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Developing a Design Methodology for Web 2.0 Mediated Learning

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Abstract

In this paper we discuss the notion of a learning methodology and situate this within the wider frame of learning design or "Designing for Learning". We discuss existing work within this broad area by trying to categorize different approaches and interpretations and we present our development of particular 'mediating design artefacts'. We discuss what can be viewed as a lack of attention paid to integrating the preferred teaching styles and learning philosophies of practitioners into design tools, and present a particular method for learning design; the COllaborative E-learning Design method (CoEd). We describe how this method has been adopted as part of a learning methodology building on concepts and models presented in the other symposium papers, in particular those of active, problem based learning and web 2.0-technologies. The challenge of designing on the basis of an explicit learning philosophy, and still trying to develop a design method or tool with a certain general applicability is discussed at the end of the paper. Experiences from a recent design workshop are described and discussed, with a focus on what specific steps have been taken in order to apply the method successfully within the EAtrain2 project as a way of enabling teachers and practitioners to collaboratively design courses. As part of the collaborative e-learning design (CoED) method and the broader learning methodology the authors held a workshop for the project partners in the EATrain2 project, and the results and inputs from this workshop will be briefly discussed in this paper and in the symposium presentation.

Keywords

Learning Design, COllaborative E-learning Design Method, Web 2.0, Mediating Design Artefacts

Introduction

As part of one of the work packages in the EAtrain2 project our research team are working on creating a learning methodology, which addresses how to adopt active problem based learning approaches and web 2.0 technologies in a range of courses on 'Enterprise Architecture'. In this final paper of the symposium on "Web 2.0 and Problem Based Learning in Enterprise Architecture Training" we therefore turn our attention towards more practical methods and methodologies for design, which will be discussed in their own right, but also draw heavily on the concepts, models and questions which have emerged from Glud et al. (2010) & Ryberg et al (2010). In this paper we present the rationale and theoretical underpinnings of our proposed learning methodology which combines insights from the area of learning design with a particular method called CoED (Collaborative E-learning Design) method (Nyvang & Georgsen, 2007). Initially we discuss the area of 'learning design' where after we locate CoED within this theoretical landscape. Then we describe how we have applied the CoED method in practice as part of an EAtrain2 workshop. We discuss how we designed the workshop, what the outcomes and insights were, and how these have then led into a more specific methodology for the continued course design within the project. In relation to this we discuss the design artefacts and templates, which are being developed and as discussed in Glud et al. (2010) we are also collecting learning practices and examples which we upload into the wiki-based community Methopedia.eu (Ryberg et al., 2008; Ryberg, Niemczik, & Brenstein, 2009).

Learning Design

Learning design is an area of research that has gained increased attention within the recent years, and very broadly stated the area is concerned with enabling educators to create, design and share pedagogically sound,

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high-quality learning designs or effective practices. One common notion within this area is the importance of learners' activity or learning activities, as summed up by (Britain, 2004):

- *The first general idea behind learning design is that people learn better when actively involved in doing something (i.e. are engaged in a learning activity).*
- *The second idea is that learning activities may be sequenced or otherwise structured carefully and deliberately in a learning workflow to promote more effective learning.*
- *The third idea is that it would be useful to be able to record 'learning designs' for sharing and re-use in the future.* (Britain, 2004, p. 2)

Even though there are many different interpretation of what constitutes a 'learning design' or a 'learning activity', there seems to be a general understanding that a learning design has a certain learning objective, has a sequential structure or flow, consists of multiple learning activities, and that there are a number of resources and/or learning supports related to the design or the activities. The relations between learning designs and learning activities are therefore often thought of as expressible in terms of nested hierarchies, where a learning design consists of several learning activities.

Whereas early e-learning research tended to focus on the development and sharing of content, the area of learning design signals a move away from an exclusive focus on delivering (digital) packaged content to students (Conole, 2007). In particular discussions of digital content have revolved around the granularity of 'learning objects, and whether these should be understood as free-floating 'digital assets' (single files such as images, videos or audio clips) or embody learning outcomes and activities. Littlejohn et al. (2008) proposes the following classification scheme to distinguish between different levels or understanding of learning objects/activities (Littlejohn, Falconer, & Mcgill, 2008, p. 759):

- Digital assets – normally a single file (e.g. an image, video or audio clip), sometimes called a 'raw media asset'.
- Information objects – a structured aggregation of digital assets, designed purely to present information.
- Learning activities – tasks involving interactions with information to attain a specific learning outcome.
- Learning design – structured sequences of information and activities to promote learning.

They stress that the first two levels are primarily 'information content', and therefore have no learning or teaching effect in isolation, but require that the 'information content' is placed within learning activities or designs (ibid.). Therefore, rather than focusing on content in isolation, the idea of learning design is to understand content as part of a flow of learning activities that students engage with, and how these flows can be represented and shared in various ways. Such representations range from purely textual descriptions to embedded elements in software systems and packages, which can represent and run pre-designed sequences of activities.

Within the area of learning design there are many ways of distinguishing between different levels of granularity, and also many interesting attempts of mapping the relations between learning designs, learning activities, learning theory/pedagogical approaches, and the particular contexts they are enacted in. The relations are interesting because one of the points of learning designs is to make teachers more reflective about their teaching practice, and how to design for effective learning by providing them with 'frameworks' for creating and describing learning designs. This also encompasses providing teachers with theoretically informed models of 'best practice learning designs' to promote better fits between 'theory' and 'practice' (Conole, Dyke, Oliver, & Seale, 2004). In this vein many theorists have worked on creating impressive mappings of the differences and similarities between various learning theoretical perspectives (Conole et al., 2004), but also more detailed schemes of how particular theories would entail different pedagogical approaches and variations in more concrete learning activities (Fowler & Mayes, 2005; Mayes & de Freitas, 2004). For a simple, but also broad way of understanding and visualising these relations, we have found inspiration in a model by (Berge, 2006), where we have added alternative descriptions in the grey column.

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Pedagogy, Learning Theory	Pedagogical Approach			
Course templates, descriptions, sequences of activities, learning designs	Course Design			
Activity structures, activities, mini-activities	Course design components			
Materials and resources	Own Material	External material	Repurposed external material	Reification of practice

Table 1: Model adapted from Berge (2006)

According to Berge (2006), the level of 'Pedagogical approach' is beyond the level of standardisation. Instead, he suggests that reuse at this level is supported by the body of pedagogical literature. Although this argument seems to be in opposition to the attempts of mapping these relations, the intention of such mappings is not to arrive at standards for design. They should rather be seen as a way providing an overview of a highly complex theoretical landscape and thus trying to reduce complexity for practitioners. Nevertheless, it does highlight some tensions which also become visible in practice. While it might be a practitioner's or theorist's dream to have prescriptive models embedded in software, which at the click of a button can generate a course and a range of learning activities congruent with a particular pedagogical perspective within a subject area, the actual practice of designing for learning is more complex and situated. As explored by de Freitas et al. (2008) more generalised frameworks and models can be useful tools in supporting practitioners' design of networked learning, but at the same time practitioners need to remodel these to make them useful, meaningful and relevant in their own contexts. Alternatively, such standardised frameworks run the risk of alienating and marginalising practitioners (de Freitas, Oliver, Mee, & Mayes, 2008, p. 38). Furthermore, 'pure' theoretical models promoting a particular pedagogy or learning theoretical perspective also run the risk of being difficult to align with actual design practice, which is often more pragmatic and dynamic, and employ a blend of approaches, rather one particular approach. These insights obviously shed a critical light on the very notion of developing a 'learning methodology' intended to support a problem based learning approach capitalising on web 2.0 practices. While our research could have created a range of more prescriptive 'innovative' learning designs based on particular interpretations of PBL and web 2.0 practices we risk marginalising the experiences and expertise of the domain experts (the partner researchers teaching Enterprise Architecture). Also, as suggested in Glud et al. (2010) & Ryberg et al. (2010) the adoption of (some) web 2.0 practices and PBL approaches might entail more fundamental pedagogical shifts or changes (e.g. radical learner centred pedagogies). These might be incompatible with practitioners' values or desires for change, but could also potentially be in conflict with institutional requirements or national policies (de Freitas et al., 2008). In the context of the EAtrain project, we have therefore adopted a more collaborative and iterative design approach, which requires mutual engagement and negotiation between educational technologists, domain experts and technical developers. Rather than further developing or drawing directly on extensive frameworks and mappings of relations between a learning theoretical approach and particular activities, we have tried to extract and distil some central tensions concerning web 2.0 and PBL, which we have translated into a number of questions, models and conceptual distinctions. These have been incorporated into the CoED-framework and the particular design of the workshop, but also in a range of mediating design artefacts and templates, which we hope can act as 'boundary objects' for mutual negotiation between the different partners in the continued, iterative process of designing the Enterprise Architecture courses. In this sense, our aim has been to provide what Conole (2007) terms 'mediating design artefacts' in the shape of 'toolkits' (*a structured resource that can be used to plan, scope and cost an activity* (Conole, 2007, p. 87)). These mediating design artefacts and templates cannot be re-represented in the paper due to space limitations, but they can be found in Ryberg, Georgsen, Buus, Glud & Davidsen (2009, p. 52-61). In the following we outline the CoED-method and then discuss in more detail how we designed the workshop, what the outcomes were, and the subsequent development of additional design artefacts.

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Developing design tools for practitioners

Learning design models often have either a content oriented ”digital asset”-approach, or a more process oriented, situated design approach drawing on the inputs and priorities of local pedagogical and domain experts. At e-Learning Lab, Aalborg University, a method for supporting the design work of practitioners has been developed and tried out in a number of different settings. The CoED method aims to support domain, qualification level and subject experts in designing targeted networked learning. Drawing on knowledge and theoretical concepts within the fields of design, systems development and collaborative learning, emphasis is on bringing focus and structure to the early stages of the design process. The method aims to develop design specifications and/or early prototypes within few hours of work, and furthermore to support the collaboration between different types of experts and practitioners. The CoED method was developed partly in the Learn@Work project and partly in other projects by researchers from e-learning lab – center for user driven innovation, learning and design (www.ell.aau.dk). In the following, the theoretical and conceptual basis for this tool is presented, followed by an explanation of how it has been used in the specific context of the EAtrain2-project.

As indicated in the definitions by (Britain 2004) the focus in learning design within networked learning builds on explicit pedagogical values or preferences; however, the process of connecting the consequences of a specific set of pedagogical values or a specific learning philosophy is often overlooked when talking about ways of designing. In the CoED method the point of departure has been a desire to let the preferences of the teaching practitioners play a pivotal role in the design process. In previous work attempts have been made to incorporate well-known pedagogical planning tools into conceptual models for design of networked teaching and learning (Georgsen, 2005), and a number of critical issues have been identified as part of this work. In the Flexnet project (http://www.ell.aau.dk/Flexnet.54.0.html), design work was focused on the three elements pedagogy, technology and study/learning materials, and as illustrated below, the careful consideration of the interplay, tensions and mutual dependencies of these three elements constitutes a crude outline of a design methodology in itself.

Pedagogy: Through use of technology and use of changed study materials new possibilities are offered to the students. Pedagogy is all about facilitating learning. Thus, in order to take advantage of the potential added value of the technology, the planner/teacher must carefully consider the consequences of his or her pedagogic values. If e.g. the planner/teacher aims at constructivist learning, then study materials and communication technology used on the course must be selected and designed to facilitate and support this. As such, a flexible design tool should be “value-free” and allow for the implementation of various pedagogic perspectives. By including a process of defining core values in the teaching philosophy in the design work, CoED allows for this.
Technology: Technology is always used within a specific context, and the interplay between design and use of technology is an important one, especially in relation to educational practices where this situated perspective becomes even more critical. Therefore, design, test and evaluation of technology/tools for educational purposes must be carried out in authentic settings in order to ensure that the tools and use are adjusted to the settings and needs of the specific culture and subject matter. By engaging both teaching experts and future users in the design process, CoED aims at bringing authenticity into the heart of the design process.
Study materials: The characteristics of online materials are different from traditional paper based materials and hold new pedagogic potential and pose a challenge to teachers. In order to develop materials and ways of working/teaching which support the overall teaching philosophy and learning style of the specific design, the process of matching student activity and technology design is an important one in the CoED method.

In order to progress beyond “black box-thinking” where notions of learning and teaching are embedded into tools, technologies and materials prior to the engagement of teaching professionals or domain, we need to acknowledge the interrelatedness between pedagogy, technology and study materials. This is the case whether we concern ourselves with designing complete courses or just elements thereof. Development of the CoED method should be seen as an attempt to further the involvement of all relevant parties in the design process, in order to enhance the influence of learning models and teaching philosophy in the designs.

History and introduction - Theoretical and methodological background for CoED

As our methodological framework in the EATrain2 project we have taken departure in CoED and further developed it by incorporating tensions concerning web 2.0 and PBL. From the historical point of view CoED is a common methodological framework developed with input from research on:

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Systems development – because we design (for) information and communication technology
Collaborative learning – because we design for learning and learn in the design process
Facilitating creative processes – because the aim is to develop something new

The focus of systems development has traditionally been on management of development projects by means of linear processes from idea and system requirements to system design, programming and technical test (the so-called waterfall model) (Vliet, 1993). This approach is often criticised because of its' straight-line linear process focusing on designing a technical system, thus producing tangible designs only at the very end of the project (Dahlbom & Mathiassen, 1993; Larman, 2003). The same sources also stress that development of ICT normally involves more than a technical system; namely social systems which influence and are influenced by the technical system. This leads to the assumption that a systems development method must in fact facilitate a learning process which involves both designers and future users in a short cycle iterative development which continuously produces designs that can be tested with users. Some sources stress that possible future practices with a new system can be subjected to discussion involving designers and users even before the very first prototype.

The systems development domain has already drawn our attention to the fact that specification and design can be regarded as a form of collaborative or community learning. According to Wenger, a social theory of learning must include community, practice, meaning and identity (Wenger, 1998). Learning in a community of practice thus involves negotiation of meaning which is a process of participation and reification. Von Krogh, Ichijo and Nonaka stress a similar complex understanding. They, however, talk about *knowledge creation* rather than learning. They define knowledge as *justified true belief, individual and social, tacit and explicit* (Von Krogh, Ichijo et al. 2000, p. 30*)*. As a consequence, knowledge creation cannot be managed, only enabled. Within a team of designers, which perhaps includes users, it is reasonable to expect participants to bring different knowledge and thus different *justified true beliefs* to the process, which subsequently calls for a negation of meaning within the design team. In addition to this, one of the lessons from systems development is that it is important that beliefs *do get* challenged and subjected to both negations and test. We thus draw on methods and techniques for challenging and negotiating beliefs.

This final source of inspiration is of a more practical nature than systems development and learning theory. Card sorting represents a powerful way of organising and *creatively facilitating* a targeted negotiation of meaning within systems development projects. Card sorting is a widely known technique for exploring differences and negotiating areas of agreement within systems development, and specifically within information architecture. This technique can help individuals explain to the designer how they think about a domain. With groups of card sorters the designer can facilitate discussion and negation of priorities – for example by giving some values priority over other. For example through a series of steps, as will be exemplified later in this paper, a group can arrive at a limited number of values all can agree on.

CoED phases and principles

The CoED method facilitates the design process by following five principles and splitting the early design into three phases.

Principles - the CoED method:
1. Facilitates conversations about e-learning design
2. Structures conversations about e-learning design
3. Produces design specifications and/or actual designs rapidly
4. Involves e-learning experts, domain specialists and future users of the e-learning design
5. Involves at least two people in the design process

Phases
1. Focus the e-learning design process
2. Identify overarching values and design principles
3. Specify design

Following principle number four, the design process ideally involves learning experts, domain specialists and future users of the learning design. This, however, is not always the case, and not always possible either. By mapping the range and degrees of the different areas of knowledge involved in the design process, it becomes

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possible to predict a number of actions and procedures in the design process. In the matrix below we predict four possible outcomes and procedures following the CoED workshop.

	Low degree of domain knowledge	High degree of domain knowledge
Low degree of pedagogical/didactical knowlege	Situation 1: The CoED product should be reviewed and tested by domain specialists, future users and learning designers.	Situation 2: The CoED product should be reviewed by experienced learning designers.
High degree of pedagogical/didactical knowlege	Situation 3: The CoED product should be reviewed by domain experts and/or tested by domain experts and end users.	Situation 4: The CoED product can be implemented without further research or test.

Table 2: Matrix of dependencies and expected outcomes in the CoED method.

In the EU project EAtrain2 we used the CoED method as our foundation and customized it in relation to the web 2.0 and the PBL models presented in Glud et al. (2010) and Ryberg et al. (2010). The methodology arising from this was used in a face-to-face workshop aimed at helping teaching practitioners within the field of enterprise architecture to design courses building on PBL and web 2.0 learning. In the following we will describe how we customized this method in relation to the specific workshop within EAtrain2.

In *phase I* of the design process the idea is to focus the design activity in relation to the overall approach to and understanding of learning, domain, and technology. In the workshop the coordinator presented the participants to key issues in pedagogical design of web 2.0 mediated learning. This was done to focus the attention on:

1. The understanding of learning (and subsequently teaching)
2. The understanding of the domain of enterprise architecture, and
3. The understanding of PBL and web 2.0 technologies and the role they play in both the design and the learning process (Nyvang and Georgsen 2007: 8).

The focus in this first phase related to the aim of designing for web 2.0 mediated learning and lead the participants to an understanding of PBL and web 2.0 for them to further exploit these in the actual design.

In *phase II* the goal is to identify the overall values and principles to guide the design. Inspired by the CoED method the participants in the workshop conducted a card sorting exercise, using cards with different positive statements about teaching and/or learning values or pedagogical concepts (further details can be found in Nyvang & Georgsen 2007; and Ryberg et al. 2009). The participants prioritized the cards into groups of: 1) the most important, 2) the important, 3) the less important, and 4) the unimportant. During two rounds of card sorting, participants discussed the chosen teaching/learning values by reflecting on questions related to the four continua: *the learning process, the motivation, the infrastructure (e.g. the system) and the resources/content*. The continua or questions were not presented directly to the participants, but were built into the design of the particular cards used. Through these discussions the participants discovered the consequences of the learning approaches presented in phase I, while at the same time making it possible to see what dimensions in relation to web 2.0 they still needed to consider. Moreover, the phase helped the participants sort out contradicting cards. In this way answering the questions helped focus the process towards choosing the final learning values.

In *phase III* the focus is to develop a detailed learning design using the values and principles prioritized in phase II (Nyvang & Georgsen 2007: 9). In this phase the participants worked in two groups or design teams, as the EAtrain project aims at both the public and private sector. Each group had a facilitator asking critical questions supporting the group in formulating a design, which was true to the values and the preliminary design choices made from answering questions relating to the four dimensions presented mentioned before (Glud et al. 2010). To guide the dialogue about the more detailed design, participants worked with a set of cards illustrating three factors relevant for pedagogical, technical and domain-related issues: *Resources*, *activities* and *infrastructure* (Nyvang & Georgsen 2007: 11) – also some of these cards represented the tensions, concepts and models identified in Glud et al. (2010) & Ryberg et al. (2010) e.g. some were named ‘student owns problem’ or ‘teacher owns solution’.

Observations from the Workshop and preliminary analysis of outcomes

In the following we evaluate the results and observations from the EATrain2 workshop where we used the CoED method as described above. This will also serve as the concluding discussion in this paper.

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The workshop was organised with the partners, primarily project leaders from the EATrain2 project with one or two representatives from each partner. There were seven representatives from the partner organisations and three facilitators from AAU. The point of departure for the workshop was presentations of web 2.0 and problem based learning to sharpen the focus. In the second phase the participants were divided into four groups of two (two groups focusing on educational sector and two on public). This phase had two steps and in the second step the four groups was merged into two. As part of the second step in this phase the two groups dealing with the public sector had defined values and they merged the cards from the categories *most important* and *important* and started the process all over again. Merging the values in the public sector group, showed that the groups in their first step had identified almost the same values, and they reached as negotiated values as limited 5 value cards: *Competence development, Collaboration, Active participation, Working with real world problems, Process oriented learning.*

The group dealing with university education had identified similar values, but they differed in which of the two categories *most important* and *important* the values were placed. They had a process negotiating the values in the different categories and arguing their statements to whether the values should be placed in one or the other category. The group ended up with five value cards: *Assessment, Resource based learning, Active participation, Learning independency, Cooperation.*

During the third phase of the workshop, the public sector group started out by defining the goals and the target, but found that they had a lack of content. In their discussion they had to agree upon an assumption that content is delivered. They were addressing critical issues related to the project frame and logics in the project framework. The other group (university) started with making the goals more clearly related to their values, but found that there was a lack in terms of not knowing more about the content and the purpose of the course. They draw what they saw as a process on a flipchart. A process could be to start with lectures → then exercises, assessment (e.g. student peer reviewed) → together with cooperation and participation, and this was to be seen as a recurring pattern throughout the process.

What we might observe in the process so far could be related to the fact that the representation of participants was project leaders and therefore there was a low degree of pedagogical knowledge and also a low degree of domain knowledge in the group of participants. For the further design of courses this notion lead to an importance of involving domain specialists, future users and learning designers, when the basic negotiations during the workshop and a preliminary design are further developed and organised.

Emerging from the workshop different issues were identified e.g. about assessment and kinds of assessment. On one hand one could have an approach where collaboration and participation is in focus, or/and one could have an approach where individual assessment is conducted. An important question is how to get from the goal to the assessment method(s), and what to take into account when designing the learning process – what is the purpose for doing 'this' activity? Another tension is the limitations in assessment to be aware of, e.g. how are the online course assessed? Emerging from this issue it will be difficult to address higher level skills with pure online assessments without examiner, facilitator or course instructor taking part in it. Another issue related to assessment is concerning whether the learner should be assessed with reference to the solution or the process. Other concerns emerging from the workshop were issues about pure online courses, and the need of a facilitator. Could it be possible to design purely online courses with no facilitator or course instructor or some other role? How are purely online courses to be managed and who will be organising deadlines for the course? These considerations are very important when taking into consideration to use web 2.0 technologies, and as we also stress in the preceding symposium papers there are some tensions related to e.g. the process and motivation important to consider when designing for web 2.0 mediated learning. What or who is motivating the learner to do social bookmarking? Is the teacher able to motivate the learner to use a wiki for collaboration? What makes students want to share among each other and not keep it to oneself, and another issue related to assessment is whether the student is going to be measured on this? Some of the issues raised during the workshop and the dialogue after the workshop have opened for further discussion and development of a practical framework for design and reflection in learning design taking web 2.0 and PBL into consideration in the design for web 2.0 mediated learning.

The theoretical foundation for this design framework is based on the web 2.0 and PBL frameworks described in the other symposium papers. Building on answers to the questions in the frameworks for web 2.0 and PBL and reflections on types of communication (interactional dependencies) in social software (Dron & Anderson, 2007), and a web 2.0 typology developed by (Dalsgaard & Sorenson, 2008), it is possible to design the course in more

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detail. Based on the issues raised during the workshop and from our theoretical approach, we developed a design framework and a template, which relates the intended learning outcome, pedagogical values, and motivation for change to the concrete modules or units in the course, and choices in relation to e.g. duration, technology, and communication type. This is further described and illustrated in Ryberg et al. (2009, p. 52-61). Using the answers to the questions in the other frameworks can identify these different issues.

Experiences using CoED as part of our learning design artefact in the EATrain2 project has among other given foundation to dialog about the differences in the approach to learning in general within the three target groups private sector, public sector and university. Emerged from the workshop is also the notion of the relation between assessment methods and learning goals or outcome as a very important point to consider when designing courses, and which might not be valued enough in the design process.

Concluding remarks

In this paper we have tried to develop a learning methodology for the particular purpose of designing courses capitalising on PBL and web 2.0 learning. This we have done by building on the theoretical foundation developed in Glud et al. (2010) & Ryberg et al. (2010) and combined these with a practical approach by integrating the collaborative e-learning design (CoED) method in the EATrain2 learning methodology. This reflects also our aim of creating a more collaborative and iterative design methodology, as existing experiences show that very prescriptive methodologies might alienate or marginalise practitioners. Therefore, the CoED method seems particularly well suited for this purpose, as it stresses giving a voice to preferred teaching styles and learning philosophies of practitioners, as this is integrated in the very design tools. In addition to this, we have also explored how the presented in the other symposium papers were built into the cards and phases of the CoED method. The outcome from the workshop has therefore also been used to broaden the CoED method as a tool for design and to develop a framework for "design for learning" or a 'learning methodology. The templates and frameworks evolved in this process will from our point of view be beneficial for further development of courses within Enterprise Architecture (EA) building on a PBL approaches and web 2.0 mediated learning.

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