A Room with a Different View
A design visualisation and presentation experiment involving the (inter)active use of physical models in an educational setting

Jack Breen
Delft University of Technology (TU Delft), Netherlands

Introduction

This contribution documents the developments, results and findings of an experimental design visualisation and presentation exercise entitled ‘A Different View of Delft’. The primary aim of this project was to make students aware of the potentials of the active utilisation of physical models for the sake of designerly enquiry. Furthermore the ambition was to explore new ways of using such model ‘environments’ for the benefit of design communication and presentation.

For this exercise a ‘game’ situation with clear constraints and rules was developed beforehand. The students were to work out a proposal for a new exhibition space, as an annex to a – hypothetical – existing museum. The new space was to create a fitting ‘setting’ for a single work of art: Johannes Vermeer’s famous View of Delft.

The maximum contours of the new exhibition space were given, along with clear guidelines concerning which walls and roof segments might be (partly) opened. The emphasis lay on the viewer’s ‘approach’ to the painting, its positioning and ‘framing’ in an architectural context. A designerly search involving form and space, the choice of colours and materials and particularly the strategic use of (natural) lighting. The students developed their proposals directly in working models scale 1 : 20, using standard model components, prepared previously, which could easily be assembled and altered.

The participants set about developing, exploring and refining (intermediate) proposals, creating ‘insightful’ views of the design model from different vantage points, making use of a mini camera and

monitor and a standard light source. The final results were reviewed and exhibited and a selection of the designs was probed further using optical endoscopy and combinations of digital photography and digital photo editing techniques.

This last approach proved to be the most fruitful and was subsequently employed by a number of students in their individual design presentations, often with convincingly professional, sometimes surprising, visual effects.

This paper intends to offer insights into the organisation and the workings of this experimental exercise, to highlight specific results and to offer an overview of findings and conclusions, as well as an indication of the potentials for further combined use of physical scale models and digital visualisation techniques.

The Aims of the Experiment

The experimental exercise which is described here formed a part of the international Delft Media module in the spring of 2001. This module is an educational (multi)media project, in all lasting two months and being offered three times a year. It attracts participants from the Delft Architecture faculty as well as a considerable number of international exchange students.

The module is globally divided into two parts:

- in the first four weeks the students are acquainted with a wide range of design and presentation media in parallel exercises;
- in the second half of the module they 'design' an individual presentation on the basis of a design which has been completed earlier on in their studies.

This particular exercise was situated in the first half of the module, taking the place of the regular model making exercise, aimed at the use of the faculty's optical endoscope facilities . Instead of the usual 'modelling for endoscopy' exercise on an urban design level, scale 1 : 200, the focus of this exercise was the development of an interior

space, with the students working in models scale 1 : 20. The underlying ambition was to explore the opportunities for interactive design modelling and (digital) image development and processing using physical models.

Summary of aims:

- educational exercise - modelling for eye-level design visualisation;
- explorative experiment - learning through (design) education;
- imaging - from design model to presentation model;
- visualising interior space – scale, colour, lighting;
- generating design views – using physical models and via (mini) camera;
- exploring opportunities for (digital) model photography;
- exploring opportunities for (digital) photo editing and presentation.

This undertaking was part of the overall Delft Form & Media Studies research programme (title: Dynamic Perspective), aimed at the furthering of knowledge and experience concerning architectural phenomena on the one hand and the implementation and development of techniques for the benefit of developing and communicating design concepts on the other hand.

Thematically, this venture had a clear relationships with the Form Studies educational programme in Delft, particularly with exercises in the first year of study.

In addition, it 'picked up the threads' of explorative Design Visualisation workshops, developed by the Delft Media group and other EAEA members in recent years.

Summary of precedents:

- Form Studies exercises – Form & Counter Form (interior): loft 1: 50;
- Learning form the (in)visible city – Vienna conference workshop and Delft educational workshop ;

- Imaging Imagination – Delft conference workshop ;
- Design modelling – Dresden conference workshop .

This initiative was intended to bring ideas concerning the role of 'designerly' activity in the context of research into practice by creating a clearly defined 'laboratory' within an educational environment. The focus of the exercise was the characteristic design activity of 'imaging' ("Bilder machen" in the words of Wolgang Thomas). The idea was to generate useful insights to the participating students, as well as looking for ways to create 'different views' using combinations of design media. This would involve the use of 'familiar' design visualisation techniques as well as 'emerging' digital media.

Methods and Assumptions

The basic 'design' for this explorative exercise follows a type of design driven research described in a typological framework developed by the author, identifying eight research approaches (see scheme) . In this particular approach design activity is - as it were - made instrumental for the benefit of a research activity. The method is essentially explorative, which means the project is targeted towards gaining understanding, rather than testing specific hypotheses. In order to reach relevant insights and draw pertinent conclusions it is considered of importance that the designers involved are all set an identical, clearly defined 'problem'. In this way the process may be monitored and results can in principle be evaluated relatively systematically.

In this case it was not so much the quality of the design results as such which were considered of interest, but rather the working methods and the potentials of the design 'tools' being utilised and developed.

The central assumptions were the following:

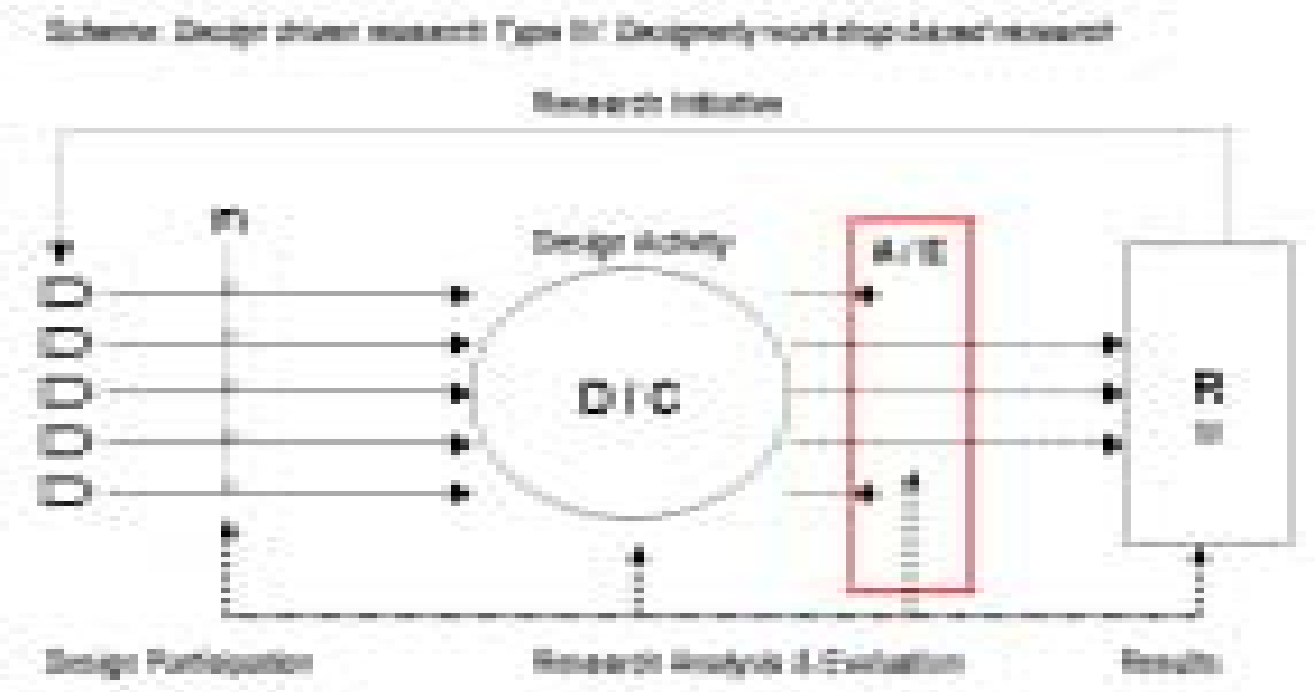
- The power of physical modelling: Despite the emphasis which has recently been placed on digital modelling, physical modelling is still an extremely effective medium, both in design development and design presentation.
- The value of eye level modelling: Modelling can be considered

as an asset, even a ‘driving’ factor, in design. This holds particularly for models made on such a scale that they allow the designer (and others involved) to get views directly from the model (either optically or via an optical instruments such as video devices or (digital) photographic cameras or virtually using computer software).

• The visual potentials of modelling: Models need not be extremely detailed (and as a consequence: time consuming and costly) in order to offer worthwhile - dynamic - designerly insights. Images taken from relatively modest physical models can in principle be manipulated - using digital techniques - in such a way that the visual results may be considered to be at least competitive with the products of purely digital forms of modelling.

Fig 1: Schematic representation of this type of design driven research workshop

The expectation was that setting all participants the same task and offering them the same working materials would contribute to an



objective evaluation of the proposed approach and possible further potentials.

Summary of experimental conditions:

- A preconceived task with a clearly defined context and constraints;
- Standardised sets of elementary modelling components;
- Combined working sessions and simultaneous design development;
- Active tutoring and technical modelling support;
- Systematic presentation, comparison and analysis of results.

Assignment and Organisation

A task was conceived which would make the students focus on the experience of their design proposals, involving the effects of movement and different spatial conditions, underscored by the relations between (interior and exterior) spaces and, furthermore, the way perception is enhanced by the use of (natural) light, colours and materials. In order for the participants to get 'involved' in the given context quickly, sets of cardboard components were prepared beforehand. The students were thereby able to assemble their working models quickly and get on with developing their ideas step by step: from 'rough' idea to integral design.

The Design task:

Another View of Delft

" This exercise involves an experimental study into ways of simulating of the experience of compositional aspects such as space, size, proportion and orientation in both dynamic and focused perception, with particular attention to natural and artificial lighting in combination with the strategic use of colours and materials.

The task is to design a museum space (an extension to an existing, larger space) for the exposition of one painting: the View of Delft (Gezicht op Delft) by Johannes Vermeer. This world famous painting

is presently exhibited in the classicist Mauritshuis museum in The Hague, as part of its regular collection.

The idea behind this exercise is that this unique ‘portrait’ of the cityscape of Delft, painted around 1660, should deserve a (more specific) space of its own. Thereby the viewer might come ‘eye to eye’ with this work of art in such a way that its qualities could be discovered and appreciated more fully than is possible in its present, cluttered surroundings.

The (fictitious) new setting is an annex to an existing exhibition space, measuring eight metres in width and five metres in height. The new exhibition space will be situated in a rear garden or courtyard (also eight metres wide) and have a plan measuring exactly five by five metres (interior space), with a total maximum height of five metres. One (partition) wall is required to remain completely closed, the other two walls facing the garden can in principle become (partly) transparent. The roof may – indeed should - be used to allow natural light to enter the space from above.

Special attention ought to be paid to the routing to (and from) the painting, the size and shape of the opening(s) between the two spaces, the positioning of the painting in the space and the way visitors might look at it from a distance and close-by. The way in which (natural) lighting can be integrated forms a major design challenge. In addition, the effects of colours and materials should be taken into consideration and studied.

The participants are free to use any combination of design media in the course of this exercise, which takes up a total of three half days. Apart from drawing, using sketches and scale drawings (plans, sections, axonometric projections as well as perspectives and possibly collages) the working sessions will involve design explorations and presentations in design models scale 1 : 20. At the end of the third session these models will be presented and exhibited.

It is advised to construct models in such a way that it is possible to look into the spatial composition (preferably from different viewpoints).

Additionally, images may be taken from the models using (digital) photography and/or video (possibly involving Chroma-key techniques or Endoscopy). Also, digital images may be generated using software such as AutoCAD, Maya and possibly Lightscape.

Apart from the model(s) a concise portfolio of design ideas is expected. ”

Specifications:

- The painting : 96.5 X 115,7 cm
- ‘Original’ space : width: 8 metres, height: 5 metres
- Wall opening : 5 X 5 metres (maximum)
- ‘New’ space : 5 X 5 metres (interior), height 5 metres (maximum)
- Model : scale 1 : 20

The time for the exercise was limited: only three half day sessions

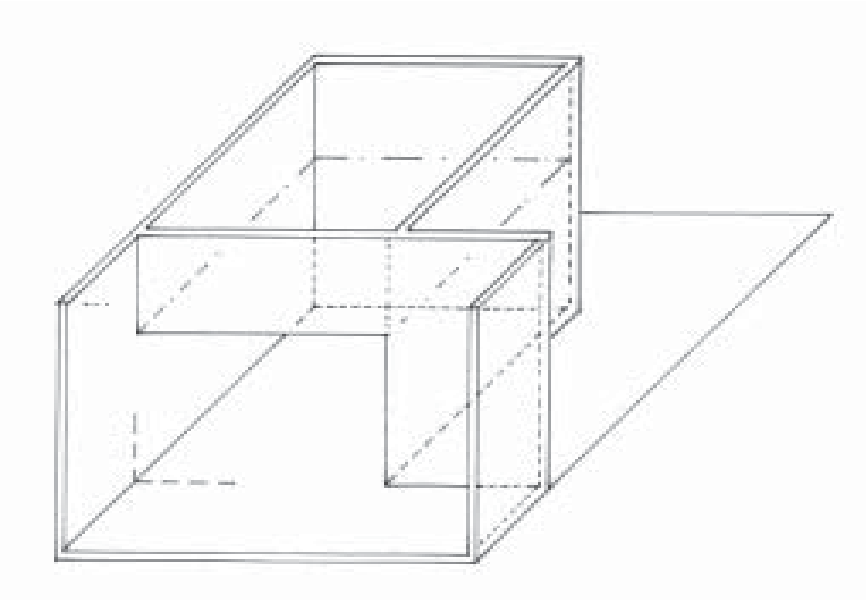


Fig 2a and 2b: The ‘model space’ used as the basis of the exercise

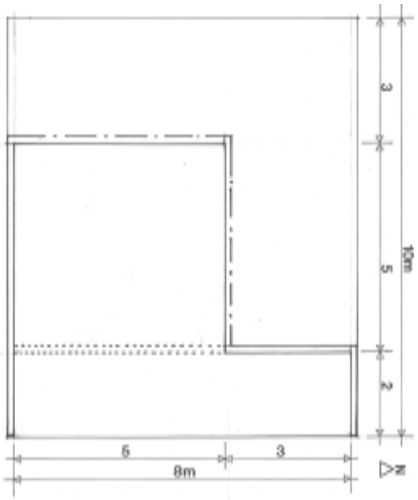


Fig 3a and 3b: Design modelling

(plus some 'homework') spread over three weeks. The group consisted of some 45 students; all working in the faculty's Form Studies hall at the same time. The authors conceived the exercise, monitored and discussed the design developments and, afterwards, created an overview of the results in the form of an exhibition.
In the first session the students were introduced to the exercise, assembled the working models and began design work. In the second and third weeks they could use a miniature video camera with a monitor, using a fixed lamp as an indication of the direction of the sun. These facilities were used actively for the benefit of testing and refining the individual design proposals.

Summary of the workshop process:

- Week 1: start, task and working model – study of space, movement, light;
- Week 2: design development – testing, video, (natural) light, colour, material;
- Week 3: presentation model – definition, form and articulation, portfolio;

- Presentation: exhibition, (systematic) comparison, discussion, evaluation.

Results and Findings

A number of things became evident during the course of the exercise. Firstly, the workshop format – more than forty students working on the same project at the same time – proved to be very effective and led to considerable interaction between the participants. The activity did not miss its impact within the faculty environment, drawing considerable attention, both during the working sessions and the final exhibit.

The time which was allotted to the exercise (essentially three afternoons) was limited. Although the majority of students 'rose to the occasion' and were able to hand in presentable models and a small portfolio at the specified time, a number of students submitted their results later. It would appear that the 'pressure cooker' approach which was used works well for most students but that certain students need more time. Not everyone is able to take decisions quickly, some participants needed a while to complete the 'definitive' model.

What was perhaps most interesting to observe was the way students actually worked and communicated their ideas (with each other and with the members of staff). For most the working model literally became a design laboratory: ideas were generated (often spontaneously), tested out, evaluated, discussed, altered, refined, perfected and presented on the spot. Initially the viewing was mostly 'direct' (looking straight in), which invited response by the tutors, but also by colleagues.

The introduction of a mini camera with monitor and light source in the second session gave an extra impulse to this practice, with students impatiently waiting their turn to put their – intermediate – design proposals 'on view'.

The results varied considerably. Some students were able to develop visually attractive, dynamic space sequences, often integrating information panels about the painting, the city of Delft or the work of

Fig 4a and 4b: The use of the mini camera

Vermeer. A number of the students was inspired by the spatial 'layering' of the painting and its use of colour, texture and light. A tendency amongst some students was to introduce such complexity into the relatively limited space that the painting in question would be all but hidden from sight.

Building the model was an essential part of the exercise. In the first phases this might entail using relatively flimsy constructions, removable 'try-outs' and studying different 'moves' using simple means such as cardboard with pins, paper with tape and sketching

paper. Gradually the models became more refined, with more attention being paid to lighting, colour and texture. Most students used the basic model from beginning to end, some preferred to use their ‘design’ model as a prototype for a more precise ‘presentation’ model, in a number of cases including special openings (with removable covers) for ‘extra’ views.

A certain measure of technical ‘handiness’ and creativity on the level of model making certainly proved to be an advantage.

The use of the mini camera turned out to be extremely effective in the design development and evaluation phase, after which some students found time to make (digital) photographs from their models. It became clear that, on this scale, the traditional ‘pipe’ endoscopes have serious limitations on the level of accessibility and lighting – subsequently resulting in disappointing image quality.

Some students put in figures and objects to give an indication of (human) scale. Due to time limitations hardly any students were able to experiment with digital ‘post production’ techniques. However, the exercise proved to be an ‘eye opener’ for a number of students, who used physical models as the basis of computer driven presentations in the second phase of the module.

Summary of workshop findings:

- Group activity: collective process, stimulating comparison, interaction;
- Atmosphere: activity, workshop ‘visibility’, counselling and assistance;
- Insight: effective use of eye level views - queue for the mini camera;
- Design experimentation: development and testing of ideas ‘in situ’;
- Design results: diverse – from effective to (overly) complex;
- Decision-making: extensive search towards presentable end product;
- Modelling: ‘building’ the concept (involving modelling

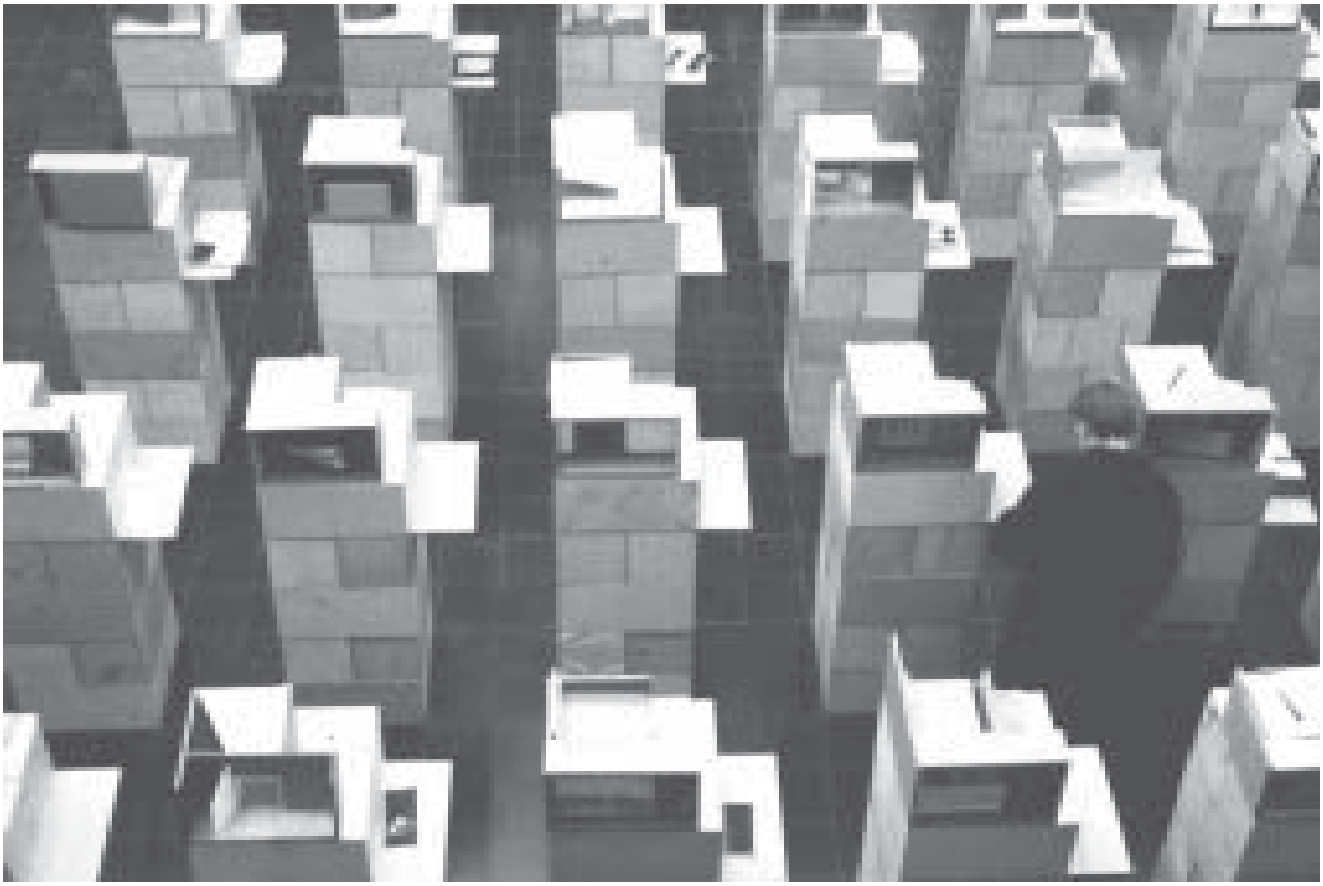


Fig 5a and 5b: The exhibition of workshop results

techniques);

- Image quality: dependency on the ‘accessibility’ of model spaces;
- Time: limited, decision-making and planning skills of importance;
- Game situation: recognisable context, constraints, ‘bending’ of rules;
- Overview: responses generated by the exhibition of models and booklets;
- Media: limitations of the endoscope – opportunities for (digital) photography;

- Follow-up: ‘kick-start’ effect on subsequent design presentations.

The students who used scale models as the basis for their further presentations in the second half of the module generally used more durable materials, for the sake of precision. This meant that they needed to plan their productions well, in order to have enough time for colour and lighting experiments, for digital photography and editing and for the finalisation of their presentation as a whole.

Two notable productions focussed on relationship between interior and exterior space: one a design for a Seminar Pavilion in typical

Dutch ‘waterscape’ , the other a Japanese Pavilion for a future Dutch world exhibition . These refreshing, novel presentations (shown partly during the conference) used models which were cleverly conceived and built up, using removable components for the sake of studio photography, and integrating a scala of visual information, including landscape backgrounds, human figures and computer textures.

Summary of follow-up findings:

- Presentation modelling: planning, allowing time for (digital) imaging;
- Lighting: direct integration of light(ing) in the studio context;
- Processing: digital refinement and furnishing using ‘samples’;
- Multimedia: integration in digital presentation formats;
- Presentation: projections on screen as well as using the physical model.

Conclusions and Perspectives

Naturally, due to the limited scope and scale of the workshop, this explorative study has its limitations. It would therefore not be opportune to draw very ‘general’ conclusions concerning the qualities of the approach or further perspectives. Nonetheless, the way of working (a focused group exercise concentrating on a collective theme) and the approach to the design and its presentation (generating and refining of ideas working directly in a model, offering eye-level views to the designer and others) proved to be stimulating and deserves to be explored further. Variations on this particular exercise are conceivable – and potentially worthwhile. Furthermore, this experimental exercise indicates that there may a lot to learn from student design processes, particularly if a ‘game’ situation with sufficient constraints is created beforehand.

During the workshop sessions the Form Studies hall became a ‘room’ with a variety of constantly changing ‘views’. The workshop format stimulated the active (inter)play of design notions and drew the attention of interested spectators. The approach proved to be effective, largely because the ‘rules’ and the working materials were relatively simple and extremely ‘direct’.

Each student's model effectively became a scaled down 'Spielraum' for interactive, spontaneous invention, intervention and the more systematic testing of design options. The working model could either be 'worked up' for the benefit of presentation, or a more accurate final model could be made relatively quickly on the basis of the 'study' model.

Apart from obtaining images 'directly', by looking into the model through openings, the use of the mini camera proved to be particularly stimulating in the design development phase. The image quality of such – portable and flexible – viewing devices proved quite satisfactory for design visualisation. As such the mini camera has certain advantages over the more cumbersome – studio based – 'pipe' endoscopes. Subsequent use of digital photography means that model imperfections could in principle be 'retouched' afterwards (using photo imaging software) and that – by adding in figures, elements and background images – the designer might be able to create a specific sense of scale and even atmosphere.

The workshop exercise led to a number successful follow-ups in the second part of the module. In these cases more precise and durable modelling techniques were usually employed than in the 'Vermeer' workshop, but the method was essentially the same, allowing for further - combined - use of different sorts of - digital and physical - media.

During the final presentations of the module it became evident that the quality of visual information generated in such a way could easily compete with renderings from computer generated models. An 'added value' of this approach was that - during the project presentation, in front of an audience - the designer was not only able to use projected (digitised) images but also to 'highlight' the (often impressive) physical model.

Summary of conclusions:

- Workshop: learning from the students' design activity and results;

- Interactivity: materials relatively inexpensive and quick to use and change;
- Overview: working directly in the model , offering design(erly) insights;
- Interface: tangibility of the spatial and material qualities of the design;
- Surprises: recognition of novel ideas, testing of design options;
- Development: from design laboratory to presentation model;
- Design model: relatively inexpensive and flexible;
- Presentation model: more complex and time consuming;
- Image quality: digital photography superior to optical endoscopy;
- Editing: creating a sense of scale and atmosphere, even humour;

Output: presentation using digital images plus the physical model.

Discussion

Designerly enquiry frequently involves the active use of a variety of design media, notably drawings and models.

In recent years there has been considerable pressure on architectural faculties and research institutes to 'think digital' (particularly by governing bodies and committee members with relatively little actual experience in the field).

Should all working methods therefore henceforth become digital? Perhaps not…

As many experts in this field will recognise, digital applications still rely on the 'go-betweens' of (screen/keyboard) interfaces and programming with serious limitations. We may have to wait for the introduction of wholly new generations of computer interfaces, programming and communication before digital techniques will truly fulfil their potentials in active design and imaginative presentation.

The question which is still frequently asked is whether analogue or digital techniques should be employed when studying and presenting

models. With the significant improvement of digital applications in recent years this no longer seems to be a serious issue. It would seem only a matter of time before digital systems will have taken the place of all analogue machinery.

Does this mean that all future designerly activity should rely solely on digital platforms?

It is likely (looking at the current situation) that most output will be conveyed via digitised means, however this need not imply that all working methods should become computer based, on the contrary. One important issue is whether digital modelling techniques should be expected to replace physical modelling, or if both approaches do not deserve to be taken seriously, and used side by side, indeed in combination...

As far as this is concerned we may learn from certain developments in the field of computer visualisation in the academic environment. In recent years we have seen the advancement and growing prominence of virtual models, spatial configurations 'constructed' in the computer. This frequently used to involve complex modelling and time consuming rendering and animation, not always with convincing results. Whereas there was originally a tendency to create everything within the (computer)model, we have recently witnessed a shift towards the production of more elementary models with advanced visual 'post-production' of still images (possibly presented in 'serial vision') using a variety of digital editing programs, to get the right 'expression'. The editing techniques which are used are often digital variants of existing manual techniques. In some cases these can be considered to be improvements, but in other cases the original – physical – techniques can still be of relevance and sometimes even superior, particularly in the development phases of design and in more personalised presentations. It seems fair to say that manual imaging techniques have recently been making something of a 'comeback', frequently in creative 'mix' with computer driven methods of visualisation and communication.

In this context the experimental study presented here should be considered as a ‘case’ for physical modelling in combination with other media (in this project essentially digital or analogue (mini) camera registration and digital editing techniques).

It ought not to be a matter of choosing one exclusive, limited technique, but of looking for fitting combinations of various - digital and physical - techniques and skills!
Room for different ‘views’…

Notes and References

The exercise was developed and carried out together with Architecture/Modelling lecturer Robert Nottrot.

Does, J. van der, Breen, J., Stellingwerff, M.C. (editors): Architectural and Urban Simulation Techniques in Research and Education, Proceedings of the third EAEA conference in Delft , Delft University Press, Delft, 1998.

Martens, B. (editor): The Future of Endoscopy, Proceedings of the 2nd EAEA conference in Vienna, 1996.

Breen, J.: Learning from the (in) visible city, in: Education for Practice, Proceedings of the 14th eCAADe conference in Lund, Lund Institute of Technology, 1996.

Breen, J.: Learning from the (in) visible city, Design media experiments in an educational setting, in: The Architectural Annual 1996 – 1997, 010 publishers, Rotterdam, 1998.

Breen, J., Stellingwerff, M.C.: Imaging imagination, Exploring the impact of dynamic visualisation techniques in the design of the public realm, Results of the EAEA Workshop, in: Architectural and Urban Simulation Techniques in Research and Education, Proceedings of the third EAEA conference, Delft University Press, Delft, 1998.

Franke, R. Maase, E. (editors): Simulation of Architectural Space – Colour and Light, Methods and Effects, Proceedings of the fourth EAEA conference in Dresden, Technische Universität Dresden, Dresden, 2001.

Jack Breen, Designerly Approaches to Architectural Research, in: The Proceedings of the Research by Design Conference 2000, Delft University of Technology, 2001.

Wolfgang Thomas and Gerald Borgwardt: Stadtbilder statt Pläne, Umwelt simulation in der Planungspraxis, Universität Essen, Fachgebiet Städtebau, Essen, 1997.

Breen, J.: Design, Research and Designerly Enquiry, to appear in the Methodology publication of the Architectural Intervention project, Faculty of Architecture, TU Delft, 2001.

Mauritshuis, Den Haag, National Gallery of Art, Washington: Johannes Vermeer, Waanders, Zwolle, 1996.

CD-rom: Seminar House in the Trekgaten in Hilversum, Presentation D11, Nina Rickert, Faculty of Architecture, TU Delft, 2001.

CD-rom: The Japanese Pavilion, A Guided Tour, Presentation D11, Katrien van Dijk, Faculty of Architecture, TU Delft, 2001.

Jack Breen and Robert Nottrot: The a2W dialogue, An exploration of new media approaches, The Architectural Annual 1999-2000, Delft University of Technology, 010 publishers, Rotterdam, 2001.