

The Shifting Tides of Academe: Oscillation between Hand and Computer in Architectural Education

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ABSTRACT: There is a current vacillation in choosing hand or computer for design presentation in academia. Although the computer emerged as very powerful alternative presentation medium, it could not sweep away the hand totally. Believing that this vacillation cannot only be due to the positive and negative aspects of both media, we worked with a group of students in a design curriculum to observe the factors that affect their choice of medium for presenting design ideas. The students were required to use both media for the same task, subsequently their satisfaction and evaluation were examined through a questionnaire. Students acknowledged the positive aspects of both media, rather than accumulating on one side. Findings led us to concur that the constant oscillation of architecture between art and science penetrates down to the individual choice of presentation medium. We assert that the warmth of hand is not deserted as it contemplates the artistic essence, while the digital perfection of the computers flirt with science. The ever-attended, age-old question of architecture's being art and/or science occupies the architectural agenda at various levels. Both the polarizations and the reconciliations have theoretical, practical and educational consequences. This paper locates itself within this context and proposes a new framework for analyzing the impacts of this oscillation in design presentation, concluding that the future of presentation in education points to the coexistence of both media.

Keywords: architecture, art/science, computer-aided design, design education, design presentation

Despite the theoretical and practical differences they may have, various disciplines highlight and discuss similar problems related to computer aid within higher education. Discussions in different disciplines and the variety of approaches towards computers allow us to speculate that architecture is not the only field that felt the impact of computerization, thus experiencing polarization and shifts between the non-computerized and the computer-assisted methods. In this sense, the debates over the role of computers in higher education are not unique to architecture, yet, what differentiates architectural education from other curricula in terms of its stubborn resistance against total computerization (Şenyapılı & Basa 2005), can be traced within its bonds of artistic discourse.

Commitment to artistic creation leads architecture to focus on the visual representation of the ideas, hence, the mode of presentation always has a special place in the assessment of the potentials of the architectural space. The role of presentation in conveying design ideas appears to be more important in design education when compared to design practice, and to any other discipline. In their study connecting engineering fundamentals and hardware design in education, Brereton, Sheppard, and Leifer illustrate graphs and sketches as a level of abstraction (together with fundamental concepts, imagined product, etc.) to help students relate to real artifacts and experiences (1995). Visualization through sketches does not merely occupy the agenda of architectural education, but also creates a realm of debate in engineering education, especially in terms of its link to the actual world. However, expressing, visualizing, and/or representing design ideas by means of eye-catching drawings, whether hand drawn or computer generated, have always been a fundamental concern in architectural education. Therefore, even though computers bring along many advantages such as time-saving, ease and meticulous detailing, to name a few, they did not achieve to make a major takeover in academia. Currently there seems to be a vacillation between the choice of hand or computer for design presentation. This situation might simply be based on the fact that both techniques have different strengths and weaknesses. However, we believe that there may be some hidden factors contributing to this phenomenon.

No doubt, these factors may be traced in various ways with different methodologies. In this study, in order to unveil these factors, we worked with a group of design students observing their tendencies in choosing hand or computer for presenting their designs. As instructors of two different graphical presentation courses (one based on hand, the other on computers), as well as teaching in third and fourth year design studios in a design curriculum, we believe that the relationship of the choice of the drawing medium is reciprocal with the factors that form it. These choices are not only formed by, but also form, the hidden factors that contribute in the current vacillation between computer and hand-based presentation techniques. We also believe that the answer to the question of whether computers will be able to take over the hand-based drawing techniques for presentation in academia lies in the preferences of today's students. The satisfaction of this young generation of designers with computer and hand-based techniques is analyzed, both *during* the presentation process and *after* the presentation is completed, in order to get a clear picture of where and how the preference of presentation technique is rooted.

While searching for an answer, this paper does not aim to problematize the gap between the use of hand and the computer in design presentations; on the contrary it underlines the oscillation of the recent years' graphical communication between presentation media; hand and

computer. This article focuses on the paradox/conflict between architecture's ideal of presentations and computer's anonymous digital formality. More realistic representation of the designed space through digital technology somehow fails to fulfill the prevailing expectations from architectural presentations. We hope that by unveiling the hidden factors contributing to the vacillation between computer and hand-based techniques, we will be able to decode all the above stated problematic issues. A majority of related current studies concentrate on examining/comparing/re-thinking the roles of hand and computer during emergence and development of design (Bailey 2000; Purcell & Gero 1998; Scrivener, Ball & Tseng 2000; Welch, Barlex & Lim 2000) and scrutinize the ways to reconcile hand and computer in design curricula, based on professional observations and experiences (Mark 2000; Mark, Martens & Oxman 2001; Norman 2001). This study, however, situates itself first within current debates over design presentation, and then contributes to the debates, based on students' observations and experiences.

A CLOSE LOOK TO THE TENDENCIES

The study is made with a group of students within an interior architecture curriculum. The students are second year design students. This choice is based on two factors. First, second year is the time when students are introduced with both computer and hand-based advanced presentation techniques via specific courses within the curriculum. Secondly, we do not intend to focus on design, but presentation; and second year students are suitable for carrying out such a study. Moreover, our previous findings (Basa & Şenyapılı 2005) help us to assume that even within the same curriculum studying with students of an advanced level; namely third and fourth level students, would produce findings in favor of the medium that they excel in during the course of their education.

The students were given an assignment with two phases. The phases were handled consecutively. First, students drew and rendered two simple 3d geometrical forms by hand within an hour and a half (Figure 1), and then, they were required to do the same task by computer within a similar time frame (Figure 2). The choice of simple 3d forms enabled the students focus directly on presentation without being distracted by the content. Moreover drawing white on black facilitated achieving a satisfying image with a few touches.

After the drawing process students were given a questionnaire to express their satisfaction and views in a comparative manner. The 69 students we worked with had a mean age of 21. They have been using computers for a mean of approximately 8 years, the distribution of purpose of use having the means of 7 years for gaming, 6 years for word processing, 6 years for Internet, 2 years for drawing. Sixty-eight students declared having a personal computer of their own.

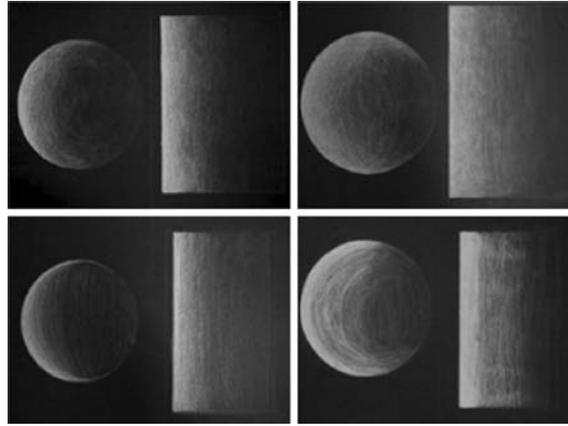


Figure 1. The task drawn by hand; randomly chosen examples.

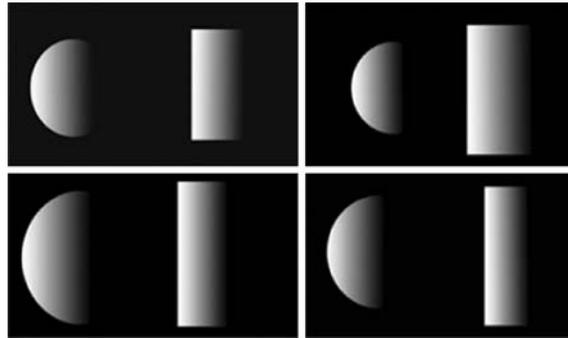


Figure 2. The task drawn by computer; randomly chosen examples.

A majority of the students acknowledged the advantages of drawing by computer over hand drawing, especially in terms of practicality, economizing of time, and using less physical effort (Figure 3).

Noticeably, all of the participating students chose drawing by computer as being easier to execute, and approximately 83% of them pointed out that drawing by computers was easier to learn. When asked about further advantages of drawing by computer, students also indicated the ability and ease of correcting mistakes, the possibility of instant adjustments of light, color and shade, and independence from hand skills.

With this picture, one may quickly presume that the students are largely in favor of drawing by computer. However, our further inquiry showed that when it comes to enjoyment and feeling designerly, students prominently gathered around hand drawing. This preference rested upon

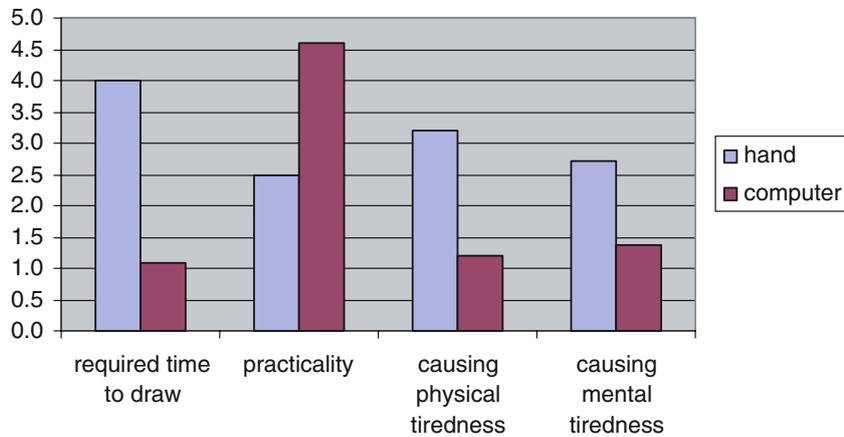


Figure 3. Comparative responses of the students in terms of evaluating hand and computer presentation techniques.

a variety of factors, from being creative by hand to finding the hand a convenient medium to demonstrate one's ability. At this point, the possibility of author identification in hand drawings emerged as a dominant issue as a preference factor for the medium. Most of the students referred to the aspect that it is easier to tell to whom a hand drawn drawing belongs. They declared authorship by stating "it is my drawing even with its mistakes", "I could easily get involved with the drawing and I could express myself", "not monotonous/homogenous, it reflects me". Some even mentioned that hand drawn presentations were totally their own product, as if computer drawn ones belonged to somebody else, the computer perhaps.

Moreover the students indicated that hand drawings are somewhat warm and artistic. Interestingly, out of the 69 students (100%) who initially said that computer drawings were easier to make, only 8 ended up regarding the final product as warm and only 6 said that computer drawings reflected their ability fully (Figure 4).

These considerations even reflected upon their choice of medium for future presentations (Figure 5).

Approximately 55% of the students indicated a preference for computers as the medium of the future, while the other half of the participating group favored hand drawings. Among the reasons given for the adherence to computers were "the preoccupation with keeping up with the contemporary techniques used in the market", "the concern for completing the drawing tasks within the shortest time frame possible", and "practicality, especially in terms of correction of the mistakes". On the other hand, fans of hand drawing justified their choice by saying that in the future everyone will be able to draw with computers, but drawing by hand will be a distinctive quality since it requires specific skills. They

also indicated hand drawing's greater potential of expressing one's style and ability. Thus, hand drawing is more unique when compared with the well-calculated digital images. They pointed out the strong bond between creativity and sketching by hand as an important factor in their preference of hand-based techniques for the future.

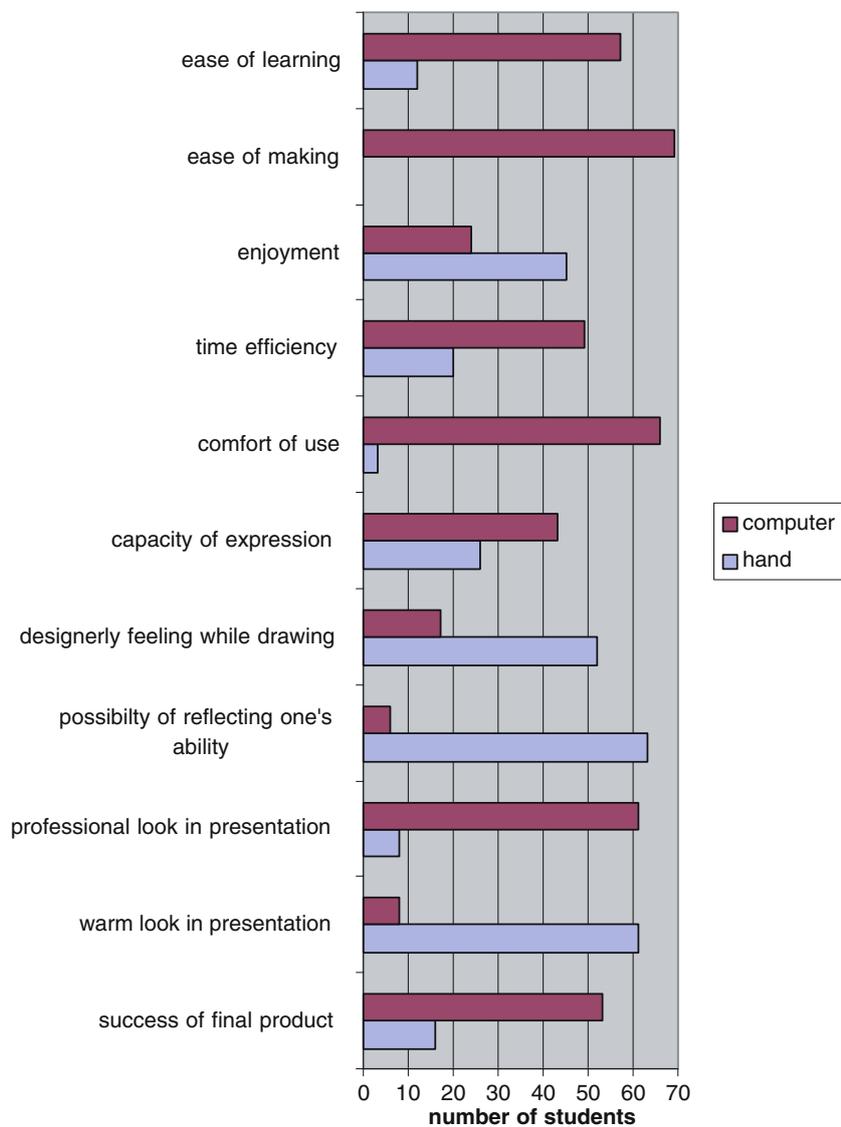


Figure 4. Tendency distribution of the students based on various criteria.

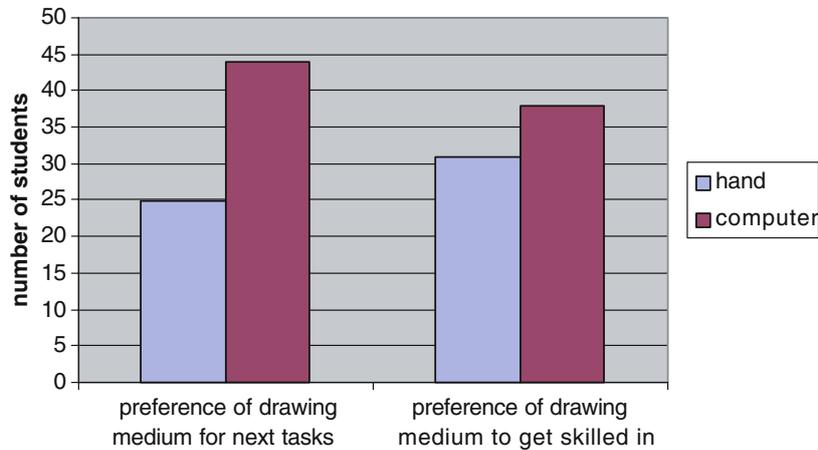


Figure 5. Preferences of drawing medium for short and long term.

THE ISSUE OF OSCILLATION

This study highlighted the conflict in the selection of hand or computer for design presentation in academia. We call this situation *current oscillation in academia*. There are already ongoing discussions that evolve around this situation. These discussions either advocate the importance of hand sketching or stress the digital superiority of computers. Between these two radical poles, reconciling positions may emerge. This paper is positioned between the two poles; recognizing the factors that form this oscillation and considering their implications for the future.

Within this context, the study gave us a powerful opinion of how students feel about both presentation media. Students acknowledged many advantages of the computers and they also emphasized that in the future computers will continue to be integrated in design practice and education. As members of a generation born to computers and being swift in using computers, the students are well aware of the capacities of computers. Yet, no matter to what extent they are computerized as a generation, the students still believe to a surprising extent, in the importance and value of hand skills in the design milieu. Students showed a great recognition of the validity of hand drawings with the indication that hand drawings are more successful in reflecting authorship, one's ability, and warmth in terms of artistic expression.

Students indirectly refer to the ostensible lack of authorship in the anonymity of the computer drawings. The calculated aesthetic of the computer assisted drawings lacks the special mood that may be attributed specifically to its author. In other words, these drawings do not carry a distinctive touch. It is this very touch that enables the viewer to trace the author of each drawing within a group of similar drawings. The given

exercise was structured consciously to handle the drawing and rendering of simple geometric forms. We also made certain that the task involved quick 3d effects, so that students would not be blinded by the assistance of the computer in creating, drawing and rendering complex 3d forms.

Current feelings of students towards hand and computer generated presentations give occasion for some future considerations. This study shows that there is a prevailing belief in a strong relationship between hand and creativity among design students. The young generation of design students who are linked to computers through Internet use, games and various software appreciates the potential of computers in terms of precision, ease and time saving, yet defend the superiority of hand over computer in reflecting artistic manner/identity. The students prefer the intimate aesthetic of their hands to the calculated aesthetic of the computer. This preference, in a sense, refers to design presentation as an expression of identity. This notion of author identity, that comprise the traceable features in a drawing that distinguish the author of the drawing, is so essential for architectural representation that its implications on both students and instructors in architectural education cannot be overlooked (Basa & Şenyapılı 2005). The critical look of the students to computer assisted drawings in terms of lack of identity seems to ensure that the role of hand will preserve its validity in the future. This leads us to conclude that neither of the techniques will dominate over the other. Despite all its capacities, the computer does not seem to trump hand-based techniques.

At this point it is relevant to ask why hand-based techniques remain the preference of so many students. The answer can be traced in the double-edged nature of architecture. Architecture is a field of design that feeds both from the domains of science and art (Cross 2001). Current ambiguity in resorting to hand or to computer drawings can be explained within this framework. The reason behind the ongoing oscillation between hand and computer drawings can be traced in the two-faceted nature of architecture: science and art. However, when it comes to design presentation, the tendency seems to be denser on the artistic side. No matter how scientific the design process may be, design presentation is closely linked to artistic issues.

On the other hand, computers' digital perfection leaves limited scope for the concepts such as identity, authorship etc. Instead, computer drawings display a technical anonymity. Architecture's ambiguity of self-definition; art/science, leads to the oscillation between pencil/computer. The notion of identity in presentation is stimulated by the (tacit) understanding of architecture/design as a creative/artistic discipline. Those regarding architecture/design as a scientific field, on the other hand, welcome the technical and anonymous look of computer output.

No doubt, within this framework studying the preference of pencil or computer may produce results closely related to the context of the study;

comprising student profile, research content, research environment, etc. Our study empowers itself by its well defined student group, the hands-on experiment, which allowed students experience both media in similar settings and then establish their views, and the *in situ* observation that enabled us to check students' responses. Different student groups within a similar setting or same student group within a different setting are prone to show different preferences, some of which may be explained by the current oscillation of academia between pencil and computer; others which may simply be mistaken for the outcomes of this oscillation.

CONCLUDING REMARKS

Architecture's oscillation between art and science is perennial and will not cease. The authors of this paper identify this oscillation as an essential factor within architecture, since it enables architecture to have an extensive and rich domain. It is also this oscillation that determines the current vacillation between hand and computer for presentation in design education. This tension between hand and computer can be seen as a motivating factor for obtaining improvements in the field of presentation. Dissatisfaction with each technique generates either competitive development within each, or innovative attempts to integrate the two.

This study critically analyses the oscillation from two points of view: a general platform, defined by the oscillation of architectural understanding between art and science in education, and a specialized one, defined by the role of authorship in this ambiguous environment. The shifts between hand-based and computer assisted techniques experienced individually by the designers, and even by the students as our study indicated, derive from this greater oscillation. Our study shows that neither computers nor hand can/should sweep the other away totally.

On one side, the hand's merit of a great sensitivity/authenticity cannot be challenged by computers despite all the improvements in the digital field. In education, unlike practice, 'lines' represent the final reality of the project. The concern for identity/authorship is not a problem to be overlooked as merely a passing feature of these current transitional years. On the contrary, it appears to be one of the main concerns of the presentation field that the future architect/designer/design student/educator will face. It is no coincidence that computer dominated design came to the point of what may be defined as an awkward last minute concern to fulfill the ever-existing need of artistic/individual touch especially in the educational medium.

On the other side, hand can never compete with the extensive and ever-evolving capacities of the computer. The penetration of computers within the field of design is irreversible. Within this context, thinking about the future of presentation confronts academia with two intriguing questions for prospective studies:

- does a tendency towards computer push architecture away from its artistic core?
- does insistence on hand techniques in presentation constrain architectural education behind the contemporary technical agenda?

Further remarks

It should be underlined that the findings of this study are not confined within the borders of architectural education. They are indeed in parallel to and part of the ongoing researches in design and engineering education. The balance of conventional ways of learning and teaching, and those introduced by the developing technologies have been (Lee in Heywood, 1989) and still are (Baille & Percoco 2000; Bot, Gossiaux, Rauch & Tabiou 2005; Brandt & Henning 2001; Rafi & Karboulonis 2000; Sheppard et al. 2004; Tribus 2005) hot debate topics in academia. This paper also aims at being considered a contribution to these discussions.

The basis of this paper is constructed upon students' viewpoints on the subject matter. However, it should not be forgotten that there is a counterpart opinion; that of the instructors. In a recent study by the authors, it was found that the approach of the design instructors towards the role of computer assistance in design education is not different from that of the students (Basa & Şenyapılı 2005). Instructors seem to acknowledge the assets of the meticulous computerized presentations, while preserving their choice for the artistic warmth of the hand, which positions them on the intersection of the scientific and artistic domains. Once more, this situation does not seem to exist only in architecture. Petrina (2003) argues that a "two-culture dichotomy" based on Snow's identification (1988) of two cultures, is still prevalent among today's design and technology educators. Snow identified two camps; a culture of scientists and a culture of non-scientists. In our case, the culture of scientists may be said to correspond to the technical content of architecture, whereas the culture of non-scientists corresponds to the artistic/theoretical content, complementing our identification of architecture's oscillation between art and science.

It seems that this dichotomy, discussed both on the engineering and architectural platforms, will continue to occupy the academic agenda by raising stimulative questions. These questions ought to serve to redefine education, rather than restructuring it by simply groping.

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REFERENCES

- Baille, C. & Percoco, G.: 2000, 'A Study of Present Use and Usefulness of Computer-based Learning at a Technical University', *European Journal of Engineering Education* **25**(1), 33–43.
- Bailey, R.: 2000, 'The Intelligent Sketch: Developing a Conceptual Model for a Digital Design Assistant', in *ACADIA 2000: Eternity, Infinity and Virtuality Proceedings of the 22nd Annual Conference of the Association for Computer-Aided Design in Architecture*, 137–145.
- Basa, İ. & Şenyapılı, B.: 2005, 'The (In)secure Position of the Design Jury towards Computer Generated Presentations', *Design Studies* **26**(3), 257–270.
- Bot, L., Gossiaux, P. B., Rauch, C. P. & Tabiou, S.: 2005, 'Learning by Doing': a Teaching Method for Active Learning in Scientific Graduate Education', *European Journal of Engineering Education* **30**(1), 105–119.
- Brandt, D. & Henning, K.: 2001, 'Perspectives of Information and Communication Technologies for Engineering Education', *European Journal of Engineering Education* **26**(1), 63–68.
- Brereton, M., Sheppard, S. & Leifer, L.: 1995, Students Connecting Engineering Fundamentals and Hardware Design: Observations and Implications for the Design of Curriculum and Assessment Methods, <http://fie.engrng.pitt.edu/fie95/4d3/4d31/4d31.htm>.
- Cross, N.: 2001, 'Designerly Ways of Knowing: Design Discipline versus Design Science', *Design Issues* **17**(3), 49–55.
- Mark, E.: 2000, 'A Prospectus on Computers Throughout the Design Curriculum', in *Promise and Reality: State of the Art versus State of Practice in Computing for the Design and Planning Process 18th eCAADe Conference Proceedings*, 77–83.
- Mark, E., Martens, B. & Oxman, R.: 2001, 'The Ideal Computer Curriculum', in *Architectural Information Management 19th eCAADe Conference Proceedings*, 168–175.
- Norman, F.: 2001, 'Towards a Paperless Studio Reinventing the Discourse – How Digital Tools Help Bridge and Transform Research, Education and Practice in Architecture', in *Proceedings of the Twenty First Annual Conference of the Association for Computer-Aided Design in Architecture*, 336–343.
- Petrina, S.: 2003, 'Two Cultures of Technical Courses and Discourses: The Case of Computer Aided Design', *International Journal of Technology and Design Education* **13**(1), 47–73.
- Purcell, A. T. & Gero, J. S.: 1998, 'Drawings and the Design Process', *Design Studies* **19**(4), 389–430.
- Rafi, A. M. E. & Karboulonis, P.: 2000, 'The Re-Convergence of Art and Science: A Vehicle for Creativity', in *CAADRIA 2000 Proceedings of the Fifth Conference on Computer Aided Architectural Design Research in Asia*, Singapore, 491–500.
- Scrivener, S. A. R., Ball, L. J. & Tseng, W.: 2000, 'Uncertainty and Sketching Behaviour', *Design Studies* **21**(5), 465–481.
- Sheppard, S., et al.: 2004, 'Studying the Engineering Student Experience: Design of a Longitudinal Study', in *Proceedings of the 2004 American Society for Engineering Education Annual Conference and Exposition*; http://www.asee.org/acPapers/2004-1736_Final.pdf.
- Snow, C. P.: 1988, *The Two Cultures: and A Second Look*, Cambridge University Press, Cambridge.
- Şenyapılı, B. & Basa, İ.: 2005, 'Reconciling Computer and Hand: The Case of Author Identity in Design Presentations': 2005, in A. Bhatt (ed.), *CAADRIA 05*, pp. 13–22, Architexturez Imprints, New Delhi.
- Tribus, M.: 2005, 'Some Remarks on the Improvement of Engineering Education', *Journal of Science Education and Technology* **14**(1), 1–28.
- Welch, M., Barlex, D. & Lim, H. S.: 2000, 'Sketching: Friend or Foe to the Novice Designer?', *International Journal of Technology and Design Education* **10**(2), 125–148.