Survey of Architectural-ICT in the Educational Curriculumns of Europe

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Abstract. The paper documents the findings of the post-graduate study carried out among the ≈180 European schools of architecture in more than 30 countries during 2002-2003.

The objective has been to describe the role of "modern digital information technology" and to give an understandable and measurable overview the current architectural education and its relation with ICT and CAAD.

The study material has been collected with a web-survey, with questionnaires to eCAADe-conference participants in Helsinki 2001 and Warsaw 2002, and with direct email-contacts to schools' key-persons.

Computer-aided design has developed into architectural information and communication technology (ICT), to become the main tool of the majority.

The general image of new media use in the architectural schools seems to be slightly too positive. The invisible or "normal" ICT-use - writing, surfing, emailing - has a lot more volume than documented.

The major hardware platform in european architecture schools is PC/Windows (90-95 %), Linux and Unix are used also commonly (25-35 %). Macintoshes are also used much more widely within architecture (50-55 %) than within the common computing platforms. MS/Office (90-95 %) and PhotoShop (85-90 %) are obviously also used widely in the architecture schools. Graphic tools PageMaker, QuarkXpress, Illustrator, Freehand are common tools for architecture students (30-50 %).

AutoCAD is "the marketing leader" in architectural platforms (80-90 %) followed by ArchiCAD (60-65 %). MicroStation/Bentley has also a remarkable volume in the schools (35-40 %). 3DStudio is the most common 3D-modelling tool (80-85 %), followed by formZ (35-40 %). Slightly less volume but still remarkable (15-25 %) have Rhino, Maya, Alias, Lightscape and Radiance.

Keywords. architectural education; architectural curriculumns; CAD; CAAD; information and communication technology; IT; ICT; questionnaires; statistics

Volume and interest of the study

This post-graduate study among European architecture schools was started in may 2002 and will be concluded in 2003/2004. The most essen- tial question of this study has been, how widely the digital media, tools and methods have been adopted into the education given in the European architectural schools.

The results are based mainly on web-surveys

by the author, and participant questionnaires in eCAADe-conferences 2001-2002 performed by eCAADe-activists. All the results are web-documented in http://www.arkit.net

The meaning of this study should interest all the European architecture schools (EAAE 2000):

– alltogether ≈180 european architectural schools in more than 30 countries
– approximately 120 000 architectural students
– approximately 5…7 000 full-time teachers
– approximately 50…70 000 courses given yearly in these schools.

One of the main motivators for this study has been the European contact forum of computing and research within architectural education eCAADe.

About 20 % of the European architectural schools have actively (4-9 conferences) attended in the eCAADe-conference forum during the last decade. On the other hand about 50 % of the european architectural schools have never been represented in these ICT-concentrated forums, and additionally, some 20 % of the schools have participated just once.

Either the visibility of eCAADe has not reached all the schools, or the conference contents have not been interesting enough to them. Obviously some kind of actions are needed by eCAADe-organization to activate also these "less new media motivated" schools.
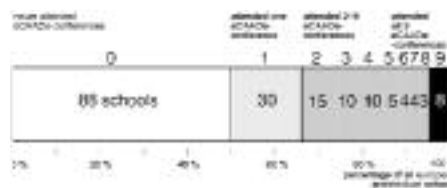
Definition of architectural ICT & digital media

So-called "modern information and communication technology" (ICT) and "digital media" have been fully adopted to the architectural discipline and architectural profession during the late 1990's, as was noted by QaQish & Hanna (QaQish & Hanna; 1997). Digital tools, mainly software & CAD have also become the major digital working environment of the discipline.

The whole concept of "architectural-ICT" has been in constantly evolving stage during the last 10-15 years, hence the conceptual framework of ICT has to be constantly redefined, to be valid within the architectural education.

The concept "CAD" was used, and also quite quickly replaced by the concept of "CAAD" expressing the specific character of "architectural-CAD" in the early days of 1980's. The concept "information technology", "IT", has recently been replaced by "information and communication technology - ICT" representing quite well the current values of computing and digital technology of our era.
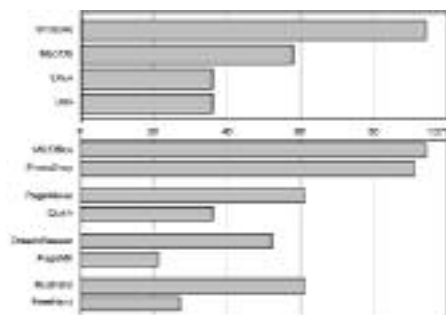
A commonly used information technology vol-

ume-based definition which devides ICT-systems to hardware and software components (figure 3), does not lead us too far in defining the architecturally interesting educational context of the current European architecture schools, though it can give some measurable facts in managing the area.

The eCAADe-based data (2001 and 2002) is based on 33 European answers and 28 outside Europe. The described status in the European schools resembles the status also outside Europe (USA, South-America, Australo-Asia).

The network structure (LAN) was not asked in the eCAADe-questionnaires, but evidently it is available by the vast majority. Software usage is declared more detailled in later chapters of this paper and in http://www.arkit.net

Another proposed definition (table 1) describes the available and used working environments which are defined by a more architectural education viewpoint. Despite the existing and traditional course-stuctures, several digital "working environments" should also be considered when teaching architecture, and especially when developing the teaching environment.

Which ways information technology is used

While becoming more or less "the" normal educational activity, the nature of architectural-ICT has also developed towards very heterogeneous and distributed environments lately. If the trend of currently used ICT-based concepts continues its evolution, the "architectural-ICT" may slowly disappear in the future, as William Mitchell proposed about CAD in the late 1980's.

Digital architectural media and tools are currently used in different ways and forms in the schools. As often described, CAD-has been used in the schools as a tool, but currently CAD is better understood more like a working platform or a larger and more meaningful designing environment.

Digital media has also become the presentation media of our time, while traditional slide-collections and overhead-film maps are transferred into digital archives. When digitizing [finally] almos everything, finding information becomes more and more crucial in the future.

Digital tools offer a flexible communication toolbox to architectural education. Not only email is used, but also numerous digital calendars, communication and chat-boards have enriched the current school environment.

Visible ICT-use

The architectural schools with "good CAAD-reputation" offer lots of well documented examples of sophisticated and "correct" new media use, presented within the "digitally active" organizations such as eCAADe, ACADIA and CAADRIA. This visible CAAD-use gives good examples and "benchmarks" of active new media use to those schools, that are not that well equipped nor skilled.

Architectural CAD (CAAD) is teached as separate courses and in larger CAAD-curriculumns, but based on a web-study, the better integration of CAAD with schools' "traditional" architectural planning & design education should be considered more.

Invisible ICT-use

An interesting question has arose during the survey, namely the need to somehow document also the invisible ICT-use. The invisible ICT-use, "every day use of ICT", low-level IT-activity - such as writing, emailing and web-browsing - has obviously a lot more volume than documented or expected – and in the future even more so! The every-day ICT-use is usually carried out without any help nor instructions, and it is very self-organized. Students teach other students, and it is also done outside the schools: at home, in the libraries, in net-cafees etc.

A critical check-point is, how well and easily the every-day ICT-use can be integrated with the schools "official" and existing environments. The rising risk of viruses, and architecture schools' - very common - trend in increasing security restrictions, may easily lead towards more heterogenious and more complex working environments.

Digital equipment used in the European schools

The results presented here could be described as "average professional estimations", due to the constantly evolving nature of the area. The tools data is collected from the active eCAADe-conference participants: 33 European schools, ≈18 % of all European schools plus 28 schools outside Europe. It obviously describes too positive status when concerning the whole Europe, because these eCAADe-active schools are also "digitally well-concerned" compared to the overall status.

Hardware in use

The major hardware platform in European schools is PC/Windows (90-95 %), while Linux and Unix are also used very commonly (25-35 %).

Macintoshes are widely used within the architectural discipline (50-55 %), while the general Mac-volume among micro-users is about 5-10 %.

Software in use

The most common software platforms MS/Office (90-95 %) and PhotoShop (85-90 %) are used widely in the architectural schools.

The commonly graphic tools (PageMaker, QuarkXpress, Illustrator, FreeHand) are also common within architecture (30-50 %).

Of architectural platforms AutoCAD is "the marketing leader" in the schools (80-90 %) followed by ArchiCAD with more volume in the schools (50-55 %) than in the European practise. MicroStation has also a remarkable volume (35-40 %) within CAD and urban planning fields.

AutoDesk's 3DStudio "rules" in 3D modelling (80-85 %), followed by formZ (35-40 %), Rhino with growing share (15-25 %) and Maya, Alias, Lightscape and Radiance with 15-25 % volume share.

Quite an interesting viewpoint in analyzing these software figures is the comparison of some marketing competitors (figure 4). Additional to the

European schools, the lower bars in the figure 4
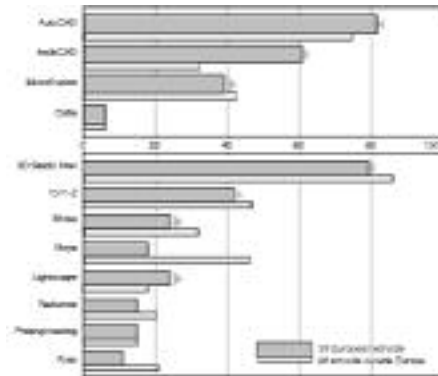
represent some outside-Europe benchmarks.

Development environments

Half of the schools reports using databases (52 %). Some 33 % use VisualBasic, as well as Java (27 %) and C++ (24 %). Obviously the are also several other development environments in use in the schools (Delphi, Lisp, GDL, etc.).

A web-forum http://www.arkit.net

A web-forum for architectural schools was launched in june 2002. It was launched

– to maintain a link collection to European architecture schools' web-presence

– to find out measurable volume and facts info about schools' ICT-use

– to form a continuous and free info forum for the schools

By the time of the publishing, the query is based just on 9 schools' representatives' answers, but by the fall 2003, the results should be more covering.

The web-forums link collection to European architecture education contains ≈180 active links to architecture schools' departments in 35

European countries.

A vast majority of the schools (95 %) do have a web-site, though some just do have a single page. Despite the good coverage, the complete course contents or more "deep facts" can only be found in just 30 % schools' public pages. Also quite interesting is, that half of the school sites serve only in their native languages, and half serve in english, meaning obviously that the schools' web-sites are strongly targetted for local use, despite the international character of the web.

Additional to the school adresses and other basic facts, the student and staff volumes are also asked, showing so far that European architecture schools sizes vary a lot. Part-time teaching seems also to be very common (≈30-40 % full-time staff, ≈70-80 % part-time staff). Schools' IT/CAD and new media staff is approximately ≈5 % of the staff.

Anonymous questions are also asked in the questionnaire. The answers tell so far (figure 5), that European architecture schools are techinically quite well equipped, but the overall understanding of new media, and its integration to schools' educational curriculumns are perhaps not so positive than expected.
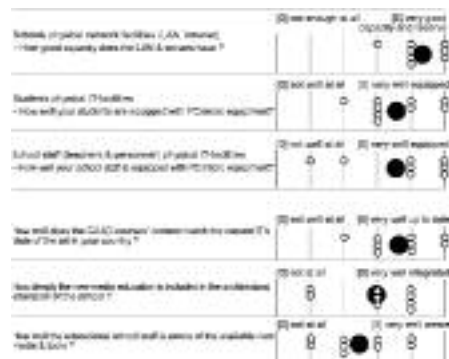
Changes in the architectural education environment

The area of digital communication has developed rapidly lately, meaning for instance email, numerous web-based tools, constantly evolving web-sites and logbooks.

Spatial modelling possibilities in teaching and project presentation have also grown together with the tools' modelling capacity.

Since the facts and data are mainly collected together with cumulated new media experience, they do not fully represent "the average new media understanding within the European architectural schools."

The study continues in collecting more data and describing the whole spectrum and variety of ICT-use in the European schools. Real-time status is visible in http://www.arkit.net. The objective is to be objective. Not to document just the most excellent or best examples, but to describe the true status of digital information technology within the European architecture schools.

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