
TEACHING PRACTICE SUPPORTED BY TECHNOLOGY USE – UNVEILING ECOMPETENCE IN PRACTICE

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Introduction

This article deals with eCompetence at the individual level by examining the use of web sites by individual university academic staff. The adaptation and use of web sites is the result of a free choice of the teachers, not the result of a regulated decision by university management or course committees/study boards. eCompetence is regarded here as the actual use of web sites in on-campus teaching. It is assumed that there is a relationship between the individual staff member's conception of teaching and learning and the design and use of web sites. In other words, it is the hypothesis of the research underlying this article that the design and use of a web site reflects the intentions and beliefs of the university teacher. As a result of this relation it should be possible to explore and analyse conceptions of teaching as the underlying reason for integrating web technology into routine teaching and learning practice. The "e-practice", which can be observed within this research approach, will be placed in relation to a set of qualitatively different categories of teaching conceptions.

The empirical foundation for the paper is an extensive analysis of web sites in use by academic staff at Aalborg University. The web sites are used as a support for on-campus course teaching and lectures. The study aims at uncovering the existing e-practice at Aalborg University's on-campus study programmes through systematic research, thus creating a knowledge base for developing concepts and models for eCompetence staff development. The article introduces tentative conclusions about patterns in the use of web sites for teaching and discusses the concept of eCompetence with regards to these conclusions.

1. Embedding e-practice – Aalborg University at a glance

Aalborg University is an institution dedicated to the learning concept of *interdisciplinary problem-oriented project work*, which is a concept designed around independent and collaborative learning. Whilst the university, from its foundation in 1974, offered only a very small amount of teaching through lectures and other teacher-based activities, the general development of the pedagogical model has shifted to a larger amount of lectures and teaching, but still with the concept of independent problem oriented, collaborative learning at the core (Enemark et al, 1994). Another important aspect of the university's pedagogical and organisational tradition is the aspect of decentralisation. The 31 "study boards" at the university are responsible for the selection of methods, in which teaching and project supervision is carried out in their subject area. At the same time, the technical infrastructure of the university is also decentralised. As a consequence the university consists of approximately 18 ICT-units, and the services and platforms available to teachers and students may vary from department to department. This means that individual e-practice is situated within a certain technical infrastructure, technical support and teaching strategy of the study board. Practice and competence are contextually bound to the teaching culture and technical structure of the department and study board, and this may cause a possible difficulty in transferring eCompetence from one technical infrastructure to another and from one teaching culture to another.

Since the pedagogical model at Aalborg University is problem-oriented and project organised, it may seem contradictory to research the teachers' web sites dedicated to teaching activities as opposed to researching the students' learning processes in online learning environments, or the online activities of project advisors. However, when studying eCompetence in practice, it is important to deal with the actual teaching practice and context in which the technology is being implemented and used. Often ICT is ascribed the role of being an important catalyst for change toward *student centred learning*, referred to as the shift "from teaching to learning" (Welbers et al, 2005). eCompetence at Aalborg University is situated within a teaching practice, where all teaching somehow relates to the independent collaborative learning of the students, but since "traditional" teaching has increased over the years, it is intriguing to explore the use and role of ICT in a pedagogical setting, where this shift from teaching to learning is of a different kind. This could also indicate that it is possible to learn more about the role of ICT in this type of pedagogical setting. How is ICT used in teaching, when it may not be playing the proclaimed role as change catalyst towards greater student involvement and student activity?

2. eCompetence – Studying and Learning from Practice

Taking *practice* as the point of departure allows us to gain valuable knowledge about the driving forces of competence development and pedagogical change among university academic staff. Understanding competence development as a learning process, which takes place in an ongoing process of practising and reflecting on one's teaching (Brookfield, 1990; Schon, 1983; Dale, 1989), leaves us with a concept of competence as something which can both be *trained for* and at the same time developed in informal learning settings through *practising* one's job. The study draws heavily on the phenomenographic research approach and on basic didactical categories as a tool for analysis of the structure and content of web sites. Carrying out phenomenographic research allows us to define qualitatively different categories of the use of web sites and apply this tentative categorising to model and conceptualise patterns of competence development on the basis of a university's existing e-practice. When designing training for eCompetence, we enter the domain of locally situated competence and practice of the university staff. They have teaching experience, teaching competence and – as is the focal point in this study – an existing e-practice reflecting a contextual eCompetence.

2.1 Research method – a framework of didactical categories

Founding explorative research on an existing methodological approach, which also contains a predefined set of assumptions with regards to content and conclusions, creates a certain type of dialectic between an inductive and a deductive research method. For the actual study at hand, this dialectic unfolds as a multi-phased research project. The first research phase, which is presented here, is mainly inductive and takes its starting point in an open exploration of web sites dedicated to teaching, using only a very basic categorising as a frame of reference, Daniel D. Pratt's "General Model of Teaching" (Pratt 1992, 1998). The conclusions will primarily deal with quantitative data, but due to being based in the phenomenographic research approach, it will also be possible to pursue qualitative aspects such as the underlying conceptions of teaching and learning and how these conceptions are expressed through the design and content of web pages for teaching and learning.

3. A general model of teaching – the frame of reference for exploring e-practice

This research into eCompetence draws upon a general model of teaching, as is it defined by Canadian researcher Daniel D. Pratt (Pratt 1992, 1998). This conception of teaching draws on didactical categories, which are generally accepted as a framework for didactical practice, teaching practice as well as educational research.

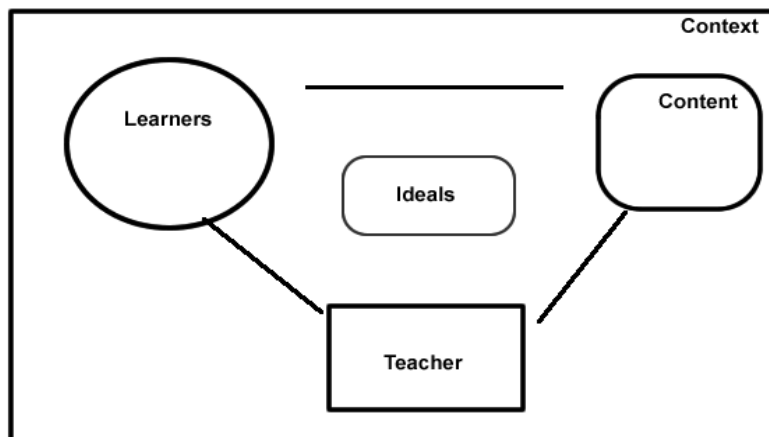


Figure 1: A General Model of Teaching, adapted from Pratt 1992, 1998

The model illustrates the relations between the main actors, activities and the primary materials as well as the surrounding contextual frame of a teaching situation. At the centre of the model is the category “Ideals”, which are defined as the overall learning outcome, which is held by the teacher, the institution and the specific cultural tradition. Ideals would, for example, be “to become independent and critical citizens”, “to obtain as much knowledge as possible”, “to become independent learners”.

A main point in Pratt’s research is that it is impossible to deal with the term ‘teaching’ neutrally (Pratt 1992, 1998). In the model, this is represented by placing “Ideals” at the centre and by placing “Teachers”, “Learners” and “Content” in a “Context”. Everyone conceptualises ‘teaching’ by ascribing the term with certain subjective meaning, depending upon experiences with teaching, ideals toward teaching, and within certain cultural understandings. Another equally vital point is the phenomenographic axiom that there is a limitation to the qualitatively different ways in which we perceive of any given phenomenon in our life world (Marton, 1998, 1988; Prosser, 1999).

In Pratt’s work, this limitation in qualitatively different conceptions of teaching is defined by the coining of five different conceptions, which have emerged on the basis of a study of 253 teachers in adult teaching in 5 different countries (Pratt 1992, 1998).

3.1 Researching web sites within the framework of a general model of teaching

From this general model of teaching, it is possible to outline a research framework for analysing web sites dedicated to teaching. The main didactical categories “teacher”, “learners” and “materials” derive from Pratt’s model and serve as analytical units to identify in web sites. The analytical units are utilised in the research framework as tools to observe the teaching and learning environment in the web site. Everything in the web site is considered to be the “digital representation” of the teacher and his/her structural and content design of a course environment (Bækkelund, 2003)¹. Thus, the total web site is in this sense metaphorically the teacher, and the web site is interpreted as the teacher’s design and use of a metaphoric classroom. The learners are not directly present in the web sites, since they have not taken part in the design of the web site and the content of the course. They can however be identified both through speech acts in the site and through the content and the structure of the site. Speech acts reveal implicit presence of students by observing, for instance, whether the language is directed toward the learners or whether the language contains speech acts such as questions, demands, assignments or invitations to interaction. The content and structure of a web site indicates the intended role and activity of the student by observing whether the site contains materials organised in a given

¹ This perception of a web site was introduced into the 2nd research phase by a teacher being interviewed about his web site and his e-practice

linear structure or whether the learning environment constitutes an open explorative environment with no given pre-defined structure. Also, observing whether the site contains interactive materials, which invite active engagement by the learners, would indicate the intended activity for the students. But for the category “teacher”, as well as the category “student”, the conclusion remains that they are not *directly* observable in the web sites. Obtaining knowledge about these categories is then only possible by either interpreting the data here or by carrying out qualitative research through interviews.

This leaves us with the content, the materials, as the primary unit of analysis, since a web site contains a variety of materials to be utilised in teaching activities. The materials are also the only one of the three didactical categories, which we can access directly by observing them on the web site. By analysing the content and the materials, we gain both descriptive and interpretative knowledge. On the surface level it is possible to describe the types of material in terms of their intentional purpose, on the deeper level the materials can be interpreted in terms of different types of conceptions of teaching.

This leaves us with the following questions as a framework for analysis:

- Which types of materials are placed on the web site?
- Which types of learning activities seem to be intended in the materials?

4. The landscape of web sites for teaching – first findings

The landscape of web sites is accessed through the web sites of the 22 departments of the university. These 22 departments are accessed through the official information portal of Aalborg University, <http://www.aau.dk>. Exploring e-practice, where web sites are accessible on the Internet, calls for a purely Internet based empirical approach. If web sites are not accessible through this access point or if they require passwords to enter, they are not accessible for data analysis and are not counted as part of the landscape.

The first conclusion was drawn during the analysis itself. It stands out very clearly that “materials” is a fuzzy category and can contain very different types of teaching and learning materials. Thus, the categorising of types of materials evolved in an iterative process, where the observed data informed the analytical categories and vice versa.

The second conclusion deals with the access to information about faculty members’ web sites. Due to the decentralised structure of Aalborg University, which is also reflected into the information structure of each department, it is difficult to identify faculty members. This means that the data collection has taken place through several differently structured methods to obtain the same type of information in differently structured information contexts. When one’s goal is to obtain knowledge of eCompetence and e-practice, this finding is important. Not only are eCompetence and e-practice ambiguous concepts – even accessing information about them is not an unproblematic venture either.

The data collection is here metaphorically compared to entering a new landscape. The first task is to present the descriptive data about the landscape – how many web sites could be identified, what materials are posted on the web site and how can the materials be described in terms of qualitatively different categories?

4.1 Quantitative descriptive data – mapping the landscape

A total of 648 faculty staff members were identified. Faculty staff members include:

- professors
- reading professors
- associate professors

- assistant professors

These numbers represent 21 of the university's 22 departments. One department's information structure made it impossible to analyse, since web access didn't contain the relevant information to identify faculty staff from other staff. Other university employees with teaching responsibilities (such as PhD students, teaching assistants and external associate professors) are not included in the study.

4.2 First description: How many faculty members and how many web sites?

- Total number of faculty members having a website: 489
- Total number of faculty members having a web site dedicated to teaching: 164

This element of the data collection provides an overview of the general usage of web sites for teaching. It is evident that this use of web sites is not a widely applied practice with only 25.5 % of all faculty members having one. It also shows a surprising finding, namely that 159 faculty members do not have a web site at all, which reveals that not only do these 159 not have a web site dedicated to teaching, they do not have a web site used for presenting research profiles, curriculum vitae or other information. When dealing with the 165 faculty members who do have web sites dedicated to teaching, it must be kept into mind that these 165 are out of a possible total of 489, which changes the percentage to 33.7.

4.3 Second description: Which types of materials are placed on the web sites?

As sketched above, the categorisation of materials turned out to be more complex than first expected. On the basis of the intended use of the materials and on the basis of an iterative process through the mapping of materials of the 164 web sites, the following categories emerged. The typology presented below is still a tentative typology, which must be verified through further research.

The types of materials are:

- Plans/Overview of course
- Slides/Notes/Hand-outs
- Online literature
- Assignments/Problems
- Solutions to assignments/problems
- Multimedia and interactive files
- Collection of URL's
- Suggestion for project themes
- Evaluation form for course

The types appear on the web sites in various frequencies, thus indicating that teachers have preferred types of materials. The frequency tendency is presented in the following figure:

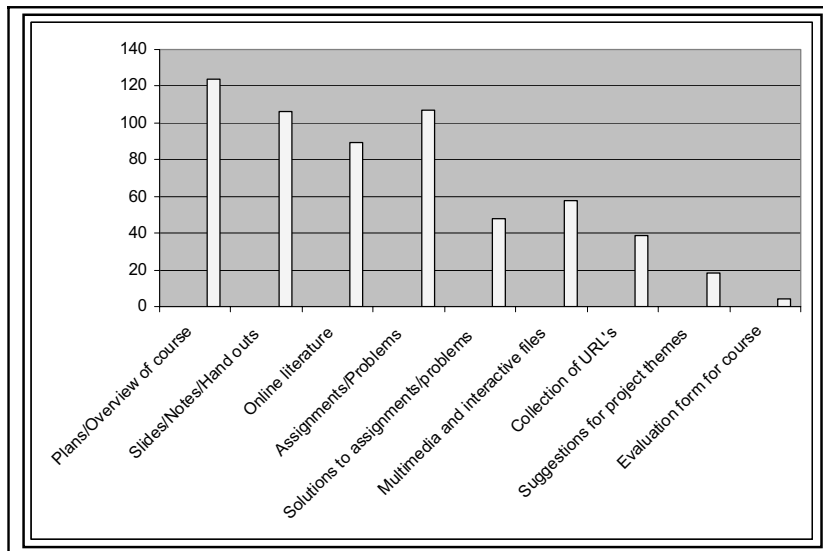


Figure 2: The frequency tendency of material types

The descriptive data analysis is elaborated here through a detailed description of the material types:

a) “Plans/overviews of course” contains the kinds of materials, which could also be characterised as the course schedule (when and where does the course take place during the semester, what is the agenda for each course module?). This type of material is categorised as *information about teaching* and thus relates more to a description of the context in Pratt’s model than to actual teaching within the context.

b) “Slides/notes/hand-outs” contains the types of materials, which are created by the teacher mainly before the course, but also sometimes during the course. These materials are considered to be a direct support for the students’ preparation for the course or a representation of the course activities for follow-up or recapture of the course. This type would be PowerPoint-slides, the traditional OHP-folios or photos of blackboard notes and scribbles. These materials are a *representation of the course content* and are characterised by the teacher’s intellectual ownership.

c) “Online literature” contains links to both online articles from literature databases and for instance PDF-documents *accessible by a click*. All online literature has been posted by the teacher as a course text collection. So this type is still intellectually owned by the teacher. The difference to the category of slides and notes lies in the degree of local embedding into the actual teaching. Where slides and notes are embedded into the local environment of one single teaching incident (a lecture or a course seminar), the category of online literature stretches across the entire teaching sequence of a semester period.

d) “Assignments/problems” contains different types of tasks for the students to solve in direct relation to the course, and the following category, “Solutions to assignments/problems” should in this regard be self-explanatory. The purpose of these categories is for students to practice the course content.

e) “Multimedia and interactive files” contains a very wide variety of materials. The common denominator for these materials is “*materials, which require some kind of active engagement from the side of the students*”. The category holds materials like streamed video clips of lectures, programming code to be dissected, spreadsheets, database files, program code for different software, online manuals, online installations, quizzes and input variables for analysis. The difference between interactive files and assignment/problems is *the degree of independence of the learners*. Analysing code or structuring data in a spreadsheet calls for a more independent problem analysis than assignments, which are handed down from the teachers. This category emerged during the research process and still needs

validating. It could be suggested that streamed video clips don't require the same type of active engagement as working with data or analysing programming code and that this type of multimedia files thus belongs in a different category.

f) "*Collection of URLs*" contains a different kind of Internet URLs than those in "Online literature". Here the materials are the main URLs, for example, of international newspapers, main web sites for companies, system development communities or online portals. As opposed to "Online literature", the teacher has not verified or justified the content of an entire web site and placed it into a relation with the other content materials for the course. "Collection of URLs" can be considered pointers or hints for students as good places to turn, if they want to explore certain areas of the course themes further. Again, there is a difference in the degree of independence of the students and in the degree of active exploration and engagement.

g) "*Suggestions for project themes*" is a category, which derives from the pedagogical model of problem-oriented project work. In some, especially early, semesters and in some educational areas, there is a tradition for the project supervisors to suggest certain themes or problems for the students to pick as their problem for the semester report. In this variation of the pedagogical model it is more appropriate to talk about problem-based teaching and learning (De Graff, 1993). It can be considered somewhat surprising to find this category of materials posted on a web site for teaching, since suggestions for project themes are usually proposed by the study board or the community of project supervisors together.

h) "*Evaluation form for course*" is also somewhat surprising to find in a web site for teaching created by an individual faculty member, since the study boards, by requirement of university regulation, are to carry out systematic evaluation of all teaching each semester. It is, as such, not an individual activity or a choice to evaluate teaching. The existence of this category could be interpreted as a special interest from some teachers to receive evaluative feedback from the students.

5. Interpreting the landscape: Which types of learning activities seem to be intended in the materials?

Returning to Pratt's general model of teaching, his research findings help us to shape the categories of materials within certain conceptions of teaching. Pursuing the relation between types of materials and indications of corresponding conceptions of teaching could point us in a direction, where knowledge of e-practice serves as an access to knowledge of eCompetence. The main focus of Pratt's research is on conceptions of teaching and the relation between actions, intentions and beliefs with regards to teaching. Pratt's work identifies five qualitatively different conceptions of teaching, which correspond with other phenomenographic research conclusions (De Graff, 1993). Of the five categories of conceptions of teaching, two seem particularly relevant to elaborate on. The findings from the web site research seem to indicate that these two conceptions of teaching exist side by side within the teaching and learning environment of Aalborg University.

5.1 Engineering Conception: Delivering Content

This conception is described thus:

"Within this conception, teaching was framed in terms of the content to be delivered. The dominant elements were the teacher and the content; the dominant relationship between elements was that of teacher-to-content, that is, the teacher's concern for and authority over that which was to be learned." See figure 3, adapted from Pratt (1992, 1998)

Within this conception, knowledge is viewed as relatively stable and external to the learner, and the teacher is viewed as possessor of the knowledge relevant to and needed by the learners (ibid.).

When transferring this conception to an analytical interpretation of the data derived from the web site research, it is possible to interpret the materials of the categories b), c), d) and e) as indicators of this conception of teaching. These categories seem to indicate an approach to teaching and a view upon the creation of knowledge similar to the Engineering Conception. With slides accessible to students before the course, a given set of literature, assignments and problems to be solved and the correct solution accessible afterwards and with these framed by a course overview, in which the teacher has defined the progression stages of the course, evidence can be found to support the conclusion that delivering content is one approach to teaching supported by web sites.

5.2 Developmental Conception: Cultivating the Intellect

The other conception of teaching relevant to the findings in the web site research is what would seem to be almost a contradictory conception, namely the Developmental Conception. It is described as:

“This conception was more learner-centred, with the instructional process focusing first on the learner’s cognitive development. Most respondents with this as their dominant conception of teaching saw themselves as facilitating the intellectual development and personal autonomy of their students. Knowledge was to be interrogated, never taken-for-granted, and authority (including the teacher’s) was open to question.” See figure 3, adapted from Pratt (92, 1998).

This conception can be interpreted from the types of materials categorised as interactive files, collections of URLs, and also the categories of assignments and solutions could be interpreted to express this conception. Assignments can be designed to prompt independent formulation of the problem to be analysed, and the apparent mismatch in frequency numbers between assignments/problems and solutions (categories d) and e)) could also indicate that there is no given solution to the assignments and problems or that solutions are to be discussed and knowledge building questioned in the classroom.

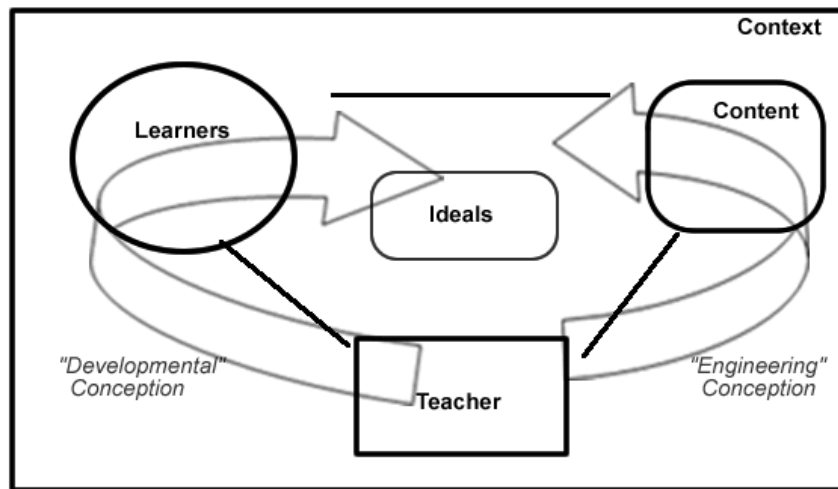


Figure 3: A Model of Teaching, adapted from Pratt 1992, 1998

6. How do these findings relate to knowledge of the concept of eCompetence?

This research unveils e-practice at Aalborg University. The e-practice in question is the use of web sites and is characterised by the freely chosen adaptation of this technology by the single teacher. This is a different type of e-practice than the use of the selected eLearning platform of the university or in a top-down strategy implementation. The difference lies in the unforced or unsupported choice of the single teacher to implement technology in his/her teaching as well as in the free creation of a web site

as opposed to finding one's feet in a pre-structured eLearning platform environment. The web sites in this data collection are the result of individual teachers designing teaching and learning environments to support their classroom teaching as a result of an active choice to do so. The data analysis can then be utilised to inform us about the unfolding of an e-practice, which has come into existence as a non-regulated change process. The frequency of materials and the categorisation of materials in this study also show how materials are selected, created and used.

These findings indicate that several conceptions of teaching exist within use of the same technology. It can be argued that the data analysis informs us about best practice examples of how to structure content and to support cognitive learning of the students – two main competencies when designing a teaching and learning environment, which corresponds with the intentions and conceptions of teaching. These conclusions could be transferred from independently designed web sites to materials and content in eLearning systems, since e-materials seem to be a common denominator in universities' use of ICT and eLearning (Seufert and Euler, 2004).

The conclusions also show that eCompetence is not about a certain template of e-practice. eCompetence, as an element of teaching competence, must be viewed as locally situated in a certain context. Thus, eCompetence must be the result of a corresponding relation between the teacher's actions, intentions for the teaching activity and the teacher's beliefs about teaching, learning and ideals for the students' learning outcome. The two conceptions, Engineering Conception and Developmental Conception, both seem to be supported by the structure of the web sites and the types of materials posted on the website.

The role of ICT as a catalyst for more student directed teaching and learning cannot be found in this study. More, it seems that ICT is used to support the teacher's intentions for a teaching sequence of a semester or a single course unit. This corresponds well with the phenomenographic notion of intentionality and contextual dependency, as it is described by among others Samuelowicz and Bain (Samuelowicz and Bain, 1992), Kember (Kimber, 1997) and Marton (Marton, 1981, 1988), where it is argued that a teacher can hold several conceptions of teaching, since the intentions for learning outcomes are relational and contextually dependent upon each teaching setting (Which subject? graduate or undergraduate course? Evaluation criteria? Lectures or seminars?). Within this understanding of teaching concepts, teaching competence and eCompetence increasingly becomes a question of competence to analyse one's intentions and beliefs about the course and utilising ICT to support those intentions. As a consequence, this reflective competence is a core element of eCompetence.

When developing training concepts, insights into e-practice could prove valuable for designing staff development courses (by presenting best practice as a catalyst for reflection on one's teaching practice) or staff development peer learning (where are the resources and existing competences to learn from?). Of course, the most important question to these research findings remains: to pose the critical questioning of the conceptions of teaching and the intentions for student learning. Does it make sense to create a web site within a Developmental Conception of teaching, where maybe an Engineering Conception would correspond more correctly with the learning outcome and the evaluation criteria? The newly adopted eLearning strategy of Aalborg University emphasises *pedagogical diversity* and *different experiences with and needs for ICT* as its keywords. This means that the use of eLearning and ICT is a decision to be made by study boards and departments by an active choice, and it also means that Aalborg University does not have an ambition to standardise teaching practice and e-practice. The ambition is to use ICT and eLearning, where it makes pedagogical and academic sense locally. Within this organisational framework it seems valid to view eCompetence as a locally embedded reflective competence.

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