

Application for Centre of Excellence in Higher Education (SFU)

TRANSFORMATIVE LEARNING IN ARCHITECTURAL EDUCATION (TransARK)

“Knowing-Acting-Being” in becoming Architect

TransARK, hosted at NTNU by the Faculty of Architecture and Fine Art (AB) in collaboration with the Unit of Educational Development (UNIPED) has the aim to open the troublesome “Black Box” of the learning experience when the student exposed to extreme complexity of aesthetical, ethical, technical, economical, functional challenges suddenly “gets it” and becomes an architect. This SFU center will therefore have the aim to go in depth on this formative aspect, influencing all activities in architectural education and relevant for all higher education.

Motivation:

We live in times of major transitions. Climatic change, economic crises and big scale environmental crises in many different areas have come to a point where we are forced to seek solutions that are outside of the paradigm that has created these problems. In architecture leading voices call for A BIG RETHINK (The Big Rethink-series through all issues of Architectural review 2012, by Peter Buchanan) to develop new ways of thinking and practicing in the discipline, and also in the education of future architects. The faculty conducted an abstract-based symposium to this effect in April 2013, “Six questions on becoming architect”, with contributions by Peter Buchanan and Juhani Pallasmaa.

Architecture is a main contributor in shaping our environment, not only in a physical way, but in an emotional, structural and artistic way. To be able to relate to the challenges of our time, architects need to develop skills, knowledge and attitude that can adjust to rapid change. Equally important is the need of developing emphatic responsiveness. Only by an attitude of responsiveness and responsibility towards our environment can our profession be a part of the solution and not the problem.

Educational vision - from best practice to next practice:

In rethinking the role of architecture, the field of architectural education is a crucial part of the discussion. In the last fifty years many interesting educational explorations have been seen within the field in Scandinavia. New schools with programs colored by regional contexts have emerged. The challenges we face today however are issues of global concern and can no longer be neglected as such, without severe consequences. The situation calls for an urgent need of rethinking also architectural education and to bring it towards a new level of pedagogical practice. This process may be termed developing the *dual professional*, a professional equally skilled in the discipline and the educational and teaching skills.

Architecture is a highly interdisciplinary field. At its base is the need to deal with complexity; to oscillate between details and “the big picture”, and to move across discipline borders in search of patterns and intersections. Issues of complexity now attract increasing emphasis in educational and

societal research (Rasmussen 2004, Qvortrup 1998, Luhmann 2000, Mason, M. 2008). In Barnett's terms the world is super complex, and the role of the university is to prepare students for a world where the learner is constantly exposed to several and sometimes conflicting frameworks for understanding. Certainty and truth is replaced with flux, unpredictability and uncertainty. The challenge for higher education is now to prepare students for multiple frameworks and competing values, ill-defined problems and open ended situations (Barnett 2000). Architecture deals with humans and social contexts as much as houses and buildings. It is a field where aesthetic, tactile experience is crucial, and creative practice is a way of thinking and a way of understanding. Becoming an architect is to develop as a complete human being.

In rethinking architectural education, new perspectives, new models and new methods need to be developed. To frame these challenges, new theoretical perspectives need to be aligned with new methodological and didactic approaches. Contours of this are already being developed as an emerging pedagogical, explorative practice at our faculty. Several project- and PBL- based methods, in particular the Live Studio approach, have been already implemented. To this foundation we will draw upon various frameworks to enhance and further develop the teaching and learning environments. These may be traced in partly overlapping models developed in different areas within the last 15-20 years, each addressing different aspects of the teaching and learning environments. Meyer and Lands *Threshold Concepts* framework focuses on the learner's relation to the learning content, and investigates into the need for a change in ontology for a learner to pass through a portal of difficulties (Meyer and Land 2006). A comprehensive literature on methodology, research and results has now emerged, and an international research community has been established, complete with specific conferences and frequent and increasing publications (Flanagan 2013). Preliminary research on threshold concepts in architecture has already started at the faculty. Additionally, Ken Wilber's *Integral Approach* (all sciences, art, ethics) that addresses issues of integrating knowledge from different disciplines and practices, will be consulted (Wilber 2007). Otto Scharmer's *Theory U* framework suggests how change and innovation is necessitated by institutional and personal change, and suggests a methodology for development that will be investigated (Scharmer 2009). Becks & Graves' *Spiral Dynamics* addresses issues of human development that bear relevance to this project (Becks & Graves). The concept of *Making is thinking* (Sennet 2008) addresses a much needed re-examination and re-description of how to understand and develop the concept of skills reconnecting body and mind. The common denominator of these approaches is the focus on understanding the trajectory and transformation of the learner, encouraging a partnership between educationalists, students and discipline specialists, with an emphasis of developing a dialogue between the three (Cousin 2010). Together these approaches may significantly change the way the teaching and learning environment may be evolved.

Given the present challenges, architectural education no longer can be seen merely as a vehicle for a professional career, but as a developmental process that educates the individual as well. This is a comprehensive process that involves the development of physical awareness, emotional and empathic responsiveness, mental flexibility, intuition and artistic sense.

Quality in established educational activities (see enclosed documentation of excellence in work by students)

The centre has two main partners, both at NTNU: The Faculty of Architecture and Fine Art (AB) and the Section Unit of Educational Development (UNIPED).

UNIPED has a dual function; one is to give courses and assistance to new faculty members, second to give strategic advice to departments, faculties and the central administration. The section also conducts research and publishes in the following HE topics; collaborative learning, learning with ICT, threshold concepts, assessment and evaluation in HE, to name a few. UNIPED also takes part in pedagogical network of Nordic 5 Tech (NTNU, DTU (Copenhagen), Chalmers (Gothenburg), Alto (Helsinki), and KTH Royal Institute of Technology (Stockholm). AB at NTNU represents the oldest and largest institution educating architects in Norway, with a broad specter of specialization courses in the master program of Architecture and collaboration with additional master programs at the faculty, such as Fine Art, Sustainable Architecture, Urban Ecological Planning, Physical Planning and Real Estate Development. The faculty has extensive international contacts in the form of exchange agreements and collaboration on education and research.

Result factors: The architectural education at NTNU is popular with a steady ratio of 4 primary applicants per each of the 75 available admissions, and with a high grade score (58,4/54,2) qualifying entry. The AB-faculty has a good flow of students with 94,5% of committed credits produced in 2012. Our 2013 survey on quality in learning outcome and professional relevance of the architectural education at NTNU shows from three different parties (present students, examined candidates 2003-2012 and employers) that the education is well regarded and professionally relevant.

Of a more specific significance we have experienced an increased activity and level of quality in externally oriented student projects, both as arranged semester courses and as independently organized student activities. In quite many cases this entrepreneurship leads the students to establish their own organizations or companies. Quite many of these activities has been published and received positive acclaim while still students, such as TYIN tegnestue (widely internationally published and prize winning young architect studio), Studio Tachloban (internationally published and in collaboration with Architectural Association in London) and RALLAR architects (at present third year students with two building commissions) to name a few. The architect students at NTNU have also played an important

role in establishing the national student workshop “Tre-stykker”, shortlisted for the Mies van der Rohe awards 2013 for the RAKE visningsrom in Trondheim.

Process factors (partially integrated with input factors): Problem Based Learning is the predominant leaning situation for our architect students. Three established learning contexts at the faculty are incorporated in the WP’s in the center: 1) full scale building in the first semester - followed by more advanced full scale building in master courses, 2) “bottom up” action planning in south countries in the context of the master program in Urban Ecological Planning and 3) student initiated projects supported and facilitated by the faculty. “Arkitekthjelpen” is in this regard a customer oriented help portal established at the faculty to help the students getting in touch with small private projects. The balance of confidence in skills and knowledge and being exposed to a productive level of risk is of vital importance as a generic pedagogical method. Most of the student projects are related and exposed to external parties informing and discussing the projects with the students keeping a high degree of actuality and relevance in the learning process. R&D and artistic work integrated in the learning processes by knowledge transfer, sharing of cases and use of students’ work as part of research projects are practiced at the faculty in a wide range of contexts, exemplified by:

- The Research Centre on Zero Emission Buildings (FME-ZEB), taking part in research projects and participating in “Solar Decathlon” with design projects
- By receiving funds from Innovasjon Norge for the Tre|Nova project, the faculty will engage students in innovation processes for development of the Norwegian wood industry for a future excellent Norwegian wood architecture
- The faculty has invested approx. NOK 6 mill the last years in establishing an advanced digital wood workshop and additional mobile scanning and production facility for research, innovation and full scale building
- As one of ten UN-habitat partner universities in the world, students develop knowledge in collaboration with students in south countries in contexts such as the Federation of Slum Dwellers in Uganda and by exhibiting student works at the World Urban Forum in Naples 2012.

For internal discussion, development and dissemination of pedagogical thinking and methodology at the faculty we have held “PED-PEPP” seminars once a year in collaboration with UNIPED.

Input factors, available to the center at start up:

Academic leader of the center, Associate Professor Bjørn Otto Braaten, also leader of WP3: architect and former partner in the architecture office 70grN, former program coordinator for architectural education at NTNU, nominated for the SINTEF Award for outstanding teaching at NTNU in 2012 by the students, reformed the pedagogic structure in basic courses in the architecture program, established

improvements on quality assessment procedure for the program, research activity on embedded knowledge in the students developed throughout the five years of study. His master course “Deep Structures in Architecture” will be attached to the center with 15 students.

Professor Leif Martin Hokstad, assistant center leader and leader of WP4: researcher and lecturer at the Unit for Educational Development, and has a solid background in international and interdisciplinary research projects.

Associate Professor Gro Rødne, leader of WP1: architect and founding partner of Agraff architect office, central contributor on the Tre|Nova project and board member at the Wood-center in Trondheim, responsible for the first semester course ARK1 including full scale building which will be attached to the center with 75 students.

Associate Professor Steffen Wellinger, leader of WP2: architect, received the SINTEF Award for outstanding teaching at NTNU in 2010, founded the help portal “Arkitekthjelpen”, mentor for many of the “Live Studios” initiated by the students. Establishment of an incubator and facility arena for supporting student driven initiatives will be attached to the center with approx. 10 students per year.

Associate Professor Hans Skotte, assistant leader of WP2: architect, teaching and research in Urban Ecological planning, huge international network on planning in south countries, member of the steering committee of the UN-Habitat University Partnership Initiative, mentor for many of the “Live Studios” initiated by the students.

Other academic staff that will be attached to the center are: University Lectors Andreas Gjertsen and Yashar Hanstad of TYIN tegnestue and Professor Sami Rintala, having for many years arranged full scale building workshops and master course “Design in Context” all over the world together with university lecturer Pasi Aalto, and been mentors for many of the “Live Studios” initiated by the students. A master course with 20 students in collaboration with local students will be attached to the center. One Ph.D. attached to the center will be funded by the AB faculty in addition to two funded by the external financing. One of the three Ph.D.’s will be designated for action research.

In addition, the Centre will draw upon the resources of other relevant environments available at NTNU with particular relevance to the Center and establish collaboration with these. This is i.e. the rich PBL environment at the Medical Faculty, and the trans disciplinary course at NTNU: EiT (Experts in Team).

Organizational plan (see also enclosed organizational chart)

The centre will be established at NTNU, Faculty of Architecture and Fine Art under the direction of Associate Professor Bjørn Otto Braaten. Section of Educational Development (UNIPED) will be

partner in the centre with Professor Leif Martin Hokstad as assistant leader. The centre direction will be supported by one dedicated administrative staff.

A steering committee will monitor the overall progress of the centre, with representatives from the NTNU rectorate, Deans of the two faculties AB and SVT, program coordinator of master program of Architecture and student representative.

An international scientific committee will in connection with the yearly conference hosted by the centre, give critique and advice on the scientific progress. Members having accepted to be asked to participate in the scientific committee: **Juhani Pallasmaa**, architect, former professor and dean of the architecture department of Helsinki University, former director of the Museum of Finnish Architecture and one of our times most influential writers in architectural philosophy with the books “The Eyes of the skin” and “Thinking hand” read by architects all over the world / **Kjetil Trædal Thorsen**, architect and founding partner of Snøhetta architects, honorary doctor at NTNU 2011/ **Peter Buchanan**, architect, urbanist, exhibition curator, writer and architectural critic, former deputy editor of The Architectural Review, author of the essay series “The Big Rethink” encouraging a re-evaluation of how we address the major challenges our times / **Professor Ray Land**, director of centre for Academic Practice in the school of Education at Durham University, former higher education consultant for the OECD and European Commission, and has published widely in the field of educational research, is particularly known for research on “Threshold Concept” and “Troublesome Knowledge”, published books and organized conferences on these themes.

A reference group with participants representing institutions for architectural education in Norway and the Norwegian Architectural Association (NAL) will establish a forum for dissemination, check of relevance and access to valorisation of the SFU’s impact on educated architects absorbed in the market. The reference group will have a national focus at start-up of the centre, but will be expanded internationally if relevant.

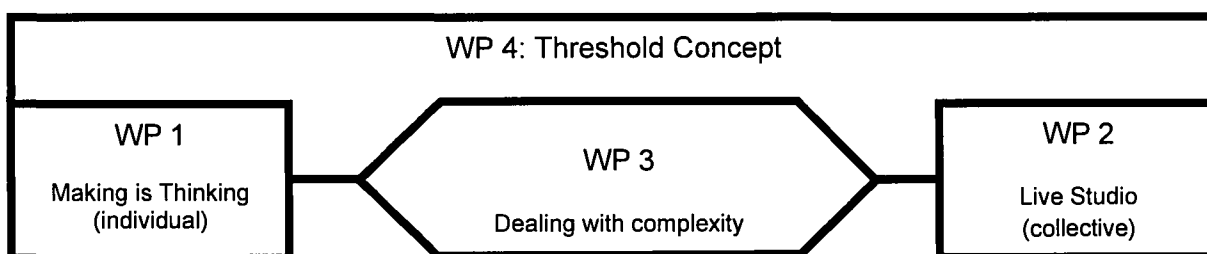
The program council for the architectural education is directly linked to the centre direction for easy coordination and planning.

Work package overview:

The research and development activities will be organized in work packages, and the collective effect of the work packages is to enable a research based redesign of courses given at the faculty. The following courses are targeted for this project: Architecture 1- and Master courses with the same content, the “Live Studio” projects and Master course in architectural design (deep structures in architecture “dealing with complexity”). The work packages are chosen because they are already in a process of development at NTNU and are having a mutual impact on each other.

While WP1 (“Making is thinking” Full scale building) is focused on the *individual* perspective, the body and mind connection, WP 2 (“Live studio”) has the social perspective and concern about community / the relationship to society but do not necessarily imply building. It is easy to assume that the “Live studio projects wouldn’t appear without the “Making is thinking”, which have emerged as a result of an intentional priority area especially on wood as a building material the last 10-12 years. This, along with the priority area of urban ecological planning (international master programs in Tibet, Uganda, Nepal i.e.) has possibly been giving the students the necessary competence to implement the Live Studio projects. Prior to the full scale building we hardly had no such activity as the “live studio” represent. This would be an obvious task to investigate in research and implement in the redesigning of the courses. WP 4 (Threshold Concepts) will use both WP1 and WP2 and WP3 as target of research. The challenges and potential troublesome areas in the students learning trajectories are connected both to the disciplinary issues, but also to develop the ability to move between disciplines.

The relations and interdependencies between the work packages may be illustrated as follows:



WP 1: Making is thinking.

Acknowledging that Architecture belongs to the “Making disciplines” and the connection between mind and body, we emphasize to give the students an embodied experience by working in full scale from the very beginning of the study. Full scale building projects continue in several assignments throughout the curriculum as a result of an intentional priority area especially on wood as a building material the last 10-12 years. By working full scale, they will gain a knowledge that not only cover professional and academic skills, but also remains as tacit knowledge (Polyani 1966). Literally it is also building their self-confidence to later implement projects on their own. Full scale building projects continue in several assignments throughout the curriculum and our students carry out high quality full scale building projects on their own, throughout the world. In rethinking WP1 it would be an aim to make use of the experiences from WP2, WP3 and especially the research in WP4, in the development of the didactic tools. This way of learning by doing, could have impact on other assignments and courses at our Faculty and possible deployment on to other disciplines.

WP 2: Live Studio.

Live Studios are conducted to challenge the students; to bring them out of the ‘academy’ and into real-world situations that enable them to gain insights, skills and understandings that cannot be academically ‘taught’. By ‘being in the situation’ where solutions are sought both physically and socially, they not only learn much more efficiently by having to engage all their senses, but they

acquire a much wider understanding of what architecture is and what it does. Being outside the academy the problems students confront are embedded in real-world constraints, social and material, that trigger ingenuity, innovation and creativity all according to the principles of problem-based-learning. The experience we have gained so far shows that the students acquire a capacity to improvise, to communicate effectively, and to respond architecturally within a responsible social setting. The Live Studio approach is grounded in the recognition that architecture is a deeply practice based and social endeavor aside from being rooted in the arts and in technology. Hence it is rooted in the writings of Freire and Lakoff & Johnson as well as on the doings of Rural Studio of Auburn University and the Mass Design Group, ex-Harvard (Freire 1987, Lakoff & Johnson 1980).

WP 3: Dealing with complexity and change.

One of the characteristics of the field of architecture is to deal with complexity. Not only technology becomes more and more complex, but the overall context of the design - and building processes are developing into still higher levels of complexity. Even more challenging is this situation, because it is also continually changing. To deal with high levels of complexity and change calls for new ways of thinking, both about the role of the architect and the role of architectural education.

This work-package will focus on developing pedagogical tools for dealing with high levels of complexity and change. The Integral Approach, as it is formulated by Ken Wilber, provides a map and a method (Integral Methodological Pluralism) that can be used as a tool of orientation in complex matters. As an interdisciplinary field, the architectural perspective in itself is a kind of integral approach. In a time where specialization and fragmentation is a main trend, it is crucial to develop understanding of the relationship between the details of things and the whole picture.

The other aspect of dealing with complexity and change is to be grounded in basic knowledge and experience of the field. For an architect to deal with high levels of complexity and change, it is crucial to master the simple fundamentals that make architecture to something more than mere production of buildings and physical manifestations of system logic. Architecture deals with the meaning- aspect of our build environment. This starts with the embodied experience of space, the tactile and physical quality of materials, constructions, light and space. The physical, emotional, structural and artistic aspects are the fundamentals for making meaningful buildings. This work-package will focus on developing methods that corresponds to these fundamental aspects of architecture.

WP 4: Threshold Concepts.

Aim: The aim of this work package is to identify, characterize and categorize threshold concepts amongst students of architecture, and to use this insight in the redesign and development of courses.

The ‘threshold concepts’ framework has in the last few years been introduced into a large number of pedagogical settings and research initiatives in higher education (Flanagan 2013). However, little research has been conducted as of yet in the field of architecture. The threshold concepts framework focuses on those aspects of the intended outcome that is particularly difficult or troublesome to the learner, especially those needed to move ahead in the subject or discipline. This position the learner

finds himself in is described as standing in front of a portal or a gate through which the learner finds it difficult to pass. The main focus is, from the point of view of designing a learning trajectory, on the world of the learner, and the effort to grasp what the world looks like to a learner who is entering into a new ontological and epistemological terrain. They represent deep aspects of a discipline and are frequently associated with tacit knowledge. First and second year students, and their teachers, will be the target of research. A methodology based on seminal work in the field (Land & Meyer 2006, M. Flanagan 2013, Mangan and Davies 2010), will be appropriated to the context of architecture. The activities taking place in WP 1 and WP 2 will provide the basis of study.

The figure below shows the timeline and relationship between the tasks in the various work packages, and the overall approach of development of methodology, pilot testing, small scale deployment, integration of research into redesigned courses, and evaluation plans (see also the more specified timeline enclosure). In addition, WP specific tasks that build on the common work are described.

Year 1	Year 2	Year 3	Year 4	Year 5
*Development of methodology of investigation (all WPs) *Establish and activate international network of researchers. (all WPs) * Pilot deployment of methodology (all WPs)	*Data gathering and analysis (all WPs) Development of on-going full scale projects (WP 1,2,3)	*Data gathering and analysis (all WPs) *Development of pilots /small scale deployment (all WPs). *Development of evaluation design (all WPs)	*Pilots/small scale deployment of redesigned courses (WP1, 2, 3). *Integrating WP results into design (WP 1,2,3) *Deployment of incubator & business models (WP 2). *Evaluation studies of effects to be fed into redesign of courses (WP 1, 2, 3)	* Deployment of redesigned courses (WP 1, 2, 3) *Evaluation studies of effects (WP1, 2, 3)

Dissemination and impact

The challenges in architecture are of an interdisciplinary nature, and many of the issues addressed in this project are shared by other disciplines. The research and development efforts in the project will therefore have impact on the discipline specific educational issues, yet with a strong generic component with high relevance for other disciplines outside architecture. The dissemination efforts will therefore serve several purposes; to participate in the *discipline specific development* (i.e. architecture and architecture education), to through generic aspects of the project contribute to the field or research and practice in *higher education*, and add to the body of knowledge in other disciplines thereby contributing to an *interdisciplinary discourse*. The dissemination will thus target *local* (i.e. NTNU, through the redesign of courses in architecture and in-service courses for faculty), *national* and *international* channels. The methods will be as follows:

1: Two biannual series of conferences with publications arranged in alternating years will be the main means for scientific and public dissemination:

a: a biannual international conference on architectural education planned to be in collaboration with “TAF celebration of Architecture at Røros” <http://rorosarch.wordpress.com/>

b: a biannual international cross disciplinary conference on education with a broader scope encompassing architecture and other “making/performing disciplines” such as music and fine art in addition to neuroscience, engineering, to name a few.

Both conference series will address discipline development and pedagogical/ methodological/ theoretical development for architectural education, cross-disciplinary education and in higher education in general. The conferences will produce a steady flow of in-house and external publications that will be collected in anthologies and books on architectural education and education in general. Additional participation on national and international conferences and publications will be part of the centres activity.

2: WP 2, “Live studio” as already practiced at the faculty, will disseminate directly one to one, with external partners such as universities, NGO’s and municipalities. The activity can be compared with “Design without borders”, managed by Norad, Fredskorpset and Norsk Form, though not only aimed at “south” countries.

3: The Scientific Advisory Board represents the highest quality in their respective fields. Their presence in the project will in itself contribute considerably to the attention of the project in the dissemination efforts. They will also take part in conferences arranged by the project.

4: The reference group described under “Organizational plan” will be a forum for planning and performing dissemination on educational development especially for architecture on a national level, involving all three institutions educating architects in Norway: AHO, BAS and NTNU. The National Architects Association NAL will in addition be involved in discussions on relevance and valorization of impact on quality in absorbed graduates in the market.

5: A web-portal will be established for a broad dissemination of R&D and activities.

6: Scientific papers and articles targeted at channels for architecture, HE and trans disciplinary research.

The TransARK centre will be an effective national platform for the following contributions:

- Developing and redefining an old teaching tradition (master - apprentice) in education, so far based on tacit pedagogical knowledge on transformational learning, to a higher level of precision in methodology and practice.
- Dissemination on national and international level as contributions for development of architectural education specifically, but also in a broader sense all relevant Higher Education.
- Establishing international and trans-disciplinary collaboration at top level on research and development of “next – practice” in transformational learning in Higher Education.