

¿IS COMPUTER SOMETHING ‘DANGEROUS’ FOR STUDENTS IN A FIRST STEP OF ARCHITECTURAL EDUCATION?

Some deep questions on informatics and the methods and character of the schools of architecture

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Abstract

Reflecting on the range of possibilities of the so-called Area of Knowledge of Graphic expression in the Schools of architecture is an urgent and, in many senses, complex task. And it must deal, above all, with the new role of **information technology** (IT). A start must be made by acknowledging the impressive advances it has made in recent years and its widespread incorporation into the work of the architect. Its systems of producing and processing information have revolutionized the scene. And neither can its role in the global position of the profession be exaggerated, faced as it is with the impact of profound transformations. This new situation constitutes a complex challenge for the study of architecture and the teaching of drawing in particular. However, it also offers an unrivalled range of **opportunities**, not only because of the bracing and indeed cathartic effect of having to come up with convincing answers for important questions but also because of the enormous possibilities of the new media.

The history of the profession is moving through a period of **profound change** and this is obviously reflected in a thousand different ways in the conceiving of the objectives and methods of teaching. In this context the question of the role of computers cannot be avoided and may indeed constitute a way of placing them in perspective. Indeed this is a frequent issue of debate in the profession. However, the discussion is often as passionate and vibrant as it is fragile, superficial and fractured due to the speed of developments and their capacity to confound us. It is, therefore, necessary to attempt to systematize the questions raised by placing them in some kind of logical order and that is the purpose of this piece. Nevertheless, we have no intention here other than to sketch out a possible list of **questions** with the intention of contributing material for reflection, identifying its range while avoiding excess in both caution and enthusiasm. In our efforts here we will have no hesitation in resorting to the commonplace, on the contrary. In any case no attempt will be made to

impose a doctrine or defend a controversial position; if that is what seems to be happening – perhaps it what's to be expected – then at least it will have been worth the effort to recognize it. At the end of the day questions are usually as important as answers and may often anticipate their content.

Perhaps the formulation of some of these questions will sound a little naive but it's a risk worth running if they are as urgent and unavoidable as they appear to be. This may well be a reflection of the exceptionally precarious nature of a teaching and intellectual space which sees history mercilessly trampling it underfoot and perhaps recognition of this situation wouldn't be a bad starting point.

Obviously the right questions might be these or they might be others. And maybe some might be missing. However, it's the **panorama** which they lay out that is important. Here they come...

1. Should drawing be pronounced dead?

The new technological resources available have caused architecture to evolve in such a way as to develop new necessities in the area of graphic expression¹. Also, they tend to substitute for the traditional vehicles for creative project work and all that is related to the transmission of information in it. The use of IT in drawing has conquered virtually all the space reserved in our world for graphic tasks. Not only have they consigned to history something as intimately linked to the traditional structure of the profession and teaching itself as drawing with ink, they have reduced the use of the pencil to unimaginable levels thus giving force to voices that proclaim and perhaps celebrate the death of drawing or, at any rate, the obligation or necessity to draw.

In a certain sense this death of drawing is an accomplished fact on the ground. Only a handful of nostalgics continue to use the pencil in the profession's main studios. The general adoption of IT for the creation of graphic documents pushes to the extreme a polarization which confronts, with ever greater radicality, the "working" graphic document, provisional and expendable, with every possible drawing that is aware of its own virtuality, self-satisfied and narcissistic, an end in itself and destined, one way or another, to be contemplated.

When manual drawing was an obligation then it was possible to entertain oneself with it. There existed the possibility of using it both for its instrumental value and at the same time use it as an autonomous exercise. It existed as an art redundant in terms of the production of specific results and more connected to exclusive spaces of virtuosity and sophistication. All of this is, however, becoming more difficult as the space for sketching becomes more reduced for reasons of comfort or simply of time.

Perhaps we should miss the slow delight with which a project matured on the drawing board - drawn with care, even if the result was not always exquisite – in which one might expect to find a certain early confirmation of the expectations aroused by the labor of design, especially for internal consumption. Perhaps we have to resign ourselves to forgetting the collections of sketches which used to be stored in architects studios as a collateral, but not unimportant result of the production process. Perhaps we might rightly long for the times when the architecture that meant something was a drawn architecture, as occurred at certain specific periods of history, including certain phases of what is called “postmodernism”. Perhaps we may come to detest the merely transitive and untidy nature of many graphic documents generated by the new IT resources. As we know very well, obtaining quality images with them is a challenge that requires a previously unknown level of effort and dedication and involves external collaborations with many elements beyond our control. Perhaps it will be difficult for us to recognize that this sort of graphic document has its inevitable degree of projectedness given its level of cold impersonality and abstraction. Still, there’s no point whining about any of this, the course of change continues unchecked and imposes its rules on us.

Manual drawing seems destined to survive above all as a mechanism for the correction of printed originals in the framework of the peculiar process of iterations which leads to the final results of a design. Its instrumental nature will be confirmed by the evidently transitory nature of the graphic developments generated in the course of its development.

Nevertheless, it might be worthwhile to spare a thought for the those who persist with traditional drawing in so far as it associated with the defense of a space reserved for the hand and pencil in the initial phases of projects.

2. Should the role of freehand drawing in the development of ideas be defended?

The effectiveness of IT in the final phases of the design project is obvious. The computer offers enormous advantages when it comes to storing and processing information and is particularly useful when it comes to the making and storing of variations as well as the subsequent introduction of modifications into plans. One can recognize this however we can still see that IT has its limitations in the earlier stages of projects when much depends on intuition and feeling one’s way.

In professional circles it’s not uncommon to hear that it’s only worth the effort to moving to the computer in order to make the best use of one’s time and effort and in order to avoid being led astray by the inevitable

rigidity of its routines, once the design is well defined and well defined means drawn.

The new media would appear to save on ink but not on pencil. The availability and approachability of IT does not seem able to replace the graphic techniques that it is supposed to supersede nor avoid the corresponding need to learn them. Nor does it seem able to answer all the requirements of the work process; while computers are able to do an enormous amount related to the accumulation, transport, manipulation and storage of information, their advantages are not so clear in the first stages of the development of ideas.

In an architectural project the first steps in the creative process are difficult to codify in objective terms. They require a medium of expression that is at once flexible, versatile and controllable. Such a medium also has to have an important degree of ambiguity, indefiniteness and gradableness. This level of ambiguity will correlate to the degree of indefiniteness of the design in each of its successive stages of development and play an important role as an activator and catalyser of the imaginative discourse of the author. Indeed it is the author who projects on the medium, just like in perceptive, analytical and graphic processes, the organizing and rational schemes which make up his mental framework as a constructor and developer of a project.

3. Should we learn to get on together with the mouse as well as with the pencil?

It's necessary to ask if we can find in the computer a vehicle as personal, versatile, malleable and docile as the pencil. We cannot answer that the computer is too complex and "perfect" to react with sufficient rapidity to the movements of the imagination nor that it does not seem to have the capacity to enter into a dialogue with it. The language of IT seems particularly suitable for the transmission of limited and concrete messages but not so suitable for receiving or releasing images in movement, as part of a process of continuous transformation and still less for simple evocations or suggestion.

The role of the computer is, therefore, not very clear in the initial stages of design when the sketch prevails. The computer competes badly with feeling one's way by hand into a design and this technique's natural suitability for the tentative finding of solutions, to give minimum and provisional form to figurative ideas while they are still very vague and to allow them to feed off each other in successive reiterations related to intentions and programs or to quickly compare alternatives of a global character.

In any case it may not be appropriate to discard the possibility of finding in the mouse a graphic tool as capable as the pencil of tuning in to what has sometimes come to be known as our “graphic thought”. The gradual familiarization of the user with the language of the screen might lead to the creation of something real that, out of a combination of surprise and inertia we find difficult to imagine (or still refuse to accept)

4. Does the “new IT tool” facilitate the work of architects?

Not only do computers allow us to work with a high degree of precision, at a scale of 1/1 or even more, they *oblige* us to do so and that’s exactly the point. The use of IT demands extra effort with regard to the definition of the project and the rigor of the documentation. It’s this fact that makes it impractical to use computers for the execution of representation while the project is not yet sufficiently well defined. These representations are constructed line by line with each supported by the others in such a way as to require a very precise kind of decision making relating to the measure and location of each one while taking account of their concatenation and strong degree of interdependence.

Furthermore, it has been held that infographics incorporates the ideational process in its final stages, if not indeed after they have been developed. And significantly that that so-called graphic animation is betrayed by its own name, one thing is a drawing or graphic effort employed to “illustrate” or “animate” a project *a posteriori* and quite another that involved in its creation.

Nevertheless, our experience of how things have developed leads us to soften this perception and moderate the force of its exposition. It’s no longer necessary to go on about it insofar as graphic animation merges into the process of the project with growing naturalness in its initial stages, taking on a driving role without problems.

In any case, the inadequacy of the idea that more technical means always results in greater comfort and more possibilities in the development process is clear. Indeed a greater variety of technical means may well result in more demands being place on their users. Clients are fully aware of the range of possibilities offered by new tools and constantly adjust their expectations and demands to them. The very existence of new technical means virtually obliges to make use of them. And this progress amounts to a kind of forward moving train which we can only get off if we give up the desire to reach our destination.

5. Do computers condition the design?

It may be too early to be sure the extent to which the computer constitutes a new tool which simply increases the efficiency with which we carry out graphic operations, while still following the equivalent traditional procedures or whether it constitutes a new way of dealing with the problems of design and makes its users call on new mental and operational resources².

In this context we ought to ask ourselves about the role of the computer as a medium in design and the influence it has on the results produced. We also ought to think about to what extent the proverbial rigidity of the routines of the computer influence creative operations and whether they do so well or badly.

It seems reasonable to suppose that IT doesn't condition the design and the computer as a medium, doesn't leave any residue, in the sense that it doesn't leave specific traces. Also, this question ought to be thought of in terms of a comparison with the possibilities offered by manual drawing. Specifically, computers are particularly good at developing all sorts of composite schemes and systems that rely on the repetition of elements and every kind of related test and experiment. It can thus be presumed that the computer tends to restrict the freshness and agility of the early phases of ideation, traditionally regarded as informal and carried out by hand, resulting in a certain depersonalization and standardization in the design. However, I don't think that there is enough evidence to back this up. It would be truer to say that IT provides us with an enormous capacity to respond to our necessities. This becomes obvious the more we become familiar with it. If this is indeed the case then it's plain to see that the use of IT vastly expands our range of possibilities and allows us to do things that would be impossible using the routines and under the conditioning of manual drawing.

6. Has IT allowed the appearance of new languages in the world of architecture?

It's obvious that computers have allowed the development of a whole series of new languages in the area of forms in architecture, like those associated with the idea of so-called "deconstruction". To these must be credited the spectacular developments experienced recently by a range of neo-organicist alternatives.

As is well known, what is involved are options associated with a variety of sources of inspiration in which the protagonists are combinations of soft forms and curved surfaces, quite often of extraordinary complexity. For obvious reasons it already has become the norm to have resort to IT

tools to manage them that originate in other fields, particularly aeronautics.

Graphic manipulations facilitated by IT languages have also permitted the growth of a range of imaginative possibilities such as those associated with pixelations and complex compositions with random structures.

7. What are the limits of our ability to anticipate the results of a design?

People are now accustomed to seeing films, often of extraordinary sophistication, entirely composed of virtual simulations and also almost believe that they can expect to see finished, animated prefigurations of similar quality as part of our daily work in the field of architecture. These expectations fail to take into account the enormous budgets, complex equipment and incredible amount of work that they involve. The growth of such expectations has also resulted in the loss of the habit of making the imaginative effort required to interpret sketches or plans.

It can therefore be seen that one our major problems as architects is the limited nature of our capacity for graphic anticipation. Quite often and paradoxically, the growing abundance of media available for the representation of projects doesn't help us but in fact works against us because with more capacity to graphically represent things come higher levels of expectation about the definition offered in these very representations, especially at the stage of the project known as the "preproject". This brings two problems with it. In the first place, there isn't usually a logical and proportional relationship between immediate objectives and the abundance of means available to realize them, or, to put it another way, the effort made towards a graphic approximation made in the initial phases of a project is often inadequate and mistaken. And, in second place, much more than the reasonable or logical may be expected of each stage of the design process to the extent of breaching the limits of our profession in search of solutions which, even their own specialized fields, can only be reached after a long and difficult work process carried out on the firmest of bases.

8. What reactions are produced by virtual images of projects?

We must surely admit that rendered images arouse in those contemplating them feelings of fascination, stupor and distrust.

There is also the problem of interpreting the perspective images; what is involved is always a series of approximations which don't attempt anything other than to contribute to the intuiting of results which they only offer a poor anticipation of. They have to be interpreted with a certain

spatial vision and in the framework of a study of the of the project plans. And these images don't aspire to offer a vision of the final result; instead they try to assist the imagination of the observer to intuit some of its most important aspects.

For example, one of the most common abstractions in these representations is that related to the materials used. They can only offer the palest evocation of the textures and effects of the components that will be used in the final version of the building. In many cases, when these kinds of images are prepared the decision about the exact materials to be used and exactly how they are going to be used still have not been made and all that can be done is offer tentative suggestions. It ought to be taken into account as well that that the preparation of these images is a laborious task and it's not easy to modify them in step with the changes being made to the design.

Perhaps the conclusion that might be reached is that rendered images tend to insinuate an almost unlimited anticipatory potential and this fact might explain some of the suspicion they produce. This suspicion can't entirely be explained by the capacity of the images to play tricks by way of the deliberate selection of the "views", exaggeration, distortion of the angles of observation, the manipulation of scale and false perspective effects. It also has to do with the peculiar combination of its, hypothetically enormous, capacity for approximation and a capacity for partiality that is as great if not larger as well as being unavoidable.

9. Does infographics constitute a real type with the possibility of several specializations?

Some experiences arising from the resorting to IT may be worth mentioning at the outset. In the first place the difference between graphic recreations resulting from three-dimensional renderings and those obtained from the treatment of images after their creation, of the type facilitated by Photoshop, must be underlined.

The difference may be attributable to the contrast between production and post-production. In that case both procedures would appear to be complementary.

But there are other cases in which the recourse to Photoshop is an alternative and they represent the production phase itself. They are based on the direct formation of perspective images through the emulation of photocomposition techniques and collage, perhaps based on visions of the state of the object of design previous to the architectonic, urbanist or territorial intervention to which it was subject.

Perhaps one of the conclusions that can be drawn from this tour of the options available is recognition of the special relevance and visual effectiveness the conventional model. The application of rendering techniques to three-dimensional models has a number of special virtues, notably its capacity for insinuation and the evidence of its imaginary condition. It tries to be anticipatory only in abstract terms and is expressly “non realist”. Its results have the virtue of keeping away from pretensions of verisimilitude appropriate for visual recreation which tend, even without wanting to, to lean towards the fidelity of photographic vision.

10. What place is there for computers in teaching?

All of these reflections have served as preparation for what is probably the star question relating to the place of computers in the teaching of architecture.

CAD, that indispensable professional instrument, demands a special place in the framework of technical teaching and even the global reordering of graphic training which it offers. This, not only for the new possibilities it offers in relation to drawing but also the comprehension of the geometry of shapes it offers, allows for the finding of options distinct from or complementary to those available by traditional means.

Without a doubt this fact “emphasizes the appropriateness and necessity of conceptualizing the formative processes and at the same time weakens the exactness of manual drawing” even if in the coexistence of the manual and the computerized “the first provides the concepts while the second provides the visualizations and drawings.”³ It must therefore be concluded that each mode of expression has its own role and that that hand drawing continues to remain necessary and useful.

We can’t still consider ourselves victims of the fascination, to some degree paralyzing, which the arrival of IT on the scene provoked. It’s now possible to glimpse a plausible approximation of its usefulness in relation both to professional work and the teaching of graphic expression. IT-based methods represent an indispensable working tool and students should be introduced to them at as early a stage as possible in their study of architecture. Nevertheless their importance does not invalidate the usefulness of the traditional teaching of drawing imparted at the beginning of the course.

We are, to some extent “the last descendents of Vitruvio, Leonardo da Vinci and Alberti”. It could be that, in practice, that “primitive” instrument which is the pencil is destined to be forgotten and without a doubt “the graphic medium has its days numbered in the form in which we know it now.”⁴ It might also be the case that the wave will wash us

away entirely and that under the seductive power of the unlimited possibilities of IT, it will become difficult to sustain the weight currently given to hand drawing in architecture courses. But at the same time it would be important to be aware of and argue with conviction that this doesn't invalidate the teaching efficiency of drawing which derives from its specific projectiveness.

The widespread availability of IT-based media may indeed constitute an argument in itself for voluntarily doing without it in the early stages of training and limiting teaching to drawing with the pencil; it's easier to manage, more approachable and it's easier to do corrections and modifications. In any case none of this should be in detriment to the exactitude and rigor appropriate to representation in architecture. Perhaps the solution might lie in focusing on the ends desired and leaving the selection of the means to be employed to the students while maintaining the demand for exactitude and rigor regardless of the means employed to achieve them.

The conclusions drawn from the reflective introspection developed in recent years in the graphic subjects of architectural studies substantially coincide with those that can be drawn, for the methodology of those same subjects, from analyzing the consequences of the historical evolution of architecture arising from the experience of the modern and based on their results they also insist on the projectiveness of the representation and the decisive role of drawing both in analytic tasks as well as in the project process. These conclusions point to focusing attention on the ends and range of graphic operations, beyond questions arising from their format, media and methods. In this way they would chime with a reflection designed to integrate teaching efforts and so focus on their intentional aspects, without, of course, losing sight of the diversity of their procedures. The claim has not been made in vain that, for example, the computer can be useful in the teaching of geometry to show the student a problem in graphic form, something that due to its operative or spatial complexity would otherwise require a much greater effort. The same holds for the graphic illustration of the same problem from a number of viewpoints.⁵

Computers introduce a defined component of precision and rigor into graphics and so can save a lot of the effort previously required in the graphic subjects related to project processes of the architecture course. However, unnecessary though it may be to say it, machines only respond to the instructions they receive from their users which means those users will have to have good judgment. And in a practical discipline there is no way to develop that judgment other than through personal and unassisted practice. With sufficient effort the student will achieve by herself that

which later she will be able to achieve much more rapidly with the new electronic media.

It's clear, therefore, that architecture students should be taught to use the pencil and express themselves with it too.

There is no option but to conclude that the exercise of our profession is founded on drawing and design and that there is no reason to think, regardless what twists and turns events might take, that this is going to change. The question, therefore, that has to be asked is what type and quantity of drawing is it necessary to learn in order to be able to acquit oneself with confidence as an architect.

Furthermore, it's already commonplace that architecture students seek a rapid form of teaching in the drawing programs that are common in the professional world. In so doing they perhaps find themselves driven by the insistence on a much more practical form of teaching – an insistence prominent in the sociological and institutional elements of the profession – as well as polluted by haste to achieve a rapid reward for their efforts and seduced by the indifference displayed by discoverers of the new towards traditional practices in subjects in this area. Neither is there any shortage of teachers sensitive to this demand and indeed enthusiastic proponents of it. This being the case it would perhaps be wise to exercise prudence compatible both with avoiding the total sanctification of existing methods and practices and the over rapid embrace of the seductive novelties.

Quite obviously, these student demands appeal for judicious limitation of the time and effort dedicated to an eminently instrumental technique, especially if they seem to be in detriment of the acquisition of fundamental skills, knowledge and judgment. Echoes still persist of the confrontation between the defenders of drawing by hand and vindicate its value in the early stage of the development of ideas and their detractors, either indifferent or enraged; it might be wise to exercise caution with the latter in so far as they are emphatic promoters of that which the former regard as risky adventures in which command of an instrument, even if an exceptionally useful instrument, counts for more than maturity in the comprehension of the subject it is to be used for.

The debate is necessary and pressing and has probably only just started. There is much in play and while we have to avoid haste the changes which we are experiencing don't permit delay either.

¹ LUXAN GARCIA DE DIEGO, M. DE, *La cultura tecnológica: transformaciones del soporte gráfica, nuevas tecnologías, nuevos materiales, nuevas formas de expresión*, in YA.VV., *Actas del V Congreso internacional de Expresión Gráfica Arquitectónica*, Las Palmas de Gran Canaria 1994. pp. 149-162.

² REGOT, J.M., y MESA, A. de, *Geometrie Descriptive & Solid Modeling. El control gráfico de los objetos en el espacio tridimensional* in AA.VV., *Actas del V Congreso de Expresión Gráfica Arquitectónica*, Las Palmas de Gran Canaria 1994, pp.245-255. See also *La Geometría Descriptiva. El cambio instrumental*, in AA.VV., *Dibujo y Arquitectura, Investigación Aplicada. Actas del IV Congreso Internacional de Expresión Gráfica Arquitectónica*, Valladolid 1992, pp. 153-156; MONEDERO ISORNA, J., *Implicaciones conceptuales de las técnicas informáticas*, in AA.VV., *Actas del V Congreso Internacional de Expresión Gráfica Arquitectónica*, Las Palmas de Gran Canaria 1994, pp. 524-546.

³ SÁNCHEZ GALLEGO, J. A., *Geometría Descriptiva. Sistemas de proyección cilíndrica*, Edicions UPC, Barcelona 1992, p. 29.

⁴ JIMÉNEZ MARTIN, A., *El dibujo en la enseñanza de la arquitectura*, Universidad de Granada 1995, p. 28.

⁵ CANIVELL RODRIGUEZ, J., *La Geometría Descriptiva y el segundo ciclo. Técnica de representación de la Arquitectura mediante ordenador* in AA.VV., *Actas del III Congreso de Expresión Gráfica Arquitectónica*, Valencia 1990.