Usefulness in architecture
accessibility, inclusion and usability
as spatial sensory experiences

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Abstract. The modern ageing process implies an improved fit between the human being and architecture. It has to be harmonized with both qualitative and quantitative requirements in order to create a space that is accessible, inclusive and usable for everyone, regardless of cognitive or physical disabilities. This study focuses on a continuing education course at the Royal Institute of Technology, KTH, which aimed at expanding teaching on accessibility, inclusion and usability. The course attracted eight professionals, seven women and one man. Two were trained architects, while the others had clerical professions. During seven five sessions, including study visits, lectures, and literature seminars the concept of 'experienced space' was addressed in order to assess 'usefulness in architecture.' Four examples of built environment highlighted spatial elements that promoted accessibility, inclusiveness, sustainability and usability of the building. The literature included three works, on universal design, on wayfinding, and a fictional work, in which spatial thinking is part of the plot. Seven out of eight participants fulfilled an essay or an oral presentation on the mentioned aspects. This study suggests that accessibility, usability and inclusion are spatial constituents that need to be activated on a personal level by the individual designer.

Keywords. Architecture, accessibility, usability, inclusiveness, sustainability

Introduction

In Sweden, the proportion of senior citizens is approximately 19.0 per cent (Statistics Sweden, 2013). For the majority of people with silver hair, the transition into retirement will take place under auspice conditions and with good health. With high age follows a risk of developing an age-related and long-term health problem. Thus, the ageing society implies an increased concern for health-care services, but also measures that increase the level of accessibility and usability in architecture and urban environment, so that an age-friendly and inclusive welfare society can be created. This concerns real estate owners, but also the architecture profession and building entrepreneurs, since these groups implement and physically realize the national welfare goals in this field.

However, in 2001, the School of Architecture at the Royal Institute of Technology, KTH, SAKTH, in Stockholm refrained from participating in the Universal Design Education Project – Sweden, UDEP-S [1] that would involve five other design educational programmes (architecture, industrial design, and landscape architecture).

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1. Universal Design Education Project – Sweden, UDEP-S

The aim of the project was to promote “a considerable step forward concerning the attention to accessibility, inclusion and usability in the training of future designers and architects” [2]. The declination of the School of Architecture, KTH, was not premeditated, rather a consequence of internal organizational problems and a late proposal from the Swedish Association of Persons with Neurological Disabilities, NHR. The interviews with the responsible body for the training of students in architecture at the school suggest the firm belief that this project would not promote a deeper understanding of how to create an accessible, inclusive and usable architecture and built environment. The SAKTH implements a studio-based teaching in architecture, during which various aspects of architectural concerns, constructive approaches and programming requirements are explored in the context of a building assignment task, for each year gradually more complex and time-consuming. After a final Diploma degree project, the student will receive a master’s degree in architecture [3].

The individual student’s knowledge of an accessible, inclusive and usable architecture is subjected to this learning principle, often combined with the study of the Swedish building code [4]. The building legislation does not contain a detailed definition of any of the three concepts. Rather, the legal text promotes an understanding of accessibility and usability as a twin concept [4]. Given the closeness to other semantic derivations of the stem words access and use, these concepts become even more imprecise, making accessibility into a seemingly more important aspect than usability: accessibility with 93 incidents, while usability only 41 incidents, however, both referring to other concerns for the built environment than barrier-free architecture. The concept of inclusion is described as “appropriate living conditions, viewed from a societal standpoint, in an environment that is accessible and usable for all citizens” [5]. The semantic use suggests that issues of an accessible, inclusive and usable nature might assume a physical and technical reasoning. This reasoning revolves around barriers, levels and obstacles rather than perceptual qualities that would underpin a comprehensive and cognitive understanding of a particular architectural space.

Additional literature about accessibility, inclusion and usability exists, often adjusted to the architecture profession with illustrated guidelines, but with a technical approach [6]. The prioritization of measurable facts over perceptual qualities can be seen as a heritage of the functionalist movement, which experienced a golden age in architecture from the Stockholm exposition in 1930 till the mid 1970s. By then, the public reaction to the national Million Housing programme, mainly realized as large-scale suburbs, became hostile towards architects and physical planners [7]. It could also represent the present trend in real estate management to view accessibility and usability as ad hoc adjustments, easily removable obstacles that may be hooked on to the new or refurbished building, instead of being an integrated component of architecture [8].

1.1. Outcome of the UDEP-S project

The UDEP-S project ended in 2004, with some 75 student projects that explored artefactual equipments and objects as well as architectural space [9]. The project

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2 In Swedish: “En från social synpunkt god livsmiljö som är tillgänglig och användbar för alla samhällsgrupper (…) PBL Chapter 2, clause 3, 2nd article.

3 In Swedish: “enkelt avhjälpta hinder”
concluded that a model for increasing awareness about accessibility, inclusion and usability would be a so-called FUSF education of architects and industrial designers: Facts about disability problems; Understanding of the implication of various disability problems for different everyday activities; Skills for solving misfits between individual disability problems and the requirements of the built environment; and Familiarity with the problem area in order to promote a continuous training in solving such problems (Ibid). A randomized comparison of student diploma projects, from the period of 2006 to 2012, with a particular focus on residential care homes for older persons with cognitive disorders or dementia produced at the Chalmers Technological University, CTH, participant in the project, with similar projects of the SAKTH, suggests that:

1. Accessibility is mainly understood as person who uses a wheelchair, which is graphically illustrated with a circle of a 1.5 meter diameter in a particular type of space (bathroom, hallways, and kitchen);
2. Accessibility and usability are seen as two-dimensional and physical requirements (ramp ways, stairs, passages);
3. Perceptual phenomena (dazzling day-light penetration, glare, reverberation, or illogical spatial connections) that might affect the cognitive understanding of the architectural space are omitted;
4. Architectural space is presented in three-dimensional views that illustrate aesthetical qualities rather than accessible, inclusive or useable aspects;
5. A person with disabilities and his/her particular panorama of needs due to a cognitive or functional problem or age-related problem are invisible.

1.2. Research problem

From an educational point of view, little indicates that the FUSF approach has promoted a profound difference in students’ understanding of accessibility, inclusion and usability. This suggests that other means are necessary in order to promote architecture students’ understanding of accessibility, inclusion and usability: expressed as policies that assume a socio-political view on the built environment in order to inhibit social discrimination based upon barriers found in the built environment. Instead of a technical approach, the sensory aspects in architecture can be explored in order to create a supportive environment [10]. This focus forwards the experience of space, the lived-space [11], which could be aligned with the American concept of Universal design [12], or as it is mostly known in the European countries, Design for all.

2. Methodology

This study uses case study methodology [13, 14]. It closely describes the unfolding of the curriculum of the continued education course “Architecture for all, accessibility, inclusion and usability,” 7.5 academic points, realized at the School of Architecture, KTH, the fall 2012. The research material was accumulated during the course: assessment protocols, individual assignments, notes from seminars and questions on lectures. The assessment protocols were based on a mixed method approach that combined qualitative assessments with quantitative ratings [15]. The course attracted

4 The course presentation can be found at the webpage, see link: www.kth.se/fortbildningskurser.
eight participants, seven women and one man. Their professional background covered administrative and educational professions, and one person was a trained architect. The participants’ average age was 60 years.

**Exterior 1: the building and townscape**

**Interior 1: the train station**

**Exterior 2: the courtyard**

**Interior 2: the shopping mall**

Figure 1. The four built spaces that the course participants evaluated by use of the assessment protocol.

### 3. Results

Like most continued education courses, the course opened with a session at the School of Architecture, KTH, with a short presentation of the curriculum. Coinciding with a conference on eldercare and appropriate housing for frail older people, arranged by the head of the course, the participants were invited to participate in this conference. If choosing this particular focus of interest for the individual assignment, the conference fee and their travel expenses could be covered.\(^5\)

The course title contained the key concepts of this thinking, accessibility, inclusion and usability (English and Swedish). The course was intended as a type of interactive

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\(^5\) This was the conference “Framtidens äldreomsorg i världen” [Future-oriented eldercare with a worldwide perspective], arranged at the residential care home Vigs Ängar, Ystad, Sweden on September 27\(^{th}\), 2012 under royal patronage of HMS Queen Silvia. The seminar was a joint-venture between the operator of the residential care home and the School of Architecture, Royal Institute of Technology, KTH, Stockholm, sponsored by the Swedish Board for Social Welfare and Health, the research foundation FAS, and the research foundation Vårdal.
education, in which short lectures were mixed with literature and seminar discussions and study visits to four types of built environment.

3.1 The curriculum

The course counted six five-hour long combined lecture-seminar-excursions that included assessing four types of built environment. Four types of built environment were used for study visits. The study visits introduced sessions 1, 2, 3 and 4, and preceded the subsequent lecture on the special topic for the session. Three of the environments were built space, of which one was assessed from the outside (SAKTH) and two from the inside (the train station and the shopping mall), see Figure 1. The fourth environment was an interior courtyard with a pleasing composition architectural elements, greenery and materiality.

An assessment protocol was specially developed in order to assess the four types of built environment that were chosen for the course. The ultimate aim with the assessment protocol was to highlight the sensory sensation of architectural space and to suppress the aesthetical assessment of the particular architecture. The students were asked to evaluate their experience of the particular space by use of a five graded scale: 1 indicating a poor level and 5 a high level, similar to the TESS-NH instrument for nursing homes [16]. In addition, the participants were asked to supply personal comments on the building. The protocol forwarded the five primary human senses (hearing, vision, smell, kinetics, thermo sensitivity). The participants were asked to assess the built environment in terms of (a) acoustic climate; (b) performative capacity/ functionality; (c) kinetic impression; (d) thermal sensation; (e) olfactory stimulation; and (f) visual impact

3.2 The seminar sessions

During the first session, it became evident that none of the participants had chosen the course out of a particular interest for accessibility, inclusion or usability. It was a case of confusion, motivated by their strict focus on the word ‘architecture.’ The common belief was that the course would define the essence of appropriate architecture, mainly from an architectural and artistic approach. The participants found the particular design-for-all angle on architecture strange. In consequence, the first session generated some disappointment and the course literature was met with hesitant comments.

The second session introduced the design-for-all/ universal-design concept in detail from the particular angle of older people. In line with the initial hesitation, the participants maintained a sceptic approach, finding it hard to combine the design concept and the angle of ageing with the traditional understanding of architecture. The third session introduced spatial clues as means to improve human wayfinding. This theme was met with some recognition by the participants, since the literature supplied a theoretical basis for reasoning about signage and space. The fourth session focused on various surfaces and angles in the indoor and outdoor environment, and their impact on older people’s physical health. By now, the participants were comfortable with the subject, and pertinent questions were addressed to the invited lecturers [17].

The fifth session introduced architecture competitions, which, during the 20th century, have been used as socio-political programming instrument of architecture for older people in view of an up-coming social reform of eldercare [18]. Most of the participants found the topic familiar, having had followed other courses in which the
relationship between architecture and architecture competition had been presented. The sixth session included a visit to the Swedish Institute for Assistive Technology, SIAT, where the participants were introduced to the institute’s work. They had also the opportunity to test assistive equipments, mostly wheel chairs of varying sophistication.

3.3. The literature

The literature seminars followed after lectures and the study visits. The course contained additional literature that was aligned with the themes for the lectures and to explain particular theories. The course ended with in individual task that could be realized as an oral presentation or short paper. The mandatory literature was (1) Steinfeld, E.; Maisel, J. L., 2012: *Universal design* [12]; (2) Arthur, P.; Passini, R, 2002: *Wayfinding: people, signs, and architecture*. [19], and (3) Perec, G., 1978: *Life: A User’s Manual* [20].

The fact that most of the participants had chosen the course with the belief that it would deal with aesthetics and architecture, made the reception of the literature negative. The first work (1) was met with mixed feelings, some of the participants finding it very inspiring and useful. Other thought that the book spanned over a too vast territory of topics with poor relevance for architecture. Still, the book opened a discussion on how to arrive at an accessible, inclusive, and usable environment. The second work (2) attracted most interest from the participants, since it supplied a theoretical approach for understanding human interaction with the built environment. The fictional work (3) was found difficult, and the participants focused on the personalities and their encounters, rather than on the spatial backdrop. The English, French and the Swedish versions contained a vertical elevation of the building, in which the fictional characters were sorted according to floor level. This material counteracted the intended training in spatial thinking: At the fifth session, a major break-through materialized, when one participant, an architect, presented a three-dimensional model, based on internet searches and Google Earth controls, see Figure 2.

![Figure 2](image.png)

*Figure 2.* A participant’s understanding of the building in Perec’s book, with names of characters (illegible).

3.4 The assessment of four types of built environment

All of the participants realized the four assessments of different built space, see Figure 3, but they were hesitant in submitting their protocols. Various reasons for postponing the submission were constructed; the most recurrent motive was the need of transcribing the protocol due to a claimed illegible handwriting. The first exterior built
space to assess was the SAKTH building. The participants were asked to find the most convenient place for placing an entrance for the pentagon shaped building. Most of the participants remained in front of the building, where the entrance is situated, but three other locations where suggested. At the train station, the first interior space, the participants found the pattern in the floor tiling to be the most important architectural element for finding their way to the trains. This pattern emphasized the necessary movement to execute in order to reach the trains. The interior courtyard, the second exterior space, overwhelmed the participants with its architectural elements, greenery, and different levels in order to overcome the steep downhill terrain. In the second interior space, the participants found the interior staging of sales products in the passages of the shopping mall more important as wayfinding cues than the mandatory signage, installed near the ceiling.

![Figure 3. The assessment protocols assembled and converted into a staple diagramme.](image)

3.5. The individual assignment

The realization of the individual assignment was prepared during approximately four weeks, during which the participants could contact the two persons in charge of the course, either the author of this paper, acting as coordinator and assistant professor, or the examiner of the course. Six out of eight participants submitted the individual assignment: Two participants wrote short papers. The papers dealt with accessibility, inclusion and usability in a three-dimensional perspective:

a. Wayfinding to primary health centers, which, given the focus on competition in public tendering process, has become increasingly difficult: off-side locations or by subdividing existing buildings with new entrances.

b. Accessibility and usability issues in relation to the design of entrances to newly developed housing areas in the Stockholm area. This comparative study

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6 Due to unrealized plans for the metro, the ground floor is elevated, accessible by a stair or a ramp.

7 This station is in functionalist architecture, with a classicistic influence in the limestone flooring that stages the movement from the outside at the ground floor level to the trains at the second floor level.
on regulations and recommendations and the actual outcome suggests a rift between the theoretical inclusion in drawings and the built realizations.

Four participants prepared presentations supported by a PowerPoint presentation. Three presentations focused on architectural problems, one building-related, two referring to landscape planning. The building-related presentation investigated requirements for a new type of housing for older people, an intermediary form of housing for older persons in search of a perceptually higher degree of safety and security thanks to communal services and day-time staff. Due to the type of real estate developer of the housing, private developers have a wider array of services, while the municipal developers supply a minimum service.

The first presentation on outdoor environment revealed that regular maintenance of the outdoor environment may result in a less adequate level of accessibility and usability that will counteract older people’s access and use of green areas: inclusion is inhibited. This discrepancy lies in the circumstance that the theoretical planning documents due to tendering processes become advisory not mandatory. The second presentation complemented the former, but pointed out that most Swedish residential care homes have an outdoor environment that is not suited to the needs of the residents. The fourth presentation suggested that universal-design-thinking could harmonize ongoing frictions between residents in older residential areas from before the 1970s, and residents in more recent ones, realized as part of the suburban development around the larger Stockholm area. This presentation made use of the more subtle items of the list of universal design goals to fulfill (wellness, social integration, personalization, cultural appropriateness).

4. Discussion

This study has presented experiences from a continued education course that had the particular aim of exploring alternative methods in order to highlight the importance of creating an accessible, inclusive and usable architecture and built environment. In order to go beyond mere physical requirements and applying a holistic approach to the matters, the lived-space [11], the phenomenological topos analysis [21], or the individual spatial experience was forwarded. Given the varying age of the course participants, some being more mature than the average architecture student, often in his or her twenties, and of other professions than the architect, only preliminary conclusions can be formulated on this case, and further research is necessary on the matter.

The assessment protocol forwarded the perceived sensory impact of the particular architectural space. This suggests that the human physiological approach for analyzing architecture could be a way of increasing the individual understanding of accessibility, inclusion and usability as three-dimensional aspects. This is in line with other research [10, 22]. The course assessments suggest that the acoustic effect of the architectural space is almost as powerful as the visual. They also suggest that the intended use of the particular building will influence the evaluator’s focus of interest. Hence, the train station triggered a particular focus on wayfinding: how to move about in the built environment and find the correct platform for a specific train departure. The other examples were associated with what was already colloquially known for being the main characteristic of the particular space: the SAKTH building being widely known.
for difficult to enter and not encouraging to do so; the interior courtyard of the KTH demanding a lot of attention for crossing due to uneven surface, but a sensuous place to explore; and the shopping mall being a recent attempt to overcome the deficits of the original shopping mall, an infill project of 1970s in an area with architecture of the late 19th century.

The course literature suggests that spatial thinking might be promoted by fictional literature that uses an architectural backdrop. However, literature that supplied a theory for understanding the human interaction with architectural space was acclaimed. The potpourri of course literature and different built spaces can be related to a personal angle for the individual assignment. The difference in liking correlates with different foci of interests that can be found in design professions and other professional skills; the former prioritizing perceptual qualities, while the latter focusing on associative aspects of the reading [23]. The individual assignments confirmed the dominance of an open definition of the concepts of accessibility, inclusion and usability. These encapsulated a broad range of phenomena, active on a direct or indirect level in the built environment. The participants’ choices suggest that this openness forwarded a need for a structural framework in order to make the concepts applicable to architecture. This tendency suggests that an umbrella concept for accessibility, inclusion and usability could be of necessity in order to increase a general understanding. With reference to classical architectural theory and the participants’ assignments, this umbrella concept tends to revolve around a holistic quality in architecture. It could be termed usefulness that through the aesthetical and sustainable aspect in architecture promote or inhibit the individual experience of the architectural space [24].

4.1. Conclusion

This study on a single continued education course on accessibility, inclusion and usability suggests that a mixed approach that forwards the individual spatial experience of architecture is an asset to develop further in order to expand the understanding of the concepts of accessibility, inclusion and usability among young architecture students and other design professions. Architectural education requires an assessment-based approach, so that an AFUSF understanding of accessibility, inclusion and usability occurs:

Continuing Assessments of built environment in use with regard to accessibility, inclusion and usability with a focus on human spatial experiences with a sensory dimension; Facts about disability problems; Understanding of the implication of various disability problems for different everyday activities; Skills for solving misfits between individual disability problems and the requirements of the built environment; and Familiarity with the problem area in order to promote a continuous training in solving such problems [9].

With such an approach, the meaning of accessibility, inclusion and usability expands from being physical requirements of the building legislation, of interest in the programming of future buildings, into becoming a holistic evaluation of the possible level of interaction between the human being and the envisioned architectural framework that the particular architectural design offers. This is a combined qualitative and quantitative assessment: the perceived usefulness in human-centred architectural design.
References


