Abstract: "Information Landscape" is one of several courses in which we explore the potential of networked environments to support creative, collaborative design processes. 180 architecture students of the first semester are participating in this course. They work in pairs. The design of an "Information Landscape" is the goal, it is a virtual terrain that is formed by the participants over time and has landmarks that lead to specific information. The location and visual appearance of the more than 400 landmarks help to remember which information is connected to them. The design of the landscape happens in five steps and is related to the tasks in the architectural design class. The collectively designed product can reach qualities beyond the possible achievements of a single person. An environment that supports such design goals must provide for motivation, transparency and support. The common product has to include a tolerance towards fluctuations in the quality of the contributions.

1. Introduction – Focus and Preconditions

In this paper, we are presenting the course "Information Landscape", an introduction to information technology for architecture students. The two aspects we are going to focus on are the learning environment, including its social aspects, and the collectively designed product that resulted from this course. The goal of the course exercises was to collectively design an “Information Landscape”. A digital two-dimensional terrain was formed by the participants over time and enriched with landmarks that lead to specific information. The location and visual appearance of more than 400 landmarks help to remember which information is connected to them, hence the name “Information Landscape”.

“Information Landscape” is one of several courses in which we explore the potential of networked environments to support creative collaborative processes for learning and the design of a common product. This approach to learning leads to new and most appropriate uses of the World Wide Web (WWW), which was originally invented as a distributed information retrieval system to support the exchange of information among scientists at the CERN High-Energy Physics laboratories (Berners-Lee, 1989). Even though many educators agree that the use of the Internet for teaching has to go beyond the documentation of learning material in digital form, videotaped lectures and multiple choice tests, the development of more sophisticated environments is still in its infancy. It has been recognised that learning is a creative process and does not happen in isolation from discussions with other learners and teachers. “Exploration and learning can be used as synonyms, they are a process of knowledge construction within a social context” (Bers, 1998). With respect to learning environments, it has been pointed out that “Education happens in social institutions not virtual ones” (Keil-Slavik, Selke, 1998).

Two preconditions are important to be mentioned. First, this is a mandatory course. About 180 students had to take it and complete the exercises. A survey at the beginning of the semester showed that only half of them were looking forward to working on the computer. Second, the course is taught over six weeks at two hours a week, one hour for the lecture and one hour for the work on the exercises. This is very little time, but on the other hand, it also becomes an interesting restriction as it leads to thinking about efficiency in the learning and design process. An important measure was to group the students in pairs for the exercise work. The landscape was divided into 96 rectangular patches of 300 by 400 pixels each, with every group
working on a single patch. This is a first semester course. The main theme of the
course focused on special aspects of information technology. Architectural design is
taught in a different course. Our intention was to avoid interference with what they
learn there, yet still to use the same theme and show how it can be applied in a differ-
ent context, so that the students can broaden their sense of what architecture is all
about.

2. Goals in Creative Collaboration, Architecture and Learning

2.1 Creative Work in a Networked Environment

To offer a networked environment, for creative collaboration is of great importance
for the course. By representing the simulations of the future working environment,
students can explore the positive and negative sides of the system while developing
and experiencing new strategies to achieve successful results. The positive sides are
related to the goals that can only be achieved as a coordinated group work, whereby
one has an open access to the resources assembled in the system by other users. The
negative sides are mostly connected to the fact that parts of the system are given and
cannot be modified by the users. The individual contributions depend on the oppor-
tunities given by the system as well as the visibility of the particular work. The pro-
fession of the architect depends on many systems: political, economical, social, tech-
nical, and procedural. To learn to carry through own ideas within restrictive fields of
influence is an important precondition for becoming a successful architect.

Communication, collaboration, and responsibility are the central issues that stu-
dents have to deal with in a networked learning environment we are offering. Com-
munication is required to explain one’s own ideas to other individuals and/or the
whole community. Communication becomes a must especially when obtaining addi-
tional information from another source is necessary to complete required task. Col-
laboration, in its simplest form, happens through the summation of the individual
contributions. More complex forms of collaboration require an exchange of informa-
tion in order to understand the work done by others as well as to understand the
working process in which many individuals can take part. Finally, responsibility is
crucial to realize that the work of every individual becomes a part of the system, and
that good contributions augment the overall quality, while bad ones have a diminish-
ing effect.

Being part of a system means also to see how one’s work can influence the others
and which works are influenced and shaped by other creative streams. It teaches to
become strong and clear in presenting the ideas and helps to see the effects of differ-
ent presentation strategies. It allows to observe decisions made by others and to learn
about the results of those decisions, so that one can evaluate them and further incor-
porate as one’s own sets of strategies.

Our goal was to provoke the investigation on the qualities of multidimensional in-
formation spaces, which can be evoked by collaborative design within the networked
system. Students learned about new ways of interpreting and re-presenting the spatial
relationships within a two-dimensional image while learning how to organize the
collected information.

2.2 Architecture and Information Architecture

The investigations described above lead to the introduction of the notion of an Infor-
mation Architecture (Wurman, 1996) based on the concepts of system, communica-
tion and information. As architects, we deal with the problems of organizing the in-
formation about a project. By creative “putting together” of the facts and needs, we
are able to propose a solution and present an idea for a new form of spatial organiza-
tion. By bringing the data to the system, students are confronted with the need for
new way of formulating the message by means of inventing visual languages, which
are then used to present the idea in the form of digital image. As part of the course,
students were confronted with aspects of structuring the information in the way so
that the idea can be shared with others. The discourses about the physical spatial rela-
tionships and its two-dimensional pixilated representation on the computer screen
resulted in developing many interesting strategies, which were subsequently used as
methods for organizing the collected information onto 96 patches of the information landscape.

2.3 Learning the Facts and Learning through Experience
Experience of working in a computer mediated networked setting has important long term effects and is given preference over teaching of facts and giving instructions. In the realm of computers and networks, development happens so fast that one’s personal know–how has to be constantly renewed. How does one decide what to learn? How does one decide how to achieve a task? No longer will fixed recipes be at hand. One has to stay flexible and open–minded. The exploration of possibilities is necessary to reach optimized solutions. Experience is needed to judge and integrate anything new that one is confronted with. Experience is the basis for the achievement of future tasks.

3. Environment, Themes and Tasks

3.1 An Internet-based Environment
The digital environment of the course was built as an Internet environment. It is globally accessible with a standard Internet-browser at http://alterego.arch.ethz.ch/. A fast connection to the Internet is advisable for accessing the landscape, otherwise downloading of the images may become cumbersome. The monitor resolution should be 1280x1024; with a smaller resolution, some scrolling will be necessary. With these prerequisites fulfilled, the students can do part of their work from home and show it to friends and family outside the school.

Through the interface of the course, numerous bits of information are accessible, such as: lectures, exercises, tutorials, technical help, teachers and their email addresses, a sign up system for coaching, landscape and the read-write level. In addition, teachers have a note system to keep track of the progress and intentions of each student group. The design and structuring of the interface had to be done so as to enable a fast and obvious access to each bit of information. Three main interfaces can be distinguished: the INFO interface, the MAP interface, and the READ-WRITE interface.

The INFO interface is also the entry interface into the course. The menu on the left gives access to many relevant documents, whereas the one on the bottom serves as a link to the MAP interface.

![Figure 1: The Entry page of the course and at the same time the INFO interface.](image)

The MAP interface shows only a part of the landscape, three times three patches out of 96. Possibilities to navigate through the whole landscape, as well as in time, are provided.
Figure 2: The MAP Interface and the relation of the view to the whole landscape.

From the MAP interface, the READ-WRITE interface can be accessed. It allows to “talk” to one’s neighbors and other participating groups. The online messages that were passed, and the discussions that went on, are displayed on the right side of this interface.

Figure 3: The READ-WRITE Interface.

The underlying system uses a database to collect information on many levels. Most important are the services that it provides to the users. First, the sign-up process must be automated. Since the students worked in pairs, every group had to be registered and a patch out of the landscape had to be assigned to them. Whenever a group logged in, the system would automatically show their patch in the center of the MAP interface and go to their communication in the READ-WRITE interface. Since the landscape is very big (15.5 Megabytes in GIF-Format), the part to be displayed over the Internet is always composed on the fly.

3.2 Themes of the Lectures

Information technology is a very broad field. There are an infinite number of themes for the lectures. Our course is too short to cover the whole field, therefore we have chosen to exemplify methods for understanding this new and fast developing field rather than trying to teach basic facts. The first lecture was devoted to the introduction of the course. In the last week, all the time of the course was used for reviews of the individual contributions. The themes of the remaining four lectures were 1) System, 2) Communication, 3) Information Sources, and 4) Information Architecture.
In the first lecture, the notion of “System” was illustrated with examples from nature, technology, and architecture. Different characteristics of systems were identified. Then, the fact that working on the “Information Landscape” meant to work in a system was pointed out. The advantages and disadvantages of the working environment were discussed. Similarities to the work situation of practicing architects were also pointed out.

“Communication” was the theme of the second lecture. Aspects of digital communication were introduced and many examples of current digital communication possibilities were demonstrated. The main point was to ask critical questions about these possibilities and at the same time think about innovative uses for them.

Then “Information Sources” were introduced. We are flooded with information, but where does the information actually come from? In addition to lexicons, newspapers and search engines the students named manifold other information sources. Different strategies for searching relevant information on the Internet were emphasized, because the students have to learn how to deal efficiently with the large amount of information that is accessible.

“Information Architecture” reflected on the abstract notion of architecture and how it can be applied to make information better accessible for humans. Richard Wurmann has introduced the notion “Information Architecture” and has given a nice definition in his book “Information Architects” (Wurmann, 1996), pointing out design tactics like “organize the pattern inherent in data,” “create of paths to knowledge” or “make the complex clear.”

3.3 Tasks of the Exercises
The sequence of the exercises resulted in the design of the information landscape, the process was divided into five phases entitled: 1) Private Yard, 2) Visual Communication, 3) Verbal Communication, 4) Information Search, and 5) Information Landscape.
In the “Private Yard” exercise, students could only see their own piece of the landscape. They were asked to do the same exercise as in the design class, namely to design a “Day Dream Space”. In the design class, they had already identified five attributes for this space. In our course, these attributes had to be placed as text on the given background, a sewing pattern. Instead of thinking about space as having three dimensions, the task was to create depth in the two-dimensional image by thinking about visual strategies and enhancing the meaning of the attributes graphically.

For the “Visual Communication” exercise, the neighbors became visible in the interface. The borders should be regarded as locations of exchange. At these seams information can flow in and out of the well-defined rectangular patches. The goal was to be a good player in the system and possibly a good source of graphical ideas, which would be carried on by the neighbors to the next border. There, the next group would hopefully continue the theme that was initialized.

For the exercise on “Verbal Communication”, the READ-WRITE interface was enabled. Now it was possible to explain ideas verbally, to pose questions, and to ask the neighbors for specific actions on their fields. The challenge was to write short, precise and nice messages. The students had to learn to use a verbal language to describe visual qualities and intentions. After this exercise, the visual basis of the landscape was mostly established.

The next task, “Information Search”, was to leave the nice, protected, enclosed learning environment and to go out into the WWW to look for information. The task was to find five appealing Internet pages that provided interesting and correct information for the following topics: architecture, art, and philosophy.

The last exercise, “Information Landscape”, lead to the completion of the common design task. The links should be localized on the landscape by identifying or designing appropriate landmarks. This step also asked for coordination with the neighbors, so that the landscape would become a readable and mnemonic basis for the access to a wealth of more than 450 interesting links.

4. Analysis of the Landscape and the Formation Process

4.1 Visual Results
After six weeks of collaborative work an information landscape was created. It was created by incorporating the ideas of 180 students belonging to the same territory, and working collectively on its parts. Travelling through the whole landscape reveals several types of activities that occurred throughout the course. Through other students’ visual and verbal influence, many groups were able to improve and strengthen their initial contributions.

Figure 6 and 7: Visual bridges over the discontinuity of the background pattern (6). This community used billboard-like elements as a design concept (7).

Different communities emerged during the design process. The forming of the communities in the landscape materialized through visual and verbal communication. The visual communication was used in signaling for the first time the intention of belonging to a community. After the group had been accepted, the verbal communication was used to discuss the details of the “membership” and to share the knowledge
about the technical ways to complete it. The communities can be identified by the unique visual language of expression they have developed.

Many actions, which lead to form a community, were indicated: 1) Following an idea of another group and giving up a personal one in order to join a common strategy and gain a stronger visual output, along with a wider recognition in the landscape. A strong wish to become a dominant landmark on a landscape helps to incorporate groups, for example by convincing them not only to accept the same color palette, but also to adapt to other parts of the design.

For one of the communities, the background pattern became a model for the specific grayscale appearance. There were also actions, which should have lead to establishing a new dominant part in the landscape, but failed to do so. Instead, designs were created, which subsequently became isolated marks as the group decided not to redesign them.

The information landscape can be mapped onto the shape of a ring, through which one can travel continuously. The background pattern has visible seams that marked certain discontinuity in the territory. Such a junction was treated immediately as an orientation mark. The idea of bridges arose and was incorporated by groups working on opposite sides of a vertical seam. The horizontal seam was instead treated as a border which none of the groups wanted to bridge.

4.2 The Links to External Information

At the end of the course information landscape became a rich hypermap. The links added a new dimension to the landscape. It is worth noticing the ways the information is linked to the image and how carefully students were choosing and designing the graphical elements which became a link to the new information: Sometimes, the graphics are related to the subject of the link. Other times, they are related to the role the linked information plays for the design. By travelling through such multidimensional information landscape, one can experience the different interesting paths to
knowledge. Several groups created communities of interest to mark the landscape with areas dedicated to specially chosen architectural or art themes. An exemplary plan was developed for the dominant “Yellow Ribbon” in the landscape. It should link to pages, which taken as a whole, document 5000 years of architectural history.

5. Conclusions

5.1 Aesthetic Quality
In this paper, we described the second launch of the course. Description and images of the first version can be found in the book “Information Architecture” (Schmitt, 1998). A major difference was that in the first version of the course we did not use words as graphical entities. Instead, we just asked students to create a graphical interpretation of their attributes. In the second version of the course, the use of typed words, and hence typographed letters that were carefully designed by a professional, enhanced the visual quality of the landscape. Nonetheless, we still faced the problem that the landscape was often criticized because of its visual output, when we print it out as a large poster. The printout then misses the level of the linked information and seems void of any message. In the future, we have to find a way to overlay this additional dimension onto the image. In its current form, the poster also does not show the design process or the communication level, the two aspects that were very important for the learning experience.

5.2 Characteristics in the Use of Language
The verbal part of the task has many important aspects, mainly that it allows for social interaction within the landscape. This has shown to have a motivating effect. Many groups used the possibility to write messages not only to talk about strategies for the development of the landscape, but also to talk about problems and to advise each other regarding the image processing. The use of this possibility for social interaction really peaked in one dialog that almost ended as a love story. It seems that these students felt very comfortable using this possibility of the interface.

Another interesting observation is that in these very short messages the whole palette of attitudes can be found, ranging from super-nice to flaming. The use of super-nice, highly formal language is close to role-playing, an attitude that may be taken to hide shyness or insecurity. Flaming, on the other hand, seemed to originate from cultural differences. Some addressees interpreted the impulsiveness of other students from the French part of Switzerland as harsh, unfriendly critic, which lead to angry and senseless discussions.

5.3 Learning
The learning process included many aspects. The lectures should give input about the topics to think about. Then the discussion among the pairs, with the assistants and other colleagues, were important to further discover the complexity of the issues and come to some conclusions. Social competence, life-long learning, and education of leaders are goals, beyond the professional competence, that we want to reach in our students. These aspects can only be learned with an appropriate challenge and an environment that requires social interaction.

Working in pairs lead to more intense reflections on the task and its fulfillment. It also reduced the risk of losing time because of technical problems or lack of ideas. Motivation was also important. Motivated students are more receptive for input, spend more time on a task, deliver better results and hence learn more because they are more engaged. The motivation was enhanced by the possibilities for interaction with others within the environment, as well as by the guidance obtained from the teaching assistants.

We are certain that the students learned more than they have consciously noticed. Much is learned by seeing the work of others, from the reaction of other people to one’s own work, and by being a part of collaborative effort, where unforeseen contributions suddenly reveal new possibilities. We claim that the students have unconsciously gained experience - this enhances the efficiency of our teaching approach, because there is only a limited amount of learning that can happen consciously.
5.4 Next steps
In the next launch of the course, we may further try to enhance the aesthetic quality, however, we have not developed a strategy yet. We are also interested in learning more about the social and psychological aspects for the next course and other projects on creative collaboration.

6. Thanks
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7. References