Ubiquitus (digital) repositories in the design studio

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1/2 PART OF

XJTLU

Teaching Development Fund
“Digital Drawing as a Generative System”
Aims:

- Ascertain the use of digital notebooks as an organizational feature of studies in structuring students’ capacity to think, schedule and produce visual imagery in architecture.

- Document the conceptual architectural development of students at the Final Year project level

- Inform the development of a digital tools curriculum at the department of architecture
HOW AN ‘AEC’ TEAM WORKS

CLIENT

DESIGN

MODEL

BUILDER

Users

Community

Facilities

Planning Staff

Construction

Contractors

Cost Estimator

Surveys

Architects

Civil Engineers

Mechanical

Landscape

Visualization

Daylight & Energy modeler
Architecture studio

FROM PAPER TO CAD

Sir Maurice Wilkes

Ivan Sutherland - Sketchpad,
Vision and Realities of Hypertext and Graphical User Interfaces, http://www.mprove.de/diplom/index.html

Architect - Gentleman from Teknsik Ukeblad technical journal 1893
drawing as a thinking tool
20 students
2 tutors
2 groups
2 Final Year Projects

each student was given a tablet and a pressure sensitive pen
each student was given a tablet and a pressure sensitive pen & an evernote account

All students shared each others’ notebooks -Plus the tutors have instant access to everything, all the time, anywhere.
record

EVERYTHING

All devices allowed (including paper)
for all students, which they use through the duration of the project to record, log, backup and trace the development of their project. This server is used also by the tutors to provide continuous feedback to the students through the project as it can work in any device be it mobile phone, tablet or computer.

At the beginning Students were introduced into the use of the digital tools and the workflow. In the workshops analytical sketches were developed based on each student's final year project. The analytical sketches were informed by the research phase that has taken place already in the first semester. In the sketches a visual dialog between tutor and student takes place, making concrete the educational learning development of the project.

In certain cases where the students were apt we developed testing processes that link sketching and strategic visual thinking with parametric design tools specifically Rhino/Grasshopper and Rhino script.

Sketching is also used by the teachers to provide feedback throughout the FYP directly on students' sketches, digital drawings, models and photographs, synchronising all sketches in their electronic logs on Evernote. Both students and teachers are able to share their sketches either on an one to one basis or with the whole group, to enhance communication, provide examples, learn from each other etc.

The project will take more of an organisational approach towards the end of the FYP where computation and fabrication heavy tools are used, and where the iPads and sketching software will contribute in a supporting role.

Moreover all of the work produced by students is accessible to students at all times including the tutors feedback. Students store the information in a structured way so that the tutors better understand students design thinking and creation processes. At the same time students learn from each others' work in a peer learning electronic environment.

Initial codes and types that we were looking for were superseded by the students' concept development of their projects. Analysis of early data on the project shows that about half the students have used the infrastructure beyond the expectations of the researchers, while the other half has used Evernote as a digital hub and digital archive of their work, to help in the development of a portfolio that will constitute one part of their assessment in the FYP. Below cases where the expectations were superseded are presented:

**Student A**

[the student followed a physical-analog hybrid process, jumping between the two to test ideas, produce alternatives and re-feed these into a generative animation system.]

**Initial conceptual model**

**Feedback sketch:**

- Site plans larger and clearer
- Positioning on site _maybe needs photos-functions on site? use lake?
- Sample volume rationalisation
- Space program _entrance
- Poster need a little bit of 3dimensionality
- Fabrication of facade
- Big space as flexible space to take them in structure
- Better rythm

**3rd Crit**

Animation results re-fed into the digital model of the building:

**Student B**

[Development on purely digital means, with tutor feedback using the student's own digital models:]
Sketch on Long roll of paper: sketching available to student, reworked through scanning and organizing. Typically these records of design thinking get lost during the process and never make it to the tutor since they are considered not camera ready and therefore not worth sharing.

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Digital Sketching as a Generative System
Potential Value to the university

The project explores the impact of the teaching format on the development of visual thinking and digital shift in conceptualising architecture as well as the potential of providing formative feedback in a digital integrated environment. It also further shifts the attention of digital tools from the teacher to the student, enabling an online, digital learning approach that is student centred.

The project tests a completely digital manner in developing coursework projects, integrating a wide range of manual and digital media and methods used in the discipline into one platform. While the specific project is centred in the architecture studio, employing digital visual feedback as a language of communication, the infrastructure employed improves design and coursework teaching by adopting the integrative use of digital tools in the design or communications process. Through the research an innovative framework for the efficient use of current technology in the design process can be provided for and applied to the teaching and learning at our university.

More broadly the project can provide avenues for innovative teaching practices, harnessing cheap, available to all technologies in tight supervision tutoring, in FYP and other research-led teaching. For example the development of an essay does not happen in one effort as many students believe but there are distinct steps that contribute, from the analysis of literature to an initial structure of the text to the final development. The students can have all these as available snapshots of development, empowering an understanding of reaching closer to the goal, demystifying the learning (and productive) process and creating a sense of fulfilment. At the same time the project employs already available everyday technology, vastly cheaper compared to similar projects where this research was based upon. The ubiquitous 'Bring your Own' smartphone or tablet is the new centre of communications for the students. The project harness this untapped power by using the smartphones and tablets to capture information. It moves the learning process closer to students' contemporary every day culture and eases the meaningful use of media, whether that is for the studio or for capturing, noting and organising references from journals or the web. This organization of information also includes the feedback from the tutors and from fellow students in inviting the student to reflect on the development of his or her coursework. An added benefit, that potentially some students (and perhaps tutors) will develop a resistance in, requires that information is regularly uploaded unto the digital notebook, that feedback is recorded there and every single piece of information about a project is located in this hub, and accessible for further use even if initially it was not considered sufficiently valuable.

Student D
[the student developed a big part of the research on the project on a paper notebook and then uploaded unto Evernote for feedback]

Sketches:
We started the project with high hopes that the tools were now in place to develop completely digital processes in the architectural education studio. However the students were also too entrenched in modes of operation and organization of production suited in analog processes.

This effectively communicates that habits are entrenched and difficult to break, thus making any such experiment in curriculum design one that would have most effectiveness if introduced early and en mass in architectural education.
On the other hand the experiment did show that the students responded positively when provided with a documentation system that captures all information in their design process. In most cases the students revealed through their lack of experimentation with the system that they still were trying to hit a final target at the end of a linear thinking process, rather than the most realistic design process of trying, failing and going back again to try again.
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student commented positively in creating their final presentation by having a consistent format and archive for all of their work, as it was already digitized and ready to be placed into production
Q&A