THE POL MODEL: USING A SOCIAL CONSTRUCTIVIST FRAMEWORK TO DEVELOP BLENDED AND ONLINE LEARNING

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Abstract
This paper presents a model for developing blended and online learning based on a given curriculum and typical learning objectives for university courses. The model consists of a three-step-process in which the instructor formulates product-oriented tasks, develops and structures the learning materials and tools, outlines a schedule, and supports the students’ learning activity in developing a product. The model is based on our experiences with transforming traditional lecture-based lessons into problem-based blended and online learning using a social constructivist approach and a standard virtual learning environment (VLE). Our initial experiments indicate that our model is useful to develop blended and online modules and, furthermore, it seems fruitful to use a social constructivist framework and orienting learning activities towards the development of products.

Keywords
Blended learning, online learning, social constructivism, product-oriented learning, POL model, instructional design model

Developing Online Learning
There are several arguments for offering online and blended learning such as flexibility in time and space for the students, to create active and multimedia-based instruction, to save on-campus lecturing time, and to support repetition and individual learning pace (Paulsen, 2003; Driscoll, 1998; Collis & Moonen, 2001; Dalsgaard & Godsk, 2007). However, it is not obvious how this online or blended learning should be developed, how to make the learning situation effective, and how to carry out the development process cheap and efficiently.

Only few models and methodologies address how blended or online learning actually should be developed \textit{and} how the instruction should be carried out. Some of the best known and recognized models are the “e-tivities” by Gilly Salmon (Salmon, 2002; 2003), Diana Laurillard’s design methodology (Laurillard, 2002), Robin Mason’s framework for online courses (Mason, 1998), and numerous individually tailored methods (as described in Bonk & Graham, 2006). These models provide useful ways to develop and organize blended or online learning activities for certain contexts, disciplines, curricula, sorts of students, certain learning styles, and/or using certain technologies. In other words, there are already a number of useful models, but oftentimes these models are tied up to certain academic or technical requirements making room for new and more generic models.

In our experience, it is important that the development of online learning complies with existing curriculum demands and course objectives, that the instructor is capable of managing and developing the materials, and that the electronic materials are easily and cheaply developed and implemented with standard tools already available (Godsk, 2006). Ideally, a
model for developing blended and online learning should comply with the existing academic, organizational, and technical circumstances and, thus, reuse the existing and predefined course objectives, teaching staff, curriculum, materials, and be supported by the university VLE. Furthermore, it would be useful to use a model that operates with different levels of “blendedness” and does not necessitate dramatically changes of the instruction towards completely online learning (at least not at the initial stage).

In our initial experiments we have been able to successfully transform traditional lecture-based instruction with predefined curriculum and learning objectives into blended and online learning by problem- and product-orienting the instruction (Dalsgaard & Godsk, 2007). Based on these experiments and a social constructivist framework, we have developed a product-oriented model for developing blended and online learning which at this point has shown to give good learning results and respond to several of the arguments for online learning, to be generic/useful for many types of courses, and, furthermore, to be relatively easy and efficient to use.

Using a Social Constructivist Framework as Theoretical Basis

According to a social constructivist approach, learning is considered an active, social process in which individuals actively construct knowledge. This means that learning necessitates the active, self-governed, and problem-based work of students. Based on a social constructivist approach, we outline a three-step, product-oriented model to develop blended learning.

According to Leont’ev (1978) and Engeström (1987) human activity is always oriented towards an object which is the result of the activities. An object should be understood as an idea or conception of the end result. In Dewey’s words this means that an individual’s actions have an aim or purpose which Dewey also describes as an “end-in-view” (Dewey, 1916; 1997). Dewey points to the object-oriented or goal-directed nature of human actions forms as the basis of learning. An individual learns when he or she mediates actions using tools (Wertsch, 1998). Wartofsky (1979) describes the relationship between tools, actions, and ends-in-view.

“The tool is understood, both in its use, and in its production, in an instrumental fashion, as something to be made for and used for a certain end.” (Wartofsky, 1979, p. 204)

The process of mediating goal-directed actions is a learning process. Knowledge lies within the very use of resources to achieve certain ends. Actions and tools make sense and have a meaning for the individual when they are related to a purpose. Resources can be physical objects as well as theoretical concepts. This means, for instance, that a theory is learned by using it in relation to achieving an end. Ultimately, all human activity is related to practice. As argued by Lave & Wenger (1991), Wenger (1998), and Suchman (1987), human activity is situated in a social practice. In other words, human activity always has a practical purpose. Thus, we argue that a fruitful starting point for learning is a product-oriented task. Construction or development of a product directs the activities of students towards an end.

A learning process is a self-governed process in the sense that the individual has to understand and perform the activities. Knowledge cannot be transferred to the individual. Instead, knowledge is actively constructed by the individual by performing purposeful actions. On the basis of this, we argue that learning is supported by self-governed activities within an open-
ended learning environment. By “open-ended” we mean that the learning environment does not structure or determine the activities of students, but instead provide opportunities for multiple activities.

In the next section, we present our three-step model, which is based on the social constructivist approach.

**The POL Model**

The POL model (short for *Product-Oriented Learning*) describes an overall process for developing and supporting blended and online learning. Based on the objectives of the course, the instructor formulates product-oriented tasks, establishes a learning setting, and supports the students’ learning activities in three steps.

![Figure 1: The POL model for developing blended and online learning.](image)

Usually a course is based on a well-defined learning target or a certain curriculum containing learning objectives. These objectives act as the starting point for the instructor to develop the blended or online learning using our model.

**Step 1: Formulating Product-Oriented Tasks**

The first step is to formulate product-oriented tasks based on the learning objectives. Learning objectives may take various forms and in order to identify what actually should be taught, a scrutiny of the course description and the central issues of the curriculum may be required. Once it is clear what should be taught (and learned), the instructor uses this information to rethink his/hers instruction in terms of *tasks* leading to *products* using the *curriculum*. A product-oriented task is different than a learning objective. A learning objective describes the result of the students’ learning, whereas the task describes what the students should be able to do/develop. According to the approach of the model, students should not be directed at *learning* something, but rather at *doing* something. Thus, a product-oriented task, and not a learning objective, should be the staring point for the activities of students. The purpose of a task involving a product is to orient students towards practice. Students should be able to see a “real” purpose with their activities by applying the theory to a practical context.

In practice the instructor should formulate a number of open-ended tasks that, in a clever way, motivates the students to explore the curriculum and leads to the development of a product. To ensure that the students use (and learn) the required curriculum several guiding, sub-questions...
may be provided in continuation of the tasks to further guide the students’ activities. Product-oriented tasks naturally differ depending on the subject matter, objectives, and course requirements, but examples could be “develop a communication strategy” in a course in communication theory, “diagnose the patient” in a course in general medical practice, “develop a MP3-player” in a programming course, or “make a company credit rating” in a course in economy. These tasks should furthermore be expanded by guiding sub-questions such as “how can we understand communication?”, “what is the purpose of communication?”, “what are the symptoms of the patient?”, “how to approach a diagnosis?”, and “how to open and decode MP3 files?”

**Step 2: Establishing the Setting**

The second step is to establish the setting by developing and organizing the instructional materials and tools and outlining a schedule. The instructional materials may consist of various things such as curriculum texts (online or hard-copy versions), interactive learning objects, regular or online lectures, example or elaborating material, handouts, discussion forums, or other tools offered by VLEs. Depending on how virtual the instruction should be – blended or completely online – the different materials should be developed and implemented as more or less digital. The point is that lectures as well as discussions and texts are all considered as *learning materials* and may be “virtualized” according to your needs. Whether you decide to develop a completely online or a “low-degree” blended course does not necessarily change the compilation of materials.

A setting is different than a course plan or a syllabus. The point in using the term *setting* is to emphasize that it is not a structure for a course, but an open-ended organization of materials and tools. Materials and tools within a setting are not structured in a sequence. Thus, the use of materials and tools is not pre-determined by a schedule, but is decided by the students as they use them to develop a product. A setting is similar to the concepts of *resource-based learning environments* (Hill & Hannafin, 2001) and a *learning framework* (Dalsgaard, 2005b) which also emphasize the open-ended nature of collections of resources in order to support multiple activities of students.

Establishing the actual setting may be done in different ways and oftentimes by the instructors themselves (see Godsk, 2006). Usually instructors have access to a VLE which provides tools such as discussion forums, document sharing/file upload, quizzes, SCORM/learning paths, and various tools for communication and collaboration. It may also be useful to reuse existing teaching materials such as PowerPoint presentations and to develop interactive learning objects using these presentations and easy-to-use authoring tools (see Godsk, 2006; Dalsgaard & Godsk, 2007).

Basically, the formulated tasks combined with the provided setting should motivate and facilitate the students learning activities with developing the product. However certain scheduling and initial introduction to the approach to teaching and the organizing of the materials may be required. In our initial experiments we provided a brief introduction in the form of a one hour lecture explaining the task, the role of the materials and how they could be accessed, and how the instructor could be contacted (primarily through discussion forums). We did the lecture face-to-face, but most likely a web-based video would have functioned as a satisfactorily substitute. The scheduling consisted of a plan of when to submit the final product and when (and where) the different materials would be available.
**Step 3: Supporting the Learning Activities**

The third step is to carry out the learning activities. The initial role of the instructor is to present the tasks and the guiding sub-questions, and afterwards nurture and support the students’ use of the setting in developing the products and answering the questions. During this period the instructor acts as a motivator, guide, and instructor (for answering questions about the tasks and curriculum, and providing additional instruction if planned or required).

As opposed to teaching, supporting learning activities emphasizes self-governed activities of students, supported by the instructor. This means that the focus is not on teaching, but on guiding self-governed activities. In this process, new sub-questions may emerge from discussions with students as they work on the product-oriented task. The consequence of the social constructivist approach is that resources – such as curriculum texts – are made subordinate to product-oriented activities of students (Koper, 2000, p. 12; Dalsgaard, 2005a). As Koper (2001) argues:

”[…] a lot of learning does not come from knowledge resources at all, but stems from the activities of learners solving problems, interacting with real devices, interacting in their social and work situation. A lot of research about learning processes provides evidence for this stance that learning doesn’t come from the provision of knowledge solely, but that it is the activities of the learners into the learning environment which are accountable for the learning.”

It is important to notice that instead of one-way communication of content from the instructor to the students, the process of developing the product is considered most important. The instructor must engage in the role as being the supporter of the learning activities by providing the “learning room” where the students can collaborate, get guidance and support, access materials, and develop the products. The technical facilities are usually available in standard VLEs, so it is basically a question about setting the scene (as described in Step 2), engaging the students, and letting the instructor assume the online role.

**Scenario no. 1: Developing a Course in Knowledge Sharing, IT, and Organization**

In the first scenario, we have transformed a course on “Knowledge sharing, IT and organization”, a masters course at Information Studies, University of Aarhus. Below is an overview of the steps of the transformation process.
The course aims at giving the students:
- an understanding of different theories of knowledge and learning, and an understanding of how the term 'knowledge sharing' should be understood on the basis of these theories,
- insight into the relations between theory and actual development of IT-supported knowledge sharing,
- insight into how knowledge sharing takes place in groups and organizations, including the relationship with communities of practice, and
- knowledge of the relationship between knowledge sharing and knowledge construction, including the concept of 'the learning organization'.

**Step 1: Products**
Develop a prototype or a model for an IT system for support of knowledge sharing, knowledge construction and organizational learning.
- What is knowledge?
- How can knowledge be shared?
- How is knowledge constructed?
- What defines an organization?
- How does an organization learn?
- What processes can IT support?

**Step 2: Setting**
- Texts divided into topics such as organization theory and knowledge management
- Interactive learning objects (with curriculum provision, elaborating information)
- Discussion forums
- Tools for document sharing
- Access to knowledge management tools and other IT tools
- Videos with demonstrations of use of IT for knowledge sharing
- Videos or presentations with organizational cases of knowledge management
- (Online) lectures and handouts

**Step 3: Activity**
- Presenting the product-oriented task
- Helping students to identify problems entailed in the task
- Answering questions about curriculum and providing elaborating information
- Providing criticism, guidance, and consultancy

Figure 2: The three steps for the development of the course on Knowledge sharing, IT, and Organization.

The first step was to rethink existing curriculum demands and learning objectives into a product-oriented task. On basis of the learning objectives, an example of a relevant product could be an IT system. In the process of developing an IT system, further questions arose. Again, on basis of the existing course description, the instructor may formulate a number of guiding sub-questions. Such questions will orient students towards more theoretical reflections in relation to their work on the product.

The second step was to develop and organize learning materials within a setting. Originally, the course materials of this course consist of a curriculum of texts, divided into weekly lessons. Students’ development of a prototype or model for an IT system can, however, also entail other kinds of materials. The challenge is to think of, which kinds of materials will be relevant for students. Instead of sequencing materials into weekly lessons, these materials should all be organized as an overall setting for students’ activities; a setting which students can explore and use in relation to their work on the product.

The third step is to initiate and support learning activities. The original course is primarily based on face-to-face lectures on a weekly basis. According to the model, the focus for the instructor is different. First of all, the instructor should kick off the activities of students by presenting the product-oriented task. It is important that the students understand the task and the product they are supposed to develop. Therefore, the instructor can introduce the students...
to examples of IT tools and cases of knowledge sharing. Further, it is important that students realize what the task entails. This means that the instructor may advantageously turn the product-oriented task into problems in co-operation with the students. This can be achieved by discussing with students what the task entails, and what is necessary to know in order to develop the product. This process can be supported by the guiding sub-questions developed by the instructor. Further sub-questions can, however, also arise from the discussions with the students.

Scenario no. 2: Developing a Course on Statistical Modeling and Analysis

The second scenario describes a course on “Statistical Modeling and Analysis” at Aalborg University. Below is an overview of, how the course could be developed on the basis of the three steps of the model.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Students should acquire an understanding of statistical modeling</th>
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<tbody>
<tr>
<td><strong>Step 1: Products</strong></td>
<td>Develop a statistical model that describes the relationship between the symphysis-fundus measure and inhibited growth of the embryo</td>
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<tr>
<td></td>
<td>• What takes place during a pregnancy?</td>
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<td>• How does a pregnancy evolve?</td>
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<td></td>
<td>• How does the embryo develop during pregnancy?</td>
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<td></td>
<td>• Which data are relevant?</td>
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<tr>
<td><strong>Step 2: Setting</strong></td>
<td>• Database of 2,625 women with various data (over a time span)</td>
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<td></td>
<td>• Mathematical models</td>
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<td></td>
<td>• Other methods of analysis and other models</td>
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<td>• Textbooks</td>
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<td>• Materials from a previous project</td>
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<td>• Lecture notes</td>
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<td>• Medical books and journals</td>
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<td></td>
<td>• Calculator</td>
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<td></td>
<td>• SPLUS (software for statistics and programming)</td>
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<tr>
<td></td>
<td>• Lectures</td>
</tr>
<tr>
<td><strong>Step 3: Activity</strong></td>
<td>• Explain theories and models</td>
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<td></td>
<td>• Teach</td>
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<td></td>
<td>• Guide</td>
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<td></td>
<td>• Help finding supplementary literature</td>
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Figure 3: The three steps for the development of the course on Statistical Modeling and Analysis.

In the course, the mathematical concept of modeling was treated in relation to problems in the “real” world. Medical doctors provided students with problems from their practices. One project in the course studied the following question, which required mathematical modeling: Is there a relationship between the symphysis-fundus measure and inhibited growth of the embryo? This question could be reformulated into a product-oriented task: Develop a statistical model that describes the relationship between the symphysis-fundus measure and inhibited growth of the embryo. During the course, the students themselves formulated a number of sub-questions (see figure 3).

The second step is to provide a variety of materials. As is shown in figure 3 a number of different materials are relevant to the students’ work on the product. The materials include such different materials as mathematical models, empirical data, and medical journals. Some of the materials were provided by the instructor, whereas other materials were found by the students themselves.
The third step is the instructor’s support of the students’ learning activities. The role of the instructor is to explain theories, but primarily to help and guide students in their work on the product.

**Conclusions and Future Work**

Considering the existing limited variety of models we believe there is a need and room for a generic, flexible, and easy-to-read model for developing online and blended learning. Our three-step POL model is an attempt to develop a model meeting these requirements and not tied up to certain academic or technical requirements. The model does not specify a certain kind of online learning, but outlines an approach, which covers different degrees of online and blended learning. Thus, it differs, for instance, from Salmon’s (2002) model, which specifically supports online activities.

Based on a social constructivist theory, we have argued for an approach that does not structure and plan a course. Instead, the model focuses on initiating and supporting self-governed activities of students. Prior to the course, the challenge for the instructor is to formulate product-oriented tasks, which the students can perform, and further to arrange a setting of learning materials and tools for student activities. During the run of the course, the instructor should guide and help students in their work on the product-oriented task. Online technologies do not serve the purpose of organizing and structuring the activities of students. Instead, online tools are made available with the purpose of providing materials and tools for activities of the students such as the students’ discussion, collaboration, and production.

This paper presents the first draft of our model which is based on theory and a limited amount of empirical studies and scenarios - so clearly a lot of experimenting and testing has to be done. We are currently planning to refine the model by initially exploring the limitations of the idea of product-oriented learning model with regards to the various curricula and course objectives present at our university. Subsequently, we seek to reapply the model to actual teaching practice in courses with various levels of “blendedness” and diverse subject matters.

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**References**