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A NEW PROFESSIONAL MASTER IN UNIVERSAL DESIGN IN THE BUILT ENVIRONMENT

CAMILLA RYHL AND ANNE KATHRINE FRANDSEN

Abstract

How can universal design be discussed and developed as an integrated part of architectural quality instead of being regarded as a separate and specialised field of knowledge as is currently the case in the Nordic region? Moreover, how may the development of a professional Masters programme designed specifically for people in practice contribute to the process?

This paper describes the new Master in universal design offered at SBi Aalborg University in Copenhagen and discusses how the Masters programme through its design and focus on challenges and unresolved potential aims at changing the understanding and rhetoric of universal design in the built environment. As the programme is targeted at people with extensive experience of the field, it is also designed to take the investigations to a higher level than the physical solutions. Studies of e.g. phenomenology, perception theory, disability studies, organisational and strategic theories, economics and ethics are included.

Based on the experience gained by the authors from giving the first class in the Masters programme, the paper presents implications and the potential of expanding the understanding of how universal design may be interpreted within the architectural and building professions.

Keywords:
universal design, further education, professional Master, architectural quality, types of knowledge

Background

In 2014 the first class of the Masters programme on universal design and accessibility started at Aalborg University in Copenhagen. The Masters programme was developed as a response to a need for more nuanced, complex and research-based knowledge for individual practitioners in the building sector to draw on as they make decisive decisions related to accessibility and universal design in the built environment. The basis of the programme is the current state of the field being perceived as an isolated issue, regulatory and prescriptive solutions defined by a legislative framework rather than a value-based framework. Through critical thinking and research-based questioning of existing methods and tacit consensus of solutions-based thinking, the Masters programme aims at expanding the students' knowledge base extensively both in width and depth, in order to open up new ways of approaching the solutions-based building process. This includes discussing rhetoric and terminology, definitions of users and user needs, questioning of how to measure and assess "quality" in both architecture and universal design, understanding ethical dilemmas of disability, user representation and equality and approaching collaboration, dissemination and innovation from a much more strategic standpoint. In this paper, the background for establishing the Masters programme will be described, as well as the aim of the Masters programme when it comes to curriculum, format and potential students.

Although Denmark introduced the first few accessibility requirements in the Danish Building Regulations in 1972, it was with *The UN Standard Rules on the equalization of opportunities for persons with disabilities* that accessibility in the built environment was introduced more comprehensively on the agenda in the Nordic region two decades ago. With Norway being the exception, the term used in the Nordic region has been accessibility and Universal Design has only recently been introduced more broadly with the ratification of the *UN Convention on the Rights of Persons with Disabilities* (CRPD).

Following the UN Standard Rules, Denmark enhanced accessibility requirements in the Danish Building Regulations in 1995 and even though revised and further expanded and tightened several times since then, this still marks the year when the building sector was required to accommodate disabled users to a degree which altered the existing design and building culture. The accessibility requirements primarily accommodates wheelchair users and to some degree also the visually impaired (Ryhl, 2009; Frandsen, et al., 2012).

As a result Denmark has witnessed an increase in accessibility requirements and professional accessibility consultants as well as quality assurance systems to ensure accessibility requirements in the individual design projects within design processes, public permit procedures

and building site cultures. Yet the expertise and specialised knowledge appear to lie with a few core "experts" and the field of expertise is often very specific as well as based on experience as opposed to on relevant theory and research data.

Furthermore, focusing only on accessibility in the Danish context has had the result of stigmatising understanding of the problem in question within the design community. Many practitioners perceive *accessibility* as being specialised design solutions targeted specifically at disabled users, and not at a more general user group (Frandsen, et al., 2012; Ryhl, 2013). This notion amongst practitioners is further underlined by accessibility being interpreted as related to physical disabilities and specifically to measurable physical aspects like threshold heights and door widths. Sensory aspects of disability or architecture, such as daylight and acoustic quality, wayfinding or safety is generally rarely perceived as related to accessibility (Ryhl, 2013). Architects and design practitioners generally share this understanding of accessibility with other key actors within the building sector including clients, engineers, landscape architects, building permit officers, builders and contractors.

Today's building process is complex and defined by a legislative as well as cultural framework that, though it follows a general process, is very context specific. The process itself is often quite general, as are the key actors involved, yet most every project is quite context specific and unique in its own framework. Over the past 20 years, the role of the building client has been professionalised and the client-consultant as a process manager and interpreter of the needs and wishes of clients and end-users has emerged. New types of procurement have developed expanded requirements to e.g. energy efficiency, indoor climate and accessibility, a focus on user involvement has created a need for specialist knowledge of various kinds. Today's project teams therefore include numerous experts from many different professions, emphasising the decisive role of interdisciplinary communication and common understanding of both terminology and priorities.

It has been shown in the Danish context that it is not possible to single out one group of actors in the building process as responsible when buildings do not comply with the requirements on accessibility – loss of accessibility occurs within all the links in the building chain. It is primarily caused by lack of communication between key actors as well as lack of broad background knowledge of the rationale behind the specific requirements (e.g. specific and complex user needs, legislative framework, human rights or value-based knowledge) or core knowledge of responsibility amongst the key actors of the project (Frandsen, et al., 2012). Among many things, this points to a need for more knowledge regarding universal design and accessibility as well as interdisciplinary collaboration and problem solving within the key actors in the building process.

When asked, actors within the building sector respond positively to the challenge of designing an inclusive built environment as well as to the ethical values that this responsibility implies. However, when it is concretised in requirements for accessibility, the response is more reserved. For building clients, the reservation is due to an expectation of increased costs. Architects often regard accessibility as design requirements that limit the creative process and demand design compromises that cause frustration. Accessibility is regarded by the general practitioner in the building sector as "add-on" solutions and is rarely thought into the very first steps in the design process, hence often requiring a compromise due to not being part of a holistic approach from the outset (Frandsen, et al., 2012; Ryhl, 2013). It is often perceived as prescriptive, pre-defined, wheelchair based and specific to a minority group as well as very often without being reasonable, and further as an isolated issue to be solved in the same manner as e.g. fire requirements. One accepts the requirements but with a negative stigma and not as an integrated part of architectural quality (Frandsen, et al., 2012; Ryhl, 2013). Our research points out the reason for this appears to be a misunderstanding of the original intentions behind the regulations, a lack of basic understanding of user needs and a failed communication of values and ethics behind the regulations. There is therefore a need for a broad dissemination of the ethical dimension of universal design and accessibility.

The United Nations *Convention on the Rights of Persons with Disabilities* (CRPD) introduced universal design to a Danish context raising a growing awareness and knowledge of the concepts within user organisations as well as amongst practitioners, although it appears that knowledge about the concepts is still very limited. Yet in Denmark, as opposed to Norway[1], there is no other official definition of the concept than the one in the CRPD, still leaving the opportunity to discuss and develop the concept through an informed, practice – as well as research-based process amongst partners of the building sector. However, it also introduces a risk of universal design simply replacing accessibility without changing the perception of the inherent possibilities and interpretations of solutions as well as user understanding imbedded in the two different design concepts.

In this paper the concepts of accessibility and universal design are understood as follows: *Accessibility* describes specific design solutions targeted specifically at disabled users, and primarily solutions covered in building regulations and hence focused on physical impairments with a wheelchair as the basis for dimensioning. Furthermore, there is some focus on visual impairment and to a small degree on hearing impairment, primarily described through TTY requirements (Ryhl, 2009). *Universal design* describes an approach to inclusive design that regards all users seen in a lifetime perspective as potential users, representing complex diversity in user needs. Universal design does not define users as disa-

1 Norway has officially adopted "universell utforming" (universal design) as a key concept in both Government strategy, building regulations and the Discrimination and Accessibility Act amongst other key documents (Ryhl, 2009; 2013).

bled or abled bodied, but takes a holistic approach to user definitions as well as methodology, process and value-based design (Ryhl, 2009).

A few key actors within the specialised field of consultancy on accessibility dominate the field, but the CRPD has focused attention by both the authorities and a growing number of architecture firms wishing to engage in the area and starting to discuss it from a slightly different perspective than only that of "minimum requirements". This results in a growing number of architects and professional consultants beginning to define and develop strategies and interpretations of both accessibility and universal design within their individual firms, often based on very little specific knowledge and/or experience of universal design. This increased interest and dedication within the practice field will very likely change the scene of how we design inclusively in Denmark, but it also points to the need for a higher level of knowledge and skills within the practicing profession.

Why a professional Master in universal design

In the paper "Accessible knowledge – knowledge on accessibility" (Kirkeby, 2015) the use of research-based knowledge about accessibility in architectural practice is studied through interviews with 11 practicing architects. Based on Aristotle's three types of knowledge – *episteme, techne and phronesis* – Kirkeby discusses what kind of knowledge architectural practitioners use. Episteme is the kind of knowledge that is invariable in time like scientific or rule-based knowledge and it is context-independent. Techne and phronesis are context-dependent; techne is a practice-based knowledge of craft and art, a know-how, and phronesis is a practical knowledge that includes ethics and wisdom (Kirkeby, 2015).

The interviewed architects state that in the initial phases of the design process they do not find specific requirements and recommendations useful, whereas concepts or metaphors are more fruitful when developing the design:

> *It was rather enlightening that a practitioner explained how he participated in a seminar on accessibility and had learned more from a philosopher lecturing on the concept of equality than a number of lectures providing specific details* (Kirkeby, 2015, p.539).

And she continues:

> *The architects use concepts like equality and inclusion to define a foothold from which they could structure their design process. Further, the answers made explicit that what originally was a requirement stipulated by law, gradually becomes part of the routines of the office and an ethical yardstick for what was considered as acceptable* (Kirkeby, 2015, p. 539).

This observation is in line with conclusions in other studies of the barriers for designing an inclusive built environment within the Danish building sector. Building clients, architects and contractors express the need for more ethical and value-based knowledge in order to change the rhetoric and stigma connected with accessibility, and to make accessibility a point of departure for discussing quality in the built environment, (Frandsen, et al., 2012).

In order to understand why such conceptual and value-based knowledge is more useful in design processes, Kirkeby uses Kristian Kreiner's term or metaphor, an *Archimedean point*:

> *Kristian Kreiner emphasizes that, in each case, the architect needs to find an approach, an "Archimedean point" which, at the moment, it is chosen, will guide the task solving. In this situation, Kreiner says, thought-provoking knowledge comes in more useful than knowledge pointing to specific solutions* (Kirkeby, 2015, p. 536).

In the design process a principle, concept or metaphor is an important requisite when the numerous and often conflicting needs, specifications and requirements are to be met in an integrated and holistic architectural design.

In case the architectural practitioners prefer to acquaint themselves with this research-based knowledge on accessibility, it appears that they preferred to get it through dialogue with researchers or other qualified persons in the office in connection with a specific and concrete project:

> *They looked for research-based knowledge, but not published via traditional publications, but the knowledge in person. The meeting between scholar and practitioner face to face allows a dialogue about a specific task and they may join each other in "reflection in action" to find a specific solution to a specific task* (Kirkeby, 2015, p. 544).

Here Kirkeby offers not only an understanding of what kind of knowledge the practitioner draws on and in the course of the design process, but also the importance of interdisciplinary dialogue with other experts. An interdisciplinary dialogue that is the core of contemporary building processes (Frandsen, et al., 2012).

Pointing out the importance of the interdisciplinary dialogue, context dependent practice-based knowledge as well as the understanding of the decisive role that the individual knowledge base plays for the Archimedean point, it becomes crucial to investigate and discuss how it is possible to strengthen these elements through further education.

Numerous courses on accessibility and universal design of varied length

and depth have been offered within the building sector over the past decade in Denmark and in the Nordic Region as a whole. Most courses offered are of a shorter duration than the Master and with an emphasis on hard data and solution identification through a focus on interpretation of rules and regulations into practice. Experience and context-specific knowledge constitute the core, but the educational focus is very specific and targeted at known and precisely pre-defined problems and with the goal of defining solutions to the specific problems in question. In that sense the existing courses primarily support the context independent knowledge, that practitioners experience as difficult to use in the initial phases of a design process, and that is most applicable in final planning phases and quality insurance. In contrast, the Master focuses on defining as well as questioning the knowledge base in general, discussing and identifying the unknown knowledge needed to qualify new and innovative ways of approaching solutions, without defining the actual solutions. Hence, the research-based academic and conceptual perspectives of the Masters programme.

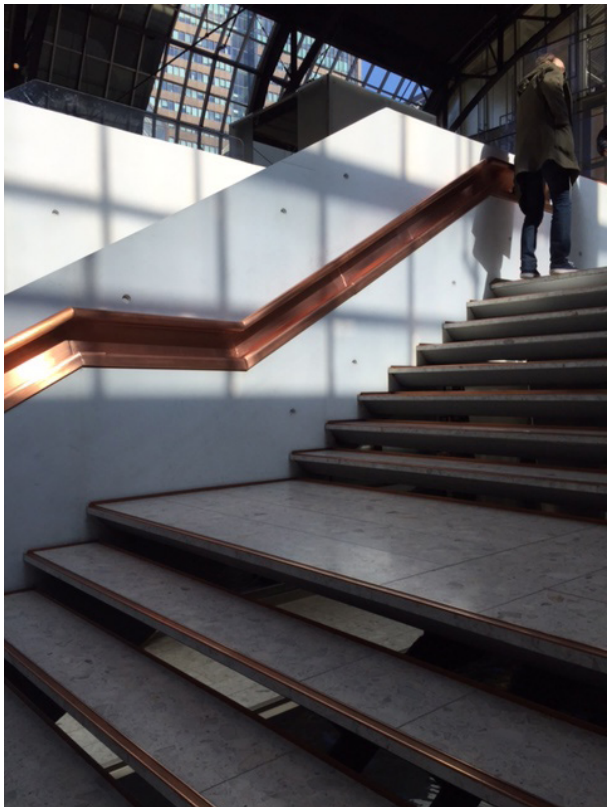
The focus of the shorter courses emphasise the reality of existing knowledge as well as professional dissemination of universal design being limited to issues related to building codes and regulations and, besides a few and unique projects, universal design and accessibility is considered a specialised, non-integrated and often problematic issue. One student at the Master expressed this very clearly in a class session: “I signed up for the Master as I was tired of always having to deal with accessibility way too late in the design process and always ending up having to compromise the project with lesser quality as the outcome”.

Detailed and complex understanding and knowledge of the background, including historic, ethical, human rights as well as value based knowledge, is often non-existing with the individual person involved, regardless of what role the person holds in the building process. In most cases, the individual actor draws on his own experience or intuition or he will ask a colleague (Frandsen, et al., 2012), in both cases often with a fragmented and project-specific decision process as a result and at worst a very random process and outcome.

As mentioned earlier, research has documented that loss of accessibility in the building process occurs in all links and amongst all actors involved and the responsibility for losses and misunderstandings cannot be placed with one specific key actor in the building process. This further point to the importance of discussing and developing accessibility through a universal design approach with a focus on the importance of interdisciplinary knowledge, communication and problem solving. Understanding other professions in the building sector and how they work, prioritize and discuss universal design within their practice may open up the process of discussing and interpreting quality and solutions in a

new perspective. Extending knowledge and understanding of other professions than one's own also include fields of knowledge that traditionally lies outside the building industry. This challenge, the Masters programme tries to address in two ways: Firstly, the programme is targeted at all professional actors in the building process, aiming at establishing a cross disciplinary discussion in the classroom. Secondly, the curriculum includes aspects of socio-economics, sociology, social sustainability, CSR, strategic thinking, policy development, ethical dimensions of user representation and disability studies that are not traditionally included in the building or design processes, yet all share common denominators with accessibility and universal design. The students in the Masters programme are quite representative of this reality and in spite of their individual extensive experience as specialists in accessibility, their knowledge and understanding of other aspects of the wider knowledge field are minimal. Exploring common rhetoric and inherent professional overlaps may be a key to developing new arguments, new rhetoric and new knowledge to be used in defining new approaches to innovative problem solving within the field of accessibility and universal design.

Figures 1 and 2
It is an essential part of the Masters programme to study in practice what we discuss in theory. Hence, the programme includes an international study trip, in this case to Oslo, where the students visited numerous examples of contemporary architecture. To the left, Oslo Central Station, to the right, the new addition to the architecture museum by Sverre Fehn.
PHOTOS BY CAMILLA RYHL



Redefining the field of knowledge – structure and focus of the Masters programme

Acknowledging the realities and challenges described in the previous section of the paper, SBi AAU (Danish Building Research Institute, Aalborg University) developed an accredited academic Master in universal design and accessibility, starting February 2014. The Masters programme is specifically aimed at professionals in the building sector already holding a Bachelor or Master's degree and hence offering a specialised degree to compliment the first one. It is also a requirement to potential students that they hold a minimum of 2 years of relevant work experience and the programme is planned as part time so it is possible to combine work practice with the academic Masters programme. The programme is research based and offered only at Aalborg University's Copenhagen campus. Furthermore the programme has a Nordic focus and is not restricted to a Danish context as it aims at consistently including both Nordic and international aspects.

The curriculum is structured in 8 modules, covering different themes. Each module results in one or more written projects, primarily solved in groups based on the Aalborg model of Problem Based Learning (PLB). One half of the models is assessed a by a graded oral exam; the other half is assessed through a written project and pass/no pass. All module assessments are conducted by the 2 principal professors and an exterior assessor.

Each module comprises extensive reading related to the theme and 5–8 full days in-class sessions depending on the number of ECTS. Class sessions are based on lectures by the professors as well as national and international experts offering either lectures or workshops. Furthermore, in-class assignments, discussions, exercises and on-site study trips are basic elements to class sessions. The Masters programme also includes an international study trip to Norway.

Semester	Module	ECTS	Focus
	Introduction	5	Background, history, UN and disability rights, related fields of knowledge, sociology and disability studies
1	Body and space	10	Architecture theory, phenomenology and perception theory, physiology, sensory, cognitive and physical abilities, user understanding
	Universal design in practice	5	Case analysis, on-site, building typology, design process
2	Strategy and implementation	10	Policy work and implementation, strategic planning, organisational and communication theory
	Investment and cost	5	Economics, theory on investment, CSR, sustainability and cost-benefit
	Ethics and universal design	5	Ethical dilemmas and theory, disability studies, public space and the Norwegian Model
3	Quality assurance- and method	5	Theory on quality, checklist analysis, case studies, technology/assistive technology
4	Individual Master thesis	15	Individual choice of subject

Figure 3
The Masters programme structure

One of the overall academic goals of the Masters programme is to raise the students' ability to question their own practice, inherent methods and thinking as well as strengthen their critical thinking about tacit unquestioned "truths" within the existing field of accessibility and universal design. This is attempted in several ways within the programme and through a combination of exercises and methods. We will present and discuss two different examples of the approach used in the Masters programme.

Understanding user needs: methodology and ethical dilemmas

User needs represent a wide range of differences, even within one specific type of impairment. The nuances are rich and complex, and sometimes opposites. Parallel to this complexity are the various, and sometimes opposite, requirements needed to be taken into consideration in a building process related to other themes e.g. fire or energy consumption. Accessibility requirements are just one of many sets of requirements. Hence, most practitioners rely on building codes, standards and guidelines to inform them of the basic needs to be considered.

The students in the Masters programme represent a wide range of actors in the building process and at the start of the programme, they all generally perceived their own user-needs knowledge as extensive and sufficient. They had never questioned their methods for acquiring knowledge of user needs; almost all had been through a "try-it-yourself"[2] exercise and felt that the experience gave them a higher level of knowledge and empathy than that of the average practitioner who had not been through the exercise.

2 Try-it-yourself exercise is the commonly used term for an exercise where the participants for a short period (generally 10–40 minutes) try maneuvering through a designated route in an existing built environment using a wheelchair or a white cane while blindfolded. The exercise often includes an activity such as having a meal and the participants are divided into groups where they are to assist each other along the way, take turns in trying the different assistive technology and together assess the experience when the tour has ended.

In the Nordic context, the method of "try-it-yourself" is used extensively when issues of accessibility and universal design are being introduced to practicing architects, architecture students as well as politicians and stakeholders. The exercise is relatively manageable concerning time, space and equipment and is often well received by the participants who generally describe the experience as resulting in a "wauw! effect" for them personally. Yet, the method is also criticised from an ethical point of view, critics arguing that the exercise increases the risk of pity towards the actual users of wheelchairs and white canes as well as pointing to other methods ensuring a more realistic knowledge of user needs as outcome. This being e.g. "walk-together-with-a-wheelchair-user" where the barriers that are met are the same, but the observations of what the user is capable and not capable of in the wheelchair is more realistic.

In the Masters programme, we aim at increasing the student's critical thinking in regard to what method they use when seeking knowledge about user needs and what the ethical dimension of the specific methods is as well as the extent of knowledge about specific user needs that they acquire through the different methods. Hence, we critically discuss and study the nuances of user needs as well as ethics and outcome of the various methods for user involvement and expert roles throughout the programme. The issue is first introduced in Module 1 and further studied specifically in Modules 2, 3, 4 and 6.

In Module 2, we introduce 3 different exercises for the students to conduct, analyse, discuss and reflect upon in relation to their own practice as well as implications for the design process. The overall assignment results in a written report consisting of two tasks:

1. To critically reflect on and discuss differences in ways of collecting knowledge about user needs.
2. To collect extensive and detailed knowledge about user needs related to a specific impairment, e.g. visual impairment.

First, the students are paired in groups with disabled users representing the Danish organisation *Youth with Disability* (SUMH) in smaller groups. The disabled guests represent different impairments. First they are given time to talk with and interview the guests about their disability, their life and their needs. Afterwards they walk together through a designated route (indoors and outdoors) both registering and discussing experiences and observations while on the tour. The tour also includes having a meal.

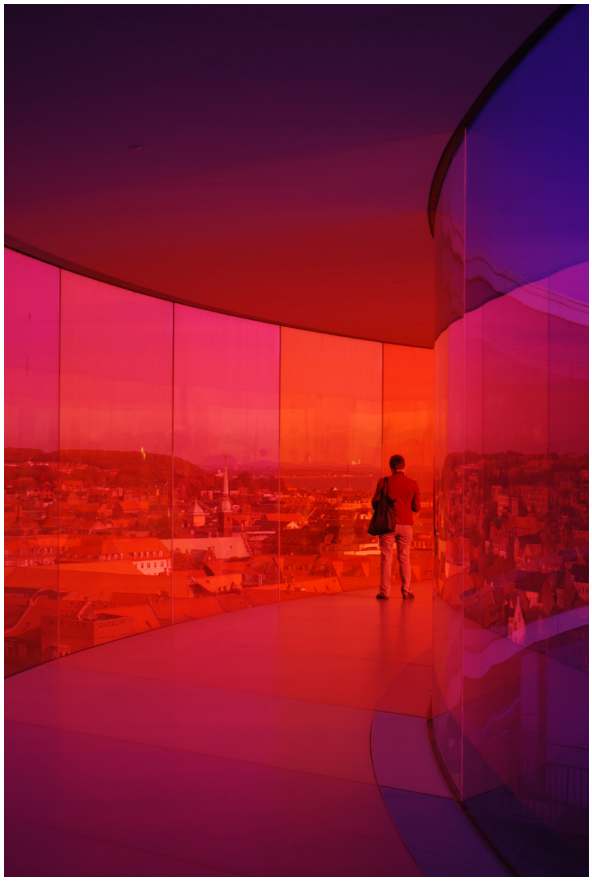
After spending 4 hours together, the groups present their observations and discussion for each other.

The next exercise is a classic "try-it-yourself" in a public building, where the students, again in groups, take turns using the wheelchair, blindfolded with white cane and headphones, respectfully imitating physical, visual and hearing impairments. The groups again follow a designated route that includes a meal. They spend 3–4 hours at their own pace and they again register and discuss their experience and observations along the way.

The last exercise in the process is to conduct an accessibility assessment of an existing public building with a specific focus on user needs, which each group has studied more extensively, e.g. visual impairment. The assessment consists of two tasks; a) to assess the building through the identified user needs of the impairment being studied, and b) to assess the relevant building requirements through the identified user needs, does the building accommodate the user needs that the group has identified.

Supplementing the practical exercises, the students are also reading critical literature on methods on how collect knowledge of the user, ethical dimensions of user involvement and expert roles, architectural quality and architectural elements of universal design as well as specific knowledge of the various impairments being studied. The assignment was solved over a period of 10 weeks.

The aim of the assignment was to make the students discuss both methods and level of knowledge of user needs from a much more critical and reflective point of view, with regard to ethical aspects as well as architectural quality. With a combination of practical exercises, numerous and different meetings with disabled users in different settings and extensive readings of critical literature it was the objective to create a new framework for their professional thinking and thereby establish an opening to new realisations as well as a new way of discussing the issues at stake.



Figures 4 and 5
In the Masters programme we also study the understanding of accessible architecture and user definitions through exiting cases. Here to the left, Aros Art Museum, Aarhus, Denmark as an example of sensory qualities and universal design. To the right, Ed Roberts Campus, Berkeley, USA, as an example of size and scale of users.
PHOTOS BY CAMILLA RYHL

New approaches: working strategically with implementation of universal design

Another theme discussed continuously as well as in depth throughout the Masters programme is how to work strategically with implementing, disseminating and developing universal design in the building sector.

Again the current students in the programme are quite representative of the documented reality (Frandsen, et al., 2012; Ryhl, 2013) that key actors in the building process tend to focus on their individual part of the building chain. As a whole, the collective of key actors equally rarely tend to relate to the landscape of surrounding fields of knowledge and expertise outside the building sector. Hence the accessibility approach is often quite fragmented, at times randomly and mostly unrelated to other significant processes related to other professional agendas, such as e.g. policy development, democratic user involvement or gerontology. The students in the current programme exemplify this tendency by being very focused on the accessibility agenda, but in some cases being almost unable to relate the agenda to other parallel agendas, in some cases even to building sector agendas such as fire or energy consumption. For all the students, it is also clear that relating their own accessibility focus to a need for more knowledge relating to policy-making or strategic thinking and collaboration is everything but obvious to them.

They are initially sceptical and reluctant to study and analysing implementation of universal design through theory on strategy in action, and it is incredibly difficult for them to change their critical reflection and thinking from a practical and concrete level to a more abstract level of connecting universal design to issues of political, strategic and policy development processes. Their comfort zone lies in the concrete solution-based thinking and the Masters programme pushes them into a more abstract, complex and question-based thinking.

Based on a given case, they are to work in groups analysing and discussing the strategic implementation of an existing accessibility policy in a specific Danish municipality. As a supplement, the given case also includes an existing building that they may use, if needed, to exemplify or qualify their analysis. However, the building is not the case, but the accessibility policy of the municipality is the case that they need to analyse.

Yet, all groups emphasised the difficulties of making the shift from concrete solution-based thinking to more abstract question-based thinking as throughout the 12-week long process they all tended to focus on what they knew best: a thorough and detailed case analysis of the existing building. The theme of strategic implementation of universal design was studied most in depth in Module 4, but is not constricted to the module. Like the themes of ethics and user needs, it consistently appears as a red thread through all the modules, only being understood and included in the learning process in an increasingly nuanced manner as the reflections and discussions continue to reflect the impact of the Masters programme in each individual student.

Furthermore, the process demonstrated an inherent culture of searching for solutions rather than searching for questions or new knowledge with the aim of qualifying new questions. This points to a key finding through the Masters programme; the potential of combining the solution focused practitioner with the question-focused researcher and merging their efforts in synergy in order to establish a more complex knowledge base to draw on in the Archimedean point of the design and building process they are involved in through their daily practice.

Figures 6 and 7
Expanding the interpretation of universal design through examples of sensory qualities in architecture. Here Therme Valz in Switzerland by Peter Zumthor.
PHOTOS BY CAMILLA RYHL

Perspectives raised through the Master in universal design

Through the first class of the Masters programme and the deliberate focus on defining as well as questioning the knowledge base in general, several themes were found to be highly relevant to develop further. In order to challenge the common perception of universal design/accessibility being equal to minimum requirements in the building regulations, it is decisive to challenge the definition of who the users of universal design and accessibility in reality are. The academic and theoretical understanding of the differences between the two concepts does not seem to have been communicated effectively to practitioners; hence, the students of the Masters programme are valid representatives of the reality when at the outset of the Masters programme they generally understood "users" as being limited to people with disabilities.

In spite of most of them having extensive experience as consultants and practitioners in the building sector, their understanding of users was mainly limited to classic disability stigma. Moreover, within the framework of disability the majority of their knowledge and definitions in reality focused on wheelchair users and visually impaired users. This is in line with the general perception of user definitions within the building sector as well as the general population. The students did not differ. It is the hope that the group of Master students after graduation, their general understanding of who the users are has changed dramatically as well

as their knowledge of user needs, which has become remarkably more complex and based on systematic documentation rather than random myths and stigma.

This leads not only to new definitions of users and user needs, but also to a new and more critical approach to the concept of "quality". Whereas the students mainly understood quality as "complying with building regulations" at the outset of the Masters programme, their discussions and assessment of quality was considerably more varied, context dependent and critical at this point. In the process of re-defining the terminology related to universal design and quality, it also becomes clear that with an extended knowledge base follows an increase in the ability to define questions rather than solutions. Which further points out the need for new methods and rhetoric in the design process, whether it is individual or interdisciplinary?

The students further demonstrate how the interdisciplinary building process is based on highly specialised consultants/practitioners with at times very little knowledge of related fields of expertise. The students all had extensive knowledge of standards and building regulations related to accessibility and universal design at the outset of the Master, yet they knew hardly anything about socio-economic, strategic, ethical or legal (human rights) discussions or dilemmas related to their own field. Their knowledge was remarkably narrow and specific, and as such, they were representative of the general culture of highly specialized consultants. Yet, their process of expanding their individual knowledge base also demonstrates the potential for developing universal design as an integrated part of architectural quality. In the process, they have to abolish their set ways of working, thinking and debating the theme and have to redefine their own rhetoric and methods, and as a result defining new approaches and opportunities that they were unable to recognise before. As such, the Master works as the off set for thought-provoking new ideas that may alter the decisions they make and their ways of making them, as they find themselves at the *Archimedean point*.

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