Going Upstream - Finding New Ways to Enhance the Use of Computers as Design Tools

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..."The power of the computer as a design tool and as a design stimulator has still to be fully exploited"… The previous statement from the conference theme, couldn't be more correct. However, the question then becomes why? Why computers aren't used more often as design tools?

In trying to find answers and solutions to these questions, the author has applied an approach similar to that taken by river explorers. These individuals, when exploring the course of a river, begin the journey at the mouth of the river, not at the source. They go up river, against the current, searching into the larger tributaries first and then proceeding to look at the smaller rivulets. In other words, rather than proposing some theoretical construct that one could put to the digital design test and find out why we're having problems with computers in terms of design creativity, here the course was reversed and began with a product that was analyzed in order to find its sources. The paper (a) presents the rationales behind the procedural approach to digital modeling, (b) the process that was used to investigate the approach, (c) its outcome.

Introduction

The author argues that today, in the field of digital modeling and visualization, the question is not whether we should first use some framework over another in order to assist the design process or to validate a particular theoretical current. While it would be great to continue to use and explore the great design traditions and theoretical frameworks of the past, it is sad to say that with digital technologies we no longer have this authority. Why? Because of the nature of the digital tools we are now using, and more specifically, the way software is structured. In other words, the proposition is that in the design studio, in conjunction with solid theoretical frameworks, we need to present students a basic method by which they can evaluate and appreciate the relative value of existing technologies. This method needs to be based on careful reasoning and not on false or inaccurate advertising that promises a lot but delivers little. It needs to be rooted on analysis and testing of applications in the world of architectural design studios and not in the rarefied air of laboratories of testing facilities. And it should be a method that classifies and selects application options after having compared alternatives. Finally, the process should cover the expenses connected with the adoption of potential technologies. Such methodology involves teaching through practical mediums without exclusion and prejudging.

An Experiment - Getting Better Results - Methodology - Process

The basic premise underpinning the experiment was the recognition that if one wanted to get better results using digital technology, one had to modify the design process. Five components that differed from traditional methodologies were therefore introduced:

1. An immersion phase where students simply played and experimented without being too constrained by architectural programmatic requirements.

3. A manipulation phase where they were asked to experiment with the transformational options unique to digital tools.

4. A discussion and evaluation phase where the group presented their findings in regards to what the applications could and could not do.

5. A two-step final design phase where the building program at the beginning was deliberately left somewhat vague

6. A final presentation and visualization phase were students were asked to present their ideas using two different approaches. The following table outlines the process:

Project Phase	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Discussion phase

Probably the most intriguing and educational part of the experiment was the discussion phase. While this part was not particularly creative or entertaining, it nevertheless provided great and invaluable assistance in guiding the group during the final and more creative parts of the experiment. During this phase students were asked to be aware and document the following points in regards to their initial design exploration:

1. Accept all new technologies - Here students were asked to be as open as possible.

2. Find what the tools can do - What can the application(s) do for me?

3. Find out what the tools cannot do – When does an application become worthless?

4. Find out what they do best – Where, how does an application excel?

5. How long it takes to produce a desired effect – Does it take one hour or one day?

6. Find out how much it costs – This is a must for cash-starved students.

7. Find out who is using it – Who uses the application.

8. Find out how reliable it is – How often does the application crash?

9. Look at the gallery – What other users have done with the application.

10. Manuals and other learning tools associated with the application

Notes on the Outcome

The brevity of this paper makes it impossible to highlight all that was learned during the experiment. The following only highlights a few points.

First, most students felt uncomfortable with the idea of unpredictability. For them, architecture had to have a predictable objective outcome. This point actually revealed the fact that one of the reasons why we are not getting the best use of digital technologies is that we use the tools in a linear fashion and seldom get involved with their great possibilities and potential as transformation tools. Second, because most students had only rudimentary skills in descriptive geometry, the first three-dimensional schemes that came out were based on Euclidean geometry. This point leads to the conclusion that if we want to get better and more creative modeling results, we need to get more involved in different rules and geometric axioms. For example, nobody was aware of the work by Gauss (1), Lovacevski (2) and Riemann (3) --done in the 1800's!

At the onset, solutions were sculpted to form either interior or exterior spaces. In other words, students began their exploration by digitally developing walls, domes, vaults, columns, etc. Probably they did so because their software included icons that generated walls, domes, vaults, and columns. Actually, it took quite a while to make a shift from universal solids to planes, solids, and voids. A magical moment that students very much enjoyed came when such threshold was crossed and compositions became articulated by intersections and superimposition of planes in three-dimensional space. This breakthrough was a major marker in the project and points out to the necessity of approaching the design process by not using application design icons in a literal way but use them in a figurative mode.

As the project progressed, a new challenge emerged. The main perceptual characteristic of solid architecture and its solid-void articulation which generates enclosures and boundaries separating the inside from the outside became a new source of anxiety. A major breakthrough came to the group when it realized that the solid and void dichotomy was not that important and that digital elements representing solids could be moved in non planar ways thereby generating new and more exciting opportunities between interior and exterior spaces. The discussion also brought a most interesting point. At the beginning most students thought of building typologies as an item that could not be tampered with. In other words, a living room had to be a living room and nothing else. But as the project evolved, students began to question the validity of fixed building typologies. Because of the fluid nature of the project, students began to see on their monitors that spaces could be multi-function, multi-typology architectures. A school could become a library, an entertainment center or a workplace or a combination thereof.

Because in its final stages the project had a real building program and site, students were asked to integrate bones (structure) and skin (surface). While students were aware that architectural form was often an expression of the structural equilibrium required to create a given space with certain materials, they also felt free to explore qualities where the structure was separated from the perceived building spaces, hidden by walls, floors and ceilings. Eventually this single discovery turned into another breakthrough and major source of satisfaction for the group.

Finally, a major goal of the experiment was to see how much one could learn about ideation and the design process using digital tools while designing at the same time. Ample notes on the process were taken and discussed by the group. One item that clearly stood out toward the end of the experiment was that students became not only better and more informed users of digital tools, but their analytical and critical skills had improved considerably. Students also became more aware of which digital tools they were using more often and why, and to what extent these tools helped them in the creative process. Moreover, instead of relying on false claims or dubious advertising, students were able to quickly make decisions on how to proceed with new digital tools and/or emergent technologies. They became a lot more independent and self-reliant. Probably one of the most fascinating aspects to both students and instructor was the experimental and playful nature of the final constructs. While one can argue that the process produced very high levels of anxiety at the beginning and took longer to run, the end result produced schemes that most saw as very intriguing and imaginative. There was a big applause at the end.

Notes

(1) Bühler, W. K.: 1981, Gauss, A Biographical Study, Berlin; Coxeter, H. S. M.:1977, Gauss as a geometer, Historia Math. 4 (4) pp. 379-396.

(2) Vucinich A.:1962, Nicolai Ivanovich Lobachevskii: The Man Behind the First Non-Euclidean Geometry, Isis 53 pp. 465-481, Bazhanov, V.A.:1994, The imaginary geometry of N. I. Lobachevskii and the imaginary logic of N. A. Vasiliev, Modern Logic 4 (2) pp. 148-156.

(3) Grauert, H.:1993, Bernhard Riemann and his ideas in philosophy of nature, in Analysis, geometry and groups: a Riemann legacy volume, pp. 124-132; Scholz, E.: 1992, Riemann's vision of a new approach to geometry, in 1830-1930: A century of geometry pp. 22-34.