Design for Free Learning – a Case Study on Supporting a Service Design Course

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Abstract

In this experience report, we provide a case study on the use of information and communication technology (ICT) in higher education, developing an open source interactive learning environment to support a blended course.

Our aim is to improve the quality of adult distance learning, ultimately involving peers worldwide, by developing learning environments as flexible as possible regardless of the culture and context of use, of individual learning style and age of the learners.
Our example concerns a course of Service Design where the teacher was physically present only intermittently for part of the course while in the remaining time students worked in teams using our online learning environment.

We developed a structure where students are guided through discovery learning and mutual teaching. We will show how we started from the students' authentic goals and how we supported them by a simple structure of pacing the discovery process and merging theoretical understanding with practice in real life.

Based on these first empirical results practical guidelines have been developed regarding improvements on the structure provided for the learning material and on the interaction facilities for students, teachers and instructional designers.

Author Keywords
Experience report; open source; cultural diversity; e-learning; service design; learner centered design.

ACM Classification Keywords
H.5.1 Multimedia Information Systems; H.5.2 User Interfaces.

General Terms
Design, Human Factors.

Introduction
ICT is providing challenging opportunities for improving adult higher education: 1) it triggered a cultural change in personal communication trough the availability of new media; and 2) it initiated a change in publishing and authoring learning material.

1) People communicate faster, at any time, and anywhere. People are invited to be more open, more direct and more sharing. Text, pictures and movies are shared with close family, friends and others they know or not yet know, or in public space, whether in the private domain, or concerning work, education, etc. Learning now may profit from the general culture of expanding social relatedness and of time and location independent communication facilities, concerning, both, peers, and experts and teachers.

2) ICT offers the potential to make education more effective, easier, and providing a more positive experience. Moreover, learning could in principal be made generally available and equally accessible to everybody. Though some people are more comfortable in adopting technology then others this should not influence their chances for learning. State of the art learning facilities should support the widest range of people possible, regardless of their location, culture or age. Public availability of educational resources for everyone (who has internet access) is trivial, as soon as this service is designed by educators and the content is provided by domain experts.

In reality the use of communication and collaboration technologies is becoming more and more common and integrated in peoples' lives: students and teachers have reasons and are motivated to incorporate them respectively in their learning and guidance [13]. Increasingly teachers feel the need to complement their courses, to adopt a learning management system, and to develop up to date learning material [10].

Thomas Friedman [5], when analyzing globalization through the arrival of the Internet, identified an intriguing effect: the ability for peers to find each other and to develop communities to share, and contribute to their knowledge and insight. This effect seems a promise for an interactive process of open educational repositories, allowing experts as well as learners to collaborate beyond mere consuming open source materials.

The worldwide community of educators and learners has a wealth of experience. This community can be facilitated to contribute, to enhance and to complement the materials already in use. Currently there is already a variety of open source repositories where institutions or individuals can share or publish their learning materials (Open source learning repositories are e.g.: www.merlot.org, ocw.mit.edu, www.oercommons.org, www.servicedesigntools.org/repository).

Our project of developing an open learning environment for a course in Service Design fits into this range of initiatives. We will show that our contribution adds a new approach through the multi-media format and interactive structure of use, as well as through the solicited and actively contributed learner generated content.

Service design – a Case Study

The case study was conducted in the context of the course of Service Design, taught in the spring semester of the second year of the bachelor curriculum "Design" to 26 students at the faculty of Architecture, University of Sassari, Italy. The course counts for 10 European Credits, which is considered 250 hours of student time. The Dutch teacher (otherwise employed in the Netherlands), communicating in English to the students, was only available at the lecture hall for 2 days every fortnight. During this period an Italian tutor was available to support students by solving language problems during the course and in communication with the teacher. For the main part of the course the students worked in teams of 4 or 5 students, developing a service design for a real (local) client, in all cases represented by a manager of the business concerned.

Theoretical framework

Traditional didactics are not suitable to provide courses in e-learning or blended learning. In e-learning there is still a component related to the mere transmission of content but the focus is on problem based or collaboration based didactic models.

Calvani [2] considers: "evolution internal to distance education toward models of open learning and the progressive acquisition of theoretical and epistemological models related to education that valorize autonomy and a negotiated building of knowledge essentially related to humanistic Psychology and constructivism" to be very important.

Besides the philosophy of open learning, a constructivist educational model and the use of ICT, Corazza [3] underlines a couple of other theoretical components in the concept of e-learning: knowledge management and lifelong learning.
ICT development brought a transformation in the way to provide education. Computer networks allow students to participate much more actively either in the learning process or in the choice of a suitable personalized path.

The learning process takes place trough close collaboration with, and communication and interaction between, all actors whether they are teachers, tutors or peers. The learning environment should be structured in order to emphasize the social dimension of the Internet. That requires continuous focus on sharing knowledge owned by these different stakeholders as well as facilitation of the construction of new knowledge. In this process even originally tacit knowledge becomes explicit and shareable.

The structure of the course, of the course material, and of the interaction, has been built based on the theory of social constructivism. According to this theory the student learns as a protagonist in building his own knowledge [7]. Maragliano [6] focuses on two issues: the autonomy of the learner and the chance to learn according to individual pace and learning style. This is a complete contrast to the traditional approach (still common in higher education in our society) where the core of didactic activities is the teacher, while students are supposed to learn through a process of elaboration and integration of information and experiences prescribed to them, collaborating with peers and teacher.

In our approach the educational aim is internalization of learning in order to keep students autonomous in the process of creation and management of knowledge.

The epistemological model in this kind of approach is based on the vision that knowledge should not be restricted by insurmountable boundaries and that everybody should be triggered to construct his own vision on the content of the learning domain. The learning environment should offer students a framework that stimulates an active approach to the elicitation of knowledge. In this context the quality of

the human computer interaction strongly influences the learning experience.

Lev Vygotsky [12] points out that human learning is based on a specific social nature and the acquisition of competencies is social before being individual. In his theory the social interaction is strongly relevant. What he defines as zone of proximal development explains the social origin of knowledge at a higher level. That refers to the difference between the level of achievement when the learner performs a task alone, and the situation of learning with the help of the dynamics of collaboration in a group or with the help of a more experienced person.

Jerome Bruner [1] enhances this framework by highlighting the role of culture. This provides the elements to define an approach where the learner is the core of the didactical activity. If knowledge is linked to the context and the activity to the learner, there is never only one right way to do something, because there are no fixed and standardized teaching contents or procedures.

The constructivist approach provides a theoretical framework for providing students with meaningful learning. A teacher's role is based on scaffolding to activate learning strategies that enable students to build new knowledge and to find new solutions based on their own interpretive schemes. According to Novak [8] "meaningful learning underlies the constructive integration of thinking, feeling and acting that occurs in human learning and in new knowledge construction". He labeled this process as human constructivism because it is "appropriate both for the way in which humans learn their usable knowledge and also for the way in which they construct knowledge" (ibid.).

In order to promote collaboration with peers, as well as to provide a realistic context for application of the developing understanding, the student of the Service Design course were asked to group themselves in design teams. These teams were charged to deliver a service designed for a real client to be used by the customers of this client or by their stakeholders (providers, employers). Taking into account the different skills, background, and availability of the team members the students combined existing knowledge, materials and tools to develop new solutions.

Throughout the course, the teams were invited to explain their design project, the design techniques discovered and why these were either discarded or applied. For all steps in the design process, and for all decisions taken, the students were asked to be creative, to be analytic and to make explicit decisions.

Designing an open learning environment
State of the art ICT allows us to accomplish the goals of a social constructivist context both for teachers and for learners. Facilities like e-mail, wiki and discussion forums are becoming available in universities' learning management systems. Students find different ways to add what is available and useful for their learning. For each learner the experience of the innovations will be different, dependent on their culture, educational background, and the context of learning (e.g. as part of traditional classroom education or as a case of individual adult lifelong learning).

In the public space of Internet blogs, tweets, and feeds, expert professionals and scientists, often related to scientific institutes or universities, publish knowledge resources via Creative Commons. This and the use of other emerging services complement or even supersede the traditional "closed" educational facilities that are offered for a fee. In essence students and teachers can choose among a large variety of services to collect knowledge, communicate, collaborate and publish.

By joining this force in the digital learning environments, each learner should benefit from the innovations that are being adopted in education. In the

perspective of a growing level of internationalization, multiculturalism and awareness of lifelong learning, we will investigate how much learners of different ages, origins and cultures are supported by technological innovations.

The service of a learning environment consists of two parts: technology and content. The first part, in our approach, is the technology of the standard Moodle learning environment (http://moodle.org/), the second part is formed by the content of learning materials. The service is designed to inform, inspire and facilitate the students, both in their classroom based learning, and in free individual learning.

The content structure and format complement the efforts to provide user centered interaction design, offering a holistic learning experience by determining each time what content could be taught electronically and what needs to be taught in a real context.

Our system was structured based on the lesson plan used in the previous year for a fully classroom based learning process. It was expanded with additional opportunities for exploration, communication within teams and between multiple teams and teachers and tutor. We provided additional resources like online exercises and multiple different modalities of presentation of topics. E.g., we developed mini lessons (10 minute long teaching of a single technique like Cognitive Walkthrough, Mood board, Persona) made available in different modalities [9]: (a) full text with pictorial illustrations; (b) video recordings of actual teaching (Figure 1); and (c) slide shows with voice-over.

The alternating classroom meetings, team meetings, and the (individual as well as team based) use of the learning environment supported integration with online learning activities, resulting in opportunities for a blended learning process. Activities to build the learning service were diverse, requiring a variety of skills of the people involved.

Figure 1. Mini course in video mode.

The teacher, instructional designer and tutor each had other tasks before, during and after the course. A close collaboration between teacher and instructional designer is needed particularly during the development phase. They need to match the instructional design of the classroom-based sessions with the online learning activities.

During the course all lectures of the teacher were recorded on video and published in the learning environment in addition to the presentation slides, to complement the notes that the students made during the lectures.

This was especially important in this course because the lectures and class discussions were in English while the native language of the students was either Italian

or Spanish. The recordings were published as well on a YouTube dedicated channel to make them available on new (for the students considered fashionable) devices like smart phones.

Special attention was paid to the way to structure the slides, the readability of text, and the visibility of face and gestures of the teacher in the video version. See Figure 2 for a view on a location in the learning environment.

Figure 2. Snapshot of the main page for week 1: PDFs of PowerPoint presentations and videos of actual lectures.

The general design method introduced by the teacher was based on DUTCH ("design for users and tasks from concepts to handles", [11]). Like in the previous version of the course (not supported by an electronic learning environment), the teacher in fact left most of the teaching to the students.

Of all the service design techniques and tools (our list runs over 40 at this moment) only 5 were initially

explained by the teacher during the first meeting. For all others, only a very brief indication (one PowerPoint sheet of 4-6 lines, with some pointers to resources) was given, and each student got the task to find the best description of some of them and to teach the use, including the pros and cons and the conditions, to the others during the 2nd meeting.

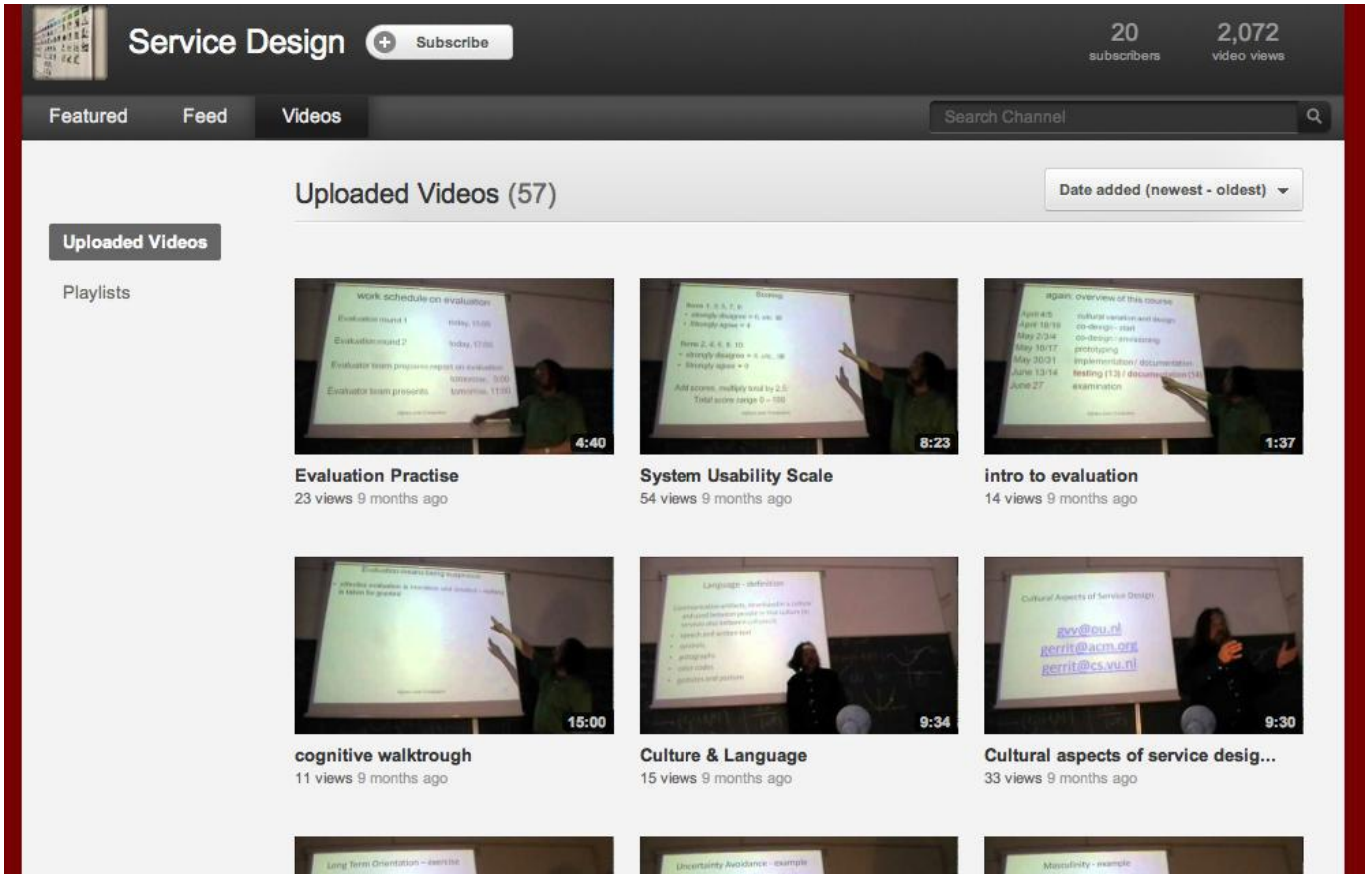

Figure 3. YouTube channel with recommended (student) presentations.

The students' presentations were put on another dedicated YouTube channel (see Figure 3), some "excellent" presentations were identified, and the students had the task to review these models and to analyze why these examples of teaching made sense to them, both from the content point of view and from the presentation (i.e., knowledge sharing) point of view.

We intent to make a series of iterations of course material and course structure embedded in a web based open learning environment. After the first conception this will be published again as an open educational resource, and active attempts will be made to find and stimulate peers worldwide to interact and contribute.

Observations

Video streams in the infrastructure

Figure 4. Snapshot of course on Smartphone.

Videos are big and bulky by nature. As a result 60 videos of 200MB can stress servers in the infrastructure of the learning environment. For the task of streaming videos to the learners, specialized services are required.

Putting the video lectures in a public space creates more exposure and possibilities for peers to get involved in use and co-development. So far we did not solicit this involvement, but we counted viewers from 26 countries in all continents.

Our students were stimulated to view the mini lectures (including each other's tool explanations) on Smartphone (Figure 4). Public services offer possibilities for streaming to mobile devices, allowing learners to see the lectures anytime, anywhere.

Lectures of the teacher and presentations of the students have different purposes. This has to do with making the learning materials open source. Therefore each type of presentation was bundled in its own YouTube channel. We should develop a process for (a) checking the content; before (b) transposing it to a "validity approved" channel.

Part of the extra resources we made available are in fact tools developed by some of our other students as part of their Masters or PhD work. E.g., a Design Pattern Wizard ([4], see Figure 5) to map the design space, and an interactive course on Human Information Processing (Figure 6).

Since we did not re-design those tools, our current Service Design students might get confused by the different interaction styles of the different learning environments. When introducing an environment build from multiple services, it is best to use the same styling as much as possible to avoid confusion for the users.

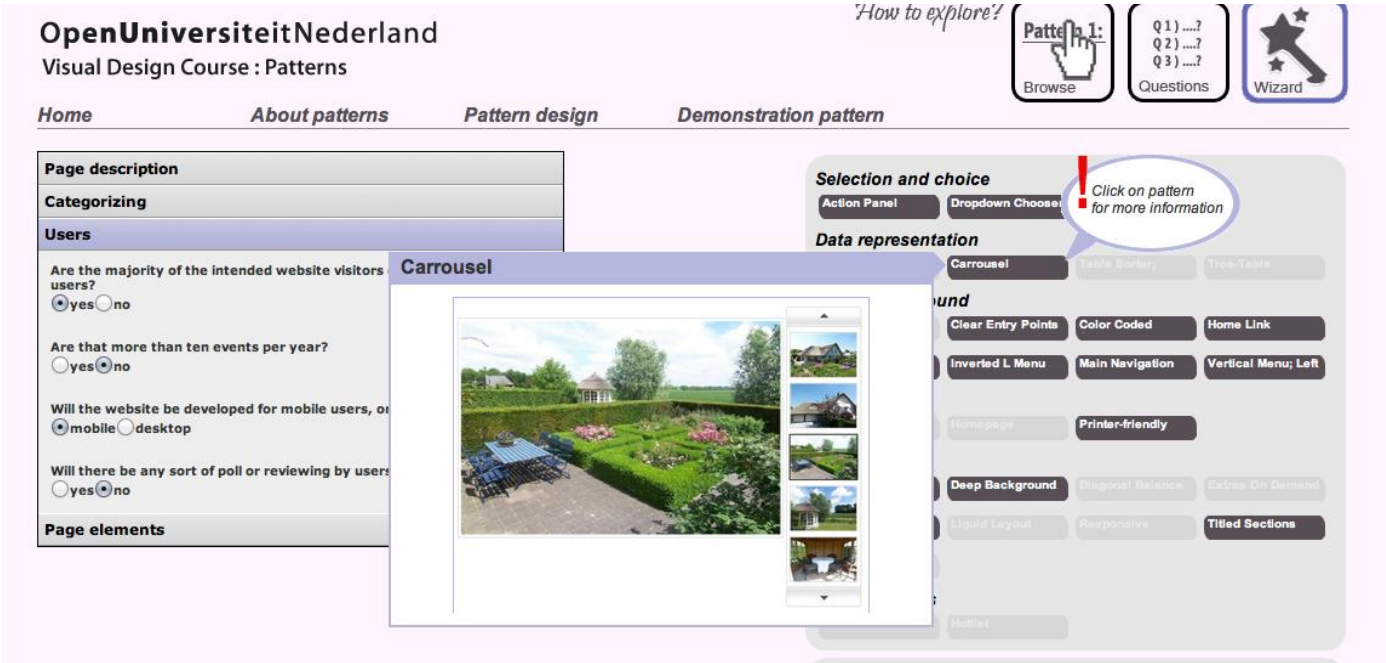

Figure 5. Design Pattern Wizard.

Creating learning objects from recorded lectures
Video lectures and presentation slides have a number of practical constraints that become apparent when trying to use them as learning objects:

Lengthy videos are hard to distribute, and, moreover, tend to lose the audience's attention. An inviting educational video seems to last for about 10 to 15 minutes.

A video lecture should focus on one topic. Therefore it is helpful, when published in the learning environment, to separate the lecture proper from self-assessment questions, application homework, and assignments as part of the overall team design project.

Abstracting the lectures from the classroom based setting allows accessibility for a broader audience. The tagging of the published lectures, the verbal label, as well as the graphical representation that is visible in the learning environment, should be self-explaining outside of the full course structure.

The slides should be readable even when the video is replayed on a mobile device. Student contributions to the learning resources should be developed with this in mind.

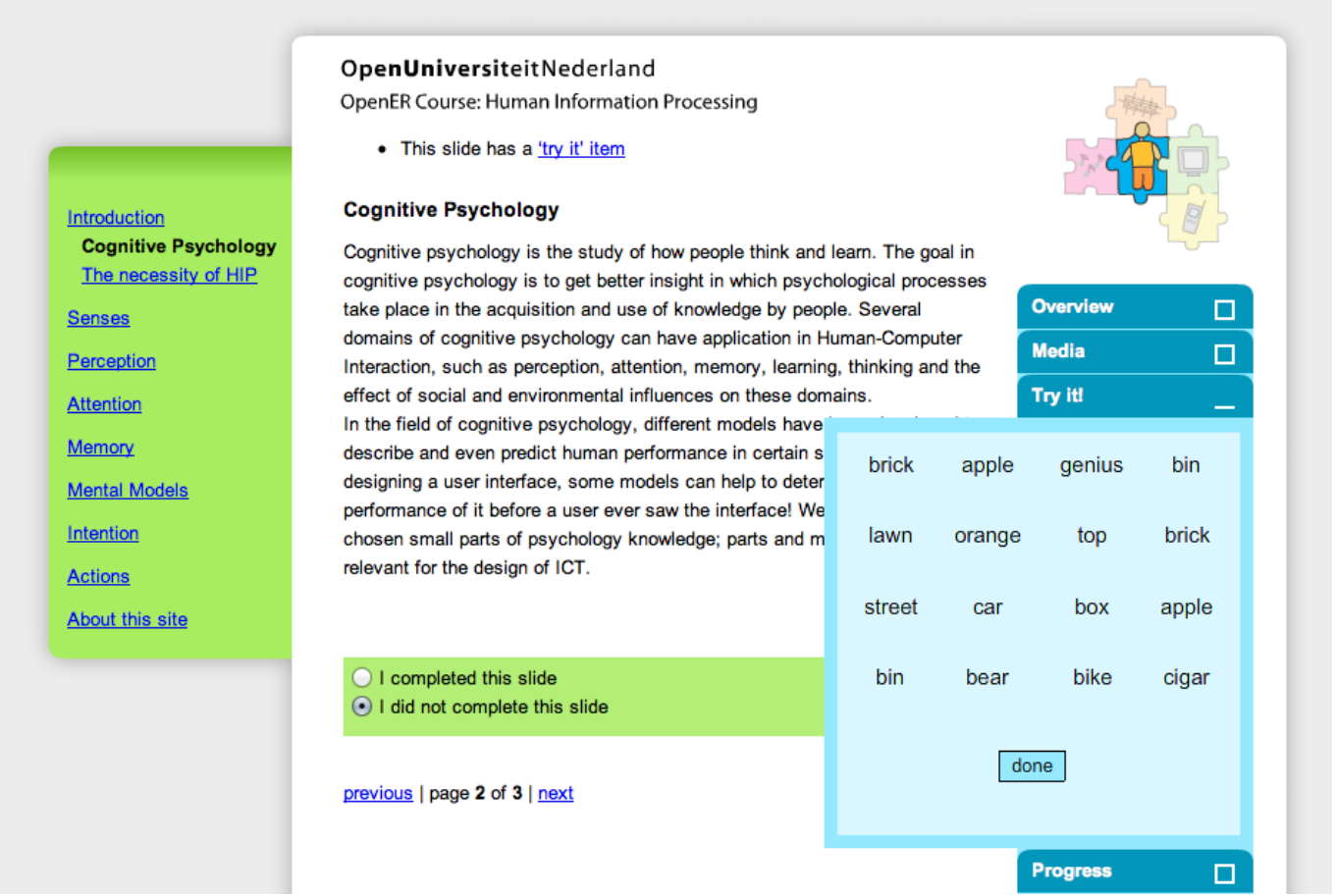

Figure 6. Interactive course on Human Information Processing

During the course all the recorded lectures sessions were published in a theme channel in the video service YouTube. This was a way to handle the use by the students, but there were viewers from other countries all over the world as well. Volumes are not big yet and the viewers are dispersed around the world since we didn't actively raise any attention on our initiative yet though some peers already found us.

A mailing in the Service Design domain is planned to further raise attention and to inform people about the lectures, the learning environment and possibilities to

contribute to the developments and improve support for local criteria.

Publishing & Licensing
Open source works with licenses that define terms and conditions for use, re-use and distribution. We have chosen for an Attribution-Share Alike license of the Creative Commons because "this license let others remix, tweak, and build upon your work even for commercial purposes, as long as they credit your license in their new creations under the identical terms."

Didactical Framework
Working with an interactive electronic learning environment where the students apply their growing understanding in a real life context defines the actual learning behavior. To this end the teacher has to step back and adjust continuously to student development, to context of real design projects, as well as to the living learning environment that is being filled by all stakeholders of the learning process.

The teacher has to structure the conceptual framework to be discussed into atomic units, since the learning process continuously asks for restructuring and for the introduction of individual topics at unpredictable moments.

The way to present, to discuss, and to prepare sources for the learning environment requires special attention because classroom communication as well as on-line resources featuring in an actual individual course moment may have to be re-used later (life lectures turn out to survive as YouTube clips, short PDF files, voice-over presentations, citations in student generated learning resources, etc.).

Moving to a constructivist approach of learning resulted in a strong change in our students' learning culture. The students' presentations showed a striking development during the 4 months we observed these. They increased in freedom to deviate from the teacher's examples and suggested techniques, in creative adaptation of techniques and tools used, and in confidence in their own findings, interpretations and creativity. At the same time they managed increasingly in convincing their clients of design to join them in co-design and shared responsibility for the outcomes.

Introduction & adoption of technology
When the course started the participants were confronted with new innovations that were added to the course. The teacher learned to structure learning resources into smaller units than used previously, and to be more flexible than before in re-ordering them. The teacher also was, to his positive surprise, confronted frequently with new versions of techniques and tools, or new experiences using them, from the students' investigations.

The temporary "negative" side of this is an increase in preparation of material at the last minute, and a lack of opportunity to plan beforehand.

The positive side is the impressive increase in valid resources as well as the valid expectation that ageing of resources is much less of a risk than in the past.

The students generally embraced the innovations. Two students who could not attend one or more of their assigned technique presentations spontaneously submitted a home recorded video presentation following the format of the lectures.

Assessment
Our course was not an experiment. We could not manipulate at will, and we could not enforce valid feedback. After the end of the course we asked the students to fill in a questionnaire (in the learning environment, available both in English and in Italian to

avoid language issues) about their experiences with the learning service. Half of the students responded.

All but one of the students found the online component in this blended course very useful, since it enhanced the classroom based lessons with an online learning environment that they could access anytime anywhere, for example on a mobile device, like this student in a comment reported by the teacher: "We watched the videos on a Nokia smartphone with a wide, large and brilliant screen and with a great audio output: we find this way of providing lectures, mini courses, information and examples interesting. And we think that this way brings learning and studying ahead, giving students the possibility to study and being informed virtually everywhere, only depending on the availability and the quality of the Internet connection".

More than half of the students would like to make use of a mobile device to enjoy the learning facilities wherever their mobile Internet would allow them to go.

Follow up
During the evaluation, the students gave suggestions like making more learning objects available such as extra examples for assignments, as well as news and articles about the service design domain. The authors themselves discovered during the developing course that the structure of the course was increasing too much in complexity to handle and expand. And we discovered alternative ways to handle this, not longer building on the plan of lessons and meetings, but on the general design method that was the generic base of the course.

Conclusions

The current iteration of the course targeted a traditional university population in a multilingual setting. Future iterations will be targeted to adult distance learning, and general learning requirements that are characteristic for (parts of) the open source community. In this way, variety in culture, background and age will be considered.

Putting peers at the driver's seat of the process will be frequently applied both for the sake of usability and applicability and for the potential of active contribution.

The learning environment should provide learners a framework stimulating an active approach to knowledge elicitation. Collaborating with a world wide open source community to complement and improve the support for a heterogeneous community of adult learners opens up new horizons for universal access to learning resources.

As it is impossible for a single institute to accommodate support for the broad variety in learning needs as well as in learning potentials in the world, the community of joining peers will influence the future directions for support as, and if, they actively contribute to realize desired improvements.

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