



# CHALMERS

## Chalmers Publication Library

### **An Emerging Research Culture – Building Doctoral Scholarship in Architecture and Design**

This document has been downloaded from Chalmers Publication Library (CPL). It is the author's version of a work that was accepted for publication in:

**Reflections +13**

Citation for the published paper:

Nilsson, F. ; Dunin-Woyseth, H. (2010) "An Emerging Research Culture – Building Doctoral Scholarship in Architecture and Design". Reflections +13

Downloaded from: <http://publications.lib.chalmers.se/publication/129091>

Notice: Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source. Please note that access to the published version might require a subscription.

Chalmers Publication Library (CPL) offers the possibility of retrieving research publications produced at Chalmers University of Technology. It covers all types of publications: articles, dissertations, licentiate theses, masters theses, conference papers, reports etc. Since 2006 it is the official tool for Chalmers official publication statistics. To ensure that Chalmers research results are disseminated as widely as possible, an Open Access Policy has been adopted. The CPL service is administrated and maintained by Chalmers Library.

(article starts on next page)

## ***An Emerging Research Culture – Building Doctoral Scholarship in Architecture and Design at Sint-Lucas***

The authors claim that a special field specific research has been developed at Sint-Lucas School of Architecture. This institution has always been at the forefront of development in the professional fields of design and architecture. Several years ago, the intentions of the school for their prospective research pursuits were therefore defined to be experimental, practice-based concepts rather than attempts at emulating discipline-based research, characteristic of the academic fields (Verbeke, 2006:9). The Bologna-Berlin policies, recognizing doctoral studies as the third cycle in European higher education, have prompted a process of establishing at the school a new doctoral scholarship, based partly on research educational activities and partly on producing new research by the doctoral students.

We appreciate very much that we both have been given the opportunity to be part of that development the recent four years.

One objective of this paper is to present and discuss an epistemological-pedagogical stance with regard to research education for practitioners. Some opinions hold that practice-based researchers do not need epistemological and scholarly foundations – or even should avoid verbal theorising and references to other disciplines – in order to pursue practice-oriented research. Our stance is that practice-based PhD students should be introduced to broader “knowledge landscapes” and be trained in certain generic and transferable research skills. Such training will prepare the alumni of the prospective professional doctoral programmes to contextualise and position their research as well as to be communicative and innovative in a broad professional field.

Another objective of this paper is to assemble some of our experiences from and reflect on the period of the four years of our engagement in the process of developing this new doctoral scholarship at the Sint-Lucas School of Architecture. The leadership of the school invited manifold of approaches to research education as represented by the guest tutors, and it was therefore possible for us to develop, besides the Research Training Session on Knowledge, of which we were responsible, an autonomous research education unit within the overall curriculum. The paper will present this autonomous research education unit within the doctoral curriculum at Sint-Lucas. It will discuss how this unit might have contributed to building a culture of doctoral scholarship in architecture and design at the school.

While describing the autonomous research education unit we shall apply the framework of Goodlad and his co-authors, who define and address five levels within the domains of curriculum: ideological, formal, perceived, operational and experiential

curricula (Goodlad, 1979:60-64). For each level a different kind of description will be used in order to better express their different characters within the whole of the “curriculum ladder”.<sup>1</sup>

### Research by design. *The ideological curriculum*

There have been broad and intensive discussions on how to integrate the field specific insights and reasoning of architecture and design within research, and there is still a lot of confusion about it both in the milieu of the practitioners and of architectural researchers themselves. During the last forty years there have been ongoing debates on the importance of perspectives “from within”, and of the “craft aspect”, or the “making aspect”, as a core focus of the design-related research (Gombrich, 1991:68; Gombrich, 1993:177; also Abrams, 1989; Dunin-Woyseth & Michl, 2001).

It is necessary to develop architecture and design as disciplines of their own ensuring a qualified dialogue within academia, while at the same time, searching for new forms of architectural research engaging practitioners who have the strongest potential to develop the field of expertise. While the former strategy would depend on developing a discourse on the premises of academia in order to make the field “academically researchable”, the other one should generate a new mode of research based on the premises of the field of the expertise itself. Then another challenge within this strategy will be how to engage in a dialogue with other knowledge producers, those from academia and elsewhere.

With the advent of post-academic science (Ziman, 2000) one can imagine a fruitful development for architectural and design research “from within” the practice and for its search for new modes of generating and communicating it within the context of an equal dialogue with other knowledge producers.

Several concepts are now in use trying to delineate this specific kind of ‘in practice model’ of research, and especially in the field of architecture and design there are several around the notions of ‘research by design’ and ‘practice-based research’ (Frayling et al., 1997; Rust et al., 2007; Biggs, 2004). These concepts have in the context of “post-academic science” and Mode-2 research opened up for new developments in research in the professional fields of architecture and design. Knowledge production in creative practice has earlier been seen as completely outside of research and scholarship. New conceptualisation of the knowledge field of design and architecture, together with more inclusive and practice-based models of scientific research, is gradually achieving academic recognition as well as gaining the vital interest of the practitioners. (Dunin-Woyseth & Nilsson, 2008)

<sup>1</sup> This presentation and discussion is an abbreviated version of the paper “Building a culture of doctoral scholarship in architecture and design. A Belgian-Scandinavian case” presented by the authors during the international conference “Professional Doctorates”, organised by the United Kingdom Council for Graduate Education in London on 9-10 November 2009.

At Sint-Lucas, the international conference ‘The Unthinkable Doctorate’ in 2005 was a step in formulating the vision of research and setting up a research education program. Important aspects of this vision were formulated by the rector of the school in 2006 as: “Research at Sint-Lucas School of Architecture clearly gives a central position to a syncretic and holistic approach (‘designing’ as a verb; the process is important after all) and fuels it in a multidisciplinary manner from theoretical and analytical perspectives. (...) The research in the School of Architecture Sint-Lucas is developing as a reflection of this integrated approach, without also excluding rigorously defined research within the specialist fields of the staff involved. The emphasis in the School is currently on strengthening designed-based research.” (Verbeke, 2008:12-13)

### The Research Training Sessions (RTS). *The formal curriculum*

The formal scheme for the research education program at Sint-Lucas School of Architecture was implemented as four research training session (RTS) modules in 2006, which were adjusted and supplemented by another four modules in 2007 as a continuation in a second year for the group of those attending the first RTS series. (Verbeke, 2008a; Janssens, 2006b) The research training sessions are now described as a two year program.

The focus on research by and through design is emphasized in the description and curriculum. The program was intentionally designed to foster a diversity of perspectives and opinions, and not to reflect the vision of a single person or methodology (Verbeke, 2008b). The goals of the RTS program are formulated in six points with the aim to: Facilitate discussions on research directions in the fields of architecture and design; Develop the research focus for Sint-Lucas; Support researchers at Sint-Lucas (and others); Establish international collaborations between schools of architecture; Create input for research within the different domains of research and education; Prepare researchers for design-based research projects or a PhD in architecture (or design).

It is explicitly stated that the content of the program modules should be on a meta-level relating to research and design methodology and culture rather than to the specific content of individual doctoral projects. Individual supervision and guidance was not a part of the program at the start, but was subsequently formalized through part time positions offered to several international guest-professors. The intention of the Research Training Session program is to discuss fundamental issues of research by design in such ways that each participant can develop his/her own research ideas and research questions. The aim is that when finished the two year RTS program the participant should have prepared a research project mature enough to be formally started.

## The missing “mezzo-level”. *The perceived curriculum*

After we executed twice our Research Training Session on knowledge (in 2006 and 2007), we were invited to join the staff of the Sint-Lucas School of Architecture as senior professors (among a group of six guest professors in part time positions). This new form of affiliation assumed extended educational responsibilities, including regular mentoring of the prospective PhD students. This close and frequent contact with the groups of previous participants of the RTS opened for discussions about how they perceived their own learning situation.

During the RTS on knowledge, we attempted to introduce various “landscapes of knowledge” and some emerging modes of knowledge production. We discussed, among other forms of post-academic science (Ziman, 2000:67), Mode 1 and Mode 2 of knowledge production and how design research could relate to both. The founders of the Mode 1 / Mode 2 movement maintain that in order to master the tasks of Mode 2, one has to get through an apprenticeship in Mode 1. One has first to develop a kind of intellectual identity of Mode 1 in order to be able to acquire multiple cognitive and social identities for practising research in Mode 2 (Gibbons et al., 1994:149). We regard research by design as a form of post-academic science, and as such its prospective practitioners should be introduced to the principles of traditional research in their own field, but also be trained in some transferable and generic research skills which are common to Mode 1.

We agree that the research training sessions offered a certain **meta-level** in the research education. The sessions have inspired many of the participants to continue their involvement with research, and the RTS have been research-educationally successful in building bridges between the participants’ everyday experiences of professional practice and the possibilities to make them the basis of their field specific research. The two internal publications (Janssens et al., 2006; Hendrickx et al., 2008) witnessed that the RTS opened for new horizons and interests, and for building grounds for a new culture at the Sint-Lucas School of Architecture.

While “mapping” the research education program, we found the individual tutoring of the prospective PhD students by numerous guest teachers as a **micro-level**. Frequent contacts with teachers from various intellectual “schools” of research have given many opportunities to discuss one’s research interests from various angles. This propitious situation helped the individual persons to “find” his or her way of thinking. Yet many students seemed not quite to perceive the relations between the macro-level of inspiration of the sessions and the micro-level of their own emerging research project.

Keeping in mind the knowledge stance, based on the conviction that even the pioneers of new ways of producing knowledge should have some orientation with regard

to traditional research, and that they should master its generic and transferable skills, we recognized a missing **mezzo-level** in the offered research education program.

The **mezzo-level** is one of transferable skills which prepare prospective scholars “...to be able to formulate research questions / problems, to access literature, to collect data / to plan and execute field work, to write a thesis / report, to defend one’s findings” (Frijdal, 2007).

Recognizing this, we formulated an independent unit of research education, consisting of four seminars. The first two of them were given a common name of “scholarly criticism”, the two others of “scholarly craft”. If one recognizes research as a practice, one has to acknowledge ongoing criticism of one’s own and of others’ practice as one of the most important generic skills in the professions. Without mastering the field specific craft, one cannot become a full-fledged professional. We found these skills common both for the design professions and for the “research professions”. Our intention was to address through these seminars the transferable and generic research skills, with the hope that the **mezzo-level** would have the potential to bridge the macro-level of the Research Training Sessions and the micro-level of the individual tutoring.

## The autonomous unit of the research education: the macro-mezzo- micro levels of *the operational curriculum*

### The macro level

The Research Session Training on knowledge which the authors have been responsible for, has been focused on different forms of knowledge and how these forms originated. A specific focus has been put on the forms of knowledge present in the domain of architecture and design, in relation to other kinds of knowledge. Established modes and notions of scientific knowledge have been discussed together with other ways of knowledge production. The so-called “Roskilde Model” has been applied as a frame for the pedagogical structure of the training. The basis of the model is to organise short periods of concentrated *ex cathedra* teaching by international lecturers, preceded by intense literature studies and followed by practical exercises such as writing of essays. The “Roskilde model” has been based on the pedagogical principle of learning by doing, which has relevance for both architectural design and architectural research.

Following the “Roskilde Model”, the required reading for the session made up the basis for a pre-start assignment of preparing a concise paper. The lecture part of the session consisted of a general introduction to various knowledge forms and to the field specific knowledge in the design professions (Dunin-Woyseth, 2009; Nilsson, 2004). After the lectures the participants were requested to answer the questions:

‘Why?’ ‘What?’ and ‘How?’ with regard to their ideas about a prospective PhD project. This assignment was done both in an academic way – a written paper – and in a designerly way – an image of their proposed research project.

The results of the session assignments have each time turned out to be fruitful for the students’ progression in developing their ideas towards a research proposal. Their ideas expressed in both written and visual form demonstrated that the participants familiarized with various types of knowledge and were willing to discuss their design-based knowledge within a broad “landscape of knowledges”. (Dunin-Woyseth & Nilsson, 2006:171-172; Dunin-Woyseth & Nilsson, 2009:43-44)

### The mezzo level

The first of the seminars, *Scholarly Criticism I*, was focused on training the doctoral candidates in the “art and craft” of academic evaluation. The object of such evaluation was a recent doctoral thesis. The two and two participants of this seminar were to present the chosen thesis and thereafter discuss some aspects of it.

The second seminar, *Scholarly Criticism II*, had two objectives: (i) to introduce and train the PhD students in constructive criticism; and (ii) to get feedback from the peers, which would give a concrete support to the research projects. This time the PhD students were to study and give criticism to the colleagues’ research proposals.

The objective of the seminar *Scholarly Craft I*, titled “Producing a Dissertation”, was to build an overview of and discuss the different phases and skills needed when producing a dissertation. A textbook on the matter was chosen by the teachers as the basis of this seminar (Borden & Rüedi Ray, 2006).

The second seminar, *Scholarly Craft II*, held under the title “Navigating in various knowledge landscapes”, was an attempt to elaborate the issues of the RTS Knowledge, with emphasis on academic research. A textbook was chosen to give a concise and rudimentary view on philosophy of science, the relation between architecture and natural and social sciences, as well as humanistic studies (Mo, 2001), in order to give a perspective on the potential of architectural and design research with regard to the disciplinary knowledge of the academia.

### The micro level

During the years of our engagement as senior professors at Sint-Lucas, we met on numerous occasions the doctoral students in traditional one-to-one tutorials, but we also practised what could be called “tandem tutorials”. The latter were meant to stage small seminar discussions to build an academic culture and strengthen the PhD students’ scholarly awareness, besides the traditional tutoring around the doctoral student’s own research project.

## The response of the doctoral students to the unit’s content and its impact. *The experienced curriculum*

This part is based on written response from some of the doctoral candidates at Sint-Lucas delivered to us in September 2009.

### Research Training Session: *Knowledge*

“I reread the articles we had to read and the little paper we made for this session: almost everything was very new and overwhelming to me then. Now this knowledge on ‘Knowledge’ seems common to me after these years, but then it was the first time I heard about Mode 1 and 2, tacit knowledge, explicit knowledge, transdisciplinarity and so on. I remember reading the articles, having a hard time to comprehend. (...) It is comparable to learning a new discipline: too many things have to be understood together in the beginning before some comprehension takes place.” (Laurens Luyten) “The RTS session in which the concept of Mode 1 and Mode 2 have been introduced have been very clarifying, not only for me but for the whole research community at Sint-Lucas. The required reading (...) have opened up ‘our collective mind’. The texts guided us through the first and often most dangerous ‘minefields’ in a country we had never been in before (...) This input also cleared the way to a first scheme of my approach, that still holds good today: it is still ‘there’ in my current scheme and my actual lines of thought. (...) But above all, it was an excellent exercise in self-positioning, like racing the top of a hill, enabling the wanderer to reward himself with an overview on the whole situation. And this was more than necessary.” (Jo van der Berghe)

### Scholarly Criticism I: *Studying in depth a PhD thesis*

“This whole new concept for a PhD opened up my eyes again: the concept of a PhD appeared to be ‘designable’! Could it also be a ‘thing’ like this? (...) The awareness of the possibilities concerning this matter began to emerge. (...) Altogether, this gave me a view on my own practice and was an excellent exercise in self-positioning, or: positioning my work in the wider landscape of knowledge.” (Jo van der Berghe) “While discussing at the workshop (...), it became obvious that there are ‘schools of research. (...) Research in my opinion can not be (only) an introspection in the own design (processes). It has to have a purpose beyond the self.” (Johan Liekens)

### Scholarly Criticism II: *Research by Design, Theories, Methods, Projects*

“I remember that we discussed how certain people critiqued paper presentations at a conference. For me that was very useful: this whole academic scene is really unknown to me, and I like to know what drives different actors on this scene and how they relate to each other. It makes it more distinct to me what I can expect when acting on

that scene. (...) In the end this workshop was very useful for me at different levels. By making such an official moment of delivering critique my timidity dropped away and it was possible for me to learn it by doing it.” (Laurens Luyten)

“The combined use of constructive criticism (during the process) and normative criticism (after the process) offered me an additional tool. This was a very *professional* session, in that it offered us much information that enables us to become ‘professional’ academics, to learn the skills, to adopt the state of mind so necessary to pass the official gatekeepers, but also to help us build our research project in the direction of something that can be managed, be mastered by ourselves through the method and not vice versa.” (Jo van der Berghe)

### Scholarly Craft I: *Producing a Dissertation*

“This workshop came at the right time for me. I had written with great difficulty my first article for Reflection (...) So this book by Borden and Rüedi Ray (...) was a great help in getting an overview of how to produce a dissertation and what I had to take into consideration while researching (e.g. what to bear in mind when doing an interview). (...) Most of the book helped me a lot in starting up my research activities as a novice. For me reading the first part of the book was already the success of the workshop. And it got better when people (...) showed me how they conducted research or wrote articles. (...) It was helpful to team up for the preparation because we could exchange practical information.” (Laurens Luyten)

“This session had the same characteristics and qualities as Scholarly Criticism sessions. It has demonstrated to be a very important input for me in terms of the academic skills.” (Jo van der Berghe)

### Scholarly Craft II: *Navigating in various knowledge landscapes*

“The knowledge presented in this book seems to me important in order to be able to operate at the Mode 1 scene. Of course this book is a dense presentation of a very broad field. (...) I think it was the right choice to the reading of the book and let everybody present a part: it was a lot of knowledge to share. And even if I did not understand all of it, I know where to find it now, and that is maybe the most important outcome for me of this workshop. (...) And in conclusion, I believe that knowledge covered in the workshop is an important part of any PhD-education. And I am glad that have participated in this workshop”. (Laurens Luyten)

### On the “educational unit” as a whole

“There has to be a structure in learning how research (through design) is done. This has to be done in subsequent sessions. This has to be done in dialogues, to provide insights beyond what we think we see. Therefore we need joint moments of working,

on topics, that are related to but that are not our research topics. In his way we can see structures instead of (poetic) content. **The workshops** (scholarly criticism- scholarly craft) provided in my opinion a setup of a **strategic frame of learning** and established **strong connections** between some of the participants in that respect, these workshops to me were the most powerful instruments during my RTS-period.” (Johan Liekens)

“We have to know (have notions of) Mode 1 to operate meaningfully in Mode 2. Why are architects / artists so afraid of what exists, of what is done, and of how it is done? Why do they want to invent everything from scratch over and over again? Why cannot they show the respect for ‘science’ they are expecting back? Why do architects want to communicate through media only they understand, while they are proclaiming to be in search of new universal ways of communication?” (Johan Liekens)

“The whole presented education-package is very consistent and has helped me in general to have a broader view on what I am doing (or should be doing) while acting on the research scene. All of the workshops were fun and interesting for me to do.” (Laurens Luyten)

### Towards a new research culture of doctoral scholarship at Sint-Lucas School of Architecture

Some ten years ago the leadership of the Sint-Lucas School of Architecture launched the process of building a proactive milieu for research at the institution. Early in this process it became clear that a narrow academic perspective on studying architecture would not be preferable in the vision of research; various research perspectives should be promoted side by side. While the academic perspective would still be welcome, a new research approach, based in practice, research by design, would be the priority for the future development. While academic research on architecture was most often based on using the methodological tools borrowed from other academic disciplines, this new mode of research would need exploring new, adequate tools, based on designerly thinking. The challenge within this mode will be how to engage in a dialogue with other knowledge producers, those from academia and elsewhere. A certain apprenticeship in the academic research provides a researcher with various generic and transferable skills which will be of great use, while addressing post-academic research.

The Research Training Sessions have inspired the prospective PhD students to engage in research by design. Many of those who attended the RTS began to formulate research proposals as the basis for their future doctoral studies. This group involved in peer-learning and self-organising of research educational activities. With the support of some of them we were able to organise the *mezzo*-level of their doctoral studies.

This level has been devoted to train scholarly craft and skills to be able to engage in dialogue with other knowledge producers, both inside and outside of academia.

From this we assume that the autonomous unit of research education which we organised in cooperation with the PhD students have helped this group to develop some generic and transferable skills and prepared them in some way to engage in dialogue on research issues in academic contexts as well as in professional practice. This group seems to have initiated a new culture of doctoral scholarship at Sint-Lucas. This propitious development builds certainly on the grounds of the “big design”, laid wisely already ten years ago.

*Halina Dunin-Woyseth & Fredrik Nilsson*

#### References:

- Abrams, M.H. (1989), “Art-As-Such: The Sociology of Modern Aesthetics”, in M. Fisher (Ed.): *Doing Things with Texts: Essays in Criticism and Critical Theory*, 135 – 158, New York and London: W.W. Norton.
- Biggs, M. (2004). “Learning from Experience: Approaches to the experiential component of practice-based research” in *Forskning, Reflektion, Utveckling* Stockholm: Swedish Research Council.
- Borden, I. & Rüedi Ray, K. (2006). *The Dissertation. An Architectural Student's Handbook*. Oxford: Architectural Press.
- Dunin-Woyseth, H. (2009). “On Designed Knowledge Artefacts. A case for diagram construction in research education for practitioners” in *Communicating (by) design*, ed. Verbeke & Jakimowicz, Brussels: School of Architecture Sint-Lucas.
- Dunin-Woyseth, H. & Michl, J. eds., (2001). *Towards a Disciplinary Identity of the Making Professions*, Oslo: AHO.
- Dunin-Woyseth, H. & Nilsson, F. (2006). “Thinking, Doing, Writing, Researching – The Brussels experiments in forms and processes of knowledge” in *Reflections +3. Research Training Sessions 2006*, ed. Nel Janssens et al., Brussel-Gent: Sint-Lucas Architectuur
- Dunin-Woyseth, H. & Nilsson, F. (2008). “Some notes on practice-based architectural design research: Four ‘arrows’ of knowledge” in *Reflections +7*, ed. Arnaud Hendrickx et al., Brussels: Sint-Lucas School of Architecture.
- Dunin-Woyseth, H. & Nilsson, F. (2009). “Visual thinking as bridge building – Testing a pedagogical concept, drawing some new insights”, in *Reflections +9*, ed. Sarah Martens et al., Brussels-Gent: Sint-Lucas Architectuur
- Frayling, C. et al., (1997). *Practice-based Doctorates in the Creative and Performing Arts and Design*, Lichfield: UK Council for Graduate Education.
- Frijdal, A. (2007), presentation at “Colloquium on Graduate Education: Strategies for Generic Skills Training, Development of Research Supervisors and Innovation in Doctoral Programmes”, Dublin, 24 – 25 October 2007.
- Gibbons, M. et al. (1994) *The New Production of Knowledge. The dynamics of science and research in contemporary societies*. London: Sage Publications.

- Gombrich, E.H.J. (1991): “Approaches to Art History: Three Points for Discussion”, in *Topics of Our Time*, 62 – 73, London: Phaidon.
- Gombrich, E.H.J. (1993): *A Lifelong Interest: Conversations on Art and Science with Didier Eribon*. London: Phaidon.
- Goodlad, J.I., Klein, F. and Tyle, K. (1979). “The Domains of the Curriculum and Their Study”. In Goodlad, J.I. and Associates *Curriculum Inquiry. The Study of Curriculum Practice*. New York: Mc Graw-Hill Book Company
- Hendrickx, A. et al. Eds. (2008). *Reflections +7*, Brussels: Sint-Lucas School of Architecture
- Janssens, N. et al. Eds. (2006), *Reflections +3. Research Training Sessions 2006*, Brussel-Gent: Sint-Lucas Architectuur
- Janssens, N. (2006b), “The Sint-Lucas Research Training Sessions” in *Reflections +3*, Brussels: Sint-Lucas School of Architecture.
- Mo, L. (2001). *Philosophy of Science for Architects*. Oslo: Kolofon
- Nilsson, F. (2004). “Transdisciplinarity and Architectural Design. On Knowledge Production through the Practice of Architecture” in *Discussing transdisciplinarity: Making professions and the new mode of knowledge production. The Nordic Reader 2004*, ed. H. Dunin-Woyseth and L.M. Nielsen, Oslo: Oslo School of Architecture and Design
- Rust, C., Mottram, J. & Till, J., (2007). *Review of Practice-Led Research in Art, Design & Architecture*, Bristol: Arts and Humanities Research Council.
- Verbeke, J. (2006), “The Sint-Lucas Research Training Sessions” in *Reflections +3*, Brussels: Sint-Lucas School of Architecture.
- Verbeke, J. (2008), “Research by Design in Architecture and in the Arts” in *Reflections +7*, ed. Arnaud Hendrickx et al., Brussels: Sint-Lucas School of Architecture.
- Verbeke, J. (2008a), “Developing Architectural Research through Design – Experiences with Research Training Sessions”, paper presented at conference *Architectural Inquiries*, Chalmers University of Technology, Göteborg. Available at: [http://tintin.arch.chalmers.se/aktuellt/PDFs/Verbeke\\_Developing%20Architectural%20research.pdf](http://tintin.arch.chalmers.se/aktuellt/PDFs/Verbeke_Developing%20Architectural%20research.pdf) [Accessed October 25, 2009].
- Verbeke, J. (2008b), “Setting up the Research Training Programme: The General Context”, in *Reflections +7*, ed. Arnaud Hendrickx et al., Brussels: Sint-Lucas School of Architecture
- Ziman, J. (2000), *Real Science. What It Is, and What It Means*, Cambridge: Cambridge University Press.