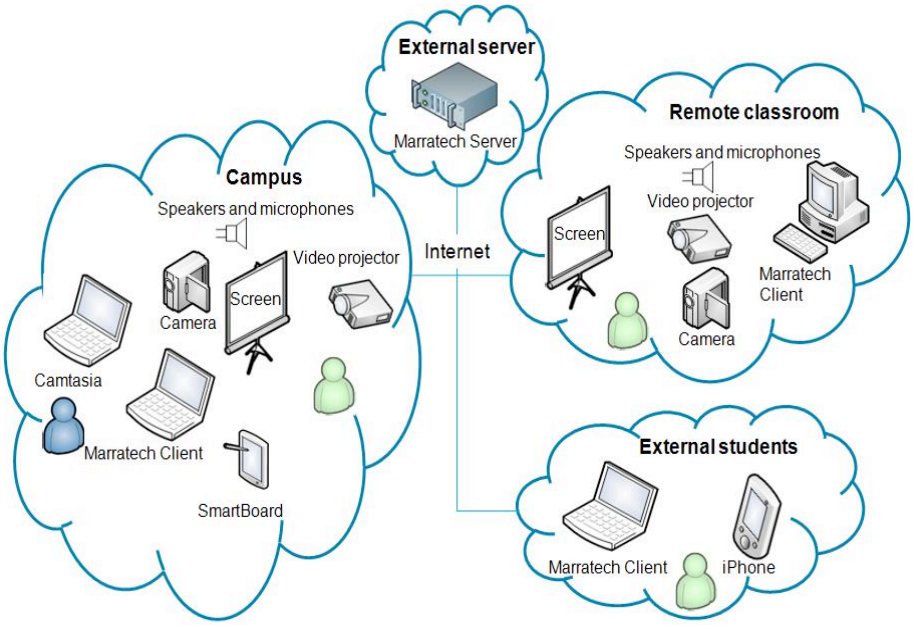

Fig. 1 – Infrastructure for lectures in the BITØK project.

- In the ANIMALIA project the assignment was to develop a self-paced e-learning course based on web pages containing, text materiel, oral presentations, video presentations and animations. The evaluation program in the course was based on multiple choice tests and the course participants received instant feedback on their answers. The subject domain area for this e-learning course was unknown to the educational provider, meaning that the customer had to contribute as a subject matter expert (SME), and therefore help to describe the content and develop a suitable knowledge model for the training course. The course, once developed, had to be reusable without involvement from the customer or the educational provider. The course was only meant for the customer's employees. This training course was in the area of vocational training for slaughterhouse workers.

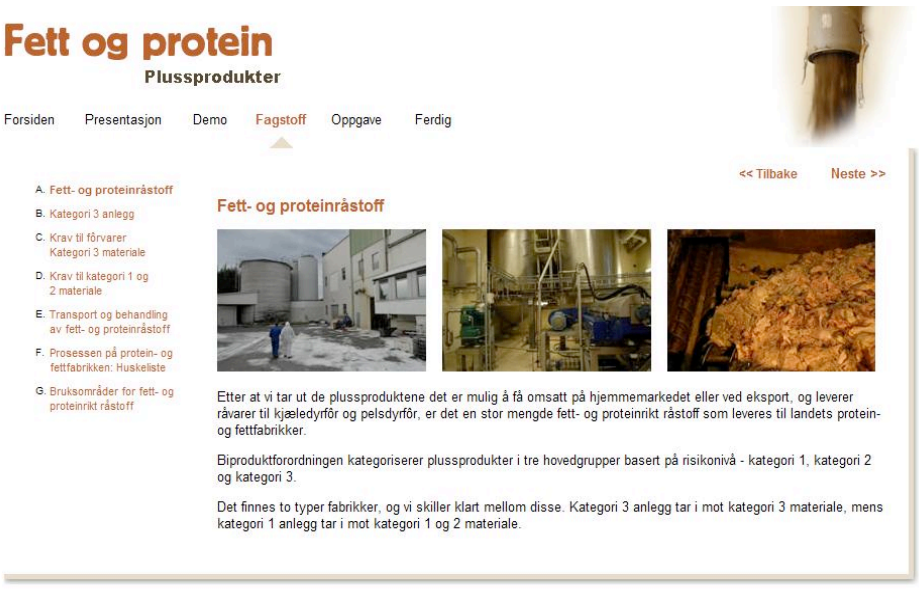

Fig. 2 – A web page from the self-paced e-learning system developed in ANIMALIA.

The Qualitative Research Approach

Qualitative data were collected from the BITØK and the ANIMALIA project through, project documents, scheduled interviews with involved project participants, and analysis of open (free-response) questions from two questionnaires. In addition, we have conducted informal interviews with relevant project participants, and we have taken part in some of the project activities. Moreover, we have used external material such as books and research articles covering relevant topics for this study. This includes the article by Mikalsen, Klefstad, Horgen, & Hjeltnes (2008) which has previously been published from the ANIMALIA project.

The four instructors who lectured the first semester in the BITØK project, and the ICT-technician who was responsible for the technical equipments, were interviewed in semi-structured interviews. Each of these persons was interviewed once and the interviews took between 30 and 70 minutes. In these interviews, data were gathered about: (1) relevant background and experience, (2) preparations before the program started, (3) preparations before the net-based lectures, (4) problems or challenges faced the first semester, (5) positive experiences and what has worked well the first semester, (6) possible adjustments and improvements, (7) issues to be retained and reinforced, (8) fulfilment of the students' expectations, and (9) if the program had been sufficiently adapted and customized with respect to needs of the customers? All interviews were taped and transcribed into text protocols.

The Quantitative Research Approach

Two electronic questionnaires were given to the students who followed the two courses in the BITØK project in the first semester. These questionnaires were conducted primarily to get an indication of how the students perceived the overall quality in the courses. A mix between free-response questions, dichotomous questions, multiple-choice questions, checklists and rating questions with the Likert scale were used. The instrument designs for these questionnaires were based on Cooper & Schindler (2008, chap. 12 - 13). It was also used several free-response questions that have been used in the qualitative analyzes afterwards. The questionnaires were distributed to the students as part of the mandatory exercise program. All 33 students answered the first questionnaire and 29 students answered the second questionnaire. At the end of the semester 27 students took the final exam in one or two of the courses in the first semester of the BITØK project.

Summary of Research Method and Material

The research method used in this study collected data from three different sources.

- Primary data from the two projects carried out by the academic institutions. Mainly relevant project documents, interview protocols and questionnaires.
- Secondary data collected from the e-learning literature. A lot of research literature on e-learning in conjunction with higher education is available; and relevant elements in relation to e-learning and customization for corporations are drawn out in this study. The search strategy included electronic databases and hand searches of some published books on e-learning. We have used databases like ACM Digital Library, IEEE Xplore, ISI Web of Science and CiteSeerX. In addition, we have used Google Scholar that provides a simple way to broadly search for scholarly literature across many disciplines and sources (Google Scholar, 2009).

- Supplementary data taken from the academic institutions. They have both offered Internet-based distance education since 1994. This represents a lot of expertise and experience but it is also a challenge to take advantage of this knowledge in the research, since much of it is tacit knowledge among the employees (Leonard & Sensiper, 1998).

Production of Customized Corporate E-Learning

E-learning or distance education are terms that cover several very different techno-pedagogical realities. Technical media used in distance education can help to categorize the scheme (Williams, Nicholas, & Gunter, 2005), but we should also be concerned with the instructional needs of the students, rather than unambiguous focus on the technology itself (Sherry, 1995). Paquette (2004) defines six teaching model paradigms to help classify different e-learning or distance education schemes. If we categorize the projects in this study with the help of these categories we could define BITØK as a mix between a distributed classroom and an on-line training project and ANIMALIA as a mix between a performance support system and a hypermedia self-training project.

The distributed classroom in BITØK is realized with web-conference software and all participants are present at the same time, synchronously. In addition, video recordings of all lectures are made and transferred to the LMS. These can later be downloaded and played in the browser (AVI files) or with an iPhone (MP4 files). Learning events are presented live by the instructor and a variety of instruments such as sound and image transmission, slideshows, application sharing features and smart boards are utilized. The on-line training dimension covers the asynchronous mode and this part is mainly supported by services provided via the LMS.

ANIMALIA is a mix between a performance support system and a hypermedia self-training project. Individual and autonomous learning are central in ANIMALIA, and it focuses on competencies and skills that are directly related to the daily production at the workplace.

Educational designers are likely to have a different approach when they are in a university context with traditional students, compared to a more business oriented context with external organizations as clients. Nevertheless, they almost completely agree on central principles for educational design, and they claim it is important to start the design process from the needs of the learners in all cases (Kirschner, van Merrienboer, Sloep, & Carr, 2002). If you are to describe the needs of the learners you must have a close dialogue with the customer. Corporate customers are heterogeneous and their needs vary in the different corporations. A corporation must consider the individual needs and balance these needs up against the corporation's total needs. Corporations are also different from educational institutions as a learning arena, since they do not have learning as a primary objective. Learning in corporations aims to serve the goals and needs for the business and is a mean to achieve competitiveness, profit, efficiency, etc. (Welle-Strand & Thune, 2003). The production of sustainable e-learning programs adapted to corporations must therefore balance the different needs of the educational institution and the corporation on an organizational level. Moreover, it is important that we meet the needs of each individual and the organization as a whole.

The different stakeholders have to be involved sufficiently when e-learning is developed, and this applies increasingly for customized corporate e-learning. Designers of corporate e-learning (business designers) are much more client-oriented and emphasize the importance of client involvement in the process to a much greater degree than university designers (Kirschner et al., 2002). The importance of involving the stakeholders is also confirmed by several of the

sixteen instructional design principles from Visscher-Voerman (1999), which is also referenced in Kirschner et al., (2002). The stakeholders receive special attention in principle three, six and seven.

- Principle three. "During the design process, designers should pay as much attention to creating ownership with clients and stakeholders, as to reaching theoretical or internal quality of the design." (Kirschner et al., 2002, p. 97).
- Principle six. "Designers should not only ask clients and (future) users for content-related input, but should also give them the right to decide about the design itself." (Kirschner et al., 2002, p. 97).
- Principle seven. "A useful means to help clients, partners, and other stakeholders to choose a solution and to formulate product specifications is by showing products from former projects." (Kirschner et al., 2002, p. 97).

We aim to develop and deliver e-learning that meet the expectations and we need to involve all relevant stakeholders in this context. In addition, it is important to conduct evaluation activities early in the process, and to integrate this formative evaluation within the design and development process (Visscher-Voerman & Gustafson, 2004; Davidson-Shivers & Rasmussen, 2006). The Web-Based Instructional Design (WBID) Model by Davidson-Shivers & Rasmussen (2006) has special focus on evaluation. In the WBID Model both formative and summative evaluation is planned early in the project. Moreover, the formative evaluation is an integral part of the design and development process and it is important to determine whether the upcoming system actually meets the requirements and needs in the best possible way. This formative evaluation should be iterative and continue during the whole project period. Summative evaluation is conducted after full implementation, which is also common for traditional Analysis, Design, Development, Implementation, and Evaluation (ADDIE) models for instructional design. In the same way, as for the stakeholders, we also find the importance of making the evaluation embodied in several of the design principles from Visscher-Voerman (1999). Formative evaluation receives special attention in principle eight, ten and fourteen.

- Principle eight. "In order to clarify product specifications, designers should spend their time on carefully planned formative evaluations of early versions of a prototype, rather than on an elaborate preliminary analysis." (Kirschner et al., 2002, p. 97).
- Principle ten. "For efficient and effective formative evaluations, several (about three) sources and several (about three) data gathering instruments should be used." (Kirschner et al., 2002, p. 97).
- Principle fourteen. Designers should conduct formative evaluations themselves. (Kirschner et al., 2002, p. 97).

Our primary data from the BITØK and ANIMALIA projects also confirm that it is important but difficult to involve stakeholders in the project, and to conduct formative evaluation along the way. This is important because it is only the stakeholders who know what they actually want, and it is the stakeholders who ultimately determine whether the system have met their expectations.

Our experience, particularly from the ANIMALIA project, was that a lot of changes had to be performed late in the project. The reason was too little stakeholder involvement along the way and too little formative evaluation integrated into the design and development phases of the project. Necessary information and material with sufficient quality was not made available early enough. This led to major changes after the first delivery when the first summative evaluation was conducted (Mikalsen et al., 2008).

Some of the weaknesses in the BITØK project can also be traced back to low stakeholder involvement. Both students and lecturers in this project believe that there is a great potential for improvement of the customization of the e-learning courses, but this requires a closer dialogue and more involvement from the corporate employees.

Experience shows that it is difficult to involve the external stakeholders. This is especially the case with the stakeholders who have the adequate decision-making authority. It is therefore extremely important to utilize the available time well, when you are in dialogue with these stakeholders. It is important that the customers really understand the existing opportunities, so that they can better evaluate them against their actual needs, when decisions are to be made. Likewise, the provider needs to understand the subject domain, as well as customer requirements concerning the business, organizational needs, individual needs, technical factors, etc. "At a general and highly abstract level, the process of organizing and planning learning activities needs to take into account the following considerations and interrelationships: why learning activities are being planned; who the learners are; what is to be learnt; how it is being learnt; where and when the learning activities are taking place; and, what the effects are." (Welle-Strand & Thune, 2003, p. 186).

Delivery of Customized Corporate E-Learning

The challenges in relation to deliveries vary between e-learning projects in different categories. The ANIMALIA project deliveries were self-paced e-learning courses where the challenge by far is limited to technical matters, and requests for changes that occur after the system is put into production. The main focus when we describe the challenges in connection with delivery of e-learning in this section is related to the BITØK project category, which is a combination of distributed classroom and on-line training. Several researchers have described relevant success factors in connection with delivery of e-learning, online learning, distance learning, web-based learning, blended learning, etc., and this covers a very broad range of challenges. In this section, however we restrict ourselves primarily to challenges associated with distributed classroom and on-line training projects.

Based on a literature study, five independent categories of distance education success factors are identified by Menchaca & Bekele (2008). These are: (1) *technology-related factors* that represent the infrastructure and the tools used, and how the varied use of technology in different contexts affects the learning environment, (2) *user characteristics* and the importance of having experienced participants (instructors, facilitators, students, etc.) that can leverage the technology, (3) *course-related factors* that generally refers to quality issues, such as structured material, well formulated learning objectives and clearly defined expectations, (4) *learning approaches* that include pedagogical conditions as well as online collaboration and interactions between the participants, and (5) *support services* that include administrative and technical support for both students and instructors. Other researchers also discuss success factors for e-learning, and the five factors mentioned in Menchaca & Bekele (2008) are also mentioned by other researchers. Several researchers underline the importance of an optimal functioning technology. Involved parties must learn to master the technology and aim for varied technological usage during the course period (Webster & Hackley, 1997; Volery & Lord, 2000; Easton, 2003; O'Neill, Singh, & O'Donoghue, 2004). "The most important factor for successful distance learning is a caring, concerned teacher who is confident, experienced, at ease with the equipment, uses the media creatively, and maintains a high level of interactivity with the students." (Sherry, 1995, p. 343).

Moreover, it is interesting to observe that several researchers studying the instructor's role in online distance learning point to increased time and workload. Required work is significantly larger in an online and distributed classroom environment, compared to equivalent face-to-face teaching on campus (Smith, Ferguson, & Caris, 2002; Easton, 2003).

Primary data from the BITØK project confirms that the technology must work perfectly and that instructors need training in order to exploit the technology. The instructors use significantly more time in an online and distributed classroom environment, where customized e-learning is delivered to external customers, compared with corresponding lectures for traditional campus students.

In relation to the technological solutions, 100% online data feed availability while the lectures take place is crucial. It is important to install and use the technical equipment correctly and test the configuration in advance. Our study shows that sound quality is really important in a distribute classroom environment. The whole experience will be spoiled if the sound is not good enough. The image quality is also important and a means to achieve good communication with students. Large screens providing good image quality helps the participants in the interaction between the instructors and students, and this stimulates the communication. In addition, the instructor must be confident with technical equipments, such as the tools embedded in the web-conference software (slide presentation tools, application sharing features, smart board features, etc.), if they should be able to utilize the possibilities and vary the use in relation to pedagogical objectives.

Our study identified several factors leading to increased workload for instructors in a distributed classroom environment. First, the instructor must spend more time to organize the customization and find examples that are relevant for the companies' students. Secondly, the teaching method must be adapted to the technology and the pedagogical setting. It takes time to prepare the lecture, and it is extremely important to maintain a good flow through the whole lecture, when the students participate through distributed classrooms. Thirdly, the examples must be prepared in a different way. This may particularly be the case in practical subjects where it is natural to, send hardware components around the physical classroom or let the students physically configure software settings. Generally, this shows challenges concerning transference of constructivist teaching techniques from traditional classrooms, to distributed classroom environments. Last, but not least, the increased preparation time is related to the video recordings that will be distributed via the LMS. Filming leads to increased preparation time, since the instructors to a greater extent feel they must think through what to say in advance. This challenge increases further if there are requirements concerning reuse. Smaller recorded parts from a long lecture could function as an independent and reusable entity, and this requires thorough preparation.

In the same way as we need to be aware of the workload for instructors, we must also think of the students. Attending a course in addition to a full job is challenging. The BITØK project study showed that about 75% of the working students felt comfortable taking one course (7.5 credits) per semester, while this percentage dropped below 30% when we asked about two courses (15 credits) per semester.

Towards a Model for Design of Corporate E-Learning

Production and delivery of customized corporate e-learning can be a complex process and it requires the involvement of several different stakeholders (Sherry, 1995; Kirschner et al., 2002; Visscher-Voerman & Gustafson, 2004). Providers and customers should meet because the customer must understand

the opportunities that exist, and the provider has to understand customers' requirements. It is only through a unified collaboration between these parties that a common understanding can be established. E-learning programs are sometimes very complicated and there are many different challenges that influence each other. Companies have business needs and financial constraints that act as overall guidelines. Moreover, they must consider organizational needs and the needs of the employees. Sometimes the stakeholders from companies are the only ones who know the relevant subject domain for the e-learning system. Companies also tend to have restrictions in relation to technological choices, adoption to existing technical infrastructure, security policy, etc. On the other hand, the educational provider must take responsibility to represent the knowledge, develop the pedagogical program, develop the learning material and arrange the delivery of the whole e-learning package to the customer.

In total this represents many different disciplines and we need to involve people in different roles in the cooperation. The clearest roles in this context are perhaps: (1) SMEs who are experts on the subject domain, (2) instructional designers who prepare the pedagogical program, (3) instructors who are responsible for course delivery, (4) students, (5) customer's decision-makers who may be responsible for various areas such as economy, the subject content, pedagogical guidelines and technological guidelines, (6) the provider's decision-makers, (7) developers and graphic designers, (8) engineers who are responsible for production, (9) quality assurance people who are responsible for ongoing formative and final summative evaluation, and (10) the project manager who is responsible for the project within the approved frame of time, cost and quality.

Several models for the production of e-learning are based on a problem-solving process with a series of defined phases like Analysis, Design, Development, Implementation, and Evaluation (ADDIE). Research shows that instructional designers have different approach to the ADDIE models. This depends on experience and background among the involved project participants, as well as the different kinds of products that are developed. Visscher-Voerman & Gustafson (2004) discusses how the approaches to ADDIE phases are for different instructional designers, and presents four different paradigms and rationalities related to ADDIE. Although the customers to some degree are involved in all these paradigms: (1) *Instrumental Paradigm*, (2) *Communicative Paradigm*, (3) *Pragmatic Paradigm*, and (4) *Artistic Paradigm*, we find the greatest degree of customer involvement in the *Communicative Paradigm*. Here the customer works as a co-designer and co-decider in addition to provide needed information. In this way, the customer is drawn deeply into the production process. "Ultimately, we believe that all of the paradigms and their accompanying perspectives, tools, and techniques can and do play useful roles in designing effective, efficient, relevant, and engaging instructional experiences. We believe that all practicing professionals should be aware of the value of each paradigm, and use the one that is most appropriate for the specific situation. To do less is to be less than a complete and competent practitioner." (Visscher-Voerman & Gustafson, 2004, p. 87).

An organization that has worked with e-learning over time has a lot of tacit and implicit knowledge (Stenmark, 2001), concerning how e-learning programs should be developed and delivered. "[Designers] are influenced by their theoretical background or frame of reference." (Kirschner et al., 2002, p. 101). When something customized for a specific audience is developed, the necessary domain expertise may be missing and it may be a challenge to extract this knowledge from the customer and have it represented in the e-learning system. These are knowledge acquisition challenges that knowledge engineers have worked with over decades and several techniques and tools are developed (Boose, 1989). We can also find such techniques and tools used in

models for e-learning production. The instructional engineering model MISA contains a knowledge model to represent the knowledge and competencies to be developed in addition to the instructional model, the media or learning model and the delivery model. The MISA model is based on phases and has much in common with traditional ADDIE models. The four models (*Knowledge Model*, *Instructional Model*, *Media Model* and *Delivery Model*) are integrated and the different models evolve in parallel through the different phases (Paquette, 2004). Moreover, they have a focus on development tools related to the different models, such as the TELOS (TELelearning Operation System) Scenario Editor and the TELOS Ontology Editor that are discussed in connection with the conceptual framework TELOS (Paquette & Magnan, 2008).

The WBID Model by Davidson-Shivers & Rasmussen (2006) also explains that some stages are conjoined rather than isolated and must be performed in tandem. This is described as concurrent design, and indicates that the design, development, and formative evaluation tasks are conducted simultaneously. "With many web-based instruction projects, especially complex ones, it is not possible to complete all of the design activities for the entire project before starting development. Constraints of resources, time, and money, and the desire to be responsive to the customer suggest that concurrent design may be a good approach. Concurrent design also permits unforeseen technical difficulties to be resolved well before the final web-based instruction is completed." (Davidson-Shivers & Rasmussen, 2006, p. 172-173).

In other engineering disciplines, we also find concepts like concurrent engineering and concurrent design. This has been a research area for a long time within space technology institutions such as the European Space Agency (ESA) and the National Aeronautics and Space Administration (NASA). "Concurrent Engineering is a systematic approach to integrated product development that emphasises the response to customer expectations. It embodies team values of co-operation, trust and sharing in such a manner that decision making is by consensus, involving all perspectives in parallel, from the beginning of the product life-cycle." (Bandecchi, Melton, Gardini, & Ongaro, 2000, p. 329). Concurrent Design is the early phases of the concurrent engineering process where multifunctional teams, possibly distributed in time and space, work together for designing some product (Lonchamp, 2000). ESA established a Concurrent Design Facility in 1998 and the key elements on which the implementation was based on were a process, a multidisciplinary team, an integrated design model, a facility, and an infrastructure (Bandecchi et al., 2000).

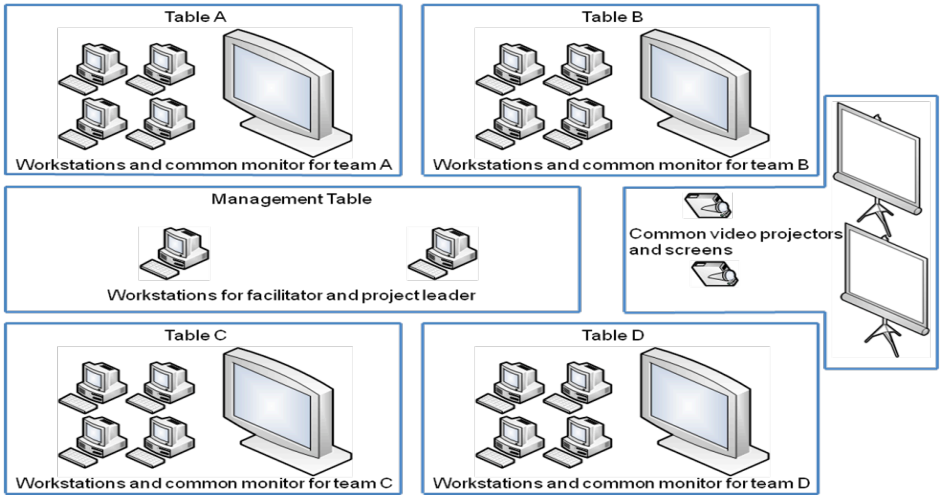

Fig. 3 – Drawing of AITeL's room where collaborative design of customized corporate e-learning is to be implemented.

Conclusion and Further Work

In this study, we have discussed some challenges related to customized corporate e-learning. When an academic institution develops and delivers e-learning for external customers, it is extra important to involve all stakeholders, and to ensure that evaluation is carried out continuously through the process. Furthermore, it is important to utilize technological opportunities, and to ensure that all involved parties receive enough training in this context. Our findings from two specific projects confirm these challenges and these findings are consistent with the e-learning research literature. However, we find little documentation on how this should be done, and this forms the basis for our further work.

We will work further to develop a new model for design of corporate e-learning. In connection with this work, it will be important to leverage existing instructional design models, but also to utilize collaborative and multidisciplinary principles from concurrent design. We will focus on: (1) the preparation of processes for customized corporate e-learning design, (2) definition of relevant roles that involves all stakeholders in the design process, (3) specification of needed sub-models that constitute a whole and integrated model for the e-learning system, (4) establishment of a facility, including software tools and hardware equipments, where the team of specialists meets to conduct design sessions, and (5) specification of an infrastructure for exchange of information between working environments at the customers site, the providers site and the customized facility.

Fig. 4 – Picture from AITeL's room where a team practices on the Concurrent Design method.

It will be important to draw on the experiences that we have described in this article. The technology must be exploited in the best possible way, we need a continuous evaluation process, we must ensure that all involved parties receive the necessary training, both in terms of the production and delivery phase, and we must find and utilize tools that are suitable in certain situations for all participants.

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