Learning Labs: The New Classroom

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Abstract: Giving a brief overview of factual school-room architecutres since the 1980's, this paper presents some main parameters for the physical design of face-to-face learning environments with brief notes on their relationships to the structuration and delivery of textbook material.

Introduction

The traditional lecture hall or theatre is built on the scenic traditions from Ancient Greece. Space is structured with one focal point which is occupied by the lecturer that has additional support from some kind of display. The structuration logic is built on the monologue, the one-to-many communication of lectures that are rendered by heart or from a set of handwritten, typed or digitized notes. The students are linearily or cirularely seated relative to this speaker so as to optimize absorption and attention. The sa*ge on the stage* is seemingly a scarce information resource.

But mobile communication technologies in the convenient form factors of sub notebooks, pads and phones punch so many holes in this attention structure. Students may easily direct their gaze, their listening and their thoughts onto something else somewhere else. On this background Thomas Carol writes about these *millenials* that *grew up digital* from 1990 and onwards and who are now becoming students and young teachers:

> *They are ready to meet this challenge to transform their factory-era schools into 21st century learning centers. But they find themselves working alone in self-contained classrooms where they are bound to the teaching practices of the past.* (Carol 2008).

Reorganization of the physical and virtual working environment - the place and space of learning - has thus become important in a holistic approach to educational design. Here I present a few personal examples from digitally oriented learning environments dating from 1980 to this day. I will try to deduce some lessons for their future design.

1982

The university sector saw rapid expansion in Norway through the 1960's and 1970's. After that further growth was channeled to a new type of regional college. These institutions should provide shorter and geographically distributed vocational training programs. One of the schools, Hedmark Regional College, was established in 1978 some 150 km north of the capital. As with many of the other schools, business administration became a core subject. Given the rapid computerization at that time, the BA programs quickly spanned programming in COBOL and FORTRAN and informatics courses where *informatics* denotes a blend of computer science and some relevant application areas like business process, public administration and teaching. The physical layout was taken from the old book; - more so since the premises for this particular college had been a primary school building that was erected two generations earlier. The layout is rendered in Figure 1.

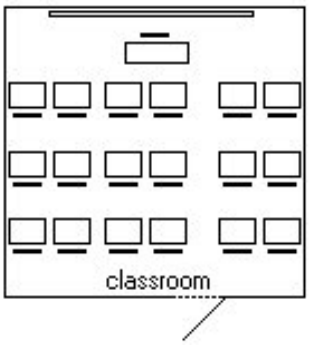

Figure 1 Lecture-oriented classroom layout with student desks, Hedmark Regional College 1982

To gain hands-on experience the college procured one mini computer from Norsk Data which was popular at the time, not least due to lavish government grants towards the purchase of this Norwegian technology.

The computer with a teletype console, an impact printer and a hard disk drive were placed in a separate room while an adjoining space housed a small number of green-on-black and very dumb terminals. This room was used for exercises. Students could time-share their access to the Norsk Data minicomputer and did so mainly for programming purposes.

When the IBM PC became available in 1982, one single unit with a printer and a colour display was also purchased for a hefty cost and placed in this area.

The lecture and the exercise room were on different floors. Study materials like textbooks, reference material and lecture notes were in some cases based on screen output, but were printed on paper.

When terminals and printers were eventually made available to the administrative staff in other parts of the campus, a local area network was built by the local telecommunication company using Current Loop cabling. The adventurous few were also allowed to log into the system from their homes using RS232 connections over a 300 baud modem

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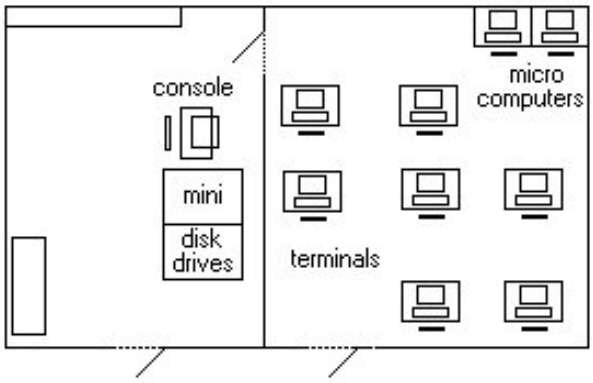

Figure 2 Mini computer with consoles in adjoining room, Hedmark Regional College 1982

1988

Some years later this author was involved with a government-funded informatics project in Oslo. We developed and delivered a one-year brush-up course for out-of-work, but well-educated immigrants. This training should compensate for their lack of computer skills from their home countries in Poland, Romania, Vietnam, Iran, Iraq and other troubled spots of the globe. They were also expected to improve their mastery of the Norwegian language.

The organizers were given rather free hands to refurberish an area in an old factory building. We replaced the electric sewing machines (that had been used for training locals of the Roma people) with personal computers and a mini-computer network. And we built a small lecture hall with an LCD overhead projector that was fed from one of the early portable computers. This was brand new technology with a reasonable cost factor.

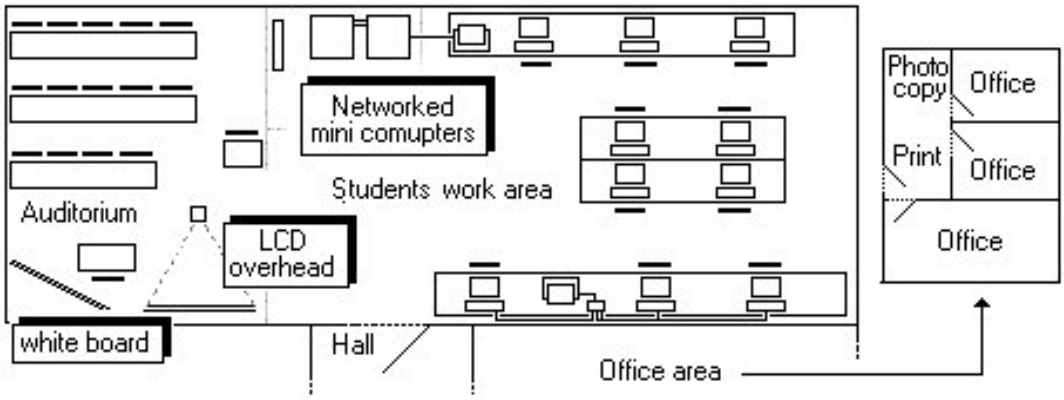

Figure 3 Adjoininig rooms for screen-supported lecture and hands-on exercise. The *AMO Informatikk* Project 1988-1990

This room was used for lectures and demonstrations. Relevant texts were mainly in English and did not support our language training. For this reason we authored most of the teaching material ourselves; - totalling about 1000 pages. This was done using word processors, drawing programs and screen capture software. The ensuing texts were printed for distribution on paper, but we could also use this material directly off the disks and off the network

for lecturing purposes. Exercise materials that were rendered in print were also distributed to participants on floppies.

The students would thus listen to and discuss lectures; see demonstrations and then immediately switch seats to go on with typing their own solutions in the neighbouring terminal hall. When problems of a more general nature would arise, a few or the whole group would move back to the lecture mode supported by a live screen for collaborative solutions and group discussions.

The teachers' offices were also easily accessible for the students and were supported by impact and laser printers, a copy machine and a small offset printer.

This setup enabled us to create a quick feedback loop between production, presentation, critique and revision of our self-authored educational texts.

1993

When bulky cathode ray screens and computers are replaced by clamshell portables, there is less need for separate computer rooms. One single area suffices for both presentations and individual or group work. But for screen projection and "immersion" it has become relevant and essential to control projection parameters.

With a generous grant from the national School of Library and Information Science, we were able to build a lecturing space for several informatics courses at the Master level. Each student was provided with a portable computer that he or she might purchase at a reduced rate after their two years of study. The machines were linked by cable to a local area network with access to local and remote printers (

Figure 4).

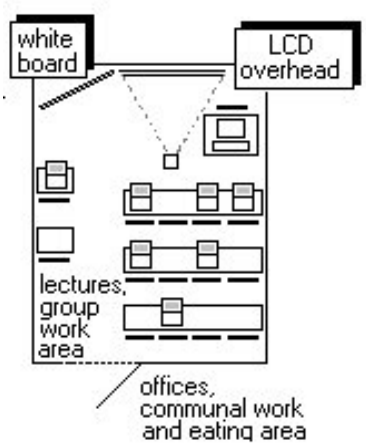

Figure 4 Integrated work and lecture environment with individual portable computers and communal screen projections. Norwegina School of Information and Library Sciense 1993.

Using the (then) Asymetrix Toolbook platform we also designed a dedicated textbook framework called *Dynadoc*. On this template we developed the main parts of the educational material for the study program (Figure 5). Each digital book was designed to be read and annotated on a portable or stationary computer. The template also supported big-screen lectures using zoom functions on each of the three panes for text (on the left), illustrations/animations (upper right) and student annotations (lower right). The system had support for named page sequences and for efficient search & retrieval. New additions and corrections to the materials were distributed using floppies or the local area network. When it became obvious that a passage or example was in need of improvement, it would only take a few hours to provide students with these corrections. The students were also invited to contribute with text and illustrations to the various volumes in the series.

From this experience we could derive a practical modul for a new type of learning environment:

1. Each student and teacher should have access to (at least) one portable unit (PC, pad, phone, --) that gives access to an individual and a shared reading&writing space.
2. Textbooks should have a primary format that supports dual use for local interaction as well as big screen presentation.
3. Texts should be accessible and sequenced for overviews and in-depth interaction in lecture, demonstration, reading and annotation modes.

The requirements are illustrated in Figure 6. Teachers and students may have immediate access to the same local and global repositories of text for individual

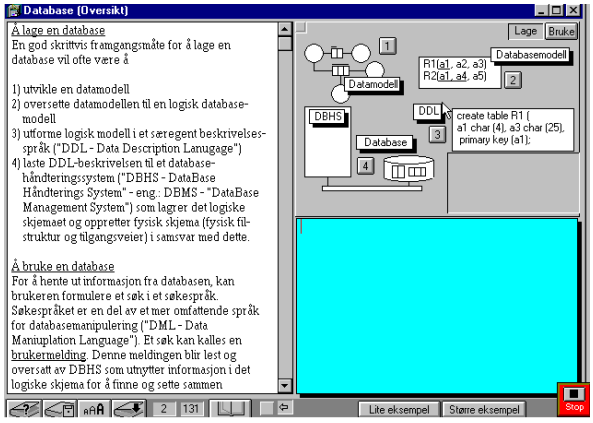

Figure 5 Screen rendition from the *Dynadoc* template with a textbook on database theory.

and collective use. The teacher is furthermore depicted as having multiple social roles as author, editor and lecturer, but such tasks may also be performed by students. The dividing line between teaching and learning is thus blurred. This creates a system that is centered on the exploration and internalization of knowledge through collaborative and extended reproduction of textual content.

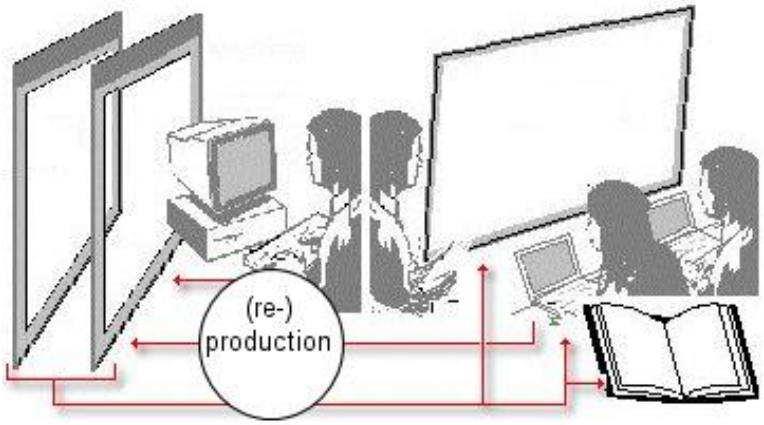

Figure 6 Reading & Writing Spaces

2009

In 2009 the Learning Center (which houses the university library, a multimedia unit with radio and video production facilities) and the Center for Educational Research and Devleopment at Oslo University College established a new research and development unit called LATINA. The acronym plays on Latin as a *lingua franca*. The letters stand for *Learning and Teaching in a Digital World*. This is also the name for a summer course on the development of collaborative teaching and learning methods using mashups and Web 2.0 technologies like blogging, digital photography and cloud-based image repositories, digital stories and videos, online spreadsheets and questionnaires etc.

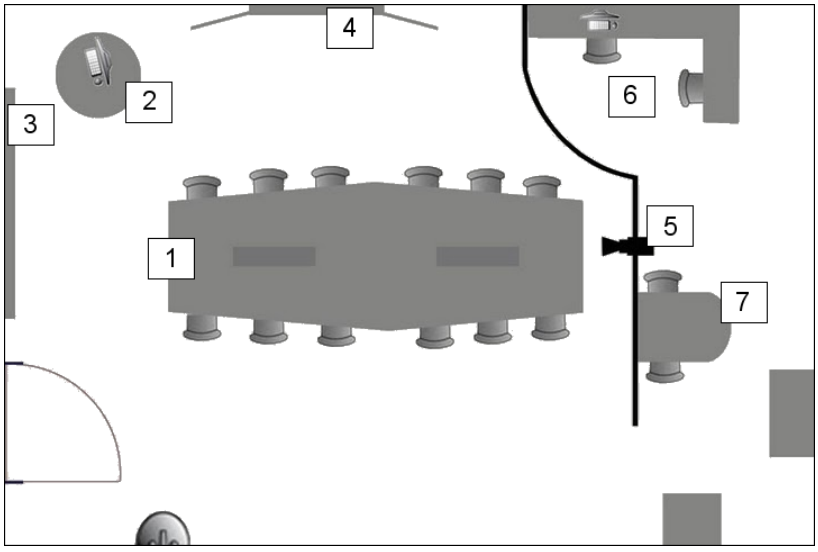

Figure 7 Design of a multipurpose area for learning, teaching, research and development. (ill.: Aslak Ormestad)

Based on these and previous experiences we built a laboratory for teaching and learning that supports group work, lecturing, video production and more secluded individual activities. An area with easy access to the facilities of the Learning Center, including computer support and available recording equipment for student use, was set aside and refurberished for the purpose. The functions of this area can be summarized in the following list (see numbered items in Figure 7):

1. Shared work area that seats 12-18 people with high-quality conference microphone and easy access to sockets for electricity, the local network (in addition to the wireless network available here and campus-wide)
2. Lecturer stand with control panel for light, sound and image projections from several sources
3. Widescreen interactive whiteboard (*smartboard*)
4. Traditional whiteboard
5. Video camera for direct digital capture and video conferencing
6. Cubicle for individual work (2-4 seats)
7. Meeting space (3-5 seats)

As with the previous example this physical space mirrors a digital reading and writing space. It contains local and cloud-based texts in a range of conventions and formats (written, still image, video, animation, sound recordings, computer-generated music etc.). For global access the underlying repositories *in the clouds* are of little practical conern. Local hosting, on the other hand, consolidates teaching and learning materials based on relational databases technology for blog and wiki access and XML for digital books. At this stage the main emphasis is on multiuser Wordpress as Content Management System with theme switching for PC and mobile phone access and the ePUB format using XML, CSS and ZIP compression for e-book publishing. The latter format is free-flow with scant image support and therefore relatively screen agnostic. The same document is readable on both PC's, pads and the later crops of mobile phones.

What's in a name?

As indicated in the title of this paper, this is still one kind of class room. But the notion experiences some duress. What we find when we explore new modes of teaching and learning is that the room itself and the contained social activities that take place within, may be called by so mane names: laboratory, a (French) *atelier*, a newsroom or newspaper *desk* and many other items from the nomenclature of print publishing, radio, television, movie and stage and scenic productions. And some of their connotations may still be in rememberance of the public performances in Ancient Greece. In this domain we expect rich experiental developments during the present decade.

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