UNIVERSAL DESIGN

17 Ways of Thinking and Teaching

Edited by Jon Christophersen

1. utgave 2002

Opplag: 3000
Trykk: Haslum Grafiske
Bokbinderi: Bokbinderiet Johnsen as
Grafisk produksjon: PrePress as
Omslag layout: Geoffrey Kempton

ISBN: 82-90122-05-5

HB: 7.F.34 E

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Foreword

During the last four years, The Norwegian State Housing Bank has co-ordinated a systematic effort targeting Norwegian schools and universities in the form of the "Universal design of housing, buildings and the external environment" project.

Universal Design became a relevant theme in social development during the course of the 1990s. Pioneers in the USA, Europe and Japan accumulated information and developed various methods of teaching. This collection of articles was assembled as part of the Norwegian initiative to put Universal Design onto the agenda.

In line with the Norwegian objective that everyone should be given the opportunity to live in a good residential environment, the Norwegian State Housing Bank believes it is important to stimulate the development and dissemination of useful social information, particularly among the future players in the housing and building sector. Architect Jon Christophersen, *Byggforsk* (the Norwegian Building Research Institute) was commissioned by the Norwegian State Housing Bank to gather articles that would provide an insight into the principles of Universal Design and how it is taught in various countries.

The articles will be of interest to everyone who works with physical design of the constructed environment, either within the sector or in a related educational context.

We hope this collection of articles will provide inspiration to those who are working to develop an inclusive society.

Oslo, April 2002

Geir Barvik
Managing director

Introduction by the Editor

This volume has come about as an appendix to the main universal design education project run by the Norwegian State Housing Bank. The project, which is presented in chapter 1.1, provides schools and universities with incentives and ideas to set up universal design courses. The aim is that by the end of the project period, universal design will be an integral part of the curriculum in most Norwegian schools and universities that educate architects, planners, designers, engineers, occupational therapists and craftsmen. The objective is to familiarize anybody involved with shaping the built environment with the concept of universal design.

The starting point for this book is that universal design has become a worldwide movement, and, as universal design courses can be found in universities all over the world, educators will be interested to see how universal design is being taught in various places. The intention is not to provide a comprehensive survey - that would require a substantial volume indeed - but to show and possibly document that the subject is being taught all over the world, and that there is both diversity and strong similarities in approaches to teaching, the content of the courses and the teaching methods. In order to limit the scope, the articles only deal with education at the university level. To some extent, the book complements Ostroff/Preiser's "Universal Design Handbook" and the "Strategies for Teaching Universal Design" by Polly Welch.

Apart from South America and Africa, universities in most parts of the world are represented. It might be noted, however, that for various reasons it has not been possible to include articles from China, Korea or countries in the south or east of Europe. Again, the argument is that the intention is to provide examples of present teaching in the field rather than being comprehensive. On the other hand, the contributors include several of the dominating and best-known personalities in the field at present.

Some attempts at covering a variety of academic fields have been made, but this has been less successful than the aim for

geographical dispersion. Thus, design and architecture dominate the book. Ideally, engineering subjects and planning should have played a larger part, but it proved impossible to find a sufficient number of available contributors who could present articles on these subjects to achieve a balance with architecture and design. There is some logic to this: Having coined the universal design concept, designers have managed to achieve a certain amount of tradition, while architects, working from the basic notions of functionality, easily see how the concept is applicable and relevant to them.

Respecting and allowing for the diversity involved we have given the authors free rein in the choice of scope, topics and presentations of their articles. Nevertheless, some features are so common as to seem central to the teaching of universal design. These are commented on in the following paragraphs.

The Structure of this Book

Structuring the present collection of articles is done in the simplest possible way: geographically, in three parts - Europe, North America and Asia/Australia. A more thematic structure would have become rather artificial, as so many of the articles cover a range of topics. However, there is some thematic structuring within each main section. Articles that focus on theoretical subjects are placed first, followed by articles dealing with infusion into the curriculum, course structure and course content, while descriptions of specific courses and projects conclude each section.

Definitions

Several of the contributors to this book were also present in the group that formulated the definition and the seven principles of universal design (appended to this introduction). Others have collaborated with or work together with these authors. Of the rest, it is safe to say that most have found that the principles of universal design provide a useful basis for their thinking about usability and functionality - although the actual terms used may vary somewhat, particularly outside the US (thus, both inclusive design - chapter 1.4 - and even accessibility is sometimes used with much the same connotations as Universal Design). Therefore, the definition, principles and guidelines listed in the appendix to this introduction serve as a basis for the design teaching that is the subject of this book.

Promotion and motivation

As a subject in schools of architecture and design, accessibility and, by extension, Universal Design, are often (as stated by James Harrison and Ken Parker in chapter 3.3 and other authors in this book) taught by default. Far less glamorous than Architectural Design, designing for a wide variety of users has to compete with the least interesting of the technical subjects - often alongside issues of legislation, or even as something which deserves little direct attention. (A good example of the latter point is cited by Andrew Walker in chapter 1.4). Thus, many teachers of universal design have had to put more effort into promoting the subject than those teaching the more traditional aspects of architecture and design. Another example of achieving recognition is through an official competition as done in Japan (chapter 3.5) and through contact with industry (see chapter 2.4).

Promotion and motivation of universal design thus become almost a subject in itself, which most of the authors in this book cover in some detail. In this context some issues have equal importance everywhere: those connected to demographics and individual rights. The rise in the proportion of elderly and disabled in the population is recognised as a problem everywhere, making the need for designs that accommodate a wide range of users imperative to avoid undue pressure on institutions and to reduce the need for personal assistance. At the same time the individual rights movement has made it politically impossible to disregard the needs of the disabled when designing the built environment. Extending the scope of universal design somewhat, design for all would also include ethnic minorities - whether indigenous peoples, immigrants or indeed women, as dealt with by Pedersen/Crouch (chapter 3.1), Harrison/Parker (chapter 3.3) and Steinfeld/Tauke (chapter 2.1). To some extent Balaram (chapter 3.2) also deals with this issue, seen from the point of view of a developing country.

Achieving popularity with the students - once the basic problem of not being glamorous is overcome (on which Balaram, chapter 3.2, has some interesting views) - does not seem to be much of a problem. Indeed, a number of authors mention the popularity of the Universal Design course (see Preiser, chapter 2.4, Ringaert, chapter 2.6, Walker, chapter 1.4, Pedersen/Crouch, chapter 3.1 and the Japanese projects, chapters 3.4 and 3.5). Much of the popularity seems to be due to some fairly simple

factors such as the obvious relevance to the fundamental issues of functionality - i.e. the fitness for use by the human body - the political and demographic issues mentioned above, and the way the teaching connects with and is orientated towards the users. The latter factor of course has the effect of creating a valuable identification with the users.

Infusing universal design into the curriculum

This issue is closely connected to the former. Although Universal Design may be taught as a specialist subject, this has obvious shortcomings, unless the specialist teaching (as M.A. or Ph.D. dissertations) comes on top of more basic teaching throughout the course. The need for inclusion of universal design on all levels of the programme may well be obvious to the practitioners, but the ways and means of achieving it are by no means equally apparent. Andrew Walker, who perhaps has more years of practice than most other teachers in the field, relates his experiences and problems in chapter 1.4. Other approaches may be found in the articles by Preiser (chapter 2.4), Welch/Jones (chapter 2.3) and Poul Østergaard (chapter 1.5).

With regard both to the problems of infusion and gaining acceptance, the efforts by the Norwegian State Housing Bank stand apart from all others. The Housing Bank is of course not an educational establishment, nor does it have any formal connection to the educational field. However, the Bank has for a number of years been one of the most prominent promoters of accessibility in dwellings and dwelling areas in Scandinavia, and has therefore experienced both the frustration of disabled users and the insufficient level of expertise among architects and designers. The Bank therefore started a large-scale project aimed at all schools and universities that educate planners, designers and builders in Norway, with the aim that Universal Design should be taught in all places where those engaged in shaping the built environment are educated. As already mentioned, the current book is a product of his project.

Teaching methods

Broadly speaking, the teaching methods can be subdivided into three main issues, theory, user involvement and evaluation.

Theory

Much of the basis for modern design might be criticised for basing its requirements on the ergonomics of the average able-bodied Caucasian male, or maybe even an idealised, "Greek god" version of him. As few people conform to this ideal, it is too narrow to fulfil the aims of good, functional design, and a different approach is needed. Thus, critical discourse becomes a worthwhile starting point for a theoretical and pedagogical approach to Universal Design. Both Steinfeld/Tauke (chapter 2.1) and Welch/Jones (chapter 2.3) deal with these aspects in their articles. Balaram (chapter 3.2), on the other hand, contrasts differences of ideals in Western culture with those found in some developing countries, while Wijk (chapter 1.2) attempts to find a broader scientific basis for design.

User involvement – users as expert consultants

User orientation is central to the teaching of Universal Design, and almost every article in this book describes ways and means of achieving it. There are at least five different approaches: One is to bring handicapped people in as lecturers, giving talks about their problems and ways to overcome them. Another is to involve users to evaluate or test existing and new designs produced by the students (see for instance Balaram, chapter 3.2). A third way is to study user requirements through interviews, for instance as described by Molly Follete Story in chapter 2.5. A somewhat different approach, which seems particularly useful when designing for groups with varying types and degrees of handicaps, such as elderly people, is to study the users' way of life using a combination of interviews and observation. This was done by some teams in the Nagoya design competition (chapter 3.5) and is a vital part of the methods used by Pedersen/Crouch (chapter 3.1). The fifth and a commonly used method is usually referred to as simulation exercises. Although simulation may be carried out in a variety of ways, the object is always the same: to create awareness through experiencing handicaps for a limited period of time, and usually over a predetermined test course through buildings and outdoor areas. The method involves putting students in wheelchairs, using spectacles that reduce normal eyesight etc (see Ringaert, chapter 2.6, Harrison/Parker, chapter 3.3 and Østergaard, chapter 1.5). It must be mentioned, however, that not all authors agree with the benefits of simulation. The argument against is chiefly that the awareness which is created is unreal; handicapped people have learnt to live and cope with their handicaps in ways which the

simulation exercise cannot hope to illustrate, and, for a handicapped person, technical aids are necessities without which certain functions cannot be performed, while a non-handicapped person may experience technical aids as an impediment.

Evaluation

Audits and evaluation are almost as important as user involvement. Thus, evaluation methodology becomes another central issue in the teaching of Universal Design. Both the articles by Jim Sandhu (chapter 1.3) and Wolfgang Preiser (chapter 2.4) deal extensively with evaluation methods, systems and tools. In addition, Molly Follete Story's article (chapter 2.5) links evaluation and assessment to the seven principles of Universal Design.

Acknowledgements

The editor wishes to thank all the contributors for their idealism and their ability to produce articles within a very short time frame. The editor is also particularly grateful to Elaine Ostroff and Dr. Satoshi Kose. Both gave invaluable help with suggesting and locating contributors to the book. A final note of thanks goes to the Norwegian State Housing Bank for putting up the funding and the means of publishing that have made this book possible.

Jon Christophersen
Norwegian Building Research Institute

Appendix
Universal Design – Definition, Principles and Guidelines

Adapted from Molly Follette Story, "The Principles of Universal Design", in Preiser/Ostroff (ed) Universal Design Handbook.

Definition

Universal Design is defined as the design of products and environments to be usable by all people, to the greatest extent possible, without adaptation or specialized design.

As developed by a group of American architects, product designers, engineers and environmental design researchers, the definition of Universal Design is accompanied by and linked to a set of seven principles. The intention is that the seven principles may be applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments. The group, which consisted of Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story & Gregg Vanderheiden, have presented the principles in the following format:

– *name* of the principle, intended to be a concise and easily remembered statement of the key concept embodied in the principle;
– *definition* of the principle, a brief description of the principle's primary directive for design;
– *guidelines*, a list of the key elements that should be present in a design which adheres to the principle.

It must be noted that all guidelines may not be relevant to all designs and that the Principles of Universal Design address only universally usable design; the practice of design involves more than consideration for usability. Designers must also incorporate other considerations such as economic, engineering, cultural, gender, and environmental concerns in their design processes. These Principles offer designers guidance to better integrate features that meet the needs of as many users as possible.

The seven principles

Name	Definition	Guidelines
1. Equitable Use	The design is useful and marketable to people with diverse abilities.	1a. Provide the same means of use for all users: identical whenever possible, equivalent when not. 1b. Avoid segregating or stigmatizing any users. 1c. Make provisions for privacy, security, and safety equally available to all users. 1d. Make the design appealing to all users. 2. Flexibility in Use
2. Flexibility in Use	The design accommodates a wide range of individual preferences and abilities.	2a. Provide choice in methods of use. 2b. Accommodate right- or left-handed access and use. 2c. Facilitate the user's accuracy and precision. 2d. Provide adaptability to the user's pace.
3. Simple and Intuitive Use	Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.	3a. Eliminate unnecessary complexity. 3b. Be consistent with user expectations and intuition. 3c. Accommodate a wide range of literacy and language skills. 3d. Arrange information consistent with its importance. 3e. Provide effective prompting and feedback during and after task completion.
4. Perceptible Information	The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. 4a. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.	4b. Maximize "legibility" of essential information. 4c. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions). 4d. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.
5. Tolerance for Error	The design minimizes hazards and adverse consequences of accidental or unintended actions.	5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded. 5b. Provide warnings of hazards and errors. 5c. Provide fail safe features. 5d. Discourage unconscious action in tasks that require vigilance.

Name	Definition	Guidelines
6. Low Physical Effort	The design can be used efficiently and comfortably and with a minimum of fatigue.	6a. Allow user to maintain a neutral body position. 6b. Use reasonable operating forces. 6c. Minimize repetitive actions. 6d. Minimize sustained physical effort.
7. Size and Space for Approach and Use	Appropriate size and space is provided for approach, reach, manipulation and use regardless of user's body size, posture, or mobility. 7a. Provide a clear line of sight to important elements for any seated or standing user.	7b. Make reach to all components comfortable for any seated or standing user. 7c. Accommodate variations in hand and grip size. 7d. Provide adequate space for the use of assistive devices or personal assistance.

Author Biographies

Dr. Sigmund Asmervik is professor of landscape architecture at the Department of Land Use and Landscape Planning at the Agricultural University of Norway. He has recently completed a compendium on Universal Design and currently leads the Agricultural University of Norway's universal design development group. He holds a degree in architecture and a Ph.D. in engineering from the Norwegian University of Science and Technology, and was formerly the head of the department of architecture and building technology at the research institute SINTEF in Trondheim. Asmervik has published widely on a number of subjects and is a highly respected lecturer.

Singanapalli Balaram has worked as creative writer, designer and senior professor at the National Institute of Design, India, for over three decades. He is presently the head of the Design Studies Faculty as well as vice president of the Society of Industrial Designers of India. He holds four patents for his innovations. His design projects have received national and international awards and he was conferred with honorary fellowship of the Society of Industrial Designers of India. His latest publications include a book "Thinking Design" and major chapters in Encyclopedia Britannica - Asia. He serves on the advisory board of "Design Issues" Journal (MIT Press, USA), on the board of governors of the Centre for Environmental Planning and Technology as well as the National Institute of Design. Design for special needs is his passion and he is presently planning to start a Ph.D. level programme in this area.

Jon Christophersen is an architect at the Norwegian Building Research Institute. He is the author of numerous publications on housing quality, accessible housing and special needs housing. He has also composed the Norwegian State Housing Bank's requirements for life span dwellings. Recent work includes recommendations for accessibility in the European Union's railways and methods for assessing accessibility in existing built up settings, including public transport. Christophersen is a contributor to the Universal Design Handbook.

Dr. Christopher Crouch has published widely on the relationship of modernity and post colonialism to visual culture. His book *Modernism in Art, Design and Architecture* is a set text in university courses in Britain and Australia. He is currently writing on a book about modernity and the city. Dr Crouch coordinates theory at the Western Australian School of Visual Arts, Edith Cowan University.

Solveig Dale is trained as an occupational therapist. Her background includes two years work with technical aids for disabled people and ten years work with housing for the municipality of Trondheim, where she is currently engaged with universal design of municipal buildings. For the past five years Solveig Dale has also had the responsibility for subjects concerning dwelling adaptations at the Department of Occupational Therapy at Sør-Trøndelag University College. Dale has written a thesis on provisions for the inclusion of disabled in the community. She holds an official recognition from the Norwegian society of occupational therapists as a specialist on community health, based on her Universal Design Work.

Rigmor Leknes is an occupational therapist. Her background includes seven years of working with physically disabled adults at Munkvoll Rehabiliteringssenter and, since 1992 teaching on, amongst others rehabilitation, retrofitting of dwellings and universal design at the Department of Occupational Therapy at Sør-Trøndelag University College. Here she also has been organising the one day, multi-disciplinary seminar described in this article. She holds a bachelor degree and is currently working on a thesis on accessibility, elderly people and activities outside the home.

Stanton Jones is professor of landscape architecture at the University of Oregon. His work has focused on open space planning and design from both a site and a systemic perspective, concentrating on public space in low-income communities and communities of colour as well as the interrelated issues of inclusivity, cultural diversity, social justice, and environmental equity as they pertain to populations underserved by the public realm. He teaches design and planning studios, graduate seminars on public space, and courses in landscape technologies and construction. Recent professional projects include a community revitalization and a community visioning process for cities in Oregon, and several design/build projects involving students, practitioners, and users.

Dr. Annette Pedersen is a socio-legal scholar interested in social justice and pedagogic practices related to inclusive curricula. She has published in areas related to social justice, pedagogic practice, post-colonialism, art history and Australian/Irish socio-legal history. She and Dr. Crouch have collaborated on a number of inclusive curriculum projects in Western Australian universities. Dr. Pedersen is currently working on a book focused on ethics and contemporary Australian culture.

Laurie Ringaert, BSc., BMR-OT, M.Sc., has been involved with disability and access issues for over 20 years. She is an occupational therapist and holds a Master of Science degree in Community

Health Sciences. She has worked as director of the Universal Design Institute at the Faculty of Architecture, University of Manitoba, Canada. She previously taught occupational therapy students. She has served as principal investigator on several research projects and has developed courses on universal design. Laurie provides consultation to several building code, standards and guidelines committees and publications. Laurie has served as a test site coordinator for the World Health Organization's (WHO) testing of the International Classification of Impairment Disability and Handicap and is a member of the WHO Environmental Task Force. She has been involved on disability community boards and is currently a founding member and Chair of the Canadian Centre on Disability Studies (CCDS). Laurie has provided universal design seminars in Canada to Ukrainian and Russian delegates and has travelled to Russia and Estonia to provide seminars and project development. Laurie is currently developing a universal design consulting business.

Tone Rønnevig is an advisor at the Norwegian State Housing Bank, and leads the Bank's Universal Design education project. She is trained as an occupational therapist. Having concentrated on accessibility in housing, her work includes project co-ordination and development, studies and research, both for the public and the private sectors. The former includes local authority as well as state bodies.

Jim Singh Sandhu has worked in the field for over thirty years in twenty-five countries and has published 200 papers, reviews, book chapters and books. His consultancy, teaching, and research work has covered products, transport, telematics and environments. A founder member of the European Institute for Design and Disability and past president he has also been policy adviser to the British Government and the European Commission. He is the director of Inclusive Design Research Associates (INDRA).

Tadao Shimizu is a MFA from Cranbrock Academy of Art (USA) and Dr. of Engineering from Tokyo University. He has worked as a designer in both Japan and USA, and has also taught as an assistant professor at University of Washington (USA) and Chiba University (Japan). Mr. Shimizu is the recipient of more than 40 design awards.

Edward Steinfeld, D.Arch., is professor of architecture and adjunct professor of Occupational Therapy at SUNY/Buffalo. He is the director of the IDEA Center and the RERC on Universal Design at Buffalo. He received two Progressive Architecture Awards for Applied Research and a Research Recognition Award from the National Endowment for the Arts. From 1974-1984 he was the

secretary of ANSI A117, the committee that develops the consensus standard used for accessible design throughout the U.S. and a member of the CABO/ANSI A117 Committee from 1995-1998. Dr. Steinfeld was one of the developers of the Principles of Universal Design. Recent activities include research on accessibility and universal design in housing, usability of automobiles for older people, methods for measuring the usability of products and environments and the development of a prototype "Universal Bathroom." He is also currently an expert consultant to the New York City Housing Authority. He has experience as a practicing architect in housing, health care, retail stores and religious buildings.

Molly Follette Story is a researcher and designer specializing in products for diverse populations, including individuals with disabilities and older adults. She has been on the staff of the Center for Universal Design since 1994. She coordinated the development of and helped author the Principles of Universal Design and has frequently written about and presented them to international audiences. Ms. Story has taught industrial design since 1984 at Georgia Institute of Technology and North Carolina State University.

Beth Tauke, M.A., M.F.A. Ms. Tauke is an associate professor at the Department of Architecture at the SUNY/Buffalo. She directs the Educational Models Project for the RERC on Universal Design at Buffalo. This project is developing resources for universal design educators and developing multidisciplinary programs on universal design education at SUNY/Buffalo. Her scholarly research combines the areas of visual communication, colour theory, visual/spatial perception/analysis, and design education. She has presented her work on design education and curriculum development at over thirty conferences since 1988, including eight National Conferences on the Beginning Student, three College Art Association Conferences, three Association of Collegiate Schools of Architecture Annual Meetings, four National Foundation for Art, Theory, and Education Conferences, three International Design Communication Conferences, and three Industrial Design Society of America Education Conferences.

Andrew Walker is an architect by training. He was formerly the Head of Technical Studies and Director of the Environmental Access Programme at the Architectural Association School of Architecture (AA). He is a founder member and former Chair of the United Kingdom Institute for Inclusive Design (UKiiD).

Polly Welch, an architect and professor at the University of Oregon, has been engaged in promoting inclusive design for twenty years

as a practicing architect and as a consultant to public and private organizations on user accommodation. She has been instrumental in developing accessibility regulations, served on the adjudication board of a state access board, and has authored award-winning guidelines on accessibility. As former deputy assistant secretary for Public Housing in Massachusetts, she was responsible for the siting and construction of housing for low-income families, people with mental and physical disabilities, and older people. She is the editor of *Strategies for Teaching Universal Design*, co-author with Stanton Jones of *Advances in Universal Design Education in the United States*, and speaks frequently on universal design and social equity. Her teaching includes design studios and classes on the social, political, and economic context of design.

Maarten Wijk is professor at the Department of Architecture at the Delft University of Technology. His interests include ergonomics of the built environment. He is senior manager at Deloitte & Touche ICS consultants in the field of strategic facility and real estate management.

Kaname Yanagisawa is associate professor at the Faculty of Engineering, Department of Design and Architecture, Chiba University. He has a Ph.D. and a Master's degree in Architecture from the University of Tokyo. His thesis "Studies of the spatial analysis from the viewpoint of children's behaviour setting" received an award from the Architectural Institute of Japan, and he has written several books and articles on the design and use of school buildings, school furniture and the uses of classrooms.

Makoto Yanagisawa is Dr. of Engineering from Tokyo University. He has worked as a professor at Nagoya University and Nagoya City University since 1975. Much of his work has been committed to improving and developing Hospital Planning. A thesis prize was awarded by the Architectural Institute of Japan; some projects he has worked on were awarded by Japan Institute of Healthcare Architecture.

Poul Østergaard was employed at the office of the architects Jørgen Bo and Vilhelm Wohlert from 1958, working amongst other projects on the design for the Louisiana Art Museum outside Copenhagen. Since 1968, he has been a member of the teaching staff at the Aarhus School of Architecture. He founded the school's department of industrial design in 1983 and was the head of the department until 1993. Since then, he has been engaged in a variety of research projects, concerning people with special needs as well as giving numerous lectures on accessibility both in Denmark and abroad. Poul Østergaard has also been engaged in external projects on accessibility guidelines for government ministries and user organisations.

Photo: FotoKnutsen AS

Part 1
Europe

Photo: FøtoKnutsen

1.1 Without Dreams, a New Reality Cannot Be Created

Tone Rønnevig, advisor, The Norwegian State Housing Bank

Tone Rønnevig. Coordinater of the project.

This chapter describes a Norwegian project organised by the Norwegian State Housing Bank. The aim of the project is to reinforce the integration of the Universal Design concept in schools, colleges and universities that educate professionals who shape the man-made environment. This includes architects, planners, designers and engineers as well as members of the building trades. The project started in 1997 and will close in 2002. This chapter describes the organisation of the project, the aims and objectives, methods and results as well as some of the ups and downs experienced in the process. Thanks to highly skilled and hard-working collaborators in the organisations for the disabled, in research institutes and government ministries, we have been able to provide the schools and universities with a framework which could be developed further. We have been quite successful, and we hope that our experiences may provide some inspiration for others outside Norway. To document the project, two booklets are currently being produced. One deals with motivation; the intention is to inspire schools and universities to get involved in the subject. The other booklet presents school projects and results reached during the project period. Another booklet, "Inspiration", which has already been produced, presents good Norwegian and European examples with comments on possible improvements.

Reasons for starting the project

Substituting institutional care for care in the home has been one of the main priorities for the reforms that have taken place in Norway during the 1980s and 1990s. The ideological basis is that everyone shall be able to live and participate equally in society, thus securing basic human values and equal opportunities for everybody. However, decisions made on this basis have and will continue to have a number of consequences. One consequence is that new demands will be put on the design of products, dwellings, buildings and outdoor areas; the former values and priorities that made up the basis for the design of the existing man-made environment are somewhat different. Thus, attitudes have to change both among designers and in the building trades. In addition, the knowledge base among the professionals has to expand.

The responsibility for the training of professionals and the development of planning and practice has been and is still divided. Statutory requirements for accessibility are worded in such general terms that disregarding them has been easy for most of the actors in the field. Well-functioning, high-quality design solutions are not created as a matter of course.

The organisations for the disabled have been playing very demanding roles in the process of changing requirements and attitudes. By tradition the organisation for the blind acted as spokesman for persons with visual impairments, whilst the Norwegian Association of the Disabled represented those with reduced mobility. The result was often that solutions that worked well for one group were less than ideal for the other, and that information to designers and planners was inconsistent and conflicting. There was little co-operation towards a common goal.

That was the starting point when the Norwegian State Housing Bank invited the organisations for the disabled to a meeting in the spring of 1997. The objective of the meeting was to discuss the possibilities for collaborating and forming a new strategy - the Housing Bank being the provider of grants for work related to housing for elderly and disabled people. Statutes, requirements, building trades and education were all seen as issues needing to be approached and influenced.

Following a long process and a series of discussions, an agreement was reached that new modes of collaboration should be tested. It was also agreed that the effort should be directed towards

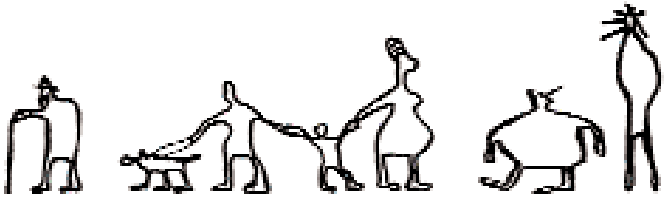
education, aiming at integrating an understanding of different user needs into the courses on offer. (Efforts towards the building trades and statutory requirements are still continuing on a day-to-day basis.)

Having agreed both to co-operate and to work towards the field of education, the Norwegian Building Research Institute was asked to produce an introductory project, describing the target areas in the educational establishments, the existing knowledge base and possible education methods for Norwegian schools and universities.

At the same time, visits were made to schools and government departments to discuss possibilities and to create interest in such a project. The reactions to these promotional efforts were generally favourable, but also somewhat sceptical. The scepticism gave us the courage to continue marketing the project and confirmed the importance of what we were doing. The visits also provided us with important information about the structure and composition of the schools - their widely different decision processes, highly individual working models and the varieties of pedagogical theories. We, with our basis in design and social sciences had to be humble towards the world of teaching and adopt an attitude of listening and learning.

Organisation

The group involved in the discussions included representatives from several organisations for the disabled in Norway: The Norwegian Society for the Blind, Norwegian Association of the Disabled, Norwegian Federation of Organisations of Disabled People, Norwegian Association for Persons with Developmental Disabilities and the Norwegian Heart and Lung Association. Additional participants were one person from the Norwegian State Council on Disability and two researchers who had worked for a number of years with questions regarding housing for disabled people.



Our logo, showing a range of human diversity.

A major problem at this stage was how to organise and finance the task. Our visits to the schools and our acquaintance with the educational system had uncovered a sector with severely limited financial resources. Any new activity would mean additional costs. We decided (1997) that the representatives involved up to then should establish themselves as a project group. The Housing Bank's role was clarified and defined as project co-ordinator. The various members of the project group were - in addition to serving as representatives for their organisations - given the task of leading a school working group. Six school working groups (one for each type of school), each consisting of three members, were established; we felt that three members were necessary in order to strengthen the groups and provide opportunities for discussion. The intention was that the school working groups should provide means of contact with the schools as well as initiate and follow-up activity, experiments and development. Given the mandate for the school working groups, their responsibilities were to develop plans for action and budget, and to follow up reporting and time scheduling.

This way of organising the project proved to be successful. It has indeed been one of the strongest forces driving the project forward, and an advantage we did not realise that we had when the project started. The process involved was, however, both time-consuming and complicated. Few participants in the group were used to looking beyond the needs of one particular group and see the totality of many groups of users. Working on this project, having Universal Design as a unifying concept, has given the organisations involved a new approach which has been useful in other contexts (such as other parallel projects - particularly one run by the Ministry of the Environment).

An advisory reference group was established in 1998, mainly to achieve a better link to the central government and to create better organisational ties (in addition to improving the chances of funding). This group had representatives from the Ministry of Education, Research and Church Affairs, the Ministry of Health and Social Affairs, the Ministry of Local Government and Regional Development, the Ministry of the Environment, the Forum for Co-operation between Organisations for the Disabled (SAFO), Norwegian Federation of Organisations of Disabled People and the Norwegian State Council on Disability (the government's agency). This group has contributed to put Universal Design on the agenda and has been supportive in the discussions on strategies and funding.

Our ambitions

After the introductory phases, the project group agreed on the following objectives:

1. *The project shall promote changes which as far as possible will ensure that products and the built environment will be designed for all, as well as altering attitudes so that the idea of integration becomes the basis for product development, planning and building in the next century.*
2. *The intended results of the project are that*
   - *planning for disabilities and knowledge about Universal Design will be integrated into the courses offered by schools and universities, including relevant health education, technological and design education in Norway (architects, planning, industrial design, interior design, occupational therapists, and builders).*
   - *the schools and universities will be able to develop sufficient know-how to carry out courses in Universal Design.*
   - *subjects relevant to Universal Design will be included in the curriculum of the schools and universities by the end of 2001, or that there is a plan for the inclusion of the subject.*

In addition, we were resolved that experiments in teaching Universal Design should be carried out in all the different types of schools during 1999.

When the aims and objectives were defined (the dates were revised while the project was running) and some of the funding was in place, we invited the schools to a starting-up conference. The project covered the participants' travelling costs.

Inspiration and starting-up conference

During the first phase of the project, two members of the project group were present at a conference on Universal Design education organised by the European Institute for Design and Disability, EIDD, in Mainz, Germany. It attracted enthusiastic and inspiring designers, and gave us the possibility of meeting Elaine Ostroff, who informed us of the work that was going on in the US. When we told her of our plans to invite Norwegian schools to a conference, she offered to supply all the participants with a copy of the book "Teaching Universal Design" (Welch 1995). She also invited us to the international conference Design for the 21th Century in New York in 1998.

Our starting-up conference took place in November 1997. It had some 60 participants, representing the levels of education we had aimed for. The main theme of the conference was to present and discuss the Universal Design concept. To open the conference, we brought in Linda Sheridan from the School of Architecture at Liverpool University, who is an experienced lecturer within the subject. She also presented ideas for the afternoon workshops. During the workshops, the school working group leaders discussed ideas for education projects, experiments and the will and possibilities for carrying them out.

The conference found that all the schools and school types that were present had a positive interest in carrying the Universal Design concept further into their educational fields. The participants agreed on a need for educating both the teachers and the students, as well as developing teaching materials and school projects. All received a copy of "Teaching Universal Design" - a summary of which we, at a later date, have published in Norwegian.

Invitations to schools and universities

The project group decided that, for the work to be effective, all types of schools that educate professionals within the fields of design, construction and production should be represented in the project. At the outset, all types of health education were also targeted. This was, however, narrowed down to occupational therapists, as these often play the part of user representatives in local authority building projects. In addition, these professionals were seen as an important resource regarding information about user needs - an aspect that is often remote and unfocused in the education of the other types of professionals.

Norway is a small country in terms of inhabitants, only 4.5 million. The universities are located in the four main cities; polytechnics are situated in smaller and larger cities, and most municipalities have secondary schools.

The schools and universities that were invited to take part in the project included:

- The schools of architecture in Oslo, Bergen and Trondheim
- Schools of planning in Ås, Oslo, Trondheim, Volda, Stavanger, Kjeller, Grimstad, Volda
- Schools of engineering in Stavanger, Bergen, Narvik, Trondheim, Agder, Oslo
- Industrial design schools in Oslo and Trondheim

– Building trades programmes in Bergen, Trondheim, Skedsmo, Kristiansand
– Schools of occupational therapy in Bergen, Tromsø, Trondheim, Oslo

As there are a large number of schools of engineering and secondary schools, only a limited number were invited.

The Vigeland sculpture park in Oslo: "Community?" - an example of Universal Design as students at SHKS, Norway have understood the term.

Structure and time schedule

The project was evaluated in the spring of 2000. The findings were largely positive with regard to the results and the way the project had been carried out. In addition, the evaluation gave us an opportunity to see some side effects of the work. At the time of writing this chapter, we have accomplished a lot of hard work, but we hope that our conclusions will be useful in the time to come. The list below sums up the main stages.

1. Preparatory phase (1997-98)
   Analysis of educational needs
   Project organisation
   Marketing and legitimising the project

2. Practical work (1998-2000)
   Initiating introductory projects and development of educational experiments
   School projects and experiments
   Reports from school and experiments
   Development of teaching material
   Conclusions

3. Conclusions (2000-2001)
   Summing up and production of documentation about the project Evaluation[1]

Being too ambitious

During 1998, the project group members spent a lot of time making contacts and learning about school structures and teaching methods. In our first plans - without pedagogic expertise in the project - we had designated 1999 as the year for teaching experiments and the year 2000 as the final year. At this time, the schools were supposed to have Universal Design worked into the curriculum. We realised, as the year 1998 was reached, that plans for an educational year are made one year ahead (a fairly obvious fact), and that it takes time to bring in new objectives. It also became clear that we, rather than the teachers, were the ones that knew about user needs. The process of creating a knowledge base and have it integrated into the school system would have to run in parallel if we were to meet the objectives we had laid down. We accepted that this was not possible in practice and decided to let the schools do their own timing regarding projects and experiments. Infusing Universal Design concepts demands not only

1 The project was evaluated by Asplan Analyse in 2000.

theoretical knowledge, but also changing attitudes and ways of thinking. We also learnt that with regard to role models a number of barriers had to be broken down. User models developed by Neuffert (Bauentwicklungslehre) and le Corbusier (the Modulor) had to be altered (and preferably discarded). Young people who are developing are not only under pressure to think universally, but also have to combat their own selfishness in addition to outmoded ideas conveyed by some teachers. However, we kept in close contact with the schools and tried to inspire them into action.

In 1998, funding was also high on the agenda. To succeed means that experiments at the different schools had to be provided with financial support. We had to convey the honourable aims and objectives of the project wherever means could be made available. Thus we were both proud and relieved when the project was listed as a separate area of commitment in the central government's budget.

The Experiments

to develop and carry out education projects. We also gave them the opportunity to start work on teaching materials. During the introductory phase the working groups had stressed that the Universal Design and user needs requirements had to be compulsory subjects. If not our surroundings would change very slowly indeed. The teachers we had contacted worked accordingly and introduced both compulsory projects and subjects for choice. In 2001 the development of projects and teaching methods is still going on, and some research projects have been formulated. A list of projects is provided in appendix 1[2]. Other projects will be presented in the booklet "Presentation", which the Housing Bank is publishing.

Follow-up Conference

In connection with a conference on aesthetics and functionality, all the participants in the project were present at a one-day conference in May 2000. The object of the conference was mutual inspiration and exchange of ideas. During the plenary session which started the day teachers and students presented school projects, experiences and sketched the aims of the exercises. In addition the leaders of the school working groups presented their experiences. In the afternoon discussions of further developments and ambitions were held in working groups, one group for each type of school. The conference was successful in several respects: The teachers found rewarding opportunities for

2 The summaries of the projects are based on Halvor Kr. Halvorsen 2000.

exchanging views and experiences with other teachers, and teachers from different types of schools had a rare chance to get acquainted.

What has been achieved?

In relation to the aims of the project, we have:

- partly achieved that planning for disabled people and knowledge about Universal Design has been integrated into the curriculum at schools where architects, industrial designers, interior designers, occupational therapists and builders in Norway are educated.
- achieved that the schools and universities are in a position to develop a knowledge base which will enable them to teach Universal Design as a subject. However, some schools prefer to use experts from the outside because they see a need for specialists on the subject and because this gives the course a higher status.
- achieved that a course will be repeated several years in a row and that subjects relevant to Universal Design have either been worked into the curriculum or that there are plans to include them.

We have seen presentations of student projects. These clearly show that the students have grasped the main points: They are open to a society which allows for human diversity, and understand that a product which can be used by a wide range of people has a potential for commercial success and may receive awards. In the words of one student: "The solution is intended to integrate use for all; if adaptations are needed, we have done a bad job."

The project has also contributed to making the term Universal Design widely known in Norway. We see that attitudes are beginning to change; the political pressures to build and design for all are increasing.

The Road Ahead

The development projects at the schools and universities will be continued, and teaching material will be distributed and improved. Research programs will be worked out and promoted. Our motivation and documentation booklets will be published during 2002, and we will present the projects and the participants who have been involved in Norway.

As the project is running to a close in Norway, the EU Council has agreed on a resolution (Res AP (2001) 1), which calls for Universal Design teaching in all schools that educate professionals who shape the built environment in the member states. Hopefully others will now pick up on our dream, grab the baton and continue the work.

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Halvorsen, H. K. *Evaluering av Husbankens utdanningsprosjekt universell utforming av bolig, bygning og utemiljø.* Asplan Analyse/Aplan VIAK. Sandvika. 2000.

Participating Schools and School Projects

Schools of Architecture

The working group consisted of Edel Heggem, architect, Norwegian Association of the Disabled; Karin Høyland, architect, SINTEF; and Solveig Kornstad, architect, Norwegian State Housing Bank, Trondheim.

Edel Heggem. Leader working group Schools of Architechture.

Elective course – student competition
A competition titled Dwellings for All was organised in 1999, and the competition evaluation including a discussion of the term Universal Design.

Teacher conference
The working group has organised a seminar for teachers at the thee schools of architecture in Norway. Professor Marten Wijk from the Delft Instutute of Technology was invited as inspirator. He also took part in the seminar discussions. A framework for further development in the schools of architecture was drawn up as a conclusion of the seminar.

Oslo School of Architecture
Co-ordinator Margrethe Dobloug.

1. Basic, first-year course module
   The module is a two-day course consisting of lectures and practical exercises in which the students make proposals based on user characteristics. The school wishes to include the course in the general curriculum.

2. One-term design subject
   Universal Design of a primary school, to illustrate how architectural solutions influence use and participation and to develop design methods which both recognise the importance of time-/user aspects and take a dynamic approach to use and users. The overall object was to put architecture into a social perspective. Twenty-seven students took part.

Norwegian University of Science and Technology, Trondheim, School of Architecture
Co-ordinators Harald Høyem and Kjell-Håvard Bråten.

1. Development and implementation of a course module in the basic architecture course

The module was developed and put into practice in 1999. The object was to make the students acquainted with scale and dimensional requirements in relation to the environment by testing full-scale models of rooms in dwellings (bedrooms, kitchen, entry, bathrooms etc). Seventy students took part. The course has been made compulsory for second year students from the year 2000.

2. Seminars (see also Schools for Occupational Therapy, Sør-Trøndelag University College below)
   The aim of the seminar was to inform the students about Universal Design and to increase understanding regarding requirements and solutions in different educational fields. Seminars were held in 1999 and 2000, as collaborations between the school of architecture, the school of occupational therapy, the school of engineering and the school of building at Brundalen. (All schools in the county of Sør-Trøndelag.) Some 150 participants were present. The seminar is compulsory for the students, and will be held every year.

3. Teaching material
   Primary school teaching plan developed by Siv Bleikli and Anne Torill Bleikli, on the premise that the Norwegian State Housing Bank sees a need to increase the awareness of dwelling quality at an early age. The existing structure in the primary schools makes it possible to include projects of this type. As a result, a booklet presenting ideas was produced in 2001.

4. Solutions for accessibility in historical buildings
   Prof. Eir Grytli and architecture student Cathrine Schøll Heneide have produced a booklet showing how accessibility has been achieved in a range of historical buildings. The booklet will be used in the advanced course at NTNU. It has since been reworked and published a new edition titled "Ingen hindring" (No Barriers). The booklet is distributed by SINTEF, Trondheim and Riksantikvaren in Oslo.

Schools of Planning

The working group consisted of Olav Rand Bringa, civil engineer; Steen L. Petterson, architect, Norwegian Heart and Lung Association; Tone Manum,

Olav Bringa. Leader working group Schools of Planning.

Norwegian Association of the Disabled, Oslo County; and Gunnar Ridderstrøm, head of planning, Larvik Municipality.

Kjeller University College
Co-ordinators: Pål Jordanger and Kari Bjerke Karlsen.
Kjeller developed a plan for the inclusion and integration of Universal Design into the various courses at the school, including overall planning, health and social studies, and local environment for children and juveniles.

Agricultural University of Norway
1. Seminar and plan for action
   Prof. Sigmund Asmervik organised a seminar to inform the teachers at the school about Universal Design, and to start the work on a plan of action to integrate the subject into the courses at the school. The plan has been made, and Universal Design has been infused into the teaching. Each year about 110–120 students are brought into contact with Universal Design.

2. Teaching material
   A booklet showing examples and providing a background for group assignments, student projects and further studies into the subject has been produced by Prof. Sigmund Asmervik. (Asmervik 2000)

Norwegian University of Science and Technology, Trondheim, School of Planning
Teaching materials
Sverre Nistov is developing reference materials for the students (experiments in the third year at the School of Architecture; Universal Design is by now integrated and compulsory for town and city planning students) and lectures, as well as an evaluation of the course. Further plans include teaching Universal Design for advanced studies in building technology.

Master degree in planning
This includes the development of a Universal Design module for a Master's degree in social studies.

Teaching materials and documentation for the education of planners
Pål Jordanger is developing a compendium for health, social and environmental studies.

Engineering Schools

The working group consisted of Jon Christophersen and Karine Denizou, architects, Norwegian Building Research Institute; Stein Hustvedt, Bergen Municipality; and Morten Skjennem, architect, Norwegian State Housing Bank, Oslo.

Jon Christophersen. Leader working group Engineering schools.

Sør-Trøndelag University College
Teachers and students at the school of engineering participate in seminars organised by others.

Stavanger University College
Architect Jonas Espedal, who teaches at the college and has a private practice in Stavanger, is developing a compendium and sets of examples to be used for teaching engineering students. Some experiments have been carried out at the school.

Secondary Schools

The working group consisted of Dagfrid Hestenes, Norwegian Federation of Organisations of Disabled People; Ole Vefferstad, the Education Council for Mining and Building; and Dagfinn Roy Andersen, Kvadraturen school in Kristiansand.

Dagfrid Hestenes. Leader secondary Schools working group.

The working group has contacted publishers and authors of educational books to enquire about the possibilities of including Universal Design in books that are already in use. The group has also initiated work on a collection of exercises for use in social studies and in the education of builders.

Dagfinn Roy Andersen has written a booklet titled "Making Way for All". The booklet introduces and discusses the Universal Design concept, and describes training exercises designed for secondary school pupils It has been distributed to all the schools that train professionals for the building trades in the country.

Interior Design Schools and Industrial Design Schools

The working group consisted of Ellen Jyhne, Norwegian Society for the Blind; Karen Karen Christie Bjønness, interior designer; and Sidsel Bjørneby, Human Factors Solutions Ltd.

Ellen Jyhne. Leader Interior Design Schools / Industrial Design Schools working group.

Oslo School of Architecture, Institute for Industrial Design
Co-ordinators Tom Vavik and Hilde Angelfoss.

1. Teaching Experiments
   The co-ordinators worked towards developing a knowledge base at the school through educational experiments. A further goal was to have Universal Design fitted into the curriculum. Some 15 students took part, and Universal Design is now being included at several levels in the programme.
2. Revised Version of the textbook Human Aspects of Design - an introduction to ergonomics. The authors, Tom Vavik and Trond Are Ørritsland, have completed a revised version of the book.

Norwegian University of Science and Technology, Trondheim, Faculty of Product Design
Developments in the teaching of Universal Design which have taken place as a consequence of the Housing Bank education project include a contribution to Tom Vavik's textbook (above), a survey of and an article about the level of competence as regards Universal Design among Norwegian industrial designers (summer 2000), the introduction of Universal Design in the teaching of ergonomics, industrial design and product design at the Norwegian University of Science and Technology. Universal Design was first introduced as a specialist subject (1999) but has later become an integrated part of the teaching (2000).

The National College of Art and Design (NCAD)
The professors Anne Alnæs and Terje Hope have developed, carried out and evaluated a course in Universal Design. The experiment was divided into three parts: "a candidate examination" in the spring of 1999, a second and third year course in the autumn of 1999 and another course as an introduction to a study trip for third-year students. A total of eight teachers and 36 students took part. In 2000 and 2001, the college has also organised projects in which Universal Design has been integrated into large-scale designs of schools and school playgrounds. One-day multi disciplinary seminar for students.

Schools of Occupational Therapy

The working group consisted of Guri Henriksen, Norwegian Association of the Disabled; Bente Osnes, Norwegian State Housing Bank, Oslo; Inger Hafsten, the City of Oslo, and Randi Røed-Andersen, DELTA-centre. The working group has organised a seminar about the effects of light. Participants were students of interior design, occupational therapists and electrical engineering.

Guri Henriksen. Leader Schools of Occupational Theraphy working group.

Sør-Trøndelag University College

1. One-day, multi-disciplinary seminar for students (see also Schools of architecture above). The seminar was organised in collaboration with the Norwegian University of Science and Technology, the school of engineering at Sør-Trøndelag University College and Brundalen school for builders. The aim of the seminar was to inform the students about Universal Design and to increase understanding regarding requirements and solutions in different educational fields. Seminars were held in 1999 and 2000. Some 150 participants were present. The seminar is compulsory for the students, and will be held every year. Universal Design courses have also been organised in 2001 and 2002.
2. Collaborative Universal Design Project
   Rigmor Leknes from the Occupational Therapy School and Embret Sandbakken from the School of Engineering organised a project where students from the two schools worked together on concrete proposals, using Universal Design principles for the refurbishment of a building in Trondheim.

Schools of occupational therapy in Trondheim, Bergen, Oslo and Tromsø

Ideas for teaching Universal Design. The four schools are collaborating with the Norwegian Association of the Disabled to create a reference work intended to increase the knowledge base, give content to the education structure and to provide a tool for the teachers.

Teaching material

The working group has produced a set of three loose-leaf folders. The first folder in the set goes through the principles of Universal Design. The second concerns user adaptations, whilst the third, which targets the teachers, contains various teaching materials such as sheets for overhead projectors etc.

Photo: FotoKnutsen AS

1.2 Cities, Buildings and Parks for Everyone, a Universal Design Compendium

Professor Sigmund Asmervik, Department of Land Use and Landscape Planning, Agricultural University of Norway (NLH).

Introduction

When I first heard the term Universal Design in the summer of 1998, in connection with an invitation to join a conference in the USA, I thought, as many others surely would, that this sounded very much like old content in a new package. However, after gaining more insight into the concept I realized that much more was involved than I had originally thought, as it was more about making all of society available and accessible to everyone, regardless of functional ability.

Financing from the Norwegian State Housing Bank (as part of the Norwegian State Housing Bank project described in chapter 1.1) has made it possible to write a compendium to be used in the teaching of students of architecture, landscape architecture and planning. The various school projects under the Housing Bank project at many institutions of learning in Norway have provided inspiration for this work, and study trips to other locations in the Nordic countries, the USA and Barcelona in Spain have provided me with good examples upon which much of this publication is based.

How to use the book

The main aim of this book is to give the concept of universal design meaning to students in the fields of planning, architecture and landscape architecture so that as professionals they will find it an exciting and challenging part of their fields of work.

Two aspects of the concept of universal design deserve special attention. One is the principle that we should plan and design for everyone without making special solutions for particular groups

of the population due to age or functionality considerations. Universal design should help to remove or at least move away from the «we and you», «us and them» approach. The second aspect is that by working with universal design, the students are forced to devote attention to the needs and requirements of various groups. Industrial designers are already quite familiar with this way of thinking, as they are dependent on a market that is willing to buy a product at a certain price. Architects and landscape architects have a strong tradition based on the idea that the individual's «signed work» is the real objective of their activity, and this attitude often relegates awareness of the needs of various users to the sidelines in the learning processes.

When we pay greater attention to these two aspects, we will need to cooperate with other professions, such as occupational therapists, social workers, educators, janitors and cleaning staff. To arouse the necessary curiosity in our students, the book presents some examples that are of special interest to universal design:

- Barcelona has been chosen as an example of a city where truly systematic efforts are being applied to facilitate use of the city for everyone. Barcelona has been and will continue to be a magnet for students of planning and design, and will, for this and a number of other reasons be an appropriate goal for study trips.
- The small city of Røros in Norway has been chosen because of its historic importance. Here, the need to protect historical monuments is a major concern, and the need to facilitate universal design is particularly challenging. At Røros a comprehensive registration of physical access to buildings with high visitor frequencies has been undertaken, yielding a good basis for student assignments. Moreover, we show a number of good solutions from other locations.
- The University Centre at Dragvoll in Trondheim, Norway, was planned in the 1970s. The concept on which this facility is built in many ways lends itself well to universal design. At the Norwegian University of Science and Technology (NTNU) in Trondheim, planners have been very aware of the need to improve access for everyone.
- Sommerfrydhagen, (the Summer Park) at Tøyen in Oslo, Norway, is a good example of a park that has been planned and designed for various groups of the population. Using simple techniques, landscape architects have created a model facility, paying special attention to the needs of functionally challenged children.

– Sinnenas Trädgård (literally: garden of the mind) in the Sabbatsberg area of Stockholm, Sweden, is an exciting facility that has been designed especially for the elderly who are suffering from dementia, but which has become a highly popular area for everyone, residents, employees and next of kin
– Buildings designed by some of the most famous architects of the 20th century, such as Frank Lloyd Wright, Mies van der Rohe, Le Corbusier and Alvar Aalto, are also included, with comments in terms of universal design. These examples prove that for quite some time architects have looked upon the ramp as an architectural element, literally creating a sliding transition from outside to inside. They have also designed such details as door handles suitable for persons of various heights.

Examples from Dragvoll in Trondheim and Sabbatsberg in Stockholm are presented below.

Background for the concept universal design

The universal design concept is American, and this country led the way in the 1990s with its intense efforts to facilitate society for everyone. The concept simply means an attitude or way of considering things, where surroundings, buildings and products are planned and designed so they can be used by everyone to the greatest extent possible. In the US there has been a fairly heated debate about this concept and its consequences. The fact that the concept can be understood in a number of ways is something that in itself fuels the debate. One interpretation is that; «It could also happen to me», i.e. that I could become functionally challenged, and that this is not only something that happens to others. Another stance is that this means nothing more than what good design and planning has always been about. Needless to say, the debate also focuses on how the concept was first arrived at and who was responsible for this.

In 1977 the architect Michael Bednar pointed out that many people were surprised when they saw how the functionality of physically challenged persons increased dramatically when physical barriers were removed. This gave him the idea of launching a more comprehensive and general concept that included the needs of everyone. In the US, the concept «acces-

sible design» was used a great deal early in the 1980s. However, as the concept appears to have taken on the meaning of accessible and accessibility particularly for persons with miscellaneous handicaps, it has lost its meaning of accessibility for everyone.

An accessible building was generally perceived as a building that could be entered by a person in a wheelchair, but exactly where the entrance was placed in relation to available public transport was not deemed to be part of the accessibility issue. Accessibility and participation are included in the universal design concept in a very wide sense. Another important point of universal design was that this would be a general condition incorporated in planning and design, and hence also cost-effective.

The concept of universal design stemmed from two separate but related movements, one focusing on removing the *they* and *us* attitude, an approach that marginalized persons with functional disabilities, and the other focusing on a «democratisation» of the definition of good design with users in mind.

In the 1960s, the focus on giving the functionally challenged, primarily mobility-challenged persons, better accessibility resulted in «solutions for the handicapped» with ramps, special lifts, bigger toilets and the international symbol featuring a wheelchair user. These measures have brought about substantial improvements for many mobility-challenged persons, but have also contributed to the stigmatization of this group of the population in a frequently negative way. The concept of universal design was also introduced to change attitudes that the physical accessibility concept could not satisfy.

Planners, architects and designers comprise a group of professionals that basically has users as the basis for their work. Architects have been especially reputed to have great interest in their personal work of art to the point of trivializing the needs of users. We find innumerable examples of buildings that generally look very good in trendy periodicals but do not function well in everyday use. There is little comfort in professing belief in functionalistic architecture if the building does not function for various user groups. Designers have in many ways enjoyed a different relationship to users, as they have had to pay attention to the demands of mass production market dependency.

A group of designers and architects in the 1960s drew attention to ergonomics and studied general human body functions, quite often based on average male bodies. This harks back to Le Corbusier's Modulor from the end of the 1940s, a slightly different kind of universal design. User-interested architects and designers have also had a tendency to consider special population groups, such as children and the elderly. Special design has often led to separation instead of integration.

The idea of standardization has also generally led to solutions that are poorly adapted to various types of functional disabilities. The trend has been a general minimum standard, which in turn has led to solutions that are not viable for everyone.

In 1990, the rights of Americans with functional disabilities were guaranteed in the Americans with Disabilities Act (ADA). This has greatly impacted the implementation of the philosophy of the concept of universal design. The discussion has now reached far beyond city ordinances and zoning bylaws on building design; attention has now been focused on the basic civil right to participate in community life in general. By connecting the intention of this act to the American constitution's pledge of equal rights, the focus has shifted from pragmatic discussions on where to place the wheelchair lift, to consideration of who are the users of the physical environment, buildings, parks and facilities, and what needs they have to orient themselves, move around and do what they want to do. One of the reasons why this epochal act from 1990 has had such an effect is that it authorizes penalties for non-compliance in the form of fines and other injunctions.

It may also be worth noting that the act was not written and promoted by radical associations and groups of people with functional disabilities, but rather proposed by the Reagan administration and adopted by Congress in the incumbency period of George Bush, conservative Republicans both. This demonstrates the relationship of the Act to one of the most typical of all American tenets, i.e. guaranteeing the civil rights of each and every citizen of the United States of America.

Universal design is also very much about designing for the entire course of life. We all need accessible areas, buildings and various facilities not only when we are children, but also as adults and when we grow old. The very topical issue of the general greying of the population will probably be a good ally of proponents of universal design.

If the concept of accessibility has largely been abandoned in the US today, it continues to be frequently used in Norway. A case in point is the circular T-5/99 B issued by three Ministries in 1999 called Tilgjenglighet for alle (Accessibility for Everyone).

Examples of general universal design assignments

How big and how small is the human body?

Does everybody have the same proportions? Measure each other's full length; arms, legs, height to the hips and knees. What about the proportions of children and young persons? Compare the measurements with those of Le Corbusier as they are expressed in his Modulor.

How many people are actually functionally challenged?

Discuss in groups of four to six persons and determine whether you have neighbours, family or friends who are functionally challenged, have visual or hearing impairments or who have allergies. Try to determine the proportion of the population that in the course of life will have one form of functional disability or another.

Why is access to towns and buildings so difficult?

Try to determine why so many buildings and types of transport are so poorly accessible. Contact the local building authorities, janitors and maintenance managers of various organizations. Local associations for the physically challenged may be good informants. Propose ways of enhancing accessibility.

The universality of functionalism

We quite automatically connect the concept of functionality to the approach within architecture and urban planning called functionalism. This philosophy generally emerged as an aesthetic project dominated by a relatively small group of architects and artists during the two or three first decades of the twentieth century.

The establishment of the Bauhaus headed by German architect Walter Gropius, initially in Weimar in 1919 and later in Dessau in 1924, occupies a central place in the development of what I would call the aesthetics of functionalism. Such a dominant figure as the architect Mies van der Rohe also had links to Bauhaus. Artists that spring to mind include Wassili Kadinskij and Paul Klee.

One of the most catchy slogans of the functionalists was *Form Follows Function*. However, this was a very mechanical and biological understanding of function. The car, the aeroplane and not least the Ocean Liner were models of the living machines of the 1920s and 1930s. The liberated individual was considered a biological phenomenon. Light, air and green areas were more than linguistic metaphors.

Le Corbusier's philosophy and proposal for «Universal Design» was *Le Modulor*, which he patented in 1947. This «modulor» was based on universal design in the sense that there are universal measurements that are adapted to the human body in a general sense, and specifically a male body of 183 cm.

Functionalism as we know it from the 1930s completely lacked social aspects, even if some of the neo-positivists in Vienna dreamed of replacing ethics with science. Generally the functionality of aestheticism developed from an aesthetically dominated point of departure into a virtual «scientification» from the middle 1930s and up towards 1960, where mass production and the forces of capital became the characteristics of later functionalism.

Illustrations from Norwegian research on housing and buildings from the 1950s clearly demonstrate how human philosophy and gender roles are based on the objectification of humans as a physical and biological phenomena.

If we consider in more detail some of the important works of the most famous architects from the 20th century we can easily demonstrate that accessibility in the sense we are now using the term was virtually unknown. Nonetheless, we can see that in a number of famous buildings the ramp has been used as a central architectonic element.

Le Corbusier

If we start with le Corbusier, we see that ramps have been used with great care in one of his most famous villas, Villa Savoye in Poissy, from 1928–31. Le Corbusier has also allowed ramps to be a central architectonic element in a number of other buildings, often large and complex ones.

Frank Lloyd Wright

The famous Guggenheim Museum from 1959 in New York by Frank Lloyd Wright is completely designed around the spiral-

ling inner ramp. The ramp inclination is so slight that the walls along it are used to exhibit pictures.

Mies van der Rohe
Mies van der Rohe's Barcelona pavilion from 1929 is an interesting example in this context. The generally flat floor without differences in levels expresses some of the main points of the pavilion and the new architecture, i.e. the fluent transition between inside and outside, where persons may move easily and effortlessly. This floor level could quite simply have been made easily accessible with a slightly inclined ramp, as the differences in levels are quite modest.

Alvar Aalto
Alvar Aalto is famous for his exquisite use of materials and the level of detailing in his buildings. Even though he did not work with the universal design concept, we see a number of examples in his work of his great concern for the users of buildings, whether this concerns illumination or cleaning. A special design element is his door handles at various heights for persons of various ages and heights.

Assignments concerning famous architecture

Are famous houses from the history of architecture easily accessible?
Find famous buildings and facilities in modern architectural history from around 1920 and later. Study their accessibility by examining blueprints and photos. The best way of becoming familiar with a building is to build a model of it.

Do architectural competitions consider accessibility?
Architectural competitions determine trends. Review a number of such competitions, and study whether the idea that buildings and facilities should be accessible to everybody has been considered.

What do famous architects and landscape architects believe?
Contact famous architects and landscape architects and interview them for their response to the idea that buildings should be accessible to everybody. Try to determine what they feel is the most important reason to explain why this principle has not been carried out more than it has. Is it due to attitudes, finances or aesthetic considerations?

The house for everyone

The university centre at Dragvoll

The university centre at Dragvoll in Trondheim is a separate part of the Norwegian University of Technology and Science, NTNU. As a special building facility it has received great attention and has received a number of awards for its architecture.

The architecture competition in 1971 which started the project was won by Henning Larsen's Architect Office in Copenhagen. The winning design was based on Oxford, England, because this has approximately the same area as the competition prospectus indicated, as much as 500,000 m_ for around 25,000 students. Today's facility is around one tenth of this.

Larsen wanted to build a dense city in a farming landscape 3–4 km from downtown Trondheim. The project was based on a block structure of approximately 100 x 100 m. The most special aspect of the proposal was that it was based on glass-covered streets, a generally untried concept at this time in the 1970s (see fig. 1). Later glass-covered streets and urban spaces have grown quite commonplace in Norway and other parts of the world. The first section was taken into use in the autumn of 1978, the second section in the autumn of 1993, and a small section 3 in the autumn of 2000. Today there are more than 2,000 students at Dragvoll and the gross area is close to 60,000 m^2.

Fig 1. Glazed "street" at Dragvoll University Centre.

The covered glass streets have especially attracted a great deal of attention, and been the object of discussions, studies and research. The original main argument for this solution was its financial benefits compared to traditional streets, bearing in mind the clearing of snow and regular maintenance. It has later been decided that this type of design reduces energy consumption for heating and has the added advantage of creating natural meeting-places.

It has later been demonstrated that the main concept for this facility is favourable for implementing the idea that the building and facilities should be accessible for everyone. A number of lifts have been centrally placed in the streets and the facility provides a very sound basis for implementing the seven principles for universal design.

In relation to the principle of equal opportunities for use and flexibility, we may state that this university centre is well designed. We notice this already when we reach the entrance doors, where a light push on an automatic door opener gives easy entrance. With no need for long detours to reach the destination and with clear signs, the principle of simple and intuitive use and easily comprehensible information has been well handled. An example of the principle of tolerance of errors and design to alleviate the risk of accidents and injuries is the railing found by some stairs to prevent people with vision impairment and others from bumping their heads. The principle of good sizes and space for access and use is enhanced by the wide streets. A curiosity is the handicap marking on a computer terminal at a height adapted to wheelchair users. This sign should really be unnecessary here!

However, even this facility features a number of details that are unsatisfactory when we consider the intention of ensuring accessibility for everyone. Measures that have been carried out to render the university centre even more accessible are listed below:

Measures for enhanced accessibility
To offer wheelchair users the opportunity to enter the building on their own and to be integrated instead of being sitting exhibits at a show, automatic entrance doors were installed in entrances adjacent to the parking area for the physically challenged. Moreover, new door opening buttons and new display panels were installed by the lifts inside the buildings to enable

wheelchair users to use the facilities on their own. Not all the lifts are accessible, but wheelchair users have access to all areas, even though in some locations they must choose one of the two lifts. Study desks have been reserved close to these lifts.

All regular exit doors have been replaced with sliding doors with infrared sensors. This eases accessibility for all users. The information desk has been furnished with hatches at a height suitable for wheelchair users and with bells for summoning assistance.

All auditoriums are being adapted for wheelchair users. Some auditoriums had a high brick wall which wheelchairs users were unable to see over, and this has now been replaced by tables so that wheelchairs users are able to sit with the others. All the auditoriums feature adjustable tables intended for wheelchair users.

All stairs in the walkways were marked so they would be visible for those with vision impairment. Moreover, induction loops have been installed in all the auditoriums. Maps on the outside of auditoriums indicate the parts of the rooms that have good coverage.

All staircases in communal areas were marked with white tiles on vertical and horizontal planes. It was too expensive to replace full tiles with split tiles on all the stair edges. Eventually all the areas will be marked in contrasting colours.

Outside markings and opening buttons have been placed on an attractive standard column that can be used by anyone.

Assignments on the building for everyone

How can we study whether a building is accessible for everyone?

Undertake a specific and detailed study of accessibility for persons with mobility, vision and hearing impairments and/or allergies in a building used by a large number of people. Interview the maintenance department and the staff working with health, environment and safety issues. Propose improvements and draw up a detailed plan for improvement works.

How can we plan to improve accessibility?

In an exercise assume that a building, park or facility must be accessible for everyone. Consider how you can exploit ramps and lifts, colour and lighting as architectural techniques/measures.

What do architects think about buildings they themselves have planned?

Visit and interview architects and landscape architects and find out what they think about their own work. It is useful to undertake some research at the locations in question so that you can ask the really penetrating questions.

The park for everyone

The Sabbatsberg area in Stockholm

In 1998 a park in Stockholm called Sinnenas Trädgård was opened close by Vasa Park in a central location in Stockholm. The purpose of this park was to create a garden that would function as therapy for elderly persons suffering from dementia. When elderly people are forced to leave their home to live in special housing, they lose contact with their familiar neighbourhood. One's previous habits and roles are taken away and opportunities for enjoying the outdoors will often be greatly reduced. If there is dementia in addition to this, the ability to orient oneself in time and space is debilitated.

Green surroundings are valuable for a person's day-to-day will to live. Being in nature, whether passively or actively, and the sensory impressions of green surroundings are important for our well-being. A therapeutic garden in which to roam, or merely sit and enjoy oneself may prevent restlessness, alleviate stress, calm persons with dementia and sharpen their concentration.

Sinnenas Trädgård

Taking a closer look at Sinnenas Trädgård in Stockholm, we see that it is designed around familiar elements from private gardens and some features of classical monastery gardens.

Fig. 2. Staff, relatives and inhabitants love this garden.

1. Paths meet around a centrally located pond where the water is shallow. This area is framed by old trees and a pergola with climbing ivy.
2. Under the wide branches of the old trees we find a beautiful conservatory.
3. The garden has three entrances. By each entrance there is a pergola and a gate with sweet-scented climbing roses, honeysuckle and clematis.
4. The framework consists of a) a wooden fence and b) a hedge. This provides a sense of space, safety, shelter against wind and a boundary against the outside traffic.
5. In the north section of the garden we find an old wrought iron fence facing the Vasa Park where children play and people walk their dogs. Children laughing and dogs at play allow visitors to Sinnenas Trädgård to participate in what is

happening without having to worry about being run into by children and dogs. Only the sounds of the passing traffic bring to mind the fact that the garden is located in a city, but this may be an important recollection for those users who grew up in a city. Plants in the garden have been selected with great care to create great variation in a small area and to generate the desire to undertake something on one's own. There are flowerbeds and fields, durable lawns, a rock-filled flowerbed and a pond with water lilies. The garden has retained its century-old chestnuts, its elm grove and its hawthorn trees.

6. The main walkway faces south and ends in a venerable old staircase.
7. Left and right of the walkway we find a raised flowerbed in granite with old-fashioned plants to stimulate recollection and recognition. Flower pergolas frame the flowerbeds with hops, roses, Virginia creepers and clematis.
8. a) Along the west walkway we find raised flowerbeds with wild strawberries, strawberries, raspberries, red currants, blackcurrants and gooseberries.
   b) Along the east walkways we find flowerbeds with cutting flowers, spices and vegetables.
9. In the north end we find two groves, one of lilacs and one of clematis, scenting the air around comfortable benches where visitors can rest and smell the flowers.
10. The flowerbeds abound with flowers and fruit, such as apples and plums. A lawn frames the main walkway.
11. There are many small tables along the raised flowerbed in granite inviting people to rest and drink their coffee.
13. The summerhouse from 1784 is surrounded by a number of small groves with lilies, bracken and forest paths covered by bark to create an illusion of being in a forest.
14. An exercise railing with larch handrails and wrought iron latticework is used to exercise the sense of balance and for support when walking.

Assignments on the park for everyone

Who are the park's users?

Make your own observations using the park. Do you find anyone who has obvious accessibility problems? Select various groups and interview them regarding their use of the park, and whether they find it difficult to find it and orient themselves.

How does the park function for you?
Carry out your own tests, preferably together with a co-student who has a functional disability. Which barriers are there? How can they be overcome?

What kind of vegetation benefits various types of users?
Catalogue the vegetation in a park. Try to establish whether parts of this park are particularly favourable for people with various types of functional disabilities. In addition to sight, also consider hearing, smells and allergies. Propose improvements.

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Photo: FotoKnutsen AS

1.3 Universal Design – an Interdisciplinary Challenge

Solveig Dale, occupational therapist, public health specialist, Trondheim.
Rigmor Leknes, post graduate student and lecturer at the Department of Occupational Therapy, Sør-Trøndelag university College, Trondheim.

"Oh! It's so difficult being blind!" groaned architecture student Wibeke Johansen from NTNU. She was suddenly completely reliant on the help of occupational therapy student Gunn Berg.

Patches had been placed over Wibeke Johansen's eyes. The lights had gone out on her world, so to speak, and the only person who could help her was her companion, Gunn Berg. The architecture student could no longer orient herself in the shopping centre and had to be led around by the occupational therapy student.

This is how the *Høgskoleavisa* (The University College Newspaper) introduces a report about the second joint seminar on universal design in Trondheim (Svanemyr, K., 2000).

History of the seminar

The seminar that is the subject of this chapter was first organised in the winter of 1999. In November 1997, *Husbanken* (The Norwegian State Housing Bank) arranged a working conference on the educational organisation of universal design and the need to improve the design of built-up environments (see chapter 1.1). The conference fired the starting gun for the planning of this seminar. Several of the conference's participants agreed that co-operation between the health and technical professions was not good enough and that co-operation between the relevant parties while they were completing their studies would probably make these future specialists more willing and able to work together. Per and Kirsten Lauvås claim: "*The different parties' attitude of mind, and the way they understand*

information, are primarily acquired through vocational socialisation" (Lauvås, K. and Lauvås, P., pg. 150, 1994). The effects of vocational socialisation are strongest during the educational phase and the first active years of work in the field (ibid).

For a number of years, the Department of Occupational Therapy in Trondheim had been wishing to co-operate more closely on a regular basis with the Department of Achitectural Design because the results of poor building plans can directly affect professional duties of occupational therapists. Practising occupational therapists quite often come across examples of buildings that have not been designed with everyone in mind: whether it involves doors that are too heavy, door sills that are difficult to negotiate, poor signing, difficulty in orienting oneself in a building, colours with insufficient contrast for the visually impaired, inappropriate placing of kitchen and toilet fittings, and the height of entrances (with the consequence that ramps have to be adjusted afterwards, etc.) Occupational therapists often learn of users' who have problems coping with everyday life due to such planning. Expensive technical modifications are often needed to enable these people to function well in their surroundings. Such solutions are rarely aesthetically attractive or fully functional and are often extremely expensive.

The need for better interdisciplinary co-operation between the relevant parties has also been pointed out by architects several years ago. Architects Grete Bull and Tore Lange believe that interdisciplinary co-operation and user input throughout the whole process of designing housing for the functionally disabled is essential. In their opinion, such co-operation can ensure that the user's needs and input are better represented (Bull, G., et al, 1993).

To promote interdisciplinary co-operation, it is important that the various professional groups participating in the planning work are familiar with each other's areas of expertise, otherwise it will be less likely that they will seek out contact with each other. Facilitating the interaction of future professionals from the relevant areas of study while they are still students is likely to increase the possibility of interdisciplinary co-operation in their work.

In the spring of 1998, the Department of Occupational Therapy called for a meeting between themselves and the departments of

architecture, building engineering and High school of carpentry. A representative from the Norwegian State Housing Bank was present and told the participants of the possibility of receiving financial support for this educational experiment. This meeting helped to bring about the joint seminar on universal design. We had to ensure that the date set did not clash with exams, project periods and practise periods. We agreed that the date would be co-ordinated by the High school of Carpentry of Occupational Therapy and early in the autumn of 1998 it was set for 4 February 1999.

We formed a small working group consisting of five people: one from the architecture department, one from the High school of carpentry department of Occupational Therapy, an architect from the Norwegian State Housing Bank, an architect from *SINTEF* and a council occupational therapist from Trondheim Council. This group was assigned the task of planning the interdisciplinary seminar. The working group included some persons that had their main occupation outside the educating institutions involved in order to benefit from the expertise these people had within their respective fields. Three of the participants had previously conducted several housing seminars for the students of occupational therapy. The two smaller departments were not represented in the group because it could have made the group too large and perhaps made it more difficult to find common points of reference. However, they were provided with the minutes of the meetings and participated in the last few meetings. The working climate was open and stimulating, which encouraged creativity. Several of the participants already knew each other, and this undoubtedly helped the work go smoothly. Simultaneously, we had so much confidence in each other that we dared to object to ideas that were viewed less practicable. Everyone wanted the seminar to take place, and many of us put in a lot of work to ensure that the practical arrangements went smoothly.

Educational aims

The aim of the seminar was for each student to gain:

- Professional knowledge about universal design
- Knowledge about the functionally disabled peoples' design needs
- Familiarity with the various professions that participated in the seminar

Contents and methodology

The working group felt that, in order to achieve these goals, the students should first be given a common professional point of reference. Most of the students were unfamiliar with the term universal design. Architect Poul Østergaard had prepared a CD-ROM that presented examples of functionally disabled people's need for functional solutions (Østergaard, P., 1996. Also see chapter 1.7). These are good examples of universal design. He was invited to present universal design from his perspective.

We also wanted an occupational therapist to communicate the role occupational therapists can play with respect to universal design, so that the students on the technical courses would become more familiar with the expertise of an occupational therapist.

We also wanted to engage someone from an organisation for the disabled to explain what it was like to encounter obstacles in their everyday life. It had been the experience of the department of Occupational Therapy that such testimonies from disabled people made a strong impression. The examples that were presented included the difficulty of getting into shops or not being able to sit next to one's spouse at the theatre because there was no place to sit for an attendant in the wheelchair users' area.

The working group wanted to employ several different pedagogic methods, since we knew that variation stimulates the learning process. We settled on a combination of lectures, video and group work. We felt it was important for students to experience a disability first hand so that they would better understand disabled peoples needs and life situation. According to Gunn Imsen, Piaget's theory says that one probably learns best when one actively participates in the learning acquisition process (Imsen, G., 1998). One can be active in many ways, such as listening, seeing, doing something practical, discussing and creating a written work, etc. It is not necessarily so that everyone learns best by use of the same teaching methods (ibid). However, the effects of teaching and the insights thus gained can be enhanced by combining personal experiences with other methods of communication.

The working group also wanted the students to meet each other and share experiences and perspectives from the various courses. We decided to give them tasks in which they would have to use their specialist knowledge and arrive at universal design solutions by way of discussion.

Motivating the students

We brought in people with international reputation in the area of universal design in order to increase the appeal and encourage student participation in the seminar.

In order to make the interdisciplinary groups work well, it was necessary that the participation from the students was as good as possible. So we did our utmost to inform students well in advance. The programmes that were printed and distributed had a nice design, which the architects' expertise contributed largely to. The attendance at the seminar was furthermore made obligatory.

Front page of programme and invitation.

The final programme looked like this:

08.30-09.00	Registration, coffee, tea
09.00-09.15	Welcome speech by university college lecturer Rigmor Leknes Introduction: Why an interdisciplinary approach? Researcher Karin Høyland, *SINTEF*
09.15-09.45	Users' perspectives Odd Walter Syltevik, The Norwegian Association of the Disabled
09.45-10.15	Universal design from the point of view of the occupational therapist Occupational therapist Sidsel Bjørnebye, Human Factor Solution
10.15-10.25	Break
10.25-11.10	Handicap, architecture and design Professor Poul Østergaard, Århus
11.10-11.20	The Delta Centre's film "Universal design – seven points about planning" Professor Tore Brantenberg
11.20-11.30	Introduction to group work Occupational therapist Solveig Dale
11.30-13.45	Lunch and group work
13.45-14.15	Plenary presentations
14.15-15.45	Accessibility and flexibility in your own work Architect Angelo Mangiarotti, Italy

Group work

The group work, including the group tasks, has in our opinion been a crucial element of the seminar. In our view it was within this setting that the greatest professional and pedagogic developments took place. As we believe it could be both useful and inspiring for others to "take part" in these experiences, we have chosen to provide a detailed presentation of the group works and the different tasks. Each year the group tasks are altered and developed on the basis of an evaluation and exchange of ideas. We have therefore chosen to present here the group tasks from the third seminar we arranged. The group tasks set in the first seminar are described in detail in an evaluation report (Dale, et al, 1999).

The aim of the group work was:

- To promote experience/observation of what it is like to be functionally disabled and to experience the types of obstacles that a person with a disability may encounter.

- For the members of the groups to gain an insight into the expertise possessed by the various professions and how this breadth of expertise can be exploited with respect to planning for all.

In all, the following students took part in the seminar:
60 occupational therapy students
60 architecture students
20 building engineering students
10 pupils from the carpentry course at an upper secondary school

The students were divided into 20 groups of about 7 people each. This was done in advance, so that the groups would represent a range of disciplines. One member from each group was to sit in a wheelchair, one's sight would be impaired with the help of special glasses, and one would be blindfolded using eye patches and sunglasses. These three physically impaired participants would each have a partner. The other members of the group acted as observers.

As part of their course, the occupational therapy students had had experiences with being physically impaired and were therefore assigned the role of companion or observer.

During the introduction to the group work, emphasis was put on the importance of the students seriously attempting to tackle difficult situations while playing the role of the disabled person.

The situations were played out both indoors in the university college building and in the local community in the vicinity of the college.

Group tasks were allocated as follows:
Four groups experimented with being functionally disabled in a bathroom. They were each told to find their way to their allocated bathroom/toilet in the building. The participants playing the role of the functionally disabled persons had to wash their hands in the sink, brush their teeth, and apply moisturising cream. They also had to make their way to the toilet.

Four groups experienced being functionally disabled in the bedroom. They were each told to find their way to their bedroom in a small hospital ward at the college. Once in the bedroom, the people playing the parts of the functionally disabled had to try to get in and out of bed. They also had to wash their hands in the sink, brush their teeth, apply moisturising cream, and open the window to air out the room.

Two groups made their way to their respective training kitchens. Here the people playing the roles of the functionally disabled were to make tea and coffee for the whole group with as little help as possible.

Two groups were given the task of finding their way to two offices. The people playing the functionally disabled had to open a window and try to reach shelves and cupboards as well as try out the workstation in front of the computer screen. Part of their task included drawing the office. These two groups were asked to come up with design changes to the office on the basis of different needs.

Some groups were also assigned tasks outside the college. While planning the group work, we tried to benefit from the opportunities presented by the college's local surroundings. These included a bus stop, busy roads, a shopping centre, petrol station, café, post office and bank.

Two groups made their way to the shopping centre near the college, where they were to shop in the foodstuffs department.

This meant the groups had very specific tasks and had to find their way to the correct products. After shopping, they had to find their way to the café on the first floor, where two tables had been reserved. Those playing the part of physically disabled persons had to order coffee or tea at the counter. While drinking their coffee, they had to discuss the joint tasks all the groups had been assigned after the experiments.

Two groups were instructed to find their way to the post office and bank in the nearby shopping centre. Here they were told to post a letter and deposit NOK 50 into Save the Children's bank account (the groups were each given NOK 50 in an envelope in advance).

Simulation excercises. Top: reaching for food in a shopping centre.

Bottom: Catching a bus.

A couple of groups were instructed to catch a bus. They had to find out when the bus was to leave, get to the local shopping centre, get off at the bus stop and return to the school along a busy road.

Two groups had to make their way to the petrol station. Here they were told to put themselves in the following situation: what would it be like for a car driver who was in a wheelchair to fill up with petrol and wash the car's windscreen? Those playing the role of functionally disabled people also had to purchase a newspaper and visit the toilet before returning to the college.

Problems in the environment as experienced and reported by a student.

One group was instructed to find its way to the shopping centre via a subway. They had to traverse a car park and a zebra crossing. They also had to find a specific shop and pick up some brochures from there before returning to the college.

At the end of the experiments all the groups were given the following tasks:

- *What impressions were those playing the role of a functionally disabled person left with? Share your experiences.*
- *What observations had the observers made?*
- *Based on the experience you now have, discuss the adaptations you will have to take into account when designing with universal design in mind so that the surroundings you have just encountered will meet the requirements of universal design. Give reasons for your answers.*
- *How can you take advantage of each other's expertise to achieve universal design?*
- *The group tasks should be answered in writing. Prepare proposals to present in plenary.*

Appendix 1, p. 73, illustrates an example of a group task.

Group advisors

Seven teachers were appointed as group advisors in advance. The advisors gathered immediately after the start of the group work. They were provided with information about the role and function of an advisor. The advisors' task was to visit the groups after the experiments had been completed. The advisors were expected to ensure that the process had begun and that it was moving along and be available should the group need clarification or have questions. The groups had to go through the process without too much intervention from the advisors. The advisors were provided with enough money to cover any expenses the groups might have incurred while carrying out their group tasks.

Visiting the groups also helped the advisors see which groups were working well together and might be candidates for making presentations in plenary. The advisors met again just prior to the gathering in plenary, discussed their experiences from the various groups and agreed on which two or three groups would be asked to present their results.

The practical planning of the seminar

Carrying out the seminar was a relatively comprehensive practical business. One person was given the responsibility for co-ordination and the practical tasks were assigned to the seminar's working group.

We strived for the smoothest possible execution of the seminar. All the equipment necessary to carry out the group tasks was obtained in advance. This included special glasses for those who were going to play the role of visually impaired people (which can be bought from Blindes Produkter AS, Oslo (see references)), eye patches (obtainable from pharmacies) for those who were going to play the role of blind people, and sunglasses to wear over the eye patches. The students were given materials and pens to be used in overhead projector presentations. This equipment was put in separate packets for the group leaders. Wheelchairs were obtained on loan from a specialist company.

We obtained class lists in advance of those students that would be attending. On the basis of these lists, we decided on the make-up of the groups to ensure that each group contained as many disciplines as possible. The students were told which groups they had been assigned to when they registered. Group leaders were picked out in advance. They received written information of the group's tasks together with all the equipment they would need to carry out their assigned tasks. Folders containing information about universal design (see Aslaksen, et al, 1997) were handed out to each student during registration.

Tables were reserved in the canteen so the students could sit with their groups during lunch, thus allowing them to spend more time together. They were given the opportunity to use the mealtime for both group work and for social contact, so as to get to know each other better.

Evaluation

The financial support from the Norwegian State Housing Bank was made subject to their receiving an evaluation of the seminar. Thorough evaluations from both students and teachers would also benefit further developing this educational experiment . Questionnaires were prepared, see appendix 2. The results of the evaluation are described in detail in a separate evaluation report (Dale, S., et al, 1999). Subsequently, the seminar has been evaluated annually on the basis of these questionnaires.

The students were particularly pleased with what they got out of the lecture by the Norwegian Association of the Disabled and Østergaard's CD-ROM (Østergaard, P., 1996). Nevertheless, the evaluation showed that the group work had had the greatest impression. Many students said that the experience of being functionally disabled had had a great emotional impact on them. They also felt that meeting students from other disciplines had been important and useful. Among other things, it gave them the chance to discuss issues from a number of different perspectives.

Students on the technical courses gave the group work a somewhat higher evaluation then those on the occupational therapy course did. This may have something to do with their experience of trying to cope as a functionally disabled person. Even though the occupational therapist students had played these roles previously, they nevertheless felt that the group tasks had been useful. They said that the discussions following the experiments had been particularly interesting and educational.

The students thought that the seminar had been very important in terms of future co-operation. The average mark given for this question, on a scale from 1-7, was 6.0. However, most students thought that too little time had been assigned for group work.

Future development of the seminar

All of the departments said the first seminar had been a great success. It has therefore been held on an annual basis since 1999, albeit with improvements and adjustments to the programme. The last lecture was dropped to allow more time for group work. We have expanded the user representation to include both the visually and physically disabled. The introductions are brief. A small group of students from the *Institutt for Samferdsel* (Institute of Transport and Communication) also participate in the seminar. Some group tasks have been adjusted to accommodate to their needs. The accessibility of both train and bus terminals will be tested. Next time the seminar is held, the theoretical part will also include a brief lecture about the universal design of transport and communication.

Conclusion

In our experience, the seminar's teaching methods and content stimulate interdisciplinary co-operation. There is no doubt that organizing such a seminar is a very demanding challenge. The

effort is worthwhile, however, because the results from the evaluations of the seminars are so good. The seminars have already given rise to projects where students from different fields work together. For instance, occupational therapy students have taken part in several major projects together with building engineering students. Occupational therapy students have also participated in projects initiated by *SINTEF, Institutt for Samferdsel*.

We hope that this event will also be a source of inspiration for collaboration after graduation as well. We wholeheartedly recommend that other educational institutes initiate similar interdisciplinary educational collaboration based on local options.

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Appendix 1:

Group tasks "Universal Design" Groups 11-12

AIM:
We want the members of the groups to experience/observe what it is like to be functionally disabled and experience the types of obstacles a functionally disabled person may encounter.

We also want the members of the groups to gain an insight into the type of expertise that the various professions possess and how this can be used with respect to designing and planning for all groups of users.

FUNCTIONAL DISABILITIES:
One person in the group will sit in a wheelchair. The person can use both of their arms but neither of their legs. One person in the group will be visually impaired and the other blindfolded. The blindfolded person will have a companion. Occupational students will act as observers or companions of the blind. The other group members will act as observers of the experiments.

TASK:
Make your way to the KBS shopping centre. Shop in the KBS food department. Those playing the role of a functionally disabled person must buy the following:

The person in the wheelchair must buy:	*The person who is visually impaired must buy:*
1 tub of yoghurt	1 tin of mackerel in tomato sauce
1 tin of peaches	1 packet of macaroni

The person who is blind must buy:
1 apple
1 packet of dry yeast

Make your way to the café in KBS, where a table has been reserved for the group. Each of you must buy your own cup of coffee or tea. Those of you who are functionally disabled must pay for the observers.

While you are drinking your coffee/tea, discuss the following:
- *What impressions have those playing the role of a functio-*

nally disabled person been left with? Share your experiences.

- *What observations have the observers made?*
- *Based on the experience you now have, discuss what adjustments you will have to take into account when designing with universal design in mind so that the surroundings you have just encountered will satisfy universal design requirements. Give reasons for your answers.*
- *How can you take advantage of each other's expertise to achieve universal design?*

If you start to run out of time, you can return to the college in a non-disabled state. Bring the receipts for the food and coffee/tea with you. Your expenses will be refunded today.

The group task must be answered in writing. Prepare proposals to present in plenary.

Appendix 2:

Evaluation form for seminar on universal design

We want your feedback on your outcome of today, along with any suggestions you may have for improvements in the event the exercise is repeated.

We need to know what course you are currently taking:

Tick relevant course:

Civil architecture, 2nd year ☐

Civil architecture, 3rd year ☐

Occupational studies ☐

Building engineering studies ☐

High schoolCarpentry studies ☐

High school Bricklaying studies ☐

1) To what degree have you benefited educationally from the various lectures and group work?

Give your evaluation by ticking off on a scale of 1–7

	None			*Average*			*A great deal*
	1	*2*	*3*	*4*	*5*	*6*	*7*
User perspective							
	1	*2*	*3*	*4*	*5*	*6*	*7*
Universal design from the occupational therapist's point of view							
	1	*2*	*3*	*4*	*5*	*6*	*7*
Handicap, architecture and design							
	1	*2*	*3*	*4*	*5*	*6*	*7*
The Delta Centre's film							
	1	*2*	*3*	*4*	*5*	*6*	*7*
Group work							
	1	*2*	*3*	*4*	*5*	*6*	*7*
Accessibility and flexibility in your own work							
	1	*2*	*3*	*4*	*5*	*6*	*7*

2) What was the most interesting and educational part?

3a) Were you familiar with the perspective of universal design previously?

Tick off on a scale of 1-7

	Not *at all*			Somewhat			Very
	1	2	3	4	5	6	7

b) To what extent do you feel that universal design is relevant to your own subject?

Not relevant		*Average relevance*				*Very relevant*
1	2	3	4	5	6	7

GROUP WORK

a) How well did the interdisciplinary co-operation succeed during the group task?

Tick off on a scale of 1-7

Very poorly			*Average*			*Very well*
1	2	3	4	5	6	7

b) To what extent do you feel your specialist knowledge contributed to the group co-operation?

Tick off on a scale of 1-7

Not very			*Average*			*A great deal*
1	2	3	4	5	6	7

c) Was the group task relevant to someone with your professional background?

Tick off on a scale of 1-7

Not very			*Average*			*Very*
1	2	3	4	5	6	7

d) What was the most useful experience you gained from the group work?

_____

_____

e) For those of you who experienced being functionally disabled; what did you learn from being "visually impaired", "blind" or "wheelchair bound"?

_____

_____

f) What group task were you given?

Group task no.: _____

5) What effect may such a joint seminar have on future interdisciplinary co-operation?

Tick off on a scale of 1-7

No effect			*Average*			*Great effect*
1	2	3	4	5	6	7

6a) Do you think that other professions should be represented at such a seminar?

Tick off one of the boxes

Yes No

b) If you answered yes to the previous question, which professions?

7) To what extent were your expectations for the seminar fulfilled?

Not fulfilled			*Average*			*To a great extent*
1	2	3	4	5	6	7

8) Was there anything about the seminar's content, organisation and arrangement that you felt was particularly noteworthy?

_____

_____

9) If such a seminar were to be held again, do you have any suggestions for how it might be improved?

Write down your suggested changes:

Evaluation form for seminar on universal design

We want your feedback on how relevant and useful you judge this seminar to be for your students/pupils.

Which course do you teach?

Civil Architecture, 2nd year *Civil Architecture, 3rd year*

Occupational therapy *Building Engineering*

Carpentry

1) To what extent have the lectures and group work been relevant for your students/pupils?

Tick off on a scale of 1-7 to give your evaluation

	Not at all			*Average*			*Very high*
	1	2	3	4	5	6	7
User perspective	*1*	2	3	4	5	6	7
Universal design from the occupational therapist's point of view	*1*	2	3	4	5	6	7
Handicap, architecture	*1*	2	3	4	5	6	7
The Delta Centre's film	*1*	2	3	4	5	6	7
Group work	*1*	2	3	4	5	6	7
Accessibility and flexibility in your own work	*1*	2	3	4	5	6	7

2) Have your students/pupils been taught anything about the term universal design before?

3) Will students receive more instruction on this subject during the course of their studies?

4) Do you feel that such a seminar might improve interdisciplinary co-operation in future careers?

5) To what extent have your own expectations for the seminar been fulfilled?

6) Was there anything about the seminar's content, organisation and arrangement that you felt was particularly noteworthy?

7) If such a seminar were to be held again, do you have any suggestions for how it might be improved?

8) Do you think it would be relevant for your course to participate in a similar seminar next year?

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1.4 If Anything, Call It Ergonomics – in Search for a Word in a World Called Science

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Introduction

In October 1996 an academic chair called “Accessibility” was installed at the Department of Architecture of the Delft University of Technology. The mission of this chair was – and still is – to improve accessibility awareness in architectural training. The precise motivation and ambitions of the chair were addressed during the inaugural speech of its managing professor – the author of this article – held in 1997 and published in English under the name of “Differences we share” (Wijk, 1997). In this chapter the author describes his general attitude towards the issue of improving accessibility awareness since the installation of the chair, and what it – in his professional opinion – all seems to come down to: the search for a word in a culture heading for science.

Golden opportunity

Admitted: it is a considerable advantage to be able to introduce a traditionally neglected issue in the curriculum of a design institute, when its necessity to do so is recognised by means of an academic chair. A chair is the carrier of the institute’s values. Nonetheless, within the common culture of the institute, there is still a huge challenge to find the most adequate vehicle to spread the message and to fulfil the ultimate objective, which is – to put it simply – good design.

If one brings down teaching to its essence, it is all about finding words which hit the state of mind of the receiver, of the architectural student, of fellow teachers and of the common culture as a whole. By tradition students just have one ambition, and that is to be one of the top designers of their generation.

Anything seemingly leading away from that ambition is considered to be off the road. However, what is to be considered "top design", depends on the contemporary culture at the institute in question.

Well, due to globalisation and competition amongst different schools of architectural training, at the beginning of the new millennium the institute's output is seriously heading towards an evaluation of its scientific merits. After all, graduated architectural designers are internationally to be called Masters of Science. Therefore teaching architectural design must have a scientific approach and its output must be scientifically explicit.

Being one of the major architecture institutes in the world and wishing to stay that way, or even be the best, the Department of Architecture is eager to improve its scientific image. Research by Design becomes a mainstream issue. For raising accessibility awareness, it would be a waste not to embrace an opportunity like this. However, making use of the opportunity demands a clever use of words which must be recognised inside the mainstream of design, where there is only a distinction between good and bad design. "Inclusive Design", "Design for All", "Universal Design" are not the proper phrases and, for that matter, the word Accessibility is not either, stigmatised as it unfortunately has become.

A Stigma

Initially it seemed like such a good word: Accessibility. How could designers possibly misinterpret it? My daughter was three years old when I asked her what the word accessibility meant. After a few moments' reflection, she answered, "Accessibility is when you have a door." Delighted by its simplicity, I often quoted my daughter's definition. When I asked her the same question many years later, she gave the same reply half of those asked give: "Accessibility has something to do with handicapped people." The remaining fifty percent has no idea what it means.

As accessibility adviser to the Dutch Government Buildings Agency (Rijksgebouwendienst), I visit a lot of governmental buildings. I always call in advance to make an appointment with the facility manager of the building. "What a coincidence, we just installed an invalid lift in our reception hall." "That's won-

derful", I reply, "but actually, I'd like to see the entire building and also to inspect such things as the accessibility of the work locations." "But," he says, sounding a bit doubtful about the purpose of my visit, "we don't employ any handicapped people here." Nevertheless, I manage to make an appointment. On the way there, I painstakingly try to come up with a synonym for *accessibility* so that the conversation will proceed more fluently. I fail to find it.

At the time of my inauguration, the newspapers regarded me as "the professor whose job will be to remove thresholds". A large national daily newspaper published an article entitled "The Threshold Professor" calling me a Professor in Barrierology. When introduced to architect and fellow professor Carel Weeber in the doorway of his room, he asked if he should now remove the sill of the doorway into his room. "That depends," I replied, "on whether you are expecting visitors", and thought: "never mind….".

Right at the beginning of my appointment I started to have doubts about the choice of this word. How would I explain to family and friends that I have been appointed merely to lecture about thresholds? Added to that, I know nothing about thresholds. Every time I am lost in thought and trip over the sill of the door into my own room, I wonder: what purpose do those little sills serve anyway?

There wouldn't be much against this limited association of thresholds with the so-called Disabled, if it would actually lead, as a matter of course, to built environments completely accessible to this user category. But what happens is the opposite. For some reason or other, the building industry is not particularly interested in solving the problems of this small group, which it fears to think about. Efforts in the field of accessibility remain, thus, incidental acts of charity. It is a welfare issue.

The stigma is historically understandable, but academically speaking odd. The Dutch definition for accessibility – as used since 1990 – is of a very basic nature. According to its definition, accessibility is the feature of built facilities which enable people to reach and use those facilities (CCPT, 1990). It sounds like the very nature of architecture, instead of being some sort of additional quality. It shows how tricky the use of words can be.

Architectural design as a science

Despite its stigma, the need for raising accessibility awareness is obvious. As suggested earlier, a scientific design attitude might just be the right vehicle to spread the message. Question is: what is science?

The first criterion for science is the capacity of a discipline to constantly improve its output. The scientific approach is based on consequently deepening the insights of its paradigms, and even renews the paradigms once in a while. Does architectural design fit this picture?

At the beginning of the twentieth century architecture was strongly associated with science. New building technologies were – for example – compared with the high-tech automobile industry. Architecture and city planning were subject to a scientific approach. It seemed science really got hold of our environment since the proclamation of the CIAM principles. Or are we looking at self fulfilling prophecies here?

In either way, the concepts of Le Corbusier and his colleagues had an enormous impact on the image of our planet. The Romans were in this respect a lot more modest. A Roman city – for example (fig. 1) – must have been a beautiful environment two thousand years ago, embracing its romantic society. In modern times we build differently. Fig. 2 shows a picture of the latest output of architectural design, the Dutch Pavilion at the Expo 2000. The building fools around with gravity, and by doing so, provides its visitors with an experience, which they never had before.

Maarten Wijk
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Fig. 1. A Roman city must have been a beautiful environment two thousand years ago.

Fig. 2. The Dutch Pavilion at the Expo 2000

The capacity of enforcing new experiences may lead to the conclusion that architecture is a product of science. But then again, architecture is not only about spectacular experiences. In most cases it is just a facilitation of ordinary activities: a building to work and a house to live in.

Certainly less spectacular is the way we build houses in The Netherlands. Since 1800 we have been building houses as shown in fig. 3. Now we do it as shown in fig. 4. I must admit I hardly see any changes. Maybe the bricks have a different size now, or a different shade. New houses may be environmentally correct and may be built more efficiently. However, in the theory which I want to address in this chapter, it does not really matter whether the looks of buildings changed or not. I am not particularly curious about the form and technical aspects of built products. I am curious about the performance. Do new buildings actually perform better than old buildings?

Fig. 3. Dutch homes in the 1800.

Fig. 4. Modern Dutch homes.

Let us take a look at the automobile industry. Around 1900 automobiles looked like carriages without horses. Within only one century we all drive around in highly sophisticated machinery with cruise control, remote control, route navigation, ABS, air conditioning, and air bags (fig. 5). A different form: yes, different technologies: yes, but certainly a better performance: new cars are faster, relatively cheaper, safer, have more comfort and we can choose any model we want. These are all function driven innovations. It makes automobiles products of science.

Fig. 5. Modern, sophisticated designs.

To be able to say whether architectural design is scientific is to measure it with the universal principles of a scientific design approach. We all know them. First we have a box. It stands for the brains of the designer. There is going information into The Box – the input – and out of The Box comes the output, which is a design of some sort. Science demands that the output is evaluated. If the design does not comply with the input, something must have gone wrong in The Box.

However, even if the output complies with the input, we will not be quite sure whether the output is the best solution for the problem. We must find out whether the input was valid by comparing it with the latest insights. By consequently validating the input, every time a process is going through The Box, the output will perform better than before. This is a scientific approach. This simple scientific design model should also apply to architectural design.

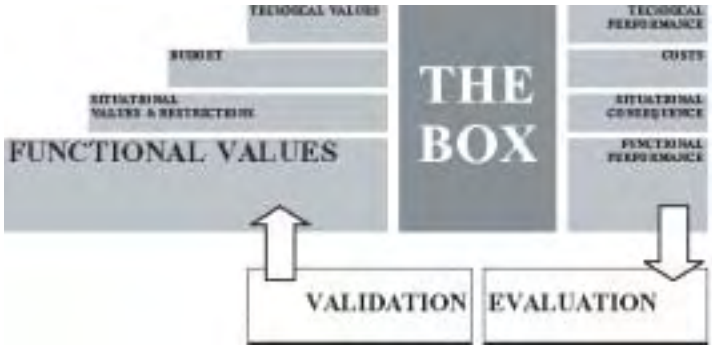

Fig. 6. The Box.

We have The Box (fig. 6), which is a student, a teacher, or an architect who was a student once. He is either a genius or an average designer, but in both cases a Master of Science. The input of an architectural design process consists basically of:

– functional values (which refer to what we need),
– situational values and restrictions (which refer to what we will influence),
– the budget (which is what we are willing to pay), and finally
– technical values (which deal about how we can comply).

The output is obviously a design for a building, which is basically:

– facilitating people so that they can work or live there,
– in harmony with its surroundings,
– within the budget, and
– properly constructed.

In this model the input will – of course – be validated and the output evaluated. And logically the functional values form the basis of this model: they are the very reason why we design in the first place. Let us take a look at those functional values. These aspects might be:

– Image (to be able to associate with the building),
– Use (to function as you wish and can),
– Safety (to feel secure and be secure),
– Health (to stay breathing), and
– Flexibility (to be able to change).

One could look at these aspects at all kinds of levels. To mention three, these levels might be:

– Our Society (which are our common cultures),
– An Organisation (which may be a company or a household), and
– The Individual (who is you and I, he and she).

By crossing the functional aspects with these three levels, one gets a matrix which has to be filled with input validated knowledge (fig. 7). This is a rather complex matter, because – though people share the same needs – people differ in what they expect at each level with regard to the values.

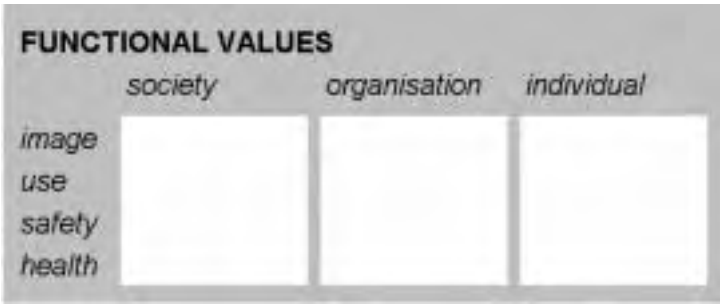

Fig. 7. Matrix

In society people are – for example – rich or poor, white or black, catholic or protestant. Organisations differ in several ways, in size, in image, in kind of activities, in lifecycle, and within organisations people have all kinds of different functions from the management to the work floor. Households are big or small, we are a single or a partially couple. As individuals people are – of course – all unique. The chapter deals with this later.

So, people are all different, and this makes architectural design rather complex. It comes with the status of the discipline. And if indeed a designer succeeds in creating a building which meets the matrix filled with validated values, one can say: yes, architectural design is Science, and the output can be labelled Architecture.

A Mismatch

But how about the following empirical data; are these master-pieces of science?

– Glass towers being used as a library, despite the fact that science learned ages ago that books should be stored in dark, cold places (fig. 8, Library of France, Paris, architect Perrault)
– An unprotected hole in the floor, in which my and anyone's daughter might easily fall down (fig. 9, KunstHal, Rotterdam, Architect: Koolhaas).
– A quite slippery-when-wet surface at a pedestrian route (fig. 10, Bridge, Bilbao, Architect: Calatrava).
– An unpredictable slippery-when-wet square, which is also hard to climb on with anything on wheels (fig. 11, Schouwburgplein, Rotterdam, Architect: Geuze).
– A slippery-when-wet-part-three glass floor, leading to a slope

which starts with a step, a slope which is too steep and has no safety measures at the most hazardous spots, a slope which leads to the main entrance, which could have been at street level in the first place. Not a product of a scientist I might add, but the signature of a perverted form fetishist with slippery-when-wet client (fig. 12, AZL Head Office, Heerlen, Architect: Arets).

Fig. 8. Library of France, Paris.

Fig. 9. KunstHal, Rotterdam.

Fig. 10. Bridge, Bilbao.

Fig. 11. Schouwburgplein, Rotterdam.

Fig. 12. AZL Head Office, Heerlen.

Well, these are all examples of exceptional architecture, which operates above the laws of science. It is Art. Okay, I can appreciate this thought. However, it is not only highly respected architecture which creates a mismatch between environment and its use. The following examples are considered to be middle of the road architectural output, and what do we see?

– Something silly like a doorbell out of reach (fig. 13),
– A stairway quite hazardous to walk on (fig.14), and
– A typical Dutch ladder (fig.15). Hardly scientific, since Adam and Eve already knew how best to climb stairs, and we are obviously not able to make them walk safely.

Fig. 13. A doorbell out of reach.

Fig. 14 A hazardous stairway.

Fig. 15. A typical Dutch ladder.

It is as if we design buildings which seem to function properly – and which do function to a certain extent – but which also consist of mismatches between the image, use, safety, health and flexibility asked for, and what has been provided. This mismatch between man and environment can be visualised by a square and a circle (fig. 16). The circle represents the needs of people, the square represents the performance of the building. You can see the mismatch. Where does it come from?

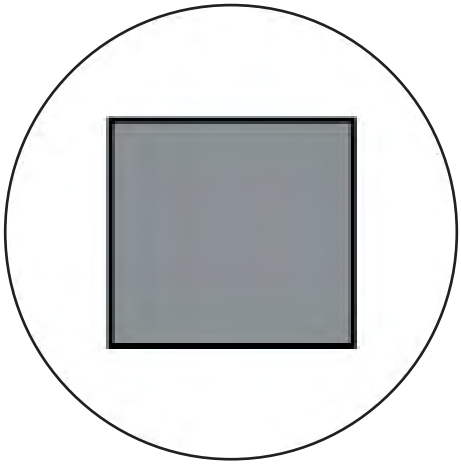

Fig. 16. Mismatch between man and environment.

In search of a match

It may be obvious that both exceptional design and middle of the road architecture have hardly anything to do with a scientific design approach. A scientific design approach would have recognised the mismatch and would have dealt with it sufficiently over the ages. We all would have been living in universal space, happily ever after. But the truth is that the functional performance of buildings did not significantly improve compared with other kinds of products. The question is how to overcome the mismatch and help design institutes to gain their scientific status.

Designing for The Disabled

What should be taken care of is to update the design input used. This can be done by investigating the experiences of people when they actually make use or try to make use of a building. When doing so, one might find that people meet all kinds of problems functioning in and around built facilities. Obviously the so-called Disabled do. This is indeed so obvious, that it might lead to the conclusion, that the needs of “The Disabled” are the proper input for good (scientifically correct) design. However, Designing for The Disabled means (and implies) implicit design with special facilities attached for special user categories, whether one calls it – for example – Universal Design, or not. In the diagram you can see little squares around the square of implicit design, representing the specific needs of categories. These little squares do not fill the circle and they are isolated (fig. 17).

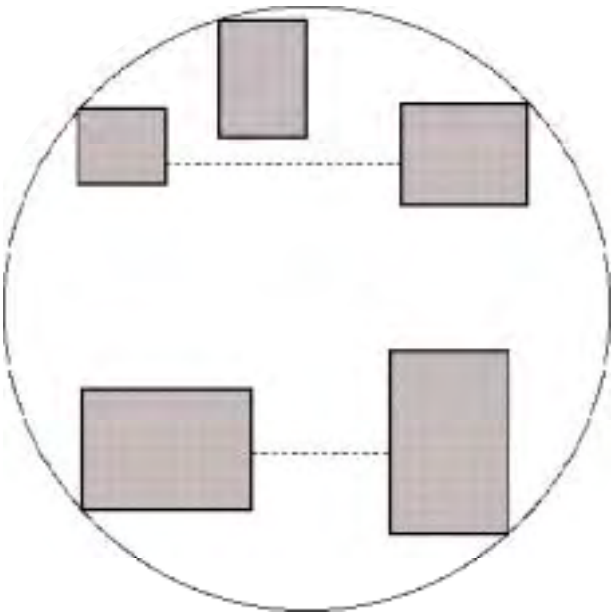

Fig. 17. Implicit design. Mismatch for some user categories.

Therefore designing for the Disabled still results in buildings where people catch their sleeve on the door handle (and spill coffee on the floor), where people get annoyed by a child rattling the flap of the letterbox because it cannot reach the doorbell, where luggage is crushed in a turnstile, where a high heel is lost in a floor grating, heads bump against awnings because spectacles are steamed up, and where people may break their neck on the stairs. People tend to think that these are just everyday inconveniences, caused by their own clumsiness. But in fact, designers have not been using the right input for their design processes. Designing for the disabled is no design science.

Integral Approach

Standardised men and women do not exist, nor do The Disabled. People are all diverse. We are thin or fat, short or tall, strong or weak. Sometimes we cannot see or hear well, and our minds can change gradually or suddenly from being clear-minded to confused. Unacquainted with a city, we can get lost – whether this happens occasionally or all the time, it happens to everybody at one time or another.

This phenomenon was recognised at the beginning of the 1990s. Consumer organisations started to develop a new approach, which was called the Integral Approach. The strategy is to combine the special needs of categories into one package of requirements, and emphasising that not only people with disabilities benefit from the measurements, but also other categories like children, the elderly and people with luggage and prams.

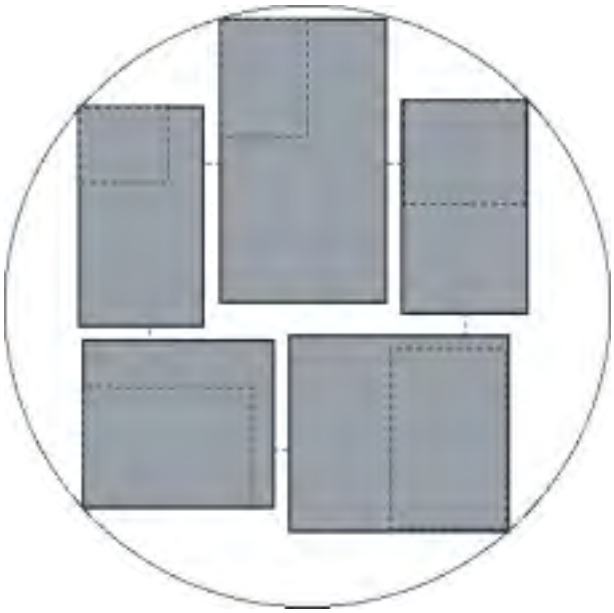

Fig. 18. Integral approach – still a mismatch.

This integral approach can be put in a diagram as well (fig. 18). As you can see the square has grown, covering parts of the special needs, but not covering the whole circle. There is still a mismatch. The design input will still not pass the test, but who cares, the university does not even know about this input, it knows nothing at all about the topic, that is, before the installation of the chair. The so-called Integral Approach – which could have been called Universal Design – is no design science. It goes much deeper than that, and is more obvious still.

Ergonomic Diversity

There are two major concerns. First of all we have the designer. Architectural designers have been trained over the ages to believe that they are to interpret the functional values of the buil-

dings they designed according to their own merits. But it may even be more concerning than that. When a student is explicitly asked what functionality he is expecting from the environment, he has no clue. He is simply not trained to look for the user aspect at all. His major concern is appearance, i.e. what the design looks like. Above that all, he has learned that this omission is in fact considered to be a quality in the educational culture: His examples are rewarded with glossy – people free – pictures in respected architecture magazines. Designers Only.

Secondly, there are the traditional accessibility promoters with their categorical interest in addressing the specific needs of groups, maintaining the assumption that man can be seen as a set of categories. People all differ, but they are still being represented as categories. However, the sum of categorical needs is not the same as covering the needs of all people. When thinking in categories one overlooks the needs people share. There are only individuals, each changing their behaviour and capacities every second of the day. The strategy is not to think in terms of people, but to look at every single aspect of human functioning. What should be done, is dividing human needs into separate aspects of functioning, and then search for the proper values to cover the extremes in each of these aspects (fig. 19).

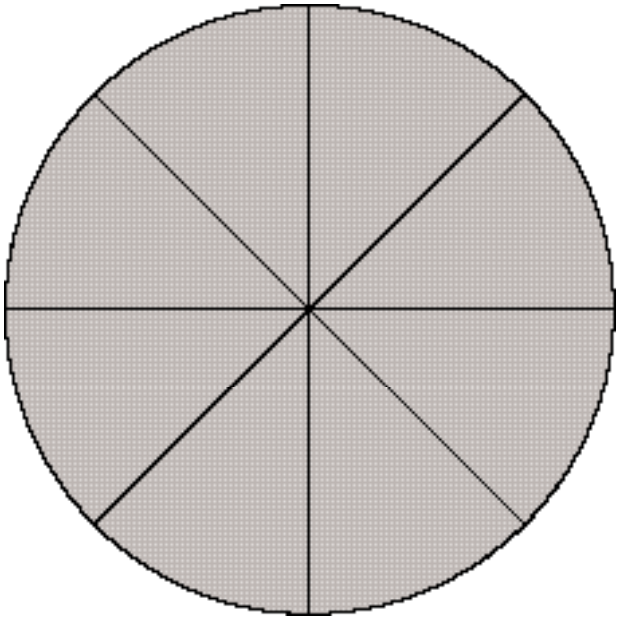

Fig. 19. Proper values to cover the extremes. No mismatch.

Aspects of functioning are just the ordinary things which people do to function in the environment, like seeing, hearing, feeling, touching, smelling, recognising, understanding, appreciating, moving around, operating, breathing, staying warm, and cooling down. Once these aspects are seen in the light of human diversity, it is possible to validate the functional values concerning all kinds of environmental parameters like lightning, acoustics, temperature, space and texture.

Epilogue

From 1997 up to 2001 the academic chair of accessibility – myself and Ita Luten – has been working on a book for teaching purposes, deepening this ergonomic approach into pragmatic design methods and criteria, to be used in several stages of interior design, architectural design and city planning. It will be published (in Dutch) by the Delft University Press in October 2001 (working title: *Mens & Omgeving – People in their environment*, M. Wijk I. Luten, 2001).

To address our work at the Delft University, we use the phrase “Ergonomics of the build environment”, covering all environmental parameters which enables people to function effectively and comfortably, safely and healthy in the environment, recognising the common needs of people in general and the needs of the individual to reach for all its rich diversity. If students are trained to take this scientific approach to their discipline seriously, there is no way past an ergonomic approach based on people the way they are: diverse but with common needs. No word is needed to express the obvious, but if one calls it anything: call it ergonomics. As mentioned to my dean, November 2000.

References

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Photo: FotoKnutsen AS

1.5 Multi-Dimensional Evaluation as a Tool in Teaching Universal Design

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Introduction

Universal design has come a long way since its inception. Some of its principles and objectives have been outlined and to a lesser extent some of its applications have been verified. But there is an urgent need to expand these to ensure its continuing evolution. For example, how can the limits/parameters of universal design be established under wide-ranging situations and contexts? What metrics do we use to evaluate success? How do we incorporate the fast pace of globalisation in order to ensure that resources are used frugally: that design can work alongside nature, not against it; that the scale of solutions matches the scale of the problems? How can universal design ensure the *continuous flow of value, seamlessness, sustainability and the quality of life of a significant number of human beings?* What is the most effective approach to teach universal design for future generations?

This chapter endeavours to address some of the issues described above with a particular focus on the built environment.

In order to understand the impact of universal design on the built environment such as housing and city-scapes it is crucial to understand the background of universal design and its development. It is interesting to observe that in Japan design power has for decades been widely accepted as being central not only to the quality of spiritual life but also of product wholeness and market power. In the typical Bushido code good design is seen as the creation of a product or environment that is totally right, made in the right way to meet user needs, of the right material, at the right price, to the right specification, to deliver the right

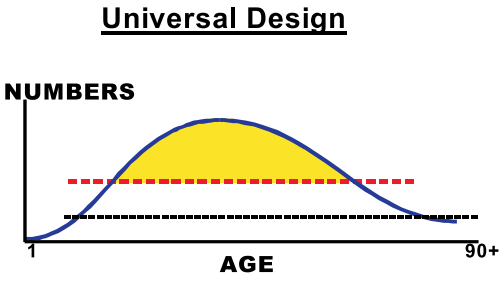
performance. Whilst this proto-universal design approach has clearly been successful in Japan it is difficult to objectify and translate it to other cultures – more so, in the context of teaching.

Universal Design

The title covers a range of over-lapping phrases whose adherents usually claim exclusive rights and insights to their own particular version. Some of the more popular ones are: inclusive design, design-for-all, barrier-free design, transgenerational design, design-for-the-broader-average and design-for-the non-average as coined by the author for a new course for post-graduate architectural students at the Polytechnic of Central London in 1973. Despite their varying focus the essence of all these definitions can be synthesised into 'universal design'.

Universal design is the concept which focuses on achieving accessibility to structures, products and services by planning for the fullest range of human functions at the blueprint stage. The two main goals of universal design are (1) to enable accessibility to the widest range of individuals and (2) to eliminate the need for retrofitting and reconstruction. Universal design is one aspect of a larger trend in the design fields described by Weisman as the "politics of inclusion and wholeness" in place of the patronising "politics of tolerance and competing interests". Fundamentally, it is an approach that values and celebrates human diversity. Above all, it highlights a major paradigm shift – from treating people as part of the medical model, as dependent, passive recipients of care, to a model where people are treated as equal citizens and disability is seen to be either irrelevant or merely as a social construct.

With the above broad characteristics of universal design in mind it can best be illustrated using the following simple diagram:



The shaded area at the top of the bell curve depicts mainstream design which largely ignores universal design principles thereby excluding a greater range and number of people, especially those who are disabled, elderly, left-handed, colour blind, poor, etc. Ironically, this lack of consideration also results in a smaller market-base. The bottom dotted line highlights that it is possible to enlarge the range and number of users, and the potential market base by using universal design precepts culled from validation, verification and. evaluation exercises.

Brief History

The main thesis of this article is that evaluation as a process is a crucial platform for teaching universal design principles. This statement is supported by the author's thirty years of experience carrying out wide-ranging evaluations and then applying the results to teaching design, supervising postgraduate research and generally bringing about greater awareness of design issues. In 1973 when starting a new post-graduate course for architects this exercise consisted of practical design projects focusing on multiple disabilities, lectures by eminent leaders in fields such as design methods, politics, policy, ergonomics, housing, etc., and visits to mental hospitals, special care units, doss houses, homes for the elderly, run down city-scapes etc.

From 1979, based at the Special Needs Research Unit (SNRU), University of Northumbria, most of the evaluation work resulted from consultancy contracts and covered a range of building types, wheelchairs, public transport and transport information, domestic and specialised products, playgrounds kitchens, computer systems and accessories, assistive technology, telematics, packaging, etc. Some of the clients who funded the evaluation of just under 400 separate items included British Gas, Consumers Association, Research Institute for Consumer Affairs, European Commission, Safeways Plc, the Passenger Transport Authority, New World Cookers Plc, and Newcastle City Council.

The multi-dimensionality (which is elaborated later) of the title emerged from cost, economic and social impact considerations on some contracts and from the fact that the projects were entirely targeted at disabled or older people. This brought into play serious ergonomic and human factor considerations related to extreme physical, sensory, cognitive and learning limitations of potential users.

Evaluation[3]

So what is evaluation? It is concerned with gathering information through the involvement of users about the usability or potential usability of a product, environment or system in order either to improve or assess its functionality and to provide generic feedback for related range of products. Without evaluation a design reaching end-users would be untried and would merely reflect the intentions of the designer but with little potential understanding of user needs. More importantly, it is now imperative to incorporate several cycles of iterative or usability evaluation during the design development phases in order to enhance quality. There are other more significant reasons why evaluation is necessary both during and after the design process:
- Statutory health, safety and building standards have to be met.
- A detailed understanding of product/environment use is required for design refinement.
- General levels of performance need to be achieved due to commercial market forces from rival products.

Every evaluation takes place within a definite context which includes:
– The experience level of users
– The types of tasks that have to be undertaken
– The environment in which the product has to be used
– The type of system or product that is being evaluated

The User/Task/Environment/Product/System Approach

Every single contextual component of evaluation also provides specific guidelines for developing similar range of products and pointers to avoiding mistakes that add up to poor design. These components are also the minutiae of teaching universal design thinking and to solving design problems for the greatest range and number of people. The generic checklists that emerge from considering user requirements during the design stage and then at the evaluation stage are best exemplified by the following flexible and expandable checklist based on the above approach. Although synthesised from literally hundreds of practical evaluation protocols or checklists it is crucial that designers and teachers treat it as a guide rather than as something set in concrete. In other words – merely a tool for thinking rather than as a rigid formula.

3 Editor's note: Evaluation methods are also described in chapters 1.5, 2.4, and 2.5.

A. The User What are the characteristics of the user?

Age
Sex
Diagnosis
Mental state/Learning abilities
Functional limitations:
e.g. strength in limbs
coordination of movement in limbs
hand and spinal function
absence of limbs
endurance/energy
trunk stability when standing/sitting
sight
hearing
speech
psychological problems:
confusion
poor memory
Other people involved in use of product:
to install
maintain
clean
repair

Some further questions:

Children:	Can the product be used by them? Should it?
Handedness:	Has suitable compromise been made between requirements of the 90% right-handed users and the 10% who are left- handed.
Anthropometrics:	Is product/environment usable by: a) women in advanced stages of pregnancy? b) fat persons c) extremely tall persons d) extremely short persons

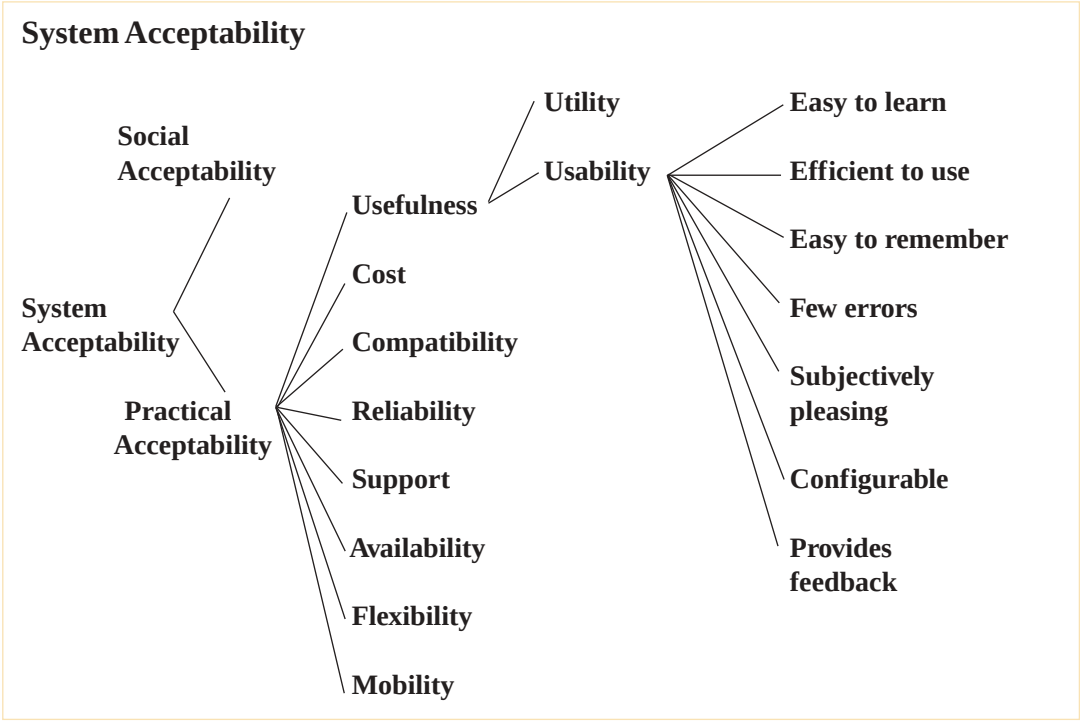
B. TheTask: What tasks should be achieved with the product/building/system?
What actions are required to carry them out?
What skills are required to carry out the tasks?
What is the dynamic interaction between the user and the task; between environment and the task?
What is the precise sequence of operation?

C. The Environment:	In what conditions will the building/product be used? Under what physical conditions? acoustics moisture lighting heat vibrations, etc Would it have to be installed? in what conditions? to what materials? to what available spaces? Would it be used in conjunction with other equipment, furniture or structures? What would be their characteristics? What kind of social environment would the product/building be used in?
D. The Product/Building /System	What is the product/building for? What features should it possess? For what activity is it intended? What are the principles for operating it? Where would it be used? Would it be used in combination with other products? Would it be used in combination with other systems? Would it need someone's assistance? Whose? How frequently would it be used? How can the user obtain or access it? How can it be installed? How can it be maintained? How can it be cleaned? How can it be moved, assembled, or adjusted for use?

In the context of evaluation all the above are components of usability which is an integral feature of universal design. The focus on usability puts the user at the hub of any design exercise. The ISO Draft International Standard (DIS) 9241-11 "Guidance on usability specification and measures" defines usability in the following way:

- *usability*: the effectiveness, efficiency and satisfaction with which specific users achieve specified goals in particular environments;
- *effectiveness*: the accuracy and completeness with which specified users can achieve specified goals in particular environments;
- *efficiency*: the resources expended in relation to the accuracy and completeness of goals achieved;
- *satisfaction*: the comfort and acceptability of the work system to its users and other people affected by its use.

In the light of the author's experience of carrying out validation exercises in the human computer interfaces (HCI) domain and in view of the overlapping nature of design particularly in the context of universal design it is possible to extend the components of evaluation even further as exemplified by the following chart:



Standards

This far one of the most important components missing from the above overview is that of standards and standardisation. The designer's conformity to standards that uphold universal design principles can enhance product/building quality and promote good practice. *Standards can also form a metric for evaluation as they are a process for establishing common rules and characteristics of products, buildings and services to be used when manufacturing, designing, building and selling products and services***.** Standards can also provide a prescription or guidelines when initiating a new project and cover such topics as:

– buildings
– ergonomics
– surface temperatures of electric appliances
– safety of household appliances
– heating, cooking and ventilation
– garden equipment
– safety of machinery
– lifts
– child safety issues
– traffic safety
– quality of internet services
– smart cards
– smart houses

Standards also cover services such as:
– measurement of quality of postal services
– terminology for tourism operators anf hotels
– quality of public transport

User Panels

An integral and unique feature of SNRU's evaluative work was the voluntary panel of disabled, older and ordinary testers first established by the author in 1981 for evaluation the Tyne & Wear Metro System which had just been opened. Over the past twenty years the panel varied from a core of 250 to just under 1000 members. Starting exclusively with volunteers with a self-admitted disability or problems using components of their environment, considerable attention was paid to keeping the range of disabilities proportional to the national average as first established by the Unit for the Commission's RACE Programme. It should be pointed out that this was not always possible. In the recent past more and more ordinary users have been added largely due to the increasing knowledge and spread of universal design principles. Despite the problems of proportionality the size of the panel made sampling of various disabilities empirically viable. However, it is interesting to note that when students were introduced to groups of volunteers one of their first observations had a common theme – that despite their social and economic differences which have tended to keep disabled and older people apart, many similarities in functional characteristics were evident in panel grouping. This was clearly the beginning of their hands-on universal design awareness. They learned more from this process of interaction than from lectures or studio work. (On average just over half the panel was over 60 years old – a reflection of the burgeoning demographic shift, amongst others.)

Sometimes the number and range of categories selected for a specific evaluation largely depended on the following:

- conditions imposed by the contracting organisation, such as a request to concentrate on the visually impaired market sector
- the nature of the product, e.g. specialised easy-to-wire plugs compared with gas or electric cookers which require more extensive and exhaustive data collection
- the overall budget which dictated what could be achieved in a given timescale; the honoraria that could be afforded to pay the volunteers; the geographic and disability spread of the volunteers.

Usability Issues

Some of the theoretical issues were discussed earlier. In the practical context of the various evaluations the prime 'teaching

goal' aside from satisfying contractor requirements, was to learn from the panellists about their experiences with products and environments. What design feature made the product work for them? What features render a product/environment inaccessible? In the early 1980s the reason for this emphasis was that traditionally, disabled and especially older consumers had not been the subjects of market research. There were very few studies describing usability from their perspective. It was also a reflection of the fact that a large proportion of users with special needs made do with 'ordinary' products to the best of their abilities. To some extent this is true of mainstream society today as it goes about making the most of poor design.

Typologies, Taxonomies and Design Morphology

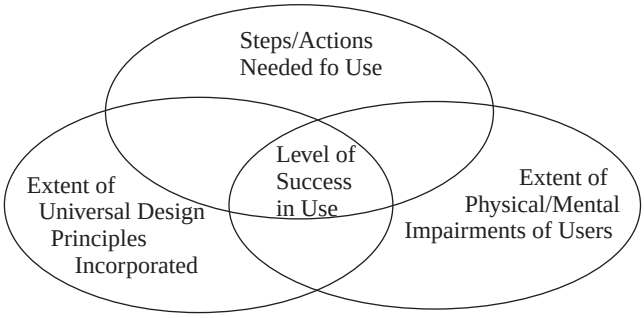
Contractually, the main goal of the evaluations was to establish some sort of a usability metric for the product/environment and to provide feedback to the client for further refinement. This feedback was based on the analysis of an evaluation protocol – a set of questions very much focused on the actual use of the product/environment. These protocols ranged from thirty-five A4 pages for cookers; fifty pages to evaluate access to a university to just three pages to evaluate screwless plugs. Severally and jointly with the research Institute for Consumer Affairs (RICA) and others over 500 pages of questions (or checklists) have been developed covering a range of generic products and environments.

The fact that the protocols emerged from establishing the typologies, taxonomies and relationships centred on the specific product/environment being evaluated holds great promise to the evolution of universal design. The methodology is a solid contribution both to establishing a design morphology and as a teaching/analysing/awareness raising tool. It is also a major help to establishing generic guidelines and to evolving meta-rules for clarifying functional specifications.

Example 1

Perhaps the simplest example of the above approach which highlights the factors affecting the successful use of a product or environment is given below in Figure 1. Due to weighting of the three main elements shown and the ever changing circumstances at any time, it has to be assumed that the three rings are

in a constant state of flux and subject to centripetal and centrifugal forces. The greater the parallax in the centre the more successful the product in use.



Example 2

The following is a simple example of the generic process of establishing user tasks when testing a new product/environment. It is a prerequisite to the more detailed processes that follow, which in turn lead to the final protocol or checklist. This table is focused on the evaluation of the whole range of microwave cookers. But it could equally apply to any other product, system or environment:

Establishing User Tasks

Task sequence involves three main areas of operation
Loading; Programming; Unloading

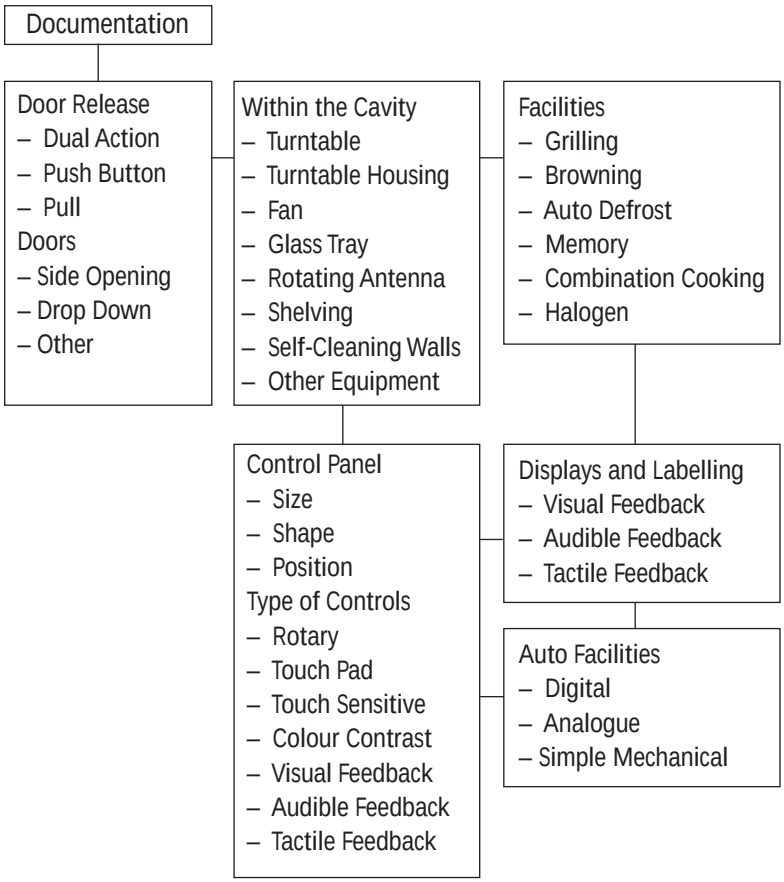
Task sequence can involve the following action
Grasping; Lifting; Pulling; Pushing; Turning

The standard sequence of operation is
Opening door; Placing an object in the cavity; Closing the door; Setting programme; Starting programme; Switching off; Opening door; Removing object/utensil; Closing door; Cleaning any spillages

Factors considered in arriving at overall evaluation
Overall ease of use within each separate task; Comfort of the user whilst using appliance; Ease of understanding instructions; Effort required to carry out each individual task; Absence of any sharp edges or dangerous components eg safety; Ease of cleaning; Audibility of signals, timer, etc. Colours, contrasts, lettering, light, etc.

Example 3

As the next step in the process, the following figure highlights the microwave cooker taxonomy in terms of the different key components and their logical relationship. The figure also introduces the concept of clustering components that belong together and the concepts of main and sub-categories.



Example 4

The evaluation procedures described this far can also be used to assess the suitability of all the components in a house for different types of impairments as shown over the next two pages:

Restrictions Problem area or object	dependant on helpers, restricted mobility	restricted movement of head, rising, bending, grasping, turning, kneeling	restricted directed handling & finger control	none or very restricted mobility of the upper body	sight problems or blindness	none or very basic co-ordination, abrupt movements, balancing problems	Restricted movement in upper limbs	severe hearing & speech defects
Dishwasher	No particular problem except minor difficulties eg.that of opening the machine	Problems opening & closing the door, for some this is impossible because of their r estrictions	No special problems only some small non-specified difficulties	Generally incapable of using a dishwasher	Plugging in & opening switch, difficult to read, impossible to know if on or not; cannot see inside the machine	Generally regarded as a problem, without considering individual elements	Difficulties opening & closing the door; difficulties reaching the back of the machine; difficulties putting in special salt	Cannot establish when machine is running & when corresponding cycle is ended
Windows	Difficulties cleaning windows particularly because of height	Impossible to clean windows; difficulties opening, closing & looking out; difficulties opening/closing curtains; fear that they may fall out low windows	No problems	General difficulties preventing opening; closing & cleaning; difficulties getting at curtains & closing windows	Cannot see whether it is clean & without streaks; fear of leaning out window when cleaning	Restrictions prevents cleaning by oneself; extreme problems opening & closing window	Cannot reach window in order to clean it; impossible to clean outside; opening & closing too difficult; difficulties getting near window with wheelchair; limited view	No special problems
Floor covering	Difficulties cleaning floors; mobility impaired by deep pile carpets; loose rugs are a greater danger	Problems turning; cleaning; things breaking on hard floors when they fall	No problems	Carpets make wheelchair movement more difficult; because of disability they cannot clean	Cannot recognise whether cleaning is necessary & when clean, whether it is clean or not	Problems cleaning particularly with dust pan & especially with loose lying carpets	Carpets cause friction; loose edges are difficult to negotiate; vacuum cleaner difficult to handle;flat slippery surfaces are particularly dangerous for old or threadbare wheels	No problems; small bother with cleaning
Bath	Problem getting in or out; difficulties reaching for cleaning purposes	Need basic help; sides too low - danger of slipping, too hard; danger of falling	Small difficulties; some demand help	Bath too low & slippery	Balancing problems when using & cleaning; does not know when clean; cleaning substance changes feeling; slippery; sides too low	Difficulties getting in or out; cannot reach in to clean it	Often restrictions prevents person from using bath; difficulties getting from chair into bath; difficulties reaching fixtures	Cannot hear when water is running or overflowing
Rubbish container	Problems transporting rubbish outside; difficulties emptying rubbish into container	Problem of transporting rubbish; rubbish container difficult to access.	No problems	Some cannot, others have no problem	Some demand shorter routes to rubbish container	Transport problem, emptying as well as reaching the rubbish container	Access with wheelchair not possible; cannot take rubbish out; rubbish container too high	No problems
Bed	Making beds is problematic	Problem making bed as well as getting in or out	No problems	No room to move around bed, cannot make bed	No problems	Changing bed-linen is a problem	Cannot make bed; no way around it; bed too high for wheelchair	No problems
WC (toilet)	Problem sitting down & standing up	Restrictions prevents independent usage; seat too low; cannot reach handle	No problems	WC too near side wall space for wheelchair too small	No general problems; very often WC too small	WC too small; space for manoveuring	Seat too low; movement difficult; problem closing door from inside, cannot get near enough	Cannot hear toilet; fear of overflowing when they are blocked
Built-in (walk-in) cupboards	Insufficient space; shelf too difficult to reach	Shelves & hangers too high; space too small; no light; no view; no storage space for brooms, luggage	No problems	Shelves too high, insufficient space	Doors difficult to handle	Stretching, too little space, jamming of sliding doors	Opening too narrow, cannot get at things high up or low down, clothes rack too high, cannot get near enough with wheelchair	No problems
Shower	Problems standing, nothing to hold on, fear of falling & slipping	Cannot get in or out, fixtures difficult to reach, space too narrow for 2 people if helper required, slippery	No problems	Too small for standing & probably for helper as well, jamming sliding doors difficult to manage	Fixtures too low, difficult to grasp dial, soapholder & other things too difficult to find	Problems moving, standing up, standing and shower controls	Cannot use fixed shower, needs help moving, difficulties reaching fixtures	No problems

Problem area or object	dependant on helpers, restricted mobility	restricted movement of head, rising, bending, grasping, turning, kneeling	restricted directed handling & finger control	none or very restricted mobility of the upper body	sight problems or blindness	none or very basic co-ordination, abrupt movements, balancing problems	Restricted movement in upper limbs	severe hearing & speech defects
Light	Problem changing ceiling light-bulbs, generally too few & badly placed switches	Wrongly & badly located switches & sockets, cannot change bulbs	Cannot change bulbs	Switch too high, too difficult to reach, too few switches	High lights dazzle - unpleasant, placing of switches in different places causes one not to know whether light is on/off, need non-dazzle light or high concentration of light	Cannot change bulbs, problems using light switch	Switch difficult to reach, switch too high, too difficult to use. Cannot change bulb	No problems
Wall sockets & electrical appliances	Difficult to reach/ no problem	Too low, too little, problems with plug-ging in & taking out	Problems with some.	Socket behind furniture or in inaccessible cor-ners, problem with plugging in taking out	Too few sockets, too deep or badly placed, so that they are behind or between furniture	Range & accessibility	Position of sockets out of reach, cannot reach wall behind work area	Problem with all audio signals, door bells etc.
Wash basins	Must be able to sit, cannot get beneath basin with wheelchair	Cannot get close enough to or underne-ath fittings, gets wet underneath basin	No problems	Basin too high, too deep. Cannot get close to basin due to wheel-chair.	No general problems	No general problems, have to be able to sit down	Problems reaching fix-tures and turning taps.	No problems
Bedroom	Too small, bad shelving & too small dressing space	Too small cannot get at light, curtain, window, T.V., radio etc. from bed	No problems	Too small, wants also to carry out work from bed, open/close curtain from bed	No problems.	Too small , no shelf space	Problems with switches and TV controls.	Better light, signal light, alarm
Maintenance	Only needs help for some manual jobs & shopping	Needs help with shop-ping, problems with mealtimes	Needs help for difficult jobs & with cleaning jobs	Needs help.	Requires help with shopping, difficulties with reading recipes	Small problems, hot meals not always pos-sible	Only some help required with strenu-ous shopping & jobs	Needs no help if equip-ment has light/sound signal systems
Housekeeping	Periodic help for clea-ning & washing	Daily help essential for cleaning, making beds, washing etc.	Periodic help for diffi-cult cleaning jobs	Help once a week with cleaning & washing	Now & again needs help for cleaning & washing, as well as for paying bills	Problems with infre-quent big cleaning jobs, chang-ing bed-linen, doing washing	Needs help with clea-ning, bed making & washing but not daily	No help required
Personal Hygiene	No help	Help with bathing, dressing, undressing, going to the toilet, to bed etc.	Now & again for mani-cures or getting hair done etc.	Help with dressing, un-dressing, bathing, going to the toilet etc.	No help	No help	Some are dependent on help, particularly for bathing & dressing	No help
Fridge/Freezer	Problems reaching higher shelves.	Needs help.	Needs help.	Needs help	Needs some help.	Needs help.	Needs help.	No help
Microwaves	No problems if within reach.	Needs help	Needs help.	Needs help.	Needs occasional help.	Needs help	Needs help.	No help.
Cookers	Restrictions due to wheelchair.	Needs help.	Needs help.	Needs help.	Needs help.	Major problem.	Needs help.	No help.

Example 5

The following example highlights a procedure for carrying out an access audit or evaluation extensively used by the author and his team over many years. The brief was to assess all the university buildings for full accessibility. The numbers in the final column rank (RK) the order of priority from 1 to 3, with 1 standing for immediate action to tackle problem areas. However, these are seriously embedded in reality – in full knowledge of the budgets available. So the ranking takes into consideration the fact that installing a vertical lift would not be feasible in the immediate future.

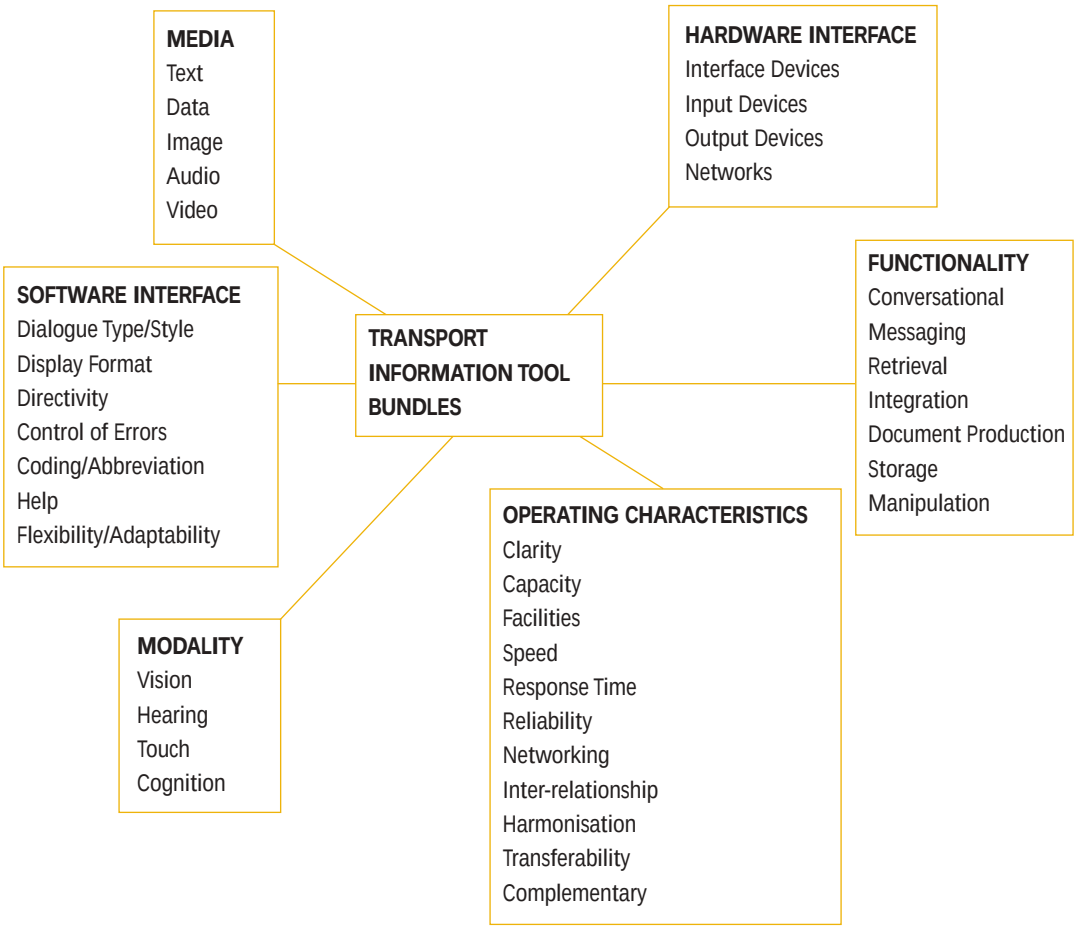
Site: City Campus, Main Facility: Ellison Building

SUB AREAS	OBSERVATIONS	REMARKS/SUGGESTIONS	RK
Block 'A' basement	Access via staircase	Install stairlift or vertical lift	3
Block 'A' doors	2 sets of heavy double doors in corridor	Adjust opening force & speed	1
Block 'B' approach to main entrance	3 steps to main double doors tl o the right of large flat leve	Dropped kerb need to be installed. Initiate parking restriction around kerb	1
Upper floors in Block 'B'	2nd floor access restricted to the right from the lift due to a single step	A ramp needs to be installed	1
South entrance toBlock 'C'	Single step to double doors No footpath leading to entrance	Dropped kerb required for step. Double doors repositioned for safe entry	3
Upper floors in Block 'C'	No access to wheelchairs no lift	Subject to budget install lift	3
Main entrance Block 'D'	Level access to main corridor via double doors to be checked	Door opening force & speeds	1
Main entrance Block 'E'	Small step to double doors 6 steps rising to main corridor Level. Mat well in foyer. Level Access to lifts.	Dropped kerb or minor ramp needed	2
Refectory goods Entrance	Ramped walkway along the side of Ellison Building leading to a ramp into the goods delivery depot.	Alternative access to building but not recommended as access route.	

Example 6

An important step in the act of designing, and therefore central to universal design, is the formulation of a prescription or model for a finished work in advance of its embodiment. This process applies to every activity which involves designing – in this example, the design of a complex interactive computer system targeted at providing up-to-date and 'real time' information to travellers. (Further information can be obtained from the websites www.prosoma.lu/turtle and www.tag.co.uk/turtle). The example focuses on the mechanism for clarifying the complex inter-relationship of the various elements that combine at different levels to result in a viable electronic information system. As can be seen there are many generic elements common to many of the previous examples in terms of tackling universal design problems.

Elements of a Taxonomy of Transport Information Tools



Example 7

An important component of the above project was to provide complementary and seamless information to all users of the Tyne and Wear Metro – including pictures and problems areas for each station (which can be seen on the above websites). The methods of gathering data or information, and of carrying out surveys or audits contribute directly to the morphology of universal design. The following audit protocol is one of seven used since 1981.

Tyne & Wear Metro Evaluation & Access Audit

General Information

Name of station		**Other information**	• No. of entrances
Location			• Suitable station to visit City Centre/Coast etc.
Date of survey			• Is it suitable for disabled people to use?
Number of platforms	• platform number • direction		

Access Information

Ramps	• handrails • gradient	• floor surface texture • length
Access between platforms	• between all available platforms • the route • footbridges • steps • ramps • subways • kerbs • dropped kerbs • escalators • overhanging shrubbery	• lifts • handrails • resting points • signage • reflective markings for guidance • textured surfaces • surface quality • distance to travel • barriers • suitable pavement for wheelchair user
Access onto Platforms	Consider: as above	
Access onto the Metrocar	Consider: as above, plus • platform edge	• gap between metrocar & platform (fixed)
Access Routes to Station	Consider: as above, plus	
Automatic Station Doors	• location • suitability for visually impaired users	• floor surface texture • signage
Disabled Parking	• no. of spaces • location	• signage
Escalators	Consider: as for steps, plus	• suitability for disabled people
Help point	• manned • location	• suitability for disabled people
Lifts	• operation • suitability for visually impaired users	• signage • suitability for wheelchair users
Parking	• no. of spaces • location	• signage
Personal Assistance Available	• number of people • hours of availability	• how to get attention
Steps	• number • height • depth • reflective markings	• handrails ⇨ colour ⇨ grip
Tactile Edge Markers	• location • colour	• nature ⇨ raised bumps, spongy rubber
Ticket Barrier	• location • nature ⇨ automatic, swing etc. • manned	• colour • signage • operation
Other Information	• Anything not previously mentioned	

Facilities At The Station

Automatic Train announcements
- nature of announcement
  - ⇨ visual
    - ◊ location
    - ◊ colour
  - ⇨ audible
    - ◊ male or female voice
    - ◊ suitability for hearing impaired

Closed circuit television
- availability

Emergency stop button
- location
- colour
- suitability for disabled people
- operation

Information Panel
- availability
- suitability for reading disabilities
- suitability for visually impaired users

Lifts
- operation
- suitability for visually impaired users
- signage
- suitability for wheelchair users

Luggage Storage Area
- signage
- location

Public Address System
- availability
  - ⇨ visual
    - ◊ location
    - ◊ colour
  - ⇨ audible
    - ◊ male or female voice
    - ◊ suitability for hearing impaired

Resting points
- seating
- non-obstructive place to stop wheelchair
- location
- signage

Seating available on platform
- colour
- height
- location
- number
- nature e.g. flip-seat

Shelter available on platforms
- distance from entrances or other shelters
- full cover
- partial

Signage Details
- signs within station
- signs to platforms
- signs for disabled access
  - ⇨ colour
  - ⇨ icons
  - ⇨ location
  - ⇨ conspicuosness

Ticket machines
- location
- suitability of operation for disabled people

Timetable Information
- availability
- suitability for visually impaired
- suitability for reading disabilities

Toilets
- location
- number
- accessible toilets
- signage
- opening hours

Transfare Information
- availability
- suitability for visually impaired
- suitability for reading disabilities

Travel Centre
- availability
- opening hours
- accessibility
- signage
- location

TURTLE Terminal
- availability

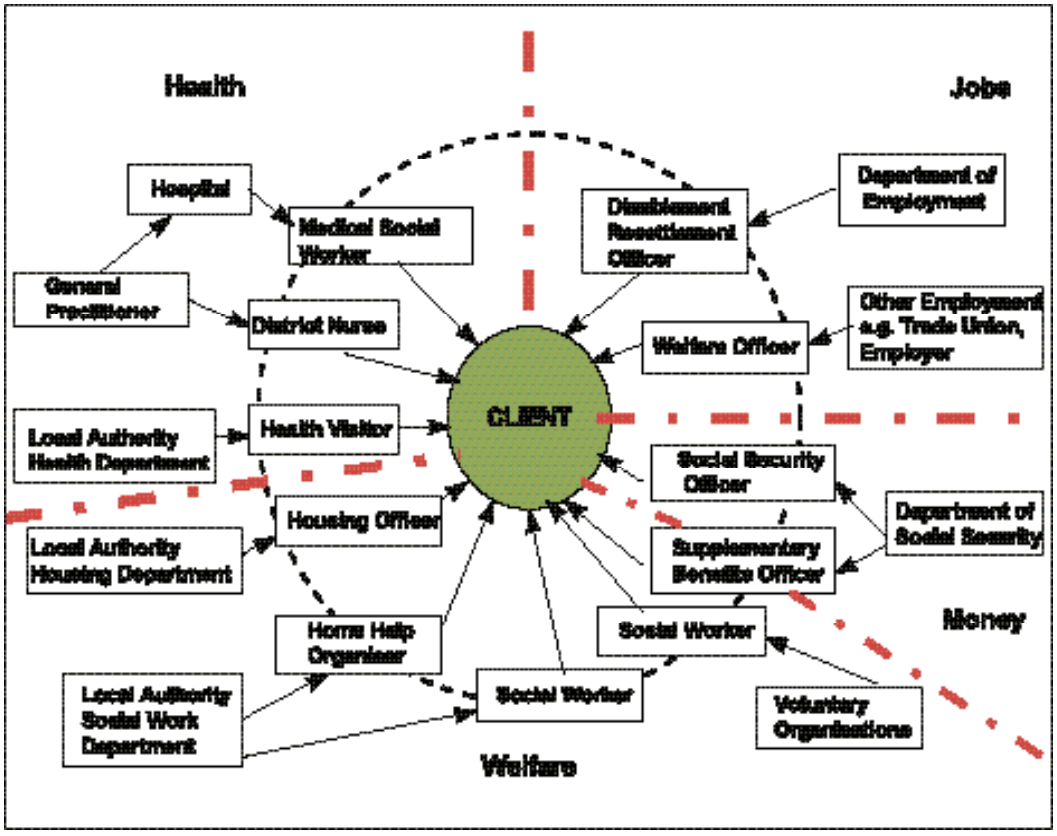
Other Information
- anything not previously mentioned

Other Facilities At The Station Or Nearby

Airport	• location
Bus Station	• location
Bus Stop	• location
Cafeteria	• accessibility • location • opening hours
Civic Centre	• location
Cigarette Machine	• location • accessibility
Confectionery Machine	• location • accessibility
Hospital	• location
Hospital with A & E	• location
Newsagent	• accessibility • location • opening hours
Park & Ride Facility	• location
Photo Booth	• location
Post Box	• location
Post Office	• accessibility • location • opening hours
Public House	• accessibility • location • opening hours
Taxi Rank	• location • signage
Telephone	• cash • card • induction loop • accessibility
Train Station	• location • signage
Other Information	• anything not previously mentioned

Example 8

This final example highlights that the most important element in teaching universal design is that of relatedness – how various relationships and dependencies impact on the problem to be solved. On the whole designers tend to have a narrow focus dictated by their profession and training. The reality is that many of the problems faced by the world are multi-dimensional: pollution, the environment, poverty, poor housing, sanitation, unemployment, etc. However, the institutions that are meant to solve these problems – government, science, education, the professions – are not multi-dimensional. Each has a particular focus and remit. Design and especially universal design can play an important role in turning policies into tangible ideas and concepts to change the way people think and act. A prerequisite of this process is not only that designers understand the role of other disciplines but also the complex matrix of service providers and policy makers. This understanding lies at the hub of universal design evolution.



In a sense the above paragraph really focuses on the concept of convergence which provides an opportunity to deal in a coherent and comprehensive way with the whole series of previously disparate accessibility issues. Convergence is particularly being driven by the fast developing new technologies.

The diagram below highlights the various bureaucracies and their relationships and how they can impact on an individual and very often enmesh them.

Conclusions

- It is clear that teaching Universal Design is not an easy task. It requires the broad vision that only comes with experience. It definitely requires a great deal of knowledge tempered by wisdom.
- Designers can bring about far greater change in society through the judicious application of their Universal Design know-how than any other means such as politics or legislation.
- Awareness of systematic methods for analysing problems and for carrying out evaluations at every stage of the design process is critical to universal design practice.
- Evaluation dictates that user issues rather than technical considerations are central; to the design process.
- It is important to focus on user task analysis so that users' needs are well understood.
- Task analysis needs to be done in addition to general requirements analysis, which tends to focus on *what* functionality is required and not on *how* to provide that functionality.
- It is crucial to design iteratively with many cycles of prototyping/testing/redesign. The designer should aim to add value with each stage.
- Multi-dimensional thinking, convergence and seamlessness should figure writ-large in any course teaching universal design.

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Photo: FotoKnutsen AS

1.6 Developments Towards Inclusive Design Teaching

Andrew Walker, AADipl, Grad Dipl (Cons)AA, United Kingdom Institute for Inclusive Design

This chapter will examine the history, evolution and implementation of Inclusive Design Teaching at an institution known for radical intervention, the Architectural Association (AA) in London, UK.

Personal Route to setting up the course

It is important I believe, however briefly, to preface my own reasons for entering this sphere of education as there are as many routes to it as practitioners and this must colour the manner in which the subject is developed.

I came into it truly by accident having fallen through a roof, as I had not been taking care whilst measuring a building. In a moment I became a wheelchair user. It was fortunate that I had trained as an architect and was at the time a part time tutor at the Architectural Association School in London. After half a year in a spinal unit it was possible to return to continue working there and to become a full time staff member with the agreement of the then lively and controversial Chair of the School, Alvin Boyasky. There was to be no problem with access around the building, it was explained, as the staff from the maintenance department could lift me anywhere I wished to go. The buildings form part of London's finest Georgian square and were built to suit sedan chairs with servants to move people about and open doors. There was of course no lift and the idea of one was not on the agenda in 1982. My office moved from the top attic floor overlooking the Square to a room in the back. After a year there I was made Head of Technical Studies and held this position for thirteen years. Conditions remained primitive but I was able to ask for a sink to cope with my sanitary needs. I learnt that disabled people are very reliable – they cannot go anywhere – students always knew I would be in my

office and I would not be at the bar or out to lunch. But we are the lucky ones with jobs and meeting students every day keeps the brain awake and I was aware that many disabled people, even those now rich with “compensation” had a less happy fate.

I was also fortunate in being asked to design a sports and rehabilitation centre for the experimental London Spinal Unit. Again, briefly, I must explain that this also meant helping raise the money to fund it. Whilst I was honoured with the experience it did mean a lot of work as part of a team and a lot of meeting and hand shaking of people on the charity circuit of those that come under the euphemism “the great and the good”. It was a fascinating experience which did produce a Centre of Excellence which was opened by the most popular of “Royals” but also still makes me shudder. It was obvious that these are the “special” people with their need for limousines, vestments, choirs, palaces, armies and of course – disabled people. Disabled people want to do the ordinary things like go out to the pub, go to the cinema, get an education, have work, sex and holidays and find somewhere an accessible lavatory. But what will the media do when we are no longer “special”. An army of professionals could completely disappear.

With the sad death of Alvin Boyasky, a new head was elected by the School Community, Alan Balfour, a Scot who had been working in the United States. Excitingly the AA is one of the few institutions that elects its own head but beyond this, being there is a rather feudal experience. Our new Chair had experienced the Americans with Disabilities Act. He was rather surprised to find that I had no access to a lavatory and that I still had to be helped in and out of the building.

For a short period I had been doing part time work for what is called, with British militaristic obsession, an Access “Officer” for a local authority. This proved fascinating to me, as it was a new world where people did not go on holiday but went “on leave” as though they were in the armed forces. (Much of our language is still militaristic; we still have «captains of industry». In design our prima donna architects still talk not of a strategy but of a «Master plan» and our master plans have to be “in line”.) Also I learnt that different departments lived in their own Masonic worlds and did not like to speak with those in different departments, frightened that their own empires would fall and they might become redundant. As a curiosity in a wheelchair, I was able to get into any department because no one really knew what all this “access” stuff meant.

The establishment of the Graduate Diploma in Environmental Access

Suddenly with the new head of the AA, an opportunity came about to get these non-speaking professions together with non-disabled and disabled people together in a new graduate diploma course taught on a day release basis for people at work. (Building Conservation had had a similar course for years.)

The AA is a registered charity and School of Architecture founded over 150 years ago. Its foundation was not by some act of Parliament or some beneficence by an aristocrat or industrialist but astonishingly by a 25-year-old student. He felt dissatisfied with the teaching he could get and wanted to prove that there must be more to Architecture than just pattern books of Gothic or Classic design. So he combined with others of like minds and they met together and taught themselves. The School has always encouraged students' initiatives, ways of thinking and problem solving which often become mainstream. So why not invite disabled people to participate with professions who did not really want to speak to one another to a graduate course in an inaccessible, listed building and ask them to pay for the privilege? It did seem a rather dubious proposition, but when I hesitated the Access Officer for the City Corporation, Julie Fleck – who also felt strongly about the idea – encouraged me to "Just do it". Since then I have advised dissatisfied users very widely to do the same thing and see what happens.

It also meant that if we were inviting students into the building, some of whom might be disabled, then there would have to be proper parking, an accessible entrance, an accessible lavatory and a lecture room with an induction loop: all the physical things that any building should normally have anyway.

Julie Fleck and I had met some years earlier whilst I was involved as Hon Sec of the Access Officers' Association in its inaugural year. We conferred with Jane Campbell then at Camden's Disability Research Centre who is now at the forefront of the Independent Living movement in this country. It was agreed that the proposals needed credibility with both disabled people and design professions. The course would reject the medical model and support the social model of disability. As a consequence, Access was viewed as an environmental and not a medical issue. We would advocate the end to people being called "special" and consequently becoming the recipients of

much bad design. We would support organisations "of" disabled people rather than those "for" disabled people. The course would be a yearlong day-release course which would lead to a Graduate Diploma in Environmental Access.

Whilst running Technical Studies at the AA, it was possible to have access to state of the art Consultants expert in such things as structure, environmental science and acoustics. The intention was now to introduce into the school experts in sound, sight, mobility and cognition – that is deaf, blind, ambulant disabled and learning-disabled people.

This would be a disability lead initiative but there was always the belief that the issue was not just one for people with disabilities. The issue would be seen as one not of disability but of access. It was considered vital that it took its ethos from the noises being made by the disability movement and not from the professional establishments which were seen as being not progressive. High standards of design, good management and clear information for people with disabilities would not leave out the majority of the population who are also all disabled by similar practices. It would be set within the context of civil rights and universal standards rather than philanthropy and special needs. Thus the debates and assignments on urban planning, public building, housing, transport, education and product, graphic and communication design would be encouraged to be seen from the perspective of inclusion with common standards related to emerging government programmes of social inclusion which were seen as both cost effective and a key element in the propagation of sustainability.

An attempt was made to get the Access Committee for England to endorse the course but while being enthusiastic it said it could not endorse it. I went before the Royal Institute of British Architects' Education and Professional Development Committee. Some of the members did not know what the discussion was about. They too could not endorse the course but they did agree with the Royal Town Planning Institute, the Institute of Building Control, the College of Occupational Therapists and the Access Committee for England to "endorse this long over-due course initiative".

Opposition came from a leading architect, AA trained, who wrote to the Chair complaining he had been doing this stuff for years for disabled people and was well qualified, and if he had

been doing it, it would be done properly and he should have been consulted. The architect had missed the point, and it was precisely for these reasons that I have avoided that advice.

"By Us" and not "For Us" should be their motto", William Morris had written in the Daily Chronicle of 1895 on the proposed emancipation of the working classes. Whatever was done must come from the bottom up; from the ignored experts who had to live with the consequences of a disabling environment. These must be encouraged to come into our highly prestigious institution with its worldwide reputation and STUDY and TEACH!

It was necessary to create a leaflet to advertise the course. I chose what I took to be a very beautiful photograph, but was told that the photograph showed a pitiful image. It was of a wheelchair-using friend of mine, taken whilst he was photographing a desolate scene in Bangladesh, where he was about to set up a factory to teach disabled people to produce their own wheelchairs from waste steel and rickshaw wheels. In this way they would get a fine design to suit their own terrain and also become independent of foreign charity. Hardly a pitiful image this.

Funding of the course was merely made under a small contingency which the School gave me. One disabled student who was helped by a bursary from a charity connected to a long-standing member of staff. All attempts to get funding from the charities of well known architectural firms failed.

The First Year of the Course

The School did get the changes to the building accomplished ready for the first intake of students. The Chair greeted the students with great hospitality and we began with hot coffee and croissants served by a white coated AA Chef from the upstairs bar. This is important, because as the bar was not accessible and we did not wish to be discriminatory, it was policy to have volunteers to bring refreshments down every so often so we could be together in a group. The group was small. Eight people to start with. Two planners, two architects, two access consultants, an editor and a researcher. Three were disabled people. It was very useful as one of the architects was deaf and required an induction loop. We held the course around some tables and had one person at a time speaking into the loop. This method has been used ever since to discipline discussions. It also meant our lecturers had to learn that discipline. Also we learnt to

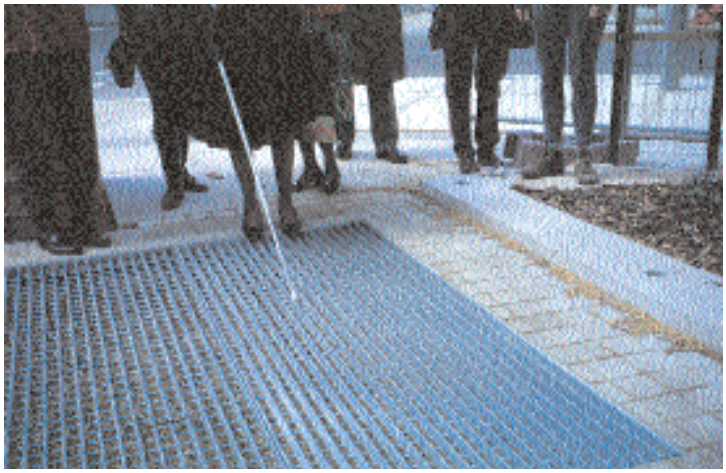
speak clearly and not to turn our faces away when speaking. Students were introduced to the library and the slide library. The AA has very fine collections in both. But it was decided that as neither were readily accessible, being on the first floor and basement. Our books and videos would be kept in the Access Office on the ground floor. This meant of course that the books in the main library and used by AA students were generally those which were very out of date – and still are.

It was a prerequisite that all students had a common grounding in a disability awareness exercise which would cover the first two weeks of the course. This not only covered issues of language but also set the whole issue in the context of race, gender, class and women's rights. After seeing a video of "Black people in the countryside" a student remarked that the long dresses do make people look odd in the country. She was asked whether this would apply also to Jane Austen? The awareness exercise was fundamental to all the work that followed and it is a vital ingredient in any such course. The pity was that it could not be done by all the staff of the School.

In the 32 weeks of the day release course, students were expected to complete three essays, several assignments and a thesis. Their coursework books notes would be examined together with any assignments with the thesis in an interview on the final day of the course. Two assessors were appointed: Geoffrey Darke, an architect now in private practice, a member of the Access Committee for England and Elspeth Morrison, former editor of Disability Arts in London (DAIL) who was then a producer for the Disability Programmes Unit at the BBC.

In this first year coursework covered the polemic, disability awareness training, architecture, planning, product design, transport and the law. It looked at education buildings, housing, theatres, cinemas, stations, historic buildings etc. It brought into the school the major organisations dealing with the issue of Environmental Access. Visits were made to test transport and facilities in different parts of the country. Seminars were held with organisations such as People First, the national organisation of people with learning difficulties.

This last was to a degree to become the high point of the presentations as we were asked to write down key words and phrases used in our profession and then explain them in simple English to people with learning difficulties. It rapidly became



Graduate course 1996 – disabling dog grids being tested by a blind person.

clear that it is this group of people who are the real experts in communication skills. We learnt for example that someone may be able to read but not understand symbols or even pictograms, and so a wheelchair symbol on a door to indicate a lavatory may just mean to them a room where there may be people in wheelchairs; the label “toilet” needed to be added.

Students were instructed in access assessment. They had to do a group assessment and one on their own of a building of their choice. Generally these were illustrated documents with photographs and diagrams. The first exercise was important as it showed that, say, a blind person or wheelchair user can do as good an assessment of a building, management practices and information as anyone, provided appropriate assistance is in place.

The course did not generally indulge in simulation exercises. The view was taken that pretending to be blind, deaf or unable to walk can be as unrewarding as pretending to be a different colour or gender. It can never be known but has to be believed. One of the problems is that users’ views are not always credible to professional people. We are expected to prove everything and end up being measured and tested. For someone to suddenly have to use a wheelchair can give a completely wrong impression of this non-walking way of life. Wheelchair skills have to be learnt over time – a well-designed wheelchair enables. It maintains independence and pride.

One student was blind, and for his first essay he attached a camera to his head and filmed his journey in black and white around Waterloo Station from his – and his dog's – view. A friend took a video of him doing this in colour. It proved a very effective way of illustrating the access, information and management shortcomings at this rail terminus. A copy was forwarded to the Minister of Transport for information.

Some of the students had asked to be able to learn how to design, but an architect or designer has to take a long time to learn this skill, and the mixed background of the students worked against producing anything but simple designs. However, it was possible to teach all the students to be very good critics of design and of the management practices that are needed to create accessible environments.

Exhibition and Evening Lectures

In celebration of the establishment of the course, an exhibition of the work of the group "Motivation" and in particular the photographs and designs of David Constantine of "Wheelchairs in the Developing World" was held for three weeks. It was an opportunity not only to exhibit some excellent designs and processes but also to invite leading figures from the right, left and centre of politics. The earliest prototype which the designer had produced whilst a student and had been on a dump rusting away was rescued and repaired and put on its own pedestal. An induction loop was added to the main lecture hall. And a light weight ramp added to the main Georgian entrance in the Square which shocked the owners of the Square and delighted taxi drivers as they could identify as "that's the School of Architecture with the ramp at the front and about time too..."

The whole of the design process and the difficulties encountered in setting up self-sufficient production lines in Bangladesh, Poland and Cambodia was explained in the first of a series of lectures held with sign language interpreters in the lecture hall.

On the same evening the Chairman launched an appeal for funds for a general passenger lift to link most of the levels of the school buildings and enable facilities to be used by all.

So over a few weeks the following evening lectures, free to the public, were held:

David Constantine:	Motivation: the design of low cost wheelchairs, using local materials and local people in Bangladesh, Poland and Cambodia.
Doug Alker:	Sound Designs? – Architecture and deaf people.
Professor Michael Oliver:	What's so wonderful about walking?
Jill Allen-King:	Access needs of blind and partially sighted people.
Rachel Hurst:	The Taj Mahal or the Native Kraal – an international perspective on Access
Cedric Price:	A concluding presentation

The exhibition and lectures were a success and gave the work some credibility in the School and further afield. It enabled the usefulness of the teaching to be recognised and it was now possible for Alan Balfour to start incorporating the work in the mainstream teaching of the School. It became possible to take the course into the First, Intermediate and Diploma levels.

The course was commented on by Mary Banham: "The densest and most exciting course I have audited – and that amounts to quite a few on two continents." (AA Files Autumn 1993)

Infusing the Subject into the Mainstream Curriculum

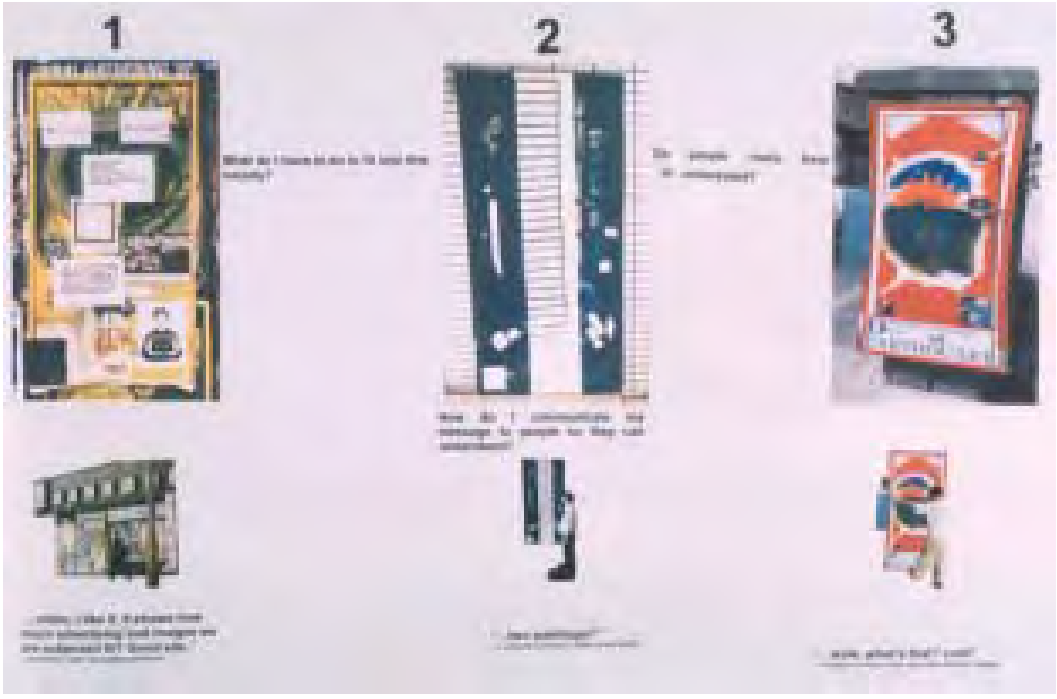
A pattern was developing that for a brief period enabled the course to be infused into the mainstream teaching of the School and also allowed the Graduate students and undergraduates to be present together in this process. An Appendix giving the Projects Review text of one year – 1997 – is added for information.

Perceptions of Space – First Year

Early in their first year all students took part in a day's presentation in a building – usually a theatre – which was undergoing design and management changes to make it usable by all. These building projects were all being funded by the Arts Council of England National Lottery money which comes from any member of the public buying a ticket. Therefore the projects had to allow access in its fullest sense as part of the condition of funding for all people – including anyone with any disability. It

seemed the greatest civil right given to disabled people had come inadvertently not by grand legislation but through gambling! The funding related to the RIBA's work stages so is an extremely practical system.

Students were lectured by disabled people on different aspects of design relating to sight, sound, mobility and cognition. Issues of race and gender were included and the presentations took place at such venues as the Theatre of Black People and Græ, the European Theatre of Disabled People, the Royal Festival Hall, the Battersea Arts Centre and Lux Cinema, Hoxton. Several firms of well-known and new firms of architects were happy to bring their projects to be scrutinised by young students. Students then had to present a submission relating to their own access needs, for example, their own auditorium. Students' recognition of the social and technical issues raised thus informed a submission assessed in conjunction with requirements for Technical Studies. This served as an Introduction to the access issue for them and a basis for the teaching in the remaining five years.

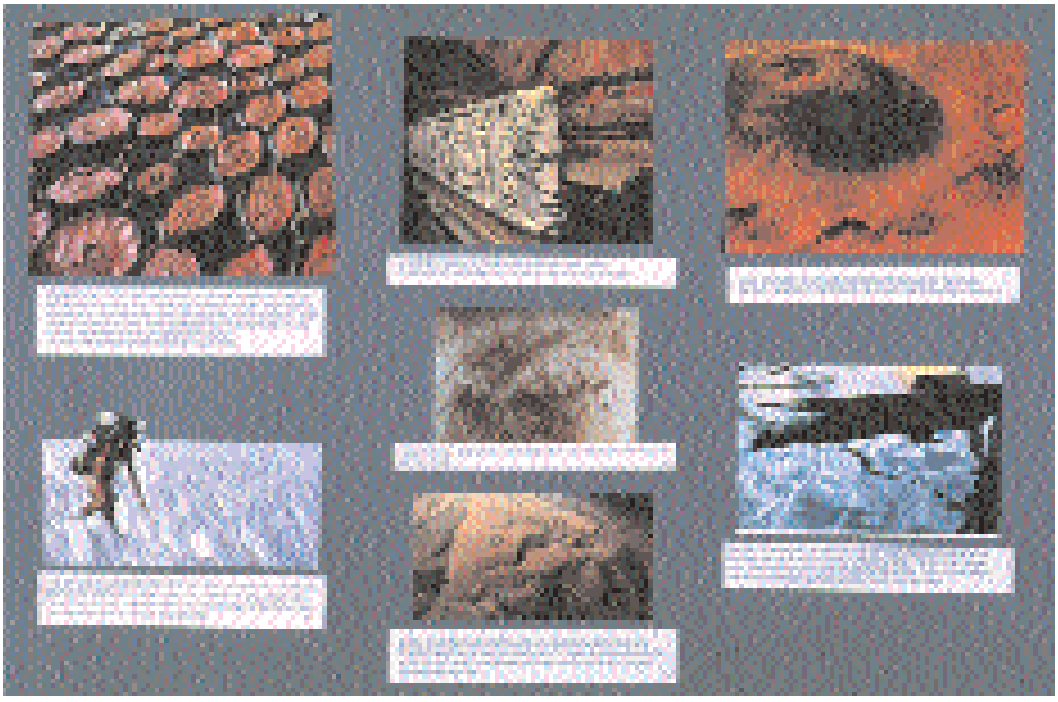


1st year perceptions of space, how do I communicate?

They were being taught from the start that the issue included them. This was quite difficult for some undergraduates to stomach. Some came from countries where disabled people are kept out of sight. One student said how horrified she had been to be lectured by disabled people but when she had to write her diary about her access needs she found that she was quite small and always had great difficulties coping with London buses and seeing above other people. Graduate students also participated.

Second Year

In the Second Year access became a technical requirement in terms of Technical Studies. Five half-day presentations by both non-disabled and disabled professional people relating to Sight, Sound, Spatial Perspectives, Cognition and Mobility were given. They took place in the AA or in buildings relevant to the presentation on Thursday afternoons.



2nd year playground – ts Roachford – wall & floor surfaces.

Students were expected to fulfil attendant coursework and demonstrate how technical access issues modified a unit-based proposal in order to pass this component of their Second Year Technical Study. Work was assessed by Interim and final juries in the spring and summer terms of each student within a unit setting. For the first time all Intermediate School students now had a scheme design in their unit work that had had to be altered in some way to be inclusive.

2nd years and graduate students 1996 project assessments.

Third Year

In this year Environmental Access now embraced the concerns of both Technical and General Studies. A series of seminars by leading practitioners discussed technical matters and the social polemic of access. With the co-operation of the General Studies and Technical Studies departments, a number of students had the opportunity at the beginning of the Spring term to enter a proposal relating to their unit design work, which could be considered as a Technical or General Studies submission. Technical and General Studies Seminars took place on two afternoons per week. Following discussions between student and course tutors, students could be paired with a consultant to guide them in their work, perhaps advising further discussion with other specialists in the field. It was intended that selected work would then be presented to a jury comprising Technical and General Studies staff and members of the graduate Environmental Access course.

3rd year – king chong – communal housing – bed pods.

It was further intended that selected work be further presented for selection for the Access Prize. This was to replace an Access Prize which had previously been given by the Chair to the second year.

2nd year workshop 1995 – Yanko Apostolov & Shibboleth Schecter – illuminated handrail to aid navigation and provide support.

Diploma School Evening Lectures

Evening lectures which were free and open to the public were held annually. Sign language interpreters were available on all occasions. They started off being under the title “Access, Architecture and Architects” and later “Inclusive Design”. They were held in the Spring Term and related to the social and technical changes being brought about by the gradual emancipation of all sections of society. The lecture series hoped to show how broad the issue was and that it concerned all people. The intention was that they could easily form the basis for study for Diploma School students.

Outside Interest

The evening lectures were always well attended but generally by people from outside the School. A designer from the USA broke his flight to come to one of them before going on to Poland. None of the presentations were ever published. This is sadly the pattern in most design schools were such work is presented. A few students embrace the ideas with great interest and there is always interest from outside the institutions and globally. Several educators visited the School to get advice on how to set up similar courses elsewhere and they have done so.
So it is important to see this in a broader perspective. The Environmental Access Course had links with other access and design organisations promoting inclusive design including the European Institute for Design and Disability and organisations in North America.

The Centre for Accessible Environments (formerly the Centre on Design for the Handicapped) has for many years been producing pamphlets and developing courses in user orientated design. Socially orientated courses were also held earlier than the AA – Greenwich University and later Leeds.

Later courses sprang up in Belfast, Bristol, Dublin, Newcastle, Reading, Salford and Singapore. All these courses look at the issue from slightly different angles. They had been better funded than the AA had been able to do and I do not think any attempted to integrate the subject within a five-year architectural education system.

The course had intended to get different professions on board and sometimes succeeded in this; however, some professions such as architecture were not as forthcoming as for instance

occupational therapy. Possibly, although it is not possible to be sure, the feeling was that architects did not need to be taught by and alongside disabled people, whilst Occupational Therapy liked the idea of being in a School of Architecture once a week. But it was agreed that the course was not meeting its multi-cultural idea whilst most of the students came from one discipline. So it ceased to operate. Also it had always been very difficult to get funding for students on the course at an independent school of Architecture. This sadly meant that the only interventions that could be made would have to be in the mainstream course itself. The problem here was one of the buildings themselves, which still did not have a lift and no proper access from the front to the back of the building without being lifted. The buildings are all historic and listed Grade I and are in London's finest Georgian Square, so changes to them are not easy to contrive.

Inclusive Design

The British Institute for Design and Disability was founded at the AA in 1995 and is one of a European network under the umbrella of the European Institute for Design and Disability. But the AA Prospectus was talking about inclusive design by then, and mirrors the change of the British Institute to the United Kingdom Institute for Inclusive Design (UKIID) in 1998 once the membership (half of which are disabled people) was allowed to vote. The organisation was therefore taking notice that it is not disability that is a problem but the disabling nature of much design. ("Bad Environmental Design Disables far more than any Medical Condition" – Elspeth Morrison AA News Spring 1993.)

This philosophy was seen as the way forward and encouraged membership from all sections of society (UKIID's membership doubled) interested in the notion that an inclusive society cannot exist unless the design of the environment is also inclusive. This principle was to seen apply to the design of buildings, infrastructure, building and consumer products.

On June 2000 in London's Docklands UKIID held the first conference on Inclusive Design, which was attended by twelve countries outside the UK. This was an opportunity to show the positive efforts in this sphere in the United Kingdom and covered regulations, domestic products, housing, transport and, fundamental to all, education. The 1995 Disability Discrimination

Act and the extension to Part M or our Building Regulations to give a general accessible standard to all new housing is giving architectural practices a spur of an interest in a more rounded approach to design. Similar user orientated notions are influencing thinking at design schools.

Last year Reading changed the name of its MSc from “Non-handicapping Environments” to “Inclusive Environments” and now, encouraged by former AA student Amanda Gibberd, the Pretoria School of Architecture is likely to introduce Inclusive Design.

Proposed MA

Now the School, under Mohsen Mostafavi, has asked that the subject is approached again and once again I have asked that an MA is introduced dealing with Inclusive Design. I have been pushing for this since 1996 and at last it may be possible to do it. Also the President of the Association, Nicholas Grimshaw, has pledged the Association to install a lift and make considerable alterations to make the buildings accessible. It will then be possible to teach on an equal footing and participate in the juries and activities of the school.

Whilst a course can be established which fits into the mechanisms for the MAs currently provided in the School it means that it must, at a School of Architecture, include more than just debate and architectural propositions. It does mean that other professions will need to be there on such a course to instruct and be taught.

This is very difficult for the profession to understand. It must practically relate to the users and be tested and it must be broad in scope and be constantly developing. Part of that development I hope will be with other institutions and also with the undergraduate school as there is a need to develop curricula which can be modified to the particular requirements of different schools of architecture and design. The issue is too important to be seen as just a specialist exercise but a fundamental change in the way design is taught at all levels.

Society still remains largely ignorant of the needs of users. It must be acknowledged that certain non-disabled people have put much energy into reform of the system. But there are others eager to jump on the bandwagon in their professional capacity. They are well funded and well placed to get their organisation’s views across at gatherings across the globe. Only a few token

disabled people manage to get funding to participate in such decision-making exercises which are fundamental to change. Civil Rights legislation would provide a move towards some recognition of this problem but very little of this is in place. And much of this is inadequate.

The paucity in numbers of disabled participants and graduates in design education is only a reflection of the lack of integration in society generally. Diversity is still considered a threat. Curricula need to ensure that students will not have to pursue their design education without coming into contact with those for whom they are supposed to be designing.

Appendix 1
1997 Extract From AA School's Annual Projects Review

Complementary Studies

ENVIRONMENTAL ACCESS

This department co-ordinates the Environmental Access Programme throughout the Graduate and Undergraduate School. Awareness of societal and technical changes has encouraged the School to take an active part on this issue. The desire is that the social and technical issues raised can be fed back into the unit work. This is increasingly seen to be the case.

UNDERGRADUATE AND GRADUATE PROGRAMME

The AA set the Environmental Access Course, the first qualification in this subject from any institution in January 1993. This is its fourth year and again there was welcome participation from architects from overseas. This work is now being developed in mainstream architectural teaching of the School and into current social changes relating to disability, race, gender and sustainability which must have an impact on design.

This year too there were offerings in the First, Second and Third Years and an evening lecture series free and open to the public and accessible to bring inclusive design to the widest possible audience.

The principle aim is to bring together those involved in the planning, design and implementation necessary to create an environment accessible to all and so promote, in terms of

architecture and design, a less hostile, more inclusive environment. The course is designed to be multi-disciplinary as like architecture itself the Access Issue does not fit within the tight confines of a single profession. Integrated with this basic principle, people who are directly affected by a disabling environment in terms of gender, race and disability are naturally included as students, educators and innovators.

Course Requirements

An essay is required by students in the first terms, followed by several audits in the second. These consisted of the pairing of the students to look at aspects of access within the AA – such as approach, horizontal and vertical access and measurements of sound and light, followed by a complete audit of a building of their choice. This work was assessed by the Programme Director. A thesis was completed in the third term and assessed together with notebooks and reports by the External Examiners.

The Students

This year most of the students were non-disabled people and mostly women. There were participants from Jersey and Japan.

The Course

AUTUMN TERM

Week 1–2: Introduction and Induction Course

Week 3: All Day Event at IBM. Profit by Design Conference – First public meeting of the British Institute for Design and Disability.

Week 4: Do Deaf People Need Architects? and Participating Practices 1

Week 5–6: Access needs of visually impaired people 1 and 2, Access to Information, Education Conference in Mainz, Site Visit (S. John's Wood Adventure Playground), Participating Practices 2

Week 7: Perceptions of Space – all day event. Race, gender, sight, sound, mobility and cognition. Participating Practices 3, Access Proposals for Oval House

Week 8: Oval House – feedback. Hand in Essay 1. Discussion on thesis titles. Participating Practices 4 – Access Proposals for the Royal Festival Hall and proposals for S. John's Wood Adventure

Week 9: What Every Architect Should Know About Wheelchairs. Participating Practices 5 – Accommodating Diversity. Improving Access Through Consultation

Week 10: Assignment 1 – Hand In. Rôle of the Access Committee for England and the Access Officer. The Taxi You Told Us You Wanted – London Taxis International on the design of the world's most advanced and user friendly taxi. Review of First Year Access Assignments and presentations by invited students

SPRING TERM

Week 1: Access Needs of Ambulant Disabled. Australian Perspective. Design Questionnaire Feedback

Week 2: The Art of Lying Down. The Big Issue; Accessible Housing. General Studies Third Year Option & Graduate Students Seminar. Disability & the Media

Week 3: Assignment 2: Access Audit. Access Auditing, Building Regulations, Consultation. Technical Studies Seminar/Option: The Art of Lying Down & Do Deaf People Need Architects?

Week 4: Barcelona Conference, Design for All. Civil Rights. Technical Studies Seminar

Week 5: Products You Can & Cannot Use. Participating Practices 6. Students Seminar; Access to Historic Buildings 1. Technical Studies Seminar. Disability & the City

Week 6: Public Transport to Your Front Door. Nothing to Fear? Trust & Respect in Urban Communities. Technical Studies Seminar. People and their Environments – Simon Richardson

Week 7: What People See – Project Rainbow Colour & Contrast. Insurance Claims and Housing Assessments – Andrew Walker

Week 8: All Day Visit – Greenwich via Canary Wharf & the Greenwich Tunnel, National Maritime Museum site visit to Nepture Hall Project with Keith Page of Bovis.

Week 9: The Americans with Disabilities Act – Eight Years On. Access to Historic Buildings 2 Participating Practices 7 – Access to Historic Buildings 3 – Winchester Project and Portland College Competition

Week 10: The Accessible Office. Design & Materials for Permanent & Temporary Ramps

Week 11: All Day Visit to Coventry – The Accessible Factory Floor – London Taxis International with MD Jevon Thorpe & lunch

SUMMER TERM

Week 1: Accessible Housing. Regent Square WC1 – access improvements? Accessible house on four levels.

Week 3: Going it Alone, Housing without a grant. Housing Adaptations. Visit – Building Centre

Week 4: Assignment 2 – Student presentations. The Redevelopment of Sadlers Wells – design, information & management practices – Judy Monahan with committee members

Week 6: Transport – the implementation of radical change in the run up to the formation of the Greater London Authority. How Discrimination is Inherent in Design

Week 7: Assignment 2 – Assessments. Access to Housing & Arts Venues, Measurement & Monitoring. Access to the Countryside 1

Week 8: Access to the Countryside 2. National Trust and Access Policy. What is Tripscope – easy access to travel arrangements for anyone who has difficulty in getting about.

Week 9: Thesis Submission. Railtack Strategy – Stations to suit passengers as well as management. Career Changes after the EA Course

Week 10: All Day Visit: Richard Attenborough Centre, Leicester University

Week 11: Interviews and Assessment of students' work with examiners. Appraisal of EA course by students, and examiners

In addition in the Summer Term, five evening lectures were held under the title Inclusive Design. They were free and open to the public, to publicise the notion of inclusive design. Sign language interpreters and an induction loop were available at all public lectures.

Ian Taylor	Are you feeling comfortable? Issues in Inclusive Design
Ken Worpole	Does Inclusive mean Universal? – Public Spaces and Public Goods
Deirdre Candlin and Diane Haigh	Incremental Access at the Royal Festival Hall
Rob Imrie	Beyond the Barriers to Inclusion in the Built Environment
Jevon Thorpe	The Creation of an Accessible Taxi – The TXI and its Future Evolution

Appendix
2 Definition of Inclusive Design

Inclusive design is design which can be used regardless of age, gender or disability.

United Kingdom Institute for Inclusive Design (UkiiD)
"Promoting and developing a culture of inclusion through design and its application"

UKIID's purpose
UKiiD is an organisation of and for anyone with an interest in design. The keystone of our work is to promote design which is *inclusive* – which can be used regardless of age, gender or disability.

Core values
- defining how design can meet the needs of as many people as possible
- designing buildings, transport, products and services to meet the needs of people with a range of disabilities so that they are easier to use, by everybody
- celebrating the culture of diversity through inclusion not exclusion
- ensuring usability and æsthetics are mutually compatible

Core activities
- creating a culture and attitude founded on inclusive design
- providing information on examples of good practice in inclusive design
- providing practical information for design and other diverse professions on all aspects of disability
- providing information on how to ensure design meet inclusive principles
- publishing a newsletter covering trends, activities and legislation
- running seminars about relevant issues

Agreed by the Board 14 March 2001


Photo: FotoKnutsen AS

1.7 Architects of Tomorrow, Accessibility of the Future – Teaching Accessibility at the School of Architecture in Aarhus

Prof. Poul Østergaard, Aarhus School of Architecture

Background

Statutory requirements in Denmark demand unequivocally that all construction must be accessible and must accommodate everybody. This has been the Danish parliament's response to the United Nations' Standard Rules on the Equalization of Opportunities for Persons with Disabilities. The accessibility requirements are laid down in the building regulations 1995[4].

Basis for the course

The slogans "Universal Design", "Design for All" and "Barrier Free Design" are used in the headlines of publications, national and international conferences and seminars on disabilities. The philosophy behind the headlines may be well enough understood, but the terms are often unworkable in practice. Even "Universal Design" and "Design for All" must at least to some extent be based on standards, which in turn rest on notions of normality, i. e. majorities, which exclude large minorities. Clothing and tools for personal use must by necessity be designed to fit individual needs. "Barrier free design" is and will be an empty phrase. The built environment obviously has barriers, but many buildings are nevertheless in some way accessible for people with reduced mobility.

The term "accessibility" is a better term for the desire to make products that can be used by the largest possible number of

4 Documents complementing the building regulations have been published by central authorities and the organisations for the disabled. In addition, several ministries have produced action plans, aiming to improving the conditions whereby disabled people can participate in society. There is, consequently, an endless number of publications, which architects and the construction industry must know and observe.

people. The term gives sufficient room for designers to weigh up how and in which ways disabled people best can gain access to all that modern society has to offer its members. As a matter of course, everybody should be able to access and enjoy the "soft values" in buildings and spaces. In addition to easy entry, signage and information should be easy to understand.

However, accessibility does not only concern the built environment. It extends for instance also to modern forms of communication, which, by means of text, sound, symbols or pictograms should be easy to understand. *Accessibility is comfort for the many, necessity for the few.*

Accessible architecture

The starting point for "accessible architecture" is the basic human need to manage the activities of daily life without the help of others. The term arises from the particular considerations that have to be made when planning for people with disabilities: fundamentally that architects and designers can create architecture and products which enrich and engage the individual user. This however, requires that the designer possesses knowledge about our physical capabilities.

If accessibility is assessed by means of "graded criteria", the requirements can be rated on a scale from "decisive" to "essential" and "suitable". It is for instance "decisive" that a person in a manual wheelchair can negotiate differences of level – by means of ramps or slopes with a maximum gradient of 1:20. For wheelchair users to open doors, 0,5m unobstructed floor space at the door handle is "essential". And it is "suitable" to have a grab bar at the centre of the door, so that a wheelchair user can close it easily.

The international accessibility symbol must of course be respected. When, for instance, the symbol is found on the doors to public toilets, in hotel brochures and in public transport, one would naturally expect unobstructed access and circulation for people with impaired mobility. The symbol does not, however, guarantee optimal conditions. The author has over the years visited numerous public facilities marked with the accessibility symbol. These visits have disclosed that toilets, which meet the needs of wheelchair users, are an exception rather than the rule. This again means that the symbol is misleading. Even the tiniest of details may be decisive as regards the chance of managing without help.

Allowing for human diversity

Human beings can only become "whole" in an environment that appeals to personal development and can only achieve self-respect in an inspiring intercourse with others. There is in other words a need for a *democratic architecture* which promotes individual activity and intercourse, and which assists and enhances human sensibilities.

Particular/general

Adding accessibility to the other basic aspects of functional architecture, it is possible to achieve a set of active rules for the interplay between the participants. These rules can in some respects turn the users' limitations into inspiring ways of thinking and experiencing, and thereby add something to the architecture which is at once special and general.

Accessibility theme-days

Architectural education in Denmark is the responsibility of the Department of Culture. The ministry's "Plan of action for disabled people's access to culture" from 1999 states: "The Ministry of Culture has started negotiations with the schools of architecture about achieving a better awareness of disabilities and architecture among the students."

Effective from September 1st 2000, the negotiations have changed the course descriptions at the two schools of architecture in Denmark. The change has meant that by the end of the second part of the course, all students must have received learning and attained knowledge – through projects – about accessibility for disabled people and other special needs groups.

The Aarhus School of Architecture has organised obligatory accessibility "theme-days" for students every year since 1995/96. The object of the theme-days is to familiarise the students with functional requirements and considerations that must be observed when planning and designing the built environment, thus influencing the students' regard for people towards a realisation that architects can contribute to alleviate the consequences of disabilities.

About 200 students take part in the theme-days, attending lectures and field trips confronting them with the problems of accessibility in the built environment. The theme-days are organised in periods of 2x2 days, with about 100 students at a time.

The program may have the following main subjects:
Day one morning session, lectures:

a) “Accessibility for better or for worse”; slides and the CD-ROM Handicap, Architecture and design
b) “Accessibility crosswise”; a blind person and a wheelchair user as lecturers
c) “Visions in practical terms”; detached house for a wheelchair user (architect and owner)

Day one afternoon session, field trips:
The students are divided into groups of four and given a manual wheelchair or simulation glasses. One group member plays the part of a disabled person; one performs the role of helper; the remaining two are observers, taking notes, making sketches or taking photographs.

Architecture students doing fieldwork as preparation to the thesis subject “A bathroom for disabled”. The project later formed the basis for the development of “Pressalit Multi System. Pressalit A/S Ry. Design Hanne Rasmussen.

Following a detailed plan, the groups are sent on field trips in Aarhus and its environs. They may visit dwellings, shopping centres, shops, restaurants, museums, theatres, town halls etc. Some groups are required to use public transport to reach their destinations. Upon arrival, they meet a young, disabled person, who, acting as a consultant, describes his/her experience of using the city and its buildings.

Day two, morning session, reports:
Each group puts together a poster giving a synopsis of their experiences from the field trip. The poster is part of a report which is distributed to all students. The pedagogical reason for this part of the exercise is to train the students in visual and written presentations.

Day two, afternoon session, lectures and discussions:

a) Group presentations
b) Planning accessible architecture, two lectures by practising architects
c) Panel discussion run by the organisations for the disabled

Planning the theme days is obviously demanding. Some 40 wheelchairs and a suitable number of simulation glasses have to be borrowed or rented from the local authority's centre for technical aids, and appointments have to be made with suitably knowledgeable and interesting lecturers and consultants whom the students can approach for assistance in other projects.

Evaluation of the theme days

In the students' evaluations of the theme days, the field trips are seen as particularly useful. Playing the role of a disabled person gives real insight into how architects can contribute to lessen the difficulties disabled people encounter at home and in the outside world. The theme days also contribute to combat prejudice about disabled people, and the students achieve a realistic attitude to the subject; their shyness is questioned and worked upon.

The experience gained from the theme days are often integrated as a vital part of a project. Later on in the course, some choose to continue working with accessibility issues, whether as a main subject for a particular term or as thesis. This holds true both for students of architecture and design. Examples of thesis subjects from 2000/01 are "Communal living for young people with handicaps", "Dwelling for the third age", "The accessible opera house", "Communal living for mentally disabled", "Easier use of bathrooms for mobility impaired people".

Thesis project for a collapsible walking frame. Line Ubbesen, Department of Industrial Design, 1999.

The development of the frame aspired to achieve a design in which both shape and materials will break down possible "human barriers" for its use. The frame has three types of breaks: One slows down the effect of the frame's dead weight on sloping ground, another can be used to varying degrees while walking, and the third is used for parking, while the user rests on the seat. The roomy basket underneath the seat is for handbags and for shopping, and acts to stabiles the entire construction. The frame was awarded 3rd prize in the plastics industry's international design competition.

Competitions

The two schools of architecture have organised competitions funded by the Ministry of Culture. The first was held in 1998, around the theme "Accessibility to culture – the city as the arena for culture". The object was amongst others:

- to create spaces and places which offer everybody, including disabled people, opportunities for activities and participation in the cultural life of the city.
- to develop innovations, visions and proposals for architecture and design for everybody
- to influence public debate and direct attention towards architectural quality and user demands
- to differentiate questions of human values and develop he notions of normality
- to create a dialogue between disabled people/user organisations and architects/schools of architecture

33 proposals were submitted, receiving the following comment from the panel of judges: "The best proposals show that attention to accessibility requirements cannot on its own lead to better design of access and interiors, but can add richness to the ways architecture is experienced and new architectural types."

The submissions included subjects like:

- City, area and local meeting points
- Historic edifices in the landscape
- Dwellings in the city
- Design, information technology and Cyberspace as keys to culture

The first prize of DKK 50000 was awarded a project titled "Access to Nature – The Museum for World Culture in Gothenburg". Projects which kept strictly to the main theme of the competition received another four awards.

The other competition, titled "Dwelling for the Future", was announced in September 2000 in collaboration with the Danish Building and Research Institute. Invitations for participation were issued to students at the School of Architecture at the Academy of Fine Arts, the School of Architecture in Aarhus, Denmark's Shcool of Design and the Kolding Shool of Design. The intention is that the students from different schools shall work together in teams.

The main aim of the competition is to develop visionary and practical solutions for dwellings for the future, stressing sustainability and accessibility, with the actual construction of the scheme – a 1:1 prototype of a city dwelling for the future, focussing on the two themes as the end result. To inspire the participants, a variety of specialists have given lectures at seminars at the four schools. Deadline for submissions was May 31st 2001. DKK 100,000 have been set aside for prizes.

Other initiatives at the School of Architecture in Aarhus

Aarhus School of Architecture has organised a course in accessibility for architects in practice. The object of the course was to inspire the participants to take the accessibility requirements into account while at the drawing board (or the computer). At the same time, the participants received necessary insight and tools to handle the statutes requiring that the city as well as its spaces and buildings should be accessible to everybody.

The course came about as a result of a demand from the Ministry for Cities and Housing that the local authorities must observe the accessibility requirements. The Ministry has prescribed that issues relating to impaired mobility, seeing, hearing and understanding must receive particular attention in all new construction. The prescription also demands that dimensional requirements are observed and that exemptions are kept to a minimum[5].

The course corresponded in principle with the theme days, but greater stress was put on statutory accessibility requirements. As on the theme days, participants were sent on field trips, using wheelchairs, which they experienced as useful in their professional practice. One of the subjects in the concluding discussion, was how architects can contribute to the assistance our society offers disabled people, without jeopardising architectural quality.

5 On the subject of accessibility requirements, the then Minister for Cities and Housing wrote in the Ministry's newsletter: «I have a vision that we will, in the future, be able to market Denmark as the country where accessibility in the built environment is a matter of course. This will not be done over night. To reach this goal we have to surf ahead using easily understandable information and goal oriented political initiatives, and follow through with sensible statutes.

The research project "the Multifunctional Kitchen" consists of four scenarios detailing how a kitchen may be designed and adapted in line with changing user demands over time. The figure shows scenario no 4 in an old person's home adapted for a wheelchair user. Design: Lone Kobberholm Storgaard. 2000.

For the corner of the kitchen table, carrousel cupboards that can be elevated have been developed. The cupboards can be reached by people who are standing or sitting.

The sink is specially made from the heat resisting material Corean, to avoid burns on thighs. Note especially the edge-mounted tap. The dish washing machine is placed at a height where it is accessible both by wheelchair users and people who are standing.

Accessibility as an area of special concern

The multifunctional kitchen

The school management decided in 1996 that accessibility should be given emphasis as a field of research at the Aarhus school of architecture. One result has been a Ph.D. scholarship on the “Multifunctional kitchen – an investigation into and experiments with special needs”.

The research project starts form the following hypothesis: *A product in which function and deliberate design forms a higher unity will have qualities that lie beyond what is immediately visible and expected. The product will therefore possess a number of merits making it well functioning and eminently suitable in conditions that go a lot further than its intended common usage and functional value.* The aim of the project is to develop multifunctional products, which people with small or large disabilities can use easily and without limitations. Through theory and practice, the dissertation sought to test the hypothesis in the real world.

The dissertation was approved in December 2000 and gives a number of concrete proposals for the thoughtful adaptation of a kitchen to the needs of self-sufficient wheelchair users. A central feature of the project is a full-scale prototype, which has been adapted for a young female wheelchair user. The dissertation also contains a series of recommendations for architects, designers and manufacturers when developing new products[6].

Accessibility handbook

Another initiative at the Aarhus School of Architecture is an ongoing research project which will result in a handbook on accessibility. The object of this project is to publish information about planning and design of the physical environment in relation to the needs of disabled people. The information is being prepared and presented in such a way that it can be used directly, with no need for complex deliberations. It is intended for use in architects' offices and for others that are involved in building and construction as well as for local authority building and planning departments.

The information will be given in written form as well as drawings and photographs, showing how accessibility may be achieved for persons with temporary or permanent disabilities. The requirements in the building code are the basis for the proposals. The research effort of this project consists of collecting and arranging systematically material that may influence architectural and planning norms. The project may be seen as a departure from traditional programming, which rests on the dimensions and capabilities of the fully functioning adult person, as depicted by Leonardo da Vinci and le Corbusier.

6 The dissertation, including a synopsis in English is written by Lone Kobberholm Storgaard, Ph.D., and is available on loan from the library at the Aarhus School of Architecture.

Handicap, Architecture and Design is available both in MC and PC versions. Author Poul Østergaard, Aarhus School of Architecture. 1996

The handbook is directed towards practising architects. It will present essential accessibility requirements, including drawings, photos and written comments showing good and bad examples of how architects have produced solutions to accessibility problems. The handbook is planned for release in the autumn of 2001 and is a development of the CD-ROM Handicap, Architecture and Design (HA&D), which the author of this article has produced. The CD-ROM has about 1000 sequences, which by means of film, animations, drawings and sound show some of the difficulties handicapped people may meet inside and outside the home, and which architects can alleviate during the design stage. HA&D is a planning tool for architects and others who are involved with the shaping of the physical surroundings of daily life. A revised version of the CD-ROM will be available as an appendix to the accessibility handbook. The CD-ROM is available in Danish, English, Japanese and Portugese.[7]

7 Handicap, Architecure and Design is published by Christian Ejlers' forlag, P.O. box 2228 Copenhagen K. e-mail: lieber@ce-publishers.dk

Photo: FotoKnutsen AS

Part 2
North America

Photo: FotoKnutsen AS

2.1 Universal Design*ing*

Edward Steinfeld, Arch. D. Professor of Architecture, and Beth Tauke, M.F.A. Associate Professor of Architecture, School of Architecture and Planning, State University of New York at Buffalo, Buffalo, NY, U.S.A.

Introduction

The origins of barrier free or accessible design lie in the field of rehabilitation. After World War II, the practice of rehabilitation was successful enough that physicians and therapists were able to provide many people with severe disabilities enough function, skills and technology for them to accomplish activities of daily living independently. But, they discovered that the environment outside the rehabilitation center was not conducive to independent living by their “clients” without modification – removal of barriers to mobility.

Barrier free design is based on a therapeutic philosophy. The objective is to intervene in the environment so that people with disabilities can be more independent. It is primarily a top-down approach based on a regulatory model.

Universal Design, however, is concerned with more than just removal of barriers. It seeks to eliminate discrimination by design and support full social participation for all members of society. There are two underlying assumptions in this idea. The first is that all people can benefit from improved function, not just people with disabilities. The second is that social participation requires respect and avoidance of stigma. Thus, unlike barrier free design, which is concerned solely with benefits for a specific group of people, Universal Design is concerned with the benefits for the entire population. And, unlike the purely functional goals of accessible design, Universal Design is concerned with how the appearance of things affects social perceptions. Ultimately, Universal Design sets its sights beyond breaking physical barriers to include the redefinition of disablement as a universal condition, a condition of difference that we all share (Wijk, 1997).

Breaking barriers
Above: Tearing apart the Berlin Wall, Photo courtesy Fredrick Rahm (http://www.remote.org/frederik/culture/berlin/)
Below: Photo, Edward Steinfeld

Many would argue that universal design education should include a focus on therapeutic intervention. But, there is another equally important tradition in education that has not been acknowledged sufficiently. This second tradition originated in the humanities and the social sciences rather than the professions of environmental design and rehabilitation. While the practitioners of barrier free design were developing their technical knowledge base, the proponents of disability rights in other disciplines were trying to understand how social and cultural conditions are related to disability and how they influence attitudes, values and practices in society. Their work, which has come to be called “Disability Studies”, is a cultural critique that views disability as socially defined rather than solely a function of impairment. By extension, the experience of disability and the social response to it involves far more than a concern for function.

Universal Design, in fact, emerged through a cultural critique. The need to design environments to be accessible to and usable by people with disabilities was viewed by second generation proponents including some, like Ron Mace and Ruth Hall Lusher in the United States, who were both trained as architects and had disabilities themselves, as a symptom of a broad failure of society to incorporate disability into its consciousness. Their argument was that if disability is perceived as a "normal" part of life – something that could happen to any of us – then the material world would be designed to accommodate it without the need for a political movement or professional specialty. Accessibility and usability, they argued, should be a goal of design right from the start. Every designer should be able to design an environment that will benefit everyone, not just temporarily able-bodied people.

This view of Universal Design as a cultural critique is very exciting for design education because the form of pedagogy most emphasized in the design professions is criticism. Nothing is sacred in a design critique. Students are encouraged throughout their academic career to develop skills of critical thinking. Faculty in the design disciplines are experts at criticism. But, Universal Design is too often presented as a therapeutic intervention or as an ideological campaign, two approaches that are not received in a positive way in our postmodern academic culture. The popularity of the Principles of Universal Design (Connel, et al. 1997) as a pedagogic framework and "attitudinal change" as a focus of introductions to Universal Design are examples of this emphasis. The prescriptive nature of the Principles adopts the stance of therapy and the focus on attitude change is a form of ideological indoctrination.

To persuade our peers in academia and our students to recognize the value of Universal Design, we must develop a reflective pedagogy that not only retains the original critical focus of universal design as a philosophy but also involves self-criticism to uncover the significant intellectual foundation behind the ideology and also the limitations in the ideology itself. A reflective perspective on the concept of Universal Design, in particular, will help us to understand how others perceive our own work and help us develop more effective educational pedagogies and practices. We hope that such pedagogies will engage our very best students and convince them not only to practice Universal Design, but perhaps also to become Universal Design educators themselves.

In the rest of this chapter, we present three critiques. The first will examine the de-institutionalization movement of the 1970's, the first attempt to use social policy to accomplish social integration of people with disabilities, using ideas of *symbolic interactionism*, a philosophical movement associated with George Herbert Mead and the Chicago School. The second will examine the genesis of universal design in the barrier free design movement through the lens of *formal rationalization*, a theory developed by the German sociologist, Max Weber. The third will turn our attention to universal design itself using a critique that focuses on the *utopian* nature of the movement using the ideas of Sir Thomas More and Ruth Levitas. Each argument will identify pedagogical approaches to make the study of universal design intellectually stimulating and rewarding as part of a general design education.

Through the Looking Glass

> *We mold things in our images: they, in their turn, shape us by the resistance they offer when we try to impose our own personal form on them. (David Harvey 1989)*

The Symbolic Interactionist school in philosophy developed a perspective on self and society that led to the contemporary notion of social construction. George Herbert Mead (1934) argued that shared meanings evolve through social interaction. Society can be understood as a symbolic representation of that interaction. One's sense of self, or a group's shared sense of self, evolves from interaction with others and through an internal interaction in which we imaginatively take the role of the "other". Charles Cooley called this process "The Looking Glass Self" (1902).

From this perspective, the relationship of material culture (architecture, products, vehicles, communication systems, media, etc.) to social life is characterized by *reciprocity*. Material culture is a physical order that, on one hand, reflects the social order. On the other hand, material culture also prescribes a social order. Physical artifacts not only tell us much about the way a social system works, but they *make* it work in specific ways. One example is the cellular telephone. The popularity of these devices throughout the world symbolically reflects a global culture that puts great value on instantaneous communication. At the same time, this culture (including the technology) enables the increasing interconnectedness of people throughout the world.

There are many examples of such reciprocity. A plan of any building, for example, gives us insight into which group of people in the inhabiting organization has the most power, and, it also channels social behavior in ways that can enforce or counteract the power of specific inhabitants. The allocation of land in a community demonstrates the value placed on different activities such as recreation or education. It also affects how residents will utilize the community for those purposes. The appearance of automobiles connotes the differences in the status or lifestyles of their owners but it also contributes to social interaction patterns, e.g. who is attracted to whom, confirming those differences. The relationship of design to behavior is not, of course, completely deterministic but there is no denying that material culture plays an important role.

Given this reciprocal relationship, it is no surprise that social change is reflected by changes in our material world, and that changes in the material world contribute to the progress of social change itself. In cultures where traditions are strong and change is slow, we find many enduring patterns or material culture with a particularly clear and homogeneous formal language, both in vocabulary and syntax (see, for example, Hillier and Hanson, 1984). But, many other less consistent examples are also represented in the historical record. Where change is particularly rapid and complex, the established and new orders exist side by side. Thus, today we find people using cell phones in places where the predominant material culture is pre-industrial and small illegal radio stations finding niches within content space neglected by the media giants.

The essence of universal design is to enable, through changes in material culture, more competence, independence and social integration through design, especially to previously disadvantaged groups. There is at least one historical precedent for this endeavor. Hayden (1981) described the emergence of the material feminist movement in the mid 1800's. Early feminists recognized the relationship between the domestic environment and the status of women. They argued that the nuclear household was supported by the unpaid domestic work of women. They further argued that the burden of such work, which, at the time, was far greater than today, segregated women and kept them from taking a leadership role in community life. Adopting an industrial model, they showed how homes could be designed to be more efficient and housework could be mechanized with labor saving devices in order to free women from this burden

and give them the time to pursue other vocations. Further, they invented new social organizations and building types to house them that would provide a significant community role. One of their ideas was removing the activities of food preparation from the home. Community kitchens would be substituted where women would work for pay and provide the meals for a whole neighborhood.

Many ideas promoted by the material feminists eventually found their way into the mainstream, for example, take-out food, vacuum cleaners and housecleaning services. However, the liberation prophesized by the material feminist theorists did not come to pass in the way they expected. While most women are now in the workforce and are increasingly taking on leadership roles in the community and the absolute burden of domestic work for women in industrial societies has been reduced, that has not necessarily brought them into an equal partnership with men with respect to who does the housework, nor have they yet achieved equality in the workplace outside the home.

The policy to eliminate residential institutions for people with disabilities and replace them with small scale, community residences has surprising parallels to the material feminist movement. De-institutionalization sought to liberate people with a disability from the status of a disadvantaged minority by altering the physical environment to reduce dependence and stigma and increase equal opportunity of access to community resources. And, as with the material feminist movement, things did not turn out quite the way that the proponents of these ideas originally expected. Examining these results can uncover some interesting implications for universal design education.

The transformation of the institution was guided by «normalization theory» (Wolfensberger, 1972). The perception of social difference, argued normalization theorists, was the root cause of the social problems related to disability. Disability was, in fact, a social construction of the 19th century. They argued that if people with disabilities are treated as *individuals* who have differences, rather than a *class of people* who are different, their specific needs could be addressed through a more humane approach. Thus, in the design of facilities for the new community-based organizations, «normal» environments were (and are) mandated. The definition of “normal” has both programmatic and aesthetic components because the appearance of

one's living environment can be stigmatizing, setting up social distance between people with disabilities and the rest of the population.

The historical association of disability and social difference (defined as "deviance") with institutions created strong symbolic content in architectural forms. Perhaps the most obvious characteristic of institutions is their scale. They are always much larger than other residential building types. Even a modular organization (e.g., cottages) fails to mask their actual size. The highly repetitive and regular appearance of institutions was generated by beliefs in the ability of order in architecture to imbue order in human minds and social behavior (Rothman, 1971). It persists as an institutional aesthetic. The institution has a characteristic spatial syntax that reflects its emphasis on social control. Visual exposure is high and privacy is low. Circulation patterns are generally more hierarchical and directed than in non-institutional settings.

Normalizing an environment, then, includes not only the development of a «non-institutional» aesthetic i.e., informal as opposed to regular, small scale as opposed to large, and roofs similar to the prevailing norms in the surrounding context, but also, a spatial syntax that creates a non-institutional experience, e.g. culturally normative levels of privacy.

For people with disabilities severe enough (usually mental impairments and often physical impairments as well) that they cannot live independently in the community, group homes have become the alternative to institutionalization. They are a form of cooperative homemaking with a paid staff, similar in concept to the boarding home which at one time was a prevalent form of housing for young industrial workers of both genders (Hayden, 1981). A major difference, however, is that group homes are not owned by a resident manager but rather by agencies or organizations that manage networks of dispersed facilities.

Although principles of normalization guide the design of group homes, in the U.S. at least, there are many factors that prevent the complete realization of the normalization ideal. Most group homes have 2–4 staff members present at all times, working in shifts. They are owned and administered by state and voluntary agencies, often the very same organizations that once operated institutions (some still do). The cost of operating group homes is covered by the state but, being funded by taxpayers, has its limits.

Because of the perception that larger homes are more cost efficient, most group homes (in the U.S.) house 6–12 people. The residents often have both physical and mental impairments. The normative form for a house so large in the U.S. is typically a 2–3-story structure, but the degree of disability of the residents often precludes a multistory design. Thus these homes tend to look very different than other homes in the immediate vicinity because they are much larger in land coverage and longer and lower in profile.

Different household compositions than conventional single family homes demand a different form for group homes. The right photo demonstrates that they don't have to look strange and awkward.
Photos: IDEA Center

In the single family context of most American communities, the group home requires parking for a large number of automobiles since there needs to be enough room for two shifts of staff (most of whom drive to work) as well as visiting professional staff. Parking a row of 4–6 vehicles at the curb is not socially acceptable in the low density American landscape.

There are many other physical differences between group homes and the typical American single family home related to different fire safety requirements, the need to supervise medications, the need to provide an efficient workplace for the staff and, in severe climates, the need to provide a protected area for loading and unloading wheelchair vans.

The awkward and unusual appearance of many group homes could be avoided by devoting more resources to their construction, especially by reducing the number of occupants. However,

there is not much public support for the construction of very expensive homes for indigent people who don't appear to be productive members of society. In truth, most, if not all residents of group homes are fully employed or fully engaged in educational programs, but the public perception is different because they do not work in "normal" occupations and are not studying in conventional educational facilities. The lack of resources devoted to making the group home fit more smoothly into the social fabric of communities is an instance of reciprocity. The social value of the residents is reflected in the physical structure of the buildings. A social policy that commits adequate resources as well as rhetoric is needed to improve the social integration of people with severe disabilities. In the U.S., the current status of group homes represents the "halfway pregnant" nature of much current social policy toward people with disabilities. In fact, one critic called it "disabled policy" (Berkowitz, 1987).

The contradiction between the ideals of de-institutionalization and the reality of facilities like group homes is a fertile ground for universal design education. It provides the opportunity to examine the relationship between movements for social justice, social policy and environmental design. Bringing a critical perspective to this investigation opens up a dialogue about the place of disability and how social policy has fallen short of the ideal. Moreover, it is an excellent ground for examining the nature of "normality" itself. What is "normal"? How have notions of 'normal' changed throughout history and cultures? How do scale, shape, material and other physical factors signify normality or difference? Could the group home be a model for other housing options? Could it become a legitimate housing option for people without disabilities? Would that make this house form less stigmatizing? Furthermore, the group home can be studied as a historical evolution of the material feminist idea. In fact, the material feminists proposed cooperative housekeeping for the broader population as a way to reduce the burden of unpaid domestic work for women. Perhaps, as housing types evolve, e.g. senior housing or hospice housing, the group home will be less stigmatized.

A pedagogy based on the concept of cooperative housekeeping for people with severe disabilities as an entry point to a broader social critique is very interesting to students and provides an opportunity to teach a more significant lesson, one that is transferable to almost any other design project where public funds

are used to house a disadvantaged population. In fact, there are clear parallels with housing for older people, the poor, students, people with AIDS and victims of domestic abuse. Can housing adopt a universal design that will accommodate people who need significant levels of support and/or supervision? The challenge in this question is to find housing forms that truly embody the ideals of democracy and social justice yet meet the specific needs of the group. This should include, in the context of an academic exercise, examining alternatives to the social policies, attitudes and economics of the existing order and how those alternatives might provide a basis for a different design response. In universal design, students should engage these issues seriously. By doing so, their minds will be opened to alternative social realities, not only alternative physical forms.

The Iron Cage

"Despite the advantages it offers, bureaucracy suffers from the irrationality of rationality." (George Ritzer, 2000)

Max Weber was a German sociologist who studied the evolution of bureaucracies in societies around the world (Weber, 1921). Based on his analysis, he argued that the culture of the Western world (today one could extend this to the increasingly Westernized global culture) was increasingly dominated by the values of efficiency, predictability, calculability and introduction of nonhuman technologies. He called this process *rationalization* and argued that bureaucracies were the best manifestation of this process. He observed that the bureaucracy has a tendency toward *formal rationalization* – the search for the optimum means to a given end shaped by rules, regulations and larger social structures. Weber argued that the process of formal rationalization can lead to an "Iron Cage" of rationality – a situation where the rationalized detail of the regulatory process creates so many constraints that *irrationality* is the result. Nothing could be a better example of this process than the regulatory world of barrier-free or accessible design in the U.S.

Technical knowledge is necessary to create barrier free buildings. To design an effective ramp, for example, one must know the maximum slope that can be negotiated by a severely disabled individual, e.g. a person who uses a wheelchair. Those within the design professions who had the requisite technical knowledge in the early days of the barrier free design movement during the 1950's and early 1960's were the architects of rehabilitation facilities and equipment. Together with rehabilita-

tion professionals and consumer advocates, they invented the specialty of barrier free design. The emphasis on regulatory activity as a way to implement barrier free design in the U.S. resulted from the general lack of technical knowledge and interest in the subject within the design professions. Although voluntary efforts were initiated during the early 1960's to encourage designers, particularly architects, to engage the issue, it became clear by the late 1960's that accessibility to the environment could not be achieved on a voluntary basis.

The first Federal legislation on barrier free design, the Architectural Barriers Act, was passed in 1968. In 1975, a government review exposed the lack of compliance with this law (GAO, 1975). Since then, a succession of laws and regulations gradually expanded the types of buildings covered and strengthened enforcement policies. In addition, the technical provisions of regulations also greatly expanded. The initial voluntary standard was less than 10 pages (ANSI A117.1, 1961). The same standard today has almost 70 pages (ICC/ANSI A117.1, 1998). Each step along the way, there has been considerable resistance from the building industry and the design professions (Steinfeld, 1977). With the advent of complex regulations, legal processes and penalties, the need for knowledge grew but it was not necessary, as in the early days, to learn about the needs of people with disabilities directly; all that was necessary was to learn the regulations and the process.

Although advocates, like the authors, support the regulatory process as the only way, in the current framework, to insure that access is provided, there is no question that the regulatory system has evolved into an "Iron Cage." Two examples illustrate the problem.

The Americans with Disabilities Act (ADA) has regulations that cover all buildings constructed with Federal funding, including housing, and another set that covers all public accommodations. However, the agency that develops the rules that are used to specify the technical design criteria, the U.S. Access Board, is not mandated (i.e. therefore not allowed) to develop rules for housing. The *ADA Guidelines* (1984) for public accommodations are being revised to reflect new knowledge from research and practical experience, but the housing standards will not be changed. There are some significant differences between the two sets of criteria but they are, to anyone but an expert, very difficult to find. Thus, architects are forced to use the obsolete

design criteria or follow the more up to date and improved technical criteria and risk having their buildings cited as non-compliant by overzealous regulators who only accept compliance with a specific set of standards.

Although the U.S. Federal government develops the *ADA Guidelines*, each state in the country can develop building code requirements for accessibility for use in the state. Many states have adopted the ADA Guidelines but many others have developed their own standards. Thus, architects and developers working in many states have to know the differences. As each state develops new rules that are not in the ADA, the rules tend to be disseminated to other states and eventually find their way into the national standards. The accessibility "industry" thrives on adopting new rules to address the needs of specific constituencies rather than completing research on the needs and carefully examining the value of those rules using empirical methods. Over time, then, the complexity of the rules has increased with questionable results in terms of improving accessibility. A serious negative backlash from the building industry developed because of the arbitrary and confusing regulatory situation. In fact, the detailed rules actually prohibit innovation through universal design in many cases.

Thus, what started out as a social movement to create equal opportunity access to resources in society has been transformed into a bureaucratic exercise in enforcement. In the litigious U.S., this has produced a veritable industry of accessibility "experts" whose main technical skills are remembering the details of the regulations and knowing how the government interprets them. While creating employment opportunities for a few, the regulatory environment has created an adversarial relationship between advocates on one side and architects and building owners and developers on the other. Moreover, it has resulted in a situation where the design professions, both in academia and in practice, do not look upon barrier free design as an opportunity for creative design. The discourse of barrier free design is basically viewed as a part of building code compliance or technical problem solving. This is evident by the general lack of aesthetic content in the literature on the subject. Most examples of barrier free design perpetuate the cold clinical look of its institutional precedents.

In general, the tendency to legislate reform can be understood, from the public's perspective, as a lack of trust in professionals.

In contemporary post-industrial societies, the belief in the goodwill of an elite professional class governed by its own standards of ethics and interests is no longer operative. The history of barrier free design suggests that the public's mistrust may be well founded. Few designers, (who, in the U.S., are mostly white, temporarily able bodied males) personally identify with the interests of people who have disabilities. The regulatory route may be the most effective political strategy that a minority group can use to insure the provision of basic human rights. Through the policy-making process, advocates can appeal to humanistic values espoused by the society as a whole. The top-down imposition of political pressure is also much more efficient and effective than trying to educate and monitor every professional or building in every community in the country.

From the profession's perspective, regulations represent an intrusion on the architect's responsibility and a demonstration that they are losing control over the power to make design decisions. Since the regulations constrain the way buildings look, they also represent an attack, by outside interests, on the «sacred» aesthetic domain of architects. Given the trends, it is likely that future regulations will proscribe such detailed design features as the shape of roofs on group homes and the fonts used in signs. The shift of power and territorial infringement has put the profession on the defensive to the point where professional associations are just as likely to resist improving access to buildings as they are to promote it.

Regulations in themselves, however, do not ensure social change. Regulatory activity is a political process in which negotiation and compromise take place. The accessibility achieved through regulations is only as extensive as the rules incorporated in them. These rules are almost exclusively minimum requirements. Thus, the codification of barrier-free design insures accessibility to a degree, but tends to reduce creative thinking that might result in more accessible places, products and systems. Perhaps the most limiting impact of regulations is that they perpetuate the myth that accessibility is a technical problem rather than an opportunity for engaging imagination. It is noteworthy that when the design for Frank Loyd Wright's Guggenheim Museum was completed, there were no regulations mandating access to public buildings. Unfettered by rules, he created an imaginative solution to the problem of making buildings accessible – he sloped the building instead of building a ramp.

The critical examination of accessibility regulations is a good point of departure for introducing universal design in an educational context. Both faculty peers and students generally share the profession's anathema toward imposition of rules from outside its world and the loss of control over the territory of design. An educational activity that starts with a critique of the regulatory approach, exposing both the necessity of regulations and their detrimental effect, can then move on to pose the challenge of an alternative. The alternative, of course, is universal design.

In opposition to the idea of designing to meet regulations that protect a class of people, the driving idea behind universal design is that the physical world should serve the needs of *all people* including those who have a disability. This concept effectively transforms the mental representation of a building user. Rather than designing a building for a stereotypical average person or special interest group, universal design promotes a culturally pluralistic representation of building users. Rather than focusing on the blind adherence to rules, universal design requires that designers learn about the design issues behind the rules and how to generalize to situations where rules are not applicable.

Universal design practice first emerged in the field of product design, where there are very few regulations related to usability by people with disabilities. This, like the Guggenheim example, supports the view that regulatory activity can actually retard the integration of disability as part of "normal" design practice. Designers of "universal" products and buildings focus on *usefulness* as a source of imaginative exploration as opposed to rules as a constraint. Moreover, they recognize that people with disabilities are not the only ones to benefit from more useful artifacts. Historically, many revolutionary products originated as assistive technology, including the typewriter, the telephone, e-mail and voice recognition. Their utility appealed to everyone and these products have truly changed our way of life. Usefulness has a great deal of appeal if it benefits a wide range of people.

Universal design, however, goes quite a bit further than simply transferring technology from the realm of rehabilitation to the general consumer market. Successful universal designs appeal to a broader constituency because of their sound ergonomic principles and attractive appearance. It is not enough to provide

Add on structures perpetuate the stigma of disability, but accessibility practiced as universal design can be an inspiration for form making.

Everson Museum of Art (c. 1975) I.M. Pei, Architect, Photo Edward Steinfeld

High Museum, Richard Meier, Architect, Photo Edward Steinfeld

a feature people want; universal design has to make that feature easy to use and attractive to the consumer. As everyone knows from personal experience, even revolutionary technologies like the VCR, can be daunting when it comes to usability. Clearly the idea of universal design is highly compatible with goals of contemporary capitalism. And, in fact, product manufacturers have been quick to use it as a marketing tool to expand markets, particularly to the older population.

Universal design has several attractive characteristics that make it a more powerful idea than barrier free design. First, it expands the constituency of design from disabled people to elderly people, children, women and others who have been under-represented in the design consciousness. Second, the

focus of universal design is on invention rather than regulation. Third, universal design overcomes the perpetuation of social difference. The idea is to infuse design with an inclusive approach. Barrier free design, on the other hand, is associated with the bureaucratic culture, which leads to the Iron Cage. Its underlying concern for people is disguised and hidden by regulation, which is associated with social control. In particular, design by regulation assumes there is only one "best" way to do something. And, its constituency is limited to people with disabilities and the accessibility industry. Universal design offers a new philosophical position for the practicing professional. It offers an opportunity to «eliminate the fascism in our heads» (Harvey, 1989, p. 45) by incorporating the perspectives of groups that have been marginalized by the design professions.

Universal design is not, of course, immune to a negative connotation from the perspective of formal rationalization. The very name itself connotes a single universal «solution» to any design problem – the "one best way". The idea of a sensibility that responds to all can too easily be perceived as a doctrine that denies the legitimacy of many particular perspectives. Universal Design, if narrowly conceived, could submerge the identity of a group within the «universal». Normalization theory shares this same tendency, a «search for invisibility». It demands normative appearances, rejecting the avant-garde because of its connotation of difference. This is, in some ways, contradictory to the idea of embracing difference. Even people with disabilities are proud of their differences, the distinctions that make them unique. They just don't want to be stigmatized because of them. Designers, particularly those who teach in academia, are suspicious of an ideology that appears to reject difference and exploratory formal explorations. That is why we believe that the term "inclusive design" or the European term "Design for All" are more accurate terms for what universal design is all about, particularly because we have had to invest much time overcoming the false perceptions described above.

Utopia

> *"Every daring attempt to make a great change in existing conditions, every lofty vision of new possibilities for the human race, has been labeled utopian."* (Emma Goldman c. 1912, first published in Shulman, 1972)

Ultimately, the universal design idea is a utopian notion. This label "utopian" has both positive and negative connotations. On

the one hand, it embraces idealism, the optimistic belief that "yes, it can be accomplished – we can do it". On the other hand, it suggests impracticality, the impossibility of reaching a goal – the naiveté of believing that "it could happen" and perhaps even the inability to separate fantasy and reality.

Many university faculty are wary of utopian claims. They argue that the term 'universal' is a specious and dangerous concept. There has, after all, been an enormous amount of suffering and waste in the world due to the adoption of universal solutions and demise of pluralism. In fact, "universal design" is, according to the experts "design for all people," but, to the outsider, the concept of "design for all" seems an impossibility.

Utopian ideas have a tendency toward absolutism. The term "universal" itself, meaning "including or covering all or a whole collectively or distributively without limit or exception" (Hoad, 1992), conveys an abolutist agenda. One of us had a high school teacher who told her class: "Be careful about using absolute terms such as every, all, always, no, none, never – it is difficult to support statements containing absolutes: *All* people need love. *No* one benefits from violence in society. Usually, this is the case, but there are exceptions. There are very few (if any) instances of absolutes in our worlds. And absolute proclamations are dangerous because they tend to close the possibility of critical examination."

Every utopian notion creates skepticism in intellectual circles because of the inherently exclusive nature of most ideologies and groups espousing those ideologies. In the early days of its evolution, those within the universal design discipline presented it (whether intentional or not) with a kind of redemptive or salvation approach. Either one had "seen the light of universal design" or one was still "in the dark of form-driven design". Those who had "seen the light" were "saved" and it was their obligation to enlighten the rest of the world – to spread the word. Those who had not "seen the light" weren't quite as "good" as those who had.

Coupled with this is the natural tendency for proponents of a utopian concept to dismiss other types of design explorations that, because of different goals and agenda, do not embrace the principles of the movement. To the outsider, much of the work produced by other designers is, *ipso facto*, defined by the proponents of universal design as illegitimate (or not discussion-

worthy) because it doesn't adhere to the stated *Principles of Universal Design* (Connel, et al., 1997). The Principles at times, act as barriers or dividers between "right" design and "wrong" design. When presented or perceived as a dichotomous choice, there are many other legitimate design enterprises that are de-legitimized: the work of those experimenting with form-driven environments that primarily are intended to challenge our preconceptions of spatial organizations and conditions, the work of phenomenologists who explore environments and products with the intention of heightening our physical experiences, and even the work of proponents of sustainable design, a field that even shares the utopian perspective and whose practitioners are natural allies.

Faculty who teach from these other perspectives often argue that the design of the material world should create physical challenges, a position diametrically opposed to the universal design principle of reducing effort and making them intuitive and simple to use. And, in fact, people do enjoy and value many activities that require added effort and cause inconvenience. Some examples are a devout woman whose faith is reinforced by the symbolism of pushing open of heavy church doors, a child who enjoys the strain of reaching to turn on the bathroom faucet while imagining that someday she'll be big enough to turn it on by herself, or, the environmentalist who values the additional effort required to empty a composting toilet because it reduces environmental pollution.

Also excluded are those whose work is intended to create disturbing and unsettling conditions for the sake of challenging social, cultural, political, and/or economic preconceptions and provoking critical reflection. Examples include Revington's Luminous Veil Bridge Project in Toronto, which calls attention to the problem of suicide, parts of Jahn's Chicago Stock Exchange in which the panic of potential market crash is incorporated into the interior space of the building. These works seem quite inappropriate for the field of universal design – perhaps even antithetical to it. They don't fit the definition or the mold that has been established, and, therefore, they are not considered in the discourse. The problem? Although the *intentions* of universal design are inclusive, its structure is inherently *exclusive*; therefore, its practices contain contradictions.

These barriers could prevent the discipline from adopting a set of critical perspectives and, ultimately, a critical practice – a

practice that continually challenges and questions itself in order to grow, a practice that considers other kinds of design and other ways in which the physical world could shape our bodies, minds, and spirits – a practice that considers various forms of design education such as those structured to support difference or to reveal the social construction of beliefs.

As noted above, utopian ideas have a positive side as well. The three primary characteristics of a utopian idea are idealism, change, and critique. All of these are positive attributes. Although an absolute idealism can be naïve and inconsequential, an idealism tempered with pragmatism is what distinguishes the mundane from the significant in design. Moreover, the courage to take risks and search for new approaches, perspectives and solutions are attributes valued highly by most design educators. Finally, and most importantly, utopian ideas emerge from a critique of the status quo. When embraced thoughtlessly with sloganeering and militancy, outsiders question the sincerity of this critique. But, when adopted with considerable reflection and articulated well, educators should respect it as a valid point of departure for good design. Thus, universal design, as a utopian construct, has the inherent qualities of a powerful design philosophy, one that should be respected by other faculty.

Two utopian ideas, are particularly useful as a theoretical framework for understanding and communicating universal design in a positive sense as opposed to the negative. The first of these is Sir Thomas More's deliberate combination of the Greek words ***eutopia*** (good place) and ***outopia*** (no place) to generate the term ***utopia*** (More, 1975, originally published 1516). The second is Ruth Levitas's contemporary description:

> *[u]topia is the expression of the desire for a better way of being. This includes both the objective, institutional approach to utopia, and the subjective, experiential concern of dis-alienation.… It allows for the form, function, and content to change over time. And it reminds us that, whenever we think of particular utopias, we learn a lot about the experience of living under any set of conditions by reflecting upon the desires which those conditions generate and yet leave unfulfilled. For that is the space which utopia occupies. (Levitas, 1990)*

More's definition is place-dependent and Levitas's is state-dependent. More's creates a space; Levitas's fills it. The double condition of More's two aspects of utopia – good place, no

place – sets up the possibility of introducing Levitas's view as a mediating device: the desired state is where 'good place' and 'no place' intersect.

These ideas of utopia can help us understand the spaces, places, objects, images and events that are the results of universal design practice. The physical products and places of universal design, and their attendant psychological states, often articulate the dichotomy inherent in desire – the utopian ideal of 'design for all' and the reality of getting closer, but never reaching the goal.

Utopian ideas help us to rethink and realize the seemingly impossible. Left: Parc des Buttes-Chaumont, Paris, France, Photo Beth Tauke Right: Tuno By, Denmark, Photo Beth Tauke.

Places and products that have the characteristics of universal design are located cognitively somewhere between what is and what is desired. Thus, the desired place becomes a 'substitute' place. This place of 'design for all' is asymptotic, namely, an approach between two conditions that continues to move forever closer, but that never achieves full merging or closure. This asymptotic condition of universal design does not completely fulfill the promise of 'design for all' but forever attempts to close the gap through *an increasingly informed practice of designing for a continually broadening and deepening population.*

The reflection required to pursue "an increasingly informed" state of consciousness is one form of critical practice. It is this reflective activity that has not been adequately communicated

as a part of universal design practice. More emphasis on this aspect of universal design will help to achieve validation of the concept within both the academic disciplines and professions of design. While emphasizing the positive connotations of utopian thinking, it is also important to avoid reinforcing the negative. Universal design educators can avoid espousing an idealism that is obviously impractical. They can avoid an absolutist stance that implies to one's peers that their own work has little value. And, they can embrace a real inclusiveness by adopting a tolerance of other perspectives, even those that appear contrary to the espoused *Principles*. Universal design educators can also demonstrate the true sincerity of their devotion to inclusiveness by expanding the sphere of their interests and activities beyond disability to aging, gender issues, cultural differences, sustainability and other issues that might emerge as cultures change. This will not only inform the development of universal design as a philosophical approach to design but also build bridges to other faculty who share equally utopian perspectives.

Conclusion

Universal design education could be enriched significantly by exploring and communicating the intellectual traditions that underlay the concept, like the idea of *reciprocity* between social life and material culture and the concept of *social justice*. Using the group home as an example, we have demonstrated how the concept of normalization has parallels in the theories of the early feminist movement. This idea has significant implications for curriculum and criticism, especially in the design studio. We proposed that group homes could be studied as a form of co-operative housekeeping. As a corollary example, the concept of *independence* can be examined as a basis for the design of an autonomous living unit, thereby making connections to the sustainable design movement. No doubt there are many other such connections and thus many other threads of intellectual discourse that could inform our work.

A *cultural critique* can become part of all design projects. Too often, design studio instructors give an assignment in the form of a problem to solve without leaving room or encouraging a redefinition of the problem itself. Yet, the most creative design usually starts with such reflection. In reality, any assignment is a program to question and critique, examining the relationship between material culture and social life, studying the differing social definitions of places or objects and comparing the

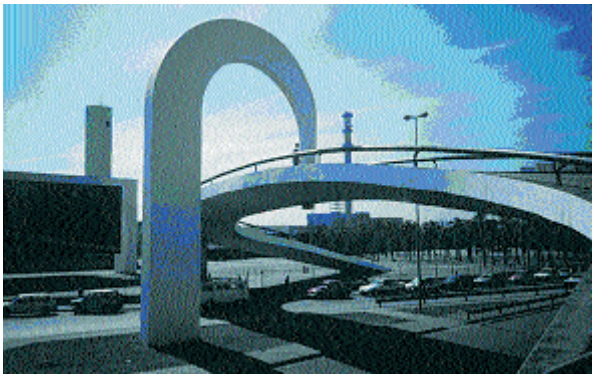
perspectives of the client, the designer and the user as “other”. The literature of disability studies can be an excellent source of ideas for such a critique. Some suggestions include:

1. the impact of disability in public encounters and what is implied for the design of public places,
2. perfection and deformity in aesthetic values and what they imply for fashions of taste and style,
3. disability as a career and the implication for design for the lifespan,
4. disability as “otherness” and its relationship with “marginal space”.

The idea that universal design is an alternative to the rule based approach of barrier free design is another powerful educational strategy. Since there is much resistance to the rule based approach among creative designers, it can be used as a foil to generate interest among students in its alternative. Since students need to know the rules they will have to follow when they enter practice, an assignment through which they have to study them and uncover their limitations and irrationalities may be a good introduction to universal design. From there, the underlying principles of design behind the rules and others that are not even represented by the rules can be uncovered and students can be challenged to find better solutions than rule based design would generate. On the other hand, an exclusive focus on design by rules, such as using the ADA as a basis for universal design education, is likely to miss the whole point of the movement.

Although pedagogy certainly should be the focus of universal design education, politics are as critical to the success of educational ventures as the merit of pedagogy. Academia is a place where intense competition among ideas is a normal state of affairs. As advocates of universal design, we have to be prepared to persuade our colleagues and students of their intellectual value. The concept of universal design has many connotations that appeal to the values and perspectives of progressive academic culture. These include a concern for human values, activism, cultural pluralism and social justice. Yet, at the same time, universal design can have connotations that can engender suspicion and resistance by other faculty as well as students. These include the perception that universal design, as a utopian concept, has an absolute idealist agenda, an exclusionary structure and unrealistic goals.

These negative connotations, however, can be overcome with a focus on the intellectual traditions to which universal design is linked and by insuring an open, critical perspective in pedagogy. We especially need to emphasize the idealism inherent in the concept and, to avoid the perception of naiveté, we need to emphasize that universal design is a search for ways to "close the gap" between the utopian ideal and the current status quo. The ideal of universal design may be more palatable when presented as a touchstone against which we try out various ideas about our ways of living in the world. In this way, the strengths and dilemmas of universal design are used to help us see what we are without prescribing what we should be. We can use its processes, products, and environments to actively participate in the unending debate about human nature and the best possible evolution of society. In fact, we prefer to use the term universal



Universal design is socially integrating, functional for everyone and inspiring as well. Above – Bara Funda, Sao Paulo, Oscar Niemeyer, Architect, Photo: Edward Steinfeld
Below – Tribeca Bridge, New York, Photo: Edward Steinfeld.

design*ing*, a verb rather than a noun, because the verb form puts the emphasis on *going* there, rather than *getting* there.

Reflective thinking should be the norm of universal design education, emphasizing the critical stance that brought it into being in the first place. We need to practice an inclusive intellectual discourse by acknowledging connections to other perspectives in education and design, in particular, those that share a utopian character, emphasize the value of diversity and encourage a person-centered design practice. And, we need to be tolerant of other, more divergent educational perspectives, recognizing that there is a place for many viewpoints in design education.

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Photo: FotoKnutsen AS

2.2 An Opportunity for Critical Discourse in Design Education

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Background

Universal design education in the United States has been fostered and documented primarily through the leadership of Elaine Ostroff, who developed the Universal Design Education Project (UDEP) in 1989, the first funded program in universal design curriculum development. Case studies from the project's twenty-two participating schools (Welch, 1995; 2000) present a range of approaches and materials across four design fields – architecture, landscape architecture, interior design and product design. These teaching examples illustrate substantial differences in operative definitions of universal design and pedagogical philosophies and illuminate the exploration of an emergent definition of universal design as «good design». While adoption of universal design values has been slow among most design faculties in the Unites States, instructors and students in interior design and product design have been more receptive to this shift in thinking than those in architecture and landscape architecture. This chapter describes the experience of two professors in these latter disciplines who use universal design as a vehicle for critical discourse in their design teaching.

The authors, as University of Oregon faculty, were selected in the second round of Universal Design Education Project (UDEP) funding for teaching innovations and had the opportunity to build on the experiences of the first round of schools. The strategies employed by the authors in teaching universal design are also influenced by their prior professional experiences as well as the specific contexts of their departments and disciplines.

The design disciplines at the University of Oregon, housed in the School of Architecture and Allied Arts, include Landscape Architecture, Architecture, Interior Architecture, Planning, Fine Arts, Art History, Arts and Administration, and Historic Preservation. While the authors are the only design faculty who explicitly teach the application of universal design values to design students, their thinking has been significantly influenced by two professors in Arts and Administration and Fine Arts, whose practice and teaching challenges traditional knowledge paradigms regarding culture, class, gender and ability.

The Architecture department and its program in Interior Architecture offer both undergraduate and graduate degrees. The department has a long history of a humanistic, non-competitive curriculum that currently attracts students for its strengths in regionalism, sustainability, and building craft and technology. The Landscape Architecture program, also serving graduates and undergraduates, has a reputation for its strength in landscape ecology, history and design technologies.

Ideals and objectives: Main Themes

Several important themes inform the approach taken to teaching the value of universal design at the University of Oregon. First, universal design is a value that establishes a quality of relationship between people and designed environments or physical objects, based on an inclusive definition of users and the potential of the built environment to empower and enable users. It is related to, by virtue of history, *but not synonymous with*, the disability-focussed terms *accessible design*, *barrier free design* and *adaptable design* or, in the United States, design that complies with the requirements of the American with Disabilities Act. Because universal design was first conceived by accessibility advocates in the disability movement, the idea was framed initially with a disability construct of design issues. In 1998 Ronald Mace supplemented his original definition of universal design (1991), by emphatically stating that «[universal design's] focus is not specifically on people with disabilities, but all people» (1998).

The Seven Principles of Universal Design Project (see main Appendix 1) has helped to explain universal design by prescribing some of its essential physical characteristics and cognitive qualities. The Universal Design Exemplars Projects [ii] built on the Seven Principles and gathered visual examples of universal design applications to real places and useful objects. Each effort

to codify the characteristics of universal design has wrestled with the residual notion that it serves primarily people with disabilities, and, secondarily, meets the needs of others. These projects offer practitioners, teachers and scholars important resources for launching an ongoing discourse about the practical applications of universal design and the merits of designing inclusively.

Secondly, the civil rights principle that serves as the legal foundation of the American with Disabilities Act (ADA) – that people with disabilities have the same rights to use and enjoy the built environment as everyone else – is an important aspect of teaching universal design. The notion that civil rights extend to the allocation and utilization of physical space is not new. African Americans and women, among others, have had to challenge spatial practices that either unduly separated them or ignored their existence altogether (Weisman 1992; Grant 1996). There are important teaching opportunities in examining the parallels and provoking critical insights about the nature of equity in design. Landscape architects and architects have generally ignored their role in shaping the environment as an opportunity for fostering social justice (Jones 1996, 1998) and their agency in reinforcing stereotypes through their designs (Welch and Jones, 1999).

Third, if universal design is a value that addresses the needs of all users, as Mace asserted (1998), then its application must recognize that many individual users have multiple identities. Universal design has typically been extended from being a disability issue to being a lifespan issue. Design concerns have extended most easily from disability issues to the needs of old people because the aging population shares characteristics of diminished mobility and stamina, sensory limitations and the need for assistive technology. «Lifespan» therefore has been interpreted by many faculty and practitioners as focussing on the latter half of life when users' relationships to the environment are similar to those of people with disabilities. Consideration of small children has been largely overlooked except for differences in stature. Teenagers, as is their common fate in the U.S., are largely ignored. Cognitive and developmental needs of children and adolescents may be in direct conflict with some universal design principles. For example, the lever door handle is now a ubiquitous example of universal design but under certain circumstances its benefits of «low physical effort» (Principle Six) [iii] may be outweighed by its lack of «tolerance for error» (Principle Five) when small children are present. (see Figure 1)

Fig. 1. The child's safety gate illustrates the need for further development of the lever door handle to be fully universal in a family housing setting.

If universal design recognizes that most individuals have multiple facets of identities, that is, people also characterize themselves in relation to race, class, gender, ethnicity, physical size and sexuality, then the design strategies need to reflect that greater complexity. An old person's interaction with the environment may be equally a factor of her ethnic traditions, especially family structure and gender expectations, as her diminishing energy and sensory ability. A mother who uses a wheelchair may find raising children alone to be challenging in new ways when negotiating the places that parents and children

frequent. Recognizing multiple facets of identity is especially important in framing environmental design decisions at the larger scales of buildings, landscapes, and communities (Welch and Jones 2001c) where the environment may provide fewer individual affordances and individuals collectively make a broader array of demands on the place.

The field of environment-behavior studies has been a source of research-based information on the needs of specific user groups – elderly people, people with disabilities, hospital patients, office workers, low income families, pedestrians, and museum visitors, to name a few. The taxonomy that has evolved over time for identifying user groups has hardly been systematic and often labels groups of people by their shared experience as occupants of a building or place type. The literature tends to convey homogenous, typical users whose environmental behaviors and needs are generic to the group being described and seldom address the implications of other facets of identity. The literature is an important resource for understanding one facet of identity but it is only partially informative unless it is complemented by input from real users with real, complex identities and needs.

User consultants have been found to be one of the most effective strategies for teaching universal design values (Lifchez 1987; Welch 1996; Ostroff 1997). Design education in the United States generally does not value the perspective of non-designers in teaching design and schools generally have such limited diversity of students and faculty that the perspectives of the school population may not be sufficiently representative. While Lifchez invited people with physical disabilities to be ongoing clients for his students, most of the UDEP schools asked users consultants to visit studio reviews and provide feedback on students' proposed designs. Users who are able to articulate their day-to-day experiences in the built environment can give students insights into their proposed design that is both memorable and interrogative, enhancing the likelihood of the student gaining a critical perspective. The UDEP students had varied reactions: «some students experienced disbelief and outrage at the indignity of the misfit between people and the environment; some felt like inadvertent accomplices in their profession's careless attitudes; others remained skeptical that design could possibly respond to the range of issues that users present.» (Welch 1995, 254). This range of responses reflects

yet another opportunity to engage students in critiquing the role of design in addressing the needs of multiple, diverse users.

Fourth, universal design has a greater likelihood of being incorporated into students' thinking and design work if the value is infused into all aspects of teaching rather than taught as stand-alone subject matter (Welch 1995). The single subject matter course called «Universal Design» was noted by some UDEP faculty for sending the message that universal design is another skill to be learned and applied, and risks losing sight of its larger value as contextual, critical exploration of the fit between people and design. Infusing universal design across the curriculum has been tried in a number of UDEP schools where faculty inserts materials and exercises into a variety of courses and levels of design studios[iv]. A more subtle effort at infusion was the meeting of faculty at Buffalo to discuss what universal design really meant to the teaching of design (Adaptive Environments 1996). In this venue, not only were the faculty (a mix of adopters and non-adopters, I believe) asked to actively and critically consider how to reflect universal design values in design teaching but each learned more about it in the process. «Infusion diminishes the potentially marginal status of the course content and introduces new discourse by challenging ableist, gendered, classist, eurocentric course content.» (Welch and Jones, 2000)

Fifth, for students to develop a complete and operational understanding of universal design requires a variety of curricular content. Five components are critical for students to move from general awareness to engagement and ultimately, integration, the ability to design inclusively (Welch and Jones 2001b):

– Technical data
– User needs research
– User involvement
– Self awareness
– Ethical and political considerations

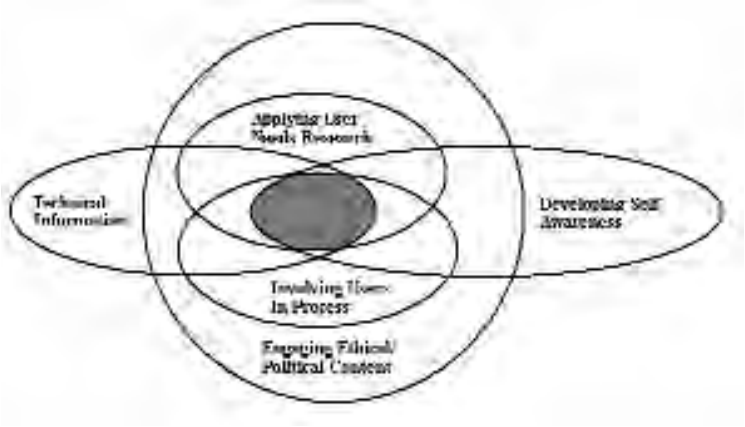

Fig. 2. Model for development of curriculum content (Welch and Jones, 2001b)

And finally, teaching universal design is an opportunity to increase critical discourse in design training. Most curricular material on accommodating people with disabilities has, to date, been presented as technical in nature – the slope of a ramp, the width of a door, the layout of a bathroom. When accessibility requirements are presented in the context of building code, students too rarely question the origin or reliability of the information nor are they inclined to imagine equivalent or enhanced alternatives to the requirements. When universal design is presented primarily through exemplars it can have the same effect on students. They are inclined to replicate what they have seen but not able to generate new inclusive solutions. Critical analysis of whose needs are addressed by universally designed places and objects seems to help internalize the value. To engage students in examining the values inherent in their training – the «truths» by which their professions judge design – and the degree of inclusivity in the precedents they select to emulate, encourages a critical perspective that can profoundly impact their world view and design aspirations. Needless to say, this type of critical assessment of built places is largely missing from both trade journals and scholarly journals in architecture and landscape architecture, leaving instructors to develop their own original materials.

Strategies

The primary focus of the Oregon faculty has been twofold: exploring the nature of infusion and the implications of universal design as a design value rather than technical knowledge

(Welch 2000). Over the course of five years the following strategies for incorporating universal design values into the many realms of intellectual interaction with students and colleagues have been explored:

– Creating a *smorgasbrod* of universal design teaching materials that other faculty could incorporate into their classes
– A weekend workshop focussed on environmental equity
– Infusing readings, exercises and images into a variety of subject matter courses.
– Design studios that foster inclusive planning and design values

The Oregon UDEP grant proposed to infuse the entire environmental design curriculum by offering faculty a variety of curricular materials about universal design that they could insert directly into their teaching or merge with existing materials. The authors selected History/Theory courses for the first effort at infusion because those professors were probably not familiar with universal design, were engaging students in critical discourse, seemed to be likely potential adopters, and their involvement in testing universal design teaching materials would stimulate useful discussion. History, theory, criticism courses generally establish for the design student a repetoire of historical precedents from which to draw aesthetic vocabulary and design inspiration. Many of the images to which students are exposed in these courses represent the exclusive values of a dominant culture, perpetuation of social stereotypes and stigmas, and assumptions about appropriate use, often without critical commentary. The UDEP faculty believed that its universal design materials would encourage faculty to critique these precedents from multiple perspectives and offer additional images and information that might provoke discussion and critical investigation.

For a variety of reasons the history/theory faculty were not teaching during the initial UDEP grant period. So a letter was sent to all faculty in both landscape architecture and architecture, describing the UDEP grant and the universal design resources available to them, with the expectation that some of them might be willing to be early adopters. No interest was forthcoming, not even a hallway conversation. The UDEP faculty shifted to testing the resource library themselves – a bibliography of readings and videos, and a slide collection of universal design exemplars. Each UDEP instructor had introduced universal design into coursework at least as a lecture and all four were experimenting with exercises that would reinforce the impor-

tance of universal design to the subject matter of their courses. In hindsight, the internal team dialogue and values development was a critical precursor to showing other faculty how universal design values could be a pedagogical nexus of their teaching.

An opportunity to match the UDEP grant with internal university funding presented itself. The call for an event that would have relevance and appeal for students and faculty from all departments in the school made possible expanding the proposed UDEP event from a «talking heads» presentation on universal design to an event that would address inclusivity in the arts.

Power and Place: A weekend workshop to explore attitudes

To raise awareness and provide an opportunity for students to engage universal design, outside the curriculum, the faculty team planned a weekend event, titled Power and Place. The intent was to provide a participatory experience that would engage simultaneously students' empathy, their critical thinking, and their creativity. A focus on art installations was selected over the more typical design intervention workshops that had been used at other UDEP sites, to make this workshop experience distinct from the problem-solving realm in which students are already being well trained. In particular the organizers wanted to clearly differentiate this event from a diagnostic effort to make the university campus accessible. The workshop structure and outcome were designed as an opportunity for social critique through creative expression that would be transformative for the students and might provoke commentary, engagement and response by passersby and possibly the community at large. The event was preceded by a presentation by Barbara Krueger, internationally recognized installation artist, who spoke about how she constructs visual commentary on socially controversial issues.

The UDEP faculty team comprising four design disciplines – architecture, interior architecture, landscape architecture, and arts and administration – planned a forum for students to examine their attitudes and feelings about people different from themselves, through the lens of power and inclusion. Students were invited to explore their own exclusion experiences, listen to others', and jointly imagine and construct an art installation to reflect their shared understanding of how the university environment supported inclusion.

Four nationally recognized advocates[v] for inclusive design presented examples of their work as an initial framework for discussion and subsequently worked closely with design teams, answering questions and sharing critical perspectives. Universal design was mentioned a number of times by different presenters as an important value. It was not the goal of the weekend, per se, and yet, when completed the participants had learned a great deal about including a variety of people in their design considerations.

The faculty developed a sequence of personal and group activities to assist participants in uncovering for themselves the meaning of "inclusive" or "universal" design. Participants began the workshop by working together in small groups to identify and share their own experiences with respect to personal stereotypes and exclusion. They were asked to brainstorm responses to three questions:

1. What part of your ignorance do you hope to address through your participation in the workshop?
2. In what ways have you personally experienced the environment as a barrier?
3. Define as a group, "inclusive design" and "inclusive place."

The resulting dialogues between individuals and across disciplines raised challenging questions for participants about their personal assumptions, the stereotypes implicit in their education, and the relative absence of discourse on ethical issues in their professions.

No single building on campus was sufficiently accessible and inclusive of the wide range of participant needs to house all of the weekend's events. The change in venues became an opportunity for kinesthetic, experiential learning about spatial accommodation. Participants formed teams that were assigned a new «identity» that would impact how they moved through space. This movement exercise, facilitated by a member of the Dance Department, afforded each participant the opportunity to heighten their own awareness of the environment around them in relation to their own bodies and to the movements of others. One assignment, for example, was: "Be sensitive to the uniqueness of each environment you pass through. Use all of your faculties to fill the spaces." One group of students joined hands to reach from wall to wall and filled multi-height spaces with

the sounds of their voices. Another assignment asked students to maintain contact with an edge at all times, drawing them off the planned pathways and requiring them to negotiate spaces and materials not planned for circulation.

The movement exercise was intended to encourage participants to look at very familiar places and pathways in a new way and to suspend visual and analytical judgments temporarily while experiencing space differently. Considerable thought went into planning an experiential exercise that would be as engaging as the popular empathic techniques of trying out a wheelchair or wearing a blindfold, while avoiding the pitfalls of misrepresentation that come with momentarily simulating the experience of being blind or paralyzed. (Welch 1995)

Following this exercise, the teams were given their weekend assignment – to brainstorm and develop ideas for the creation of an art installation on the university grounds, that would promote public awareness of the University's commitment to inclusivity, especially as expressed within the public realm of the campus. The problem statement was «to explore and express, in a non-competitive workshop environment, the inclusivity commitments of the University as described in the tagline that appears at the bottom of every university document: «*An equal opportunity, affirmative action institution committed to cultural diversity and compliance with the Americans with Disabilities Act.*» While many participants had assumed that this legal statement of inclusivity was focused on employment and administrative practices, it quickly became clear to the participants that this statement could, and in fact did, have implications for the built environment. With recent political and judicial decisions threatening the future of affirmative action, a growing disparity between «haves» and «have-nots» in American society, and the global increase in social and cultural balkanization, critical exploration of these issues seemed timely.

The groups were consciously organized to ensure an interdisciplinary mix of students and community members[vi] because student assistants insisted that participants would form homogenous teams if given the chance. The invited panelists were available to the teams for consultation and inspiration throughout the entire day as they crafted their installations. Each group had a small budget for purchasing materials and access to a truck to obtain whatever the group needed to implement its idea. Many of the selected materials had been recycled

from other student projects or were obtained from a local recycling center.

At the end of the weekend, workshop participants, community members, and curious bystanders gathered for a tour and presentation of the seven installations. While most of the installations were constructed as objects or sequences of objects that could have been placed anywhere on campus, at least one was a response to a specific university symbol, a statue of The Pioneer, prominently located in front of the administration building. The Pioneer, visible from the main road through campus, had been wrapped in paper. Another statue, The Pioneer Mother, situated in a copse of trees and not very visible from campus circulation routes, was strung with wind chimes. The student artists commented:

> *We wanted to call out the differences in where these statues were located, who saw them, and whom they saw. There are many connections here. An act of architecture was placed between them... inaccessible architecture... We weren't just talking about gender, but about who represents the school... Even when the wrapping is gone, people can walk by and remember that there was wrapping.*


Oregon Daily
Emerald
Architects challenge assumptions

Fig. 3. The Pioneer statue wrapped in paper.

The Table installation was located on a plaza in front of the Business School. Wind chimes made from pots, pans and eating utensils hung at the corners of the plaza to draw people to the site. An old kitchen table with six place settings and different types of chairs was placed in the center of the plaza. A reflective was tied to each chair balloon at approximately head height. Clothes and accoutrements that represented people with different facets of identity were arranged at the place settings.

Fig. 4. The Table Installation.

The group's posted commentary read, in part:

"Sitting at a table is a social activity.
It may be for a meal or a political negotiation.
The table creates intimacy as well as separation.
Where and how you are seated symbolizes your status, authority and power.
The location of your place at the table defines you.
Sometimes the location of your table defines you.
You are where you sit; you are where you are seated; you are how you sit.
You are where you eat; you are where you speak; you are your visibility; you are how you get there.

You can.....leave the table
or.....upturn the table
change.....the shape of the table
change.....the shape of the seating at the table
change.....the ideas of the people at the table

Think about your ideal table.
Think about your place at the table now, and where you would like to sit tomorrow.
Expand your thinking."

"Our intention is to create a place where stereotypes and assumptions are not an issue. 'We are able at the table.'

Participants' written reflections over the subsequent months described a sense of empowerment and engagement that directly impacted their work and their lives. The workshop reinforced the importance of addressing attitudes by combining empathy and creativity in the search for inclusive design. (Welch and Jones 1998)

This workshop was primarily an exploration into an alternative pedagogy, one that could address the fundamental role of attitudes and awareness of others' needs in placemaking. By raising participants' awareness of inclusiveness and providing an opportunity to implement their insights, participants appeared to have become more receptive to and interested in acquiring the knowledge needed to support these values in the design process. The participants, however, needed opportunities to follow up on new sensibilities that they had developed in the workshop. The shift from awareness to critique and implementation requires more

than three short days. Three years later, participants continue to comment on the essential value of this experience in their personal and professional development. A few have independently pursued more in-depth work on universal design values; many have been frustrated by the absence of further opportunities in the curriculum for further discourse and development and assume that they can re-engage their new found sensibilities when they move on to practice.

While these kind of events increase both visibility and participation, and can attract funding to sustain universal design teaching and research, they are also extremely time consuming and place an enormous burden on individual faculty in terms of planning, coordination and implementation.

Infusion of inclusive design values into existing classes

Teaching the values of universal design requires more than adding another content area to the curriculum and introducing more knowledge for the student to assimilate. To be most effective universal design needs to be taught as a critique about the values underlying the way designers plan and shape environments.

First, the instructors had to confront the students' confusion about the difference between universal design and accessibility, reflecting the inadequacy of instruction on access codes. Design faculty tacitly assumes that code instruction is every instructor's responsibility so students' awareness depends on whatever information an instructor chooses to pass on in studio reviews. There is no specific area of the design curriculum that systematically covers accessibility codes in detail. It is unlikely that the rationale behind an access feature, such as the danger of protruding objects, is covered anywhere in the curriculum. Many students have expressed an interest in a coherent presentation on accessibility codes. If universal design is different from accessibility why does it matter what students know about accessibility? One strategy was to use students' awareness of the accessibility codes to explain the need for, the genesis of, and the long-term value of universal design. More recently, as described below, the strategy has evolved to addressing universal design as an approach to achieving good design, quite separately from achieving accessibility.

Infusing universal design into teaching also needs to address

process as well as substance. Systematic use of word slides/overheads reinforcing concepts and terminology aids non-auditory learners as well as students whose native language differs from that of the instructor. In a studio setting, including non-designers at reviews supports universal design by valuing the importance of multiple perspectives. Encouraging students to present their design work so that the ideas are intelligible to non-designers reinforces how universal design impacts design communication traditions.

Stan Jones incorporated universal design concepts into his *Land as Media* course five years ago. A technical course designed to teach students the basics of contour manipulation and storm water management, Jones challenges his students to consistently address, in all of the course assignments, the many social factors inherent within the design of built landscapes. He also expects them to evaluate all of their design work – both in his course and in other concurrent classes – in terms of "who is included?" and "who is excluded?" by design decisions. Jones includes a lecture on universal design and the ADA and occasionally uses empathic exercises accompanied by in-depth discussions by people with disabilities midway through the term. By linking social factors to the technical embedded in every design action they undertake, Jones' course helps students to design inclusive environments that are both technically sound and socially just.

Polly Welch, in *Human Context of Design*, a required course for all architecture students, scrutinizes each lecture for opportunities to critique accepted knowledge from the perspectives of alternative perspectives such as race, class, gender, culture and ability. She uses case studies and contradictory readings to demonstrate that prevailing wisdom can be challenged, interrogated, and supplemented by materials that include the perspectives of those who have been traditionally invisible and voiceless in the design of the built environment. For example, she has developed a discussion on building codes, regulations, and zoning laws as instruments of social priorities. She encourages students to examine the purpose of segregating land uses in zoning, the assumptions about human behavior in traditional fire codes, and the attitudes about people with disabilities reflected historically and recently in accessibility regulations.

To encourage students to think critically, Welch first asks them to reflect on their life experiences of being different. The «Who am I « worksheet, adapted from University of California at

Berkeley's diversity training, lists various social identities including race, religion, culture, sexual orientation, ability/disability, gender, ethnicity and class. Students reflect on the extent to which they are aware of the various parts of their identity:

– how they learned about that identity: under what circumstances they are most aware of that identity, have felt different, excluded or vulnerable;
– how they celebrate that identity; and
– what they have felt witnessing others being stereotyped or excluded.

White, able-bodied men, in particular, who are tired of being seen as perpetrators «rediscover» facets of their identity, oftentimes invisible, that have exposed them to the experience of being different in their childhood or adolescence. Dutton (1991) points out in his chapter on the hidden curriculum, the enormous meaning and power of knowledge when it is constructed from the real experiences of students – their «lifelines».

This exercise precedes short student papers where they are asked to respond to topics such as:

- Social Diversity and Architecture: *Think about who is well represented and underrepresented in the professions of architecture and interior architecture, on the faculty and curriculum of design programs, and among the clients who employ architects. Does it matter? How do we connect with a profession that has been historically elitist in nature? What are our responsibilities to be inclusive and what do we need to act and think inclusively?*
- Making Socially Responsible Places: *What can architects do to design socially responsible places? What aspects of design can reflect the designers' social awareness and sensitivity?*

Welch assigns two projects for students to learn more about someone else's experience of the built environment.
- Students interview a person different from themselves to learn how well the built environment meets that person's needs.
- Students select a facet of identity that would lead to a different experience of the built environment and research what issues designers should take into consideration.

Students tend to pick commonly identified identities like blindness but a significant number use the opportunity to think broadly and contribute perspectives that are often overlooked by designers: carlessness, pregnancy, left handedness, colorblindness, and panic disorder.

Each student conducts a term long assignment to conduct an environment-behavior analysis of a public place and make recommendations for improving it. One lens they are asked to use in their formal observations is who occupies the place and who is absent. They critique this along with other data to determine why some places are more inclusive than others. At the end of nine weeks Welch's students demonstrate their understanding of environment-behavior concepts, including universal design, by showing how they have incorporated them into the design projects they have worked on in their studios.

In the course, Housing and Society, Welch uses housing as a vehicle for examining how the planning and design professions address social, economic and political issues. She gives a design problem that asks students to design a unit of housing that can be lived in over forty years of a household's transformations. Emerging demographics point to the need for architects to design housing that responds to new American household configurations. Among these trends are women bearing children at an older age, dual worker families, a fifty percent divorce rate, blended families (second marriages between people with children from previous marriages), the likelihood of some family member having a temporary or permanent disability, increases in life expectancy and the majority of older people wanting to stay out of institutions and to grow old in their homes.

Stage 1: Starter House for Young Couple – Year One
Stage 2: Divorced Single Mother with Two Young Children – Year Ten
Stage 3: Blended Family with Four Children – Year Twenty
Stage 4: Older Couple with Aging Parent – Year Thirty
Stage 5: Growing Old at Home – Year Forty

The purpose is to challenge the U.S. notion that every change in household makeup requires a new living environment. Most of the changes needed by the different household configurations can be accommodated by design strategies that anticipate and provide options for a variety of different life circumstances.

Design studio problems that foster inclusive planning and design values

Another strategy for embedding universal design into design education is to assign design studio problems that require a cri-

tical analysis of exclusion and inclusion. The authors developed a joint Architecture/Landscape Architecture studio that took a critical look at how existing residential neighborhoods could accommodate greater density and meet the needs of a diverse and aging population. Students critically examined the homogeneity implicit in neighborhoods developed over time in accordance with traditional zoning and explore the ramifications of designing for greater diversity. Then investigated whether permitted increases in density could also enhance livability, by encouraging building innovations that respond to: changing household composition and housing needs throughout people's lives; changing uses of and demands on neighborhood open space; increasingly multigenerational and multicultural community makeup; and a more sustainable community.

Students worked in multidisciplinary teams that encouraged them to consider the differing perspectives of others – from other countries, from other backgrounds, and from different disciplines. Design exploration took place at multiple scales from unit design to neighborhood placemaking to urban watershed. While the focus was on inclusion and exclusion, universal design was an identifiable model for creating solutions that meet the needs of a wide range of people. Applying universal design to problems at the scale of neighborhood and land use was difficult for the students to comprehend at first because most of the existing exemplars illustrate universal design at the object or interior design scale. The instructors encouraged students to read and critique contemporary planning theory and social research for its relevance to this project. A few specific exercises were developed to illustrate diversity among the students.

Students made individual posters of a favorite home place where they had lived at some point in their lives and were asked to identify the special qualities they associated with it (Marcus 1995). They also identified the «cast of characters» that were important to the place. The students discovered from this exercise that there was a broad array of life/family/housing experiences within this studio. These home places exist within individual contexts, with a host of outside influences contributing to the qualities of the place students chose to illustrate. The next step was to explore how these seemingly disparate experiences might be woven into a tapestry of housing and land use types that approximates how the students' define a good neighborhood.

Students were asked, in groups of five to seven individuals, to develop a single-block (400' x 400') of a mythical neighborhood that included all of their favorite home places. They were free to choose to have each student's place represented once and only once, or select some for repeated inclusion into a fabric of 'higher density'. They were also free to choose how many total units to include in the block, as well as any additional elements that they felt would be appropriate or important to the livability of the neighborhood.

An exercise to envision the diversity of possible household types seeking inclusion in a neighborhood, the students divided into pairs and drew numbers from 1–7. They were asked to illustrate a household containing that number of people. The twelve resulting households were pinned up for discussion. The student pairs were then asked to identify household configurations that were missing from the initial group and illustrate those as well. The twenty-four examples represent a range of households that reflect a diversity of age, ability, culture, composition, as well as economic and social status. The instructors asked the students to use these typical households as representative of who might choose to live in their neighborhoods to test their hypotheses about neighborhood improvements.

For the design project, students were divided into teams to analyze a real neighborhood and were asked to: 1) increase density and 2) explore how to make the neighborhood more inclusive by determining what types of households don't live there, why, and what interventions would make the neighborhood more appealing to them.

A variety of non-designers were invited to discuss the students' proposals and provide feedback. In addition to offering concrete ideas about making neighborhoods more welcoming, they were especially critical of the inadequacy of architecture drawings to communicate with users. Some students chose to apply universal design values to the presentation of their work, adding explanatory text, Braille, and other graphic devices to make their drawings understandable to non-designers.

Studio is an excellent venue for students to explore how the design process might be enhanced to bring in opinions and experiences beyond their own: user participation and student driven research. The overall challenge of teaching universal design in the studio setting is to help students think creatively

and inclusively, at the same time, so that their final designs are simultaneously aesthetically 'beautiful' and socially equitable.

Conclusions

Teaching universal design as a value embedded within each and every design decision is a daunting challenge. Yet, to help students see beyond code driven user requirements and to enable them to think creatively about how to infuse their own design work with the values of inclusivity and equity, requires a critical shift in design thinking. The themes described earlier, that have informed the authors' teaching, are also ongoing agenda for pedagogical invention and offer the following challenges for sustained, collective inquiry by those teaching universal design.

The Seven Principles of Universal Design provide a foundation for guidance on achieving universal design but need further development to be more informative at scales larger than products, rooms, and buildings. Students working on projects with greater spatial complexity, increased physical scale, and users with a broad range of identities, found the principles difficult to apply. Nor do the principles inform complex tradeoffs in building or preserving environments that need to meet multiple goals, such as wilderness habitat preservation in the face of recreational development, or safe places for children's play in light of the role of trial and error in cognitive development. Students and faculty in landscape architecture, planning, and architecture are in a unique position to investigate and develop the inclusive qualities of the Seven Principles at larger scales.

Using «facets of identity» as a tool for teaching and discussing diversity and inclusivity in the creation of the built environment reinforces for students the importance of thinking broadly about users in the design process. Many students, especially 18–21 year olds, believe they are eternally healthy and immortal. They are also at a critical stage in their own identity development that leaves them open to discuss how individual traits or 'facets' might be supported by the actions that designers and planners take. By affording students the opportunity to see themselves as multifaceted users of the places they design, educators create an opportunity to broaden the discussion to encompass facets students do not yet possess. This allows the value of inclusivity to permeate the discussion in a way that personalizes the issue, and makes it one that students can grasp, internalize, and use. Available research on users generally is oriented to the single

facet of identity, posing a challenge to instructors to integrate across user categories. A more promising approach than relying on personal experience and research, however, is to bring the user/consultant more prominently into the teaching process.

Incorporating users into design teaching would, in the United States, be a radical departure from prevailing design pedagogy, challenging the very notion of expertise that design professionals collectively value and promote. Public participation, as a planning and design activity, has been effectively co-opted by developers and bureaucrats, seeking to justify their worldview (Hester 1996, Jones 1998). A return to substantive input from multiple constituencies is a first step to creating more inclusive environments. Design students must be exposed to the value, processes, and politics of user participation during their design training to be able to exercise a more democratic practice of making inclusive places.

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End Notes

I Portions of this chapter have been previously published in The Universal Design Handbook and in Confronting the Conservative in Architecture: Proceedings of the 2000 Northeast Regional Meeting of the Association of Collegiate Schools of Architecture.

II Images have been collected through two competitions. The first universal design images were made available by Universal Designers & Consultants, Inc. in 1996 as a slide collection called Images of Excellence in Universal Design, jointly sponsored by the National Endowment for the Arts and the National Building Museum. (See http://www.UniversalDesign.com/services). The most recent collection of universal design images, Universal Design Exemplars, is available as a CD-ROM from the Center for Universal Design and was funded by the National Endowment for the Arts, NEC Foundation of America and the Trace R&D Center at the University of Wisconsin-Madison. (See http://www.design.ncsu.edu/cud).

III These principles refer to the Seven Principles of Universal Design. See Main Appendix 1 of this document or http://www.design.ncsu.edu/cud/univ_design/princ_overview.htm

IV These schools include Iowa State, Miami University, Michigan State University, Purdue University, State University of New York at Buffalo, Missouri State, Tennessee State University, Texas Tech University, and Virginia Polytechnic Institute and State University.

V Presenters included Susan Goltsman, landscape architect and principal of Moore Iacofano Goltsman of Berkeley, CA; Joe Meade, Recreational Wilderness Manager and Access Specialist, United States Forest Service, Washington, DC; Ricardo Gomes, Professor of Industrial Design, San Francisco State University; and Kristy Edmunds, artist and director, Portland (OR) Institute of Contemporary Art.

Photo: FotoKnutsen AS

2.3 Infusing Universal Design Into the Curriculum

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This chapter reports on the organizational structure, pedagogy and teaching methodology, as well as the content of a universal design course and curriculum elements at the University of Cincinnati's College of Design, Architecture, Art and Planning. It describes course structure and teaching methods, and it details the course content, emphasizing in particular the practical work, including post-occupancy evaluation (POE), and analytic, evaluative methods in general. The cooperative education system, unique for the University of Cincinnati, as far as the United States is concerned, as well as the field-based, "service learning" approach to instruction are outlined and thoughts about future directions in this endeavor are presented.

Organizational Structure

The University of Cincinnati

At the University of Cincinnati, the School of Architecture and Interior Design is housed in the College of Design, Architecture, Art & Planning. As the name of the College implies, there are three other schools besides Architecture and Interior Design, namely, the School of Design, the School of Art, and the School of Planning. Current enrollment at the college is approximately 1,200 students. The College has been in existence for over 75 years, and presently occupies a facility that consists of an older part dating from the 50's and 70's, and a recent addition designed by Peter Eisenman (East Facade, see Figure 1), which was completed in 1996, with a total square footage amounting to 310,000 square feet.

The School of Architecture and Interior Design has an enrollment of 450 students in architecture and 200 students in interior design. The existing MS Arch. Program has about 20 students enrolled. There are 25 full-time and 5 part-time faculty members.

Fig. 1. East Facade of the College.
Photo: Bulletin of the University of Cincinnati in 1997.

The cooperative education system, which is unique for the University of Cincinnati, provides all students the opportunity to work in professional practices for a total of seven quarters, or almost two years, prior to being able to graduate. The Professional Practice Division of the University assists students in job applications and placement. This means that at all times, 50% of the student body are present on campus while taking course work, while the other 50% is away. A network of over 400 firms has been established, with additional internship opportunities being available in a number of firms in London, United Kingdom, and Germany.

Curricular Structure

At the present time, the curriculum is undergoing major change by being transformed from a six-year Bachelor degree as the terminal, first professional degree, to a Master of Architecture in the 4+2 format, meaning four years of undergraduate study leading to a Bachelor of Science in Architecture degree (Bs.Arch.), plus two years of graduate study culminating in the Master's degree.

While there is no sequence of courses focusing solely on universal design in this curriculum, elements of universal design

are infused at different levels, culminating in a singular elective course at the fifth year level. This starts in the freshman year in an introductory course called “Introduction to the Theory of Environmental Design II”. It continues in mid-level courses, such as, “Introduction to Programming”. The latter two courses are required, and have to be taken by all architecture and interior design students. Further immersion into universal design subject matter is possible through several elective courses, which the author offers upper level students, such as, “Building Evaluation” and “Universal Design: Case Studies in Architecture”. Both of these courses are field-based and service learning oriented, and they get the students involved in studying real people in real world projects in the local community, as opposed to abstract book learning.

Further opportunities exist for students to enroll in independent study credit for purposes of pursuing individual or team investigations or projects emphasizing universal design issues. Such is the case with a team of two students who are currently participating in a universal design competition at the national level, focusing on a universally designed elementary school. Finally, students who are so inclined may choose their thesis subject to be universal design oriented. Thesis implies a theoretical written investigation in addition to a comprehensive final design project prior to graduation. In such cases, the author may be asked to serve on thesis committees and to advise on directions and resources for the thesis. Accordingly, networking at the national and international levels is a common method in order to provide the student with the absolutely highest quality information, precedents or access to literature, documentations and advice.

Incentives

Recent surveys of major employers in architecture and interior design in the United States ranked our interior design program graduates first and our architecture graduates third in the nation (Cramer, 2000). Our graduates are most valued by employers for their capacity of critical thinking, a product of both significant professional experience and theoretical/academic instruction, starting with the first year and ending at the time of graduation. Thus, questioning basic assumptions behind programming and design decisions is a position commonly held by our students.

Part of this questioning has to do with who one considers the client to be, and further, what the client’s needs are, depending

on such factors as age, gender, cultural and ethnic origin, and so forth. Universal design and its seven Principles facilitate such questioning, and it can easily be incorporated into research and/or value-based programming, which, in turn, becomes a solid foundation for good design. In all of the courses the author is offering, students are encouraged to produce work which is of very high quality and which can become part of the student's portfolio.

Teaching Methods

Relationship to Planning/Architecture/Design Theory

The approach taken to instruction on universal design topics is heavily biased toward environment/behavior studies, a field which has grown up over the past 30 years (Preiser, 1999). The foundation and theoretical perspective regarding person-environment relationships was described as a "habitability framework" (Preiser, 1983). Over time, this framework evolved into a conceptualization which is not static, but rather a dynamic, forward-moving and evolving system with feedback and feed-forward loops, and a "driver"or engine which moves the system. These could be planners, programmers, designers, of products, environments and systems, but they could also involve the end-users. This was described in the book *Design Intervention: Toward a More Humane Architecture* (Preiser, Vischer and White, 1991).

Most recently, in a state-of-the-art review of evaluation practices, as far as the built environment and products are concerned, this conceptualization was extended to be applied to universal design. Universal design evaluation (UDE) bases its performance criteria on the seven Universal Design Principles listed in the introduction to this book, and develops the notion of universal design performance evaluation (see Figure 2), (Preiser, 2001a) even further than reported in the *Universal Design Handbook* (Preiser, 2001b). [8]

8 Editor's note: Evaluation methods are also described in detail in chapters 1.4, and 2.5.

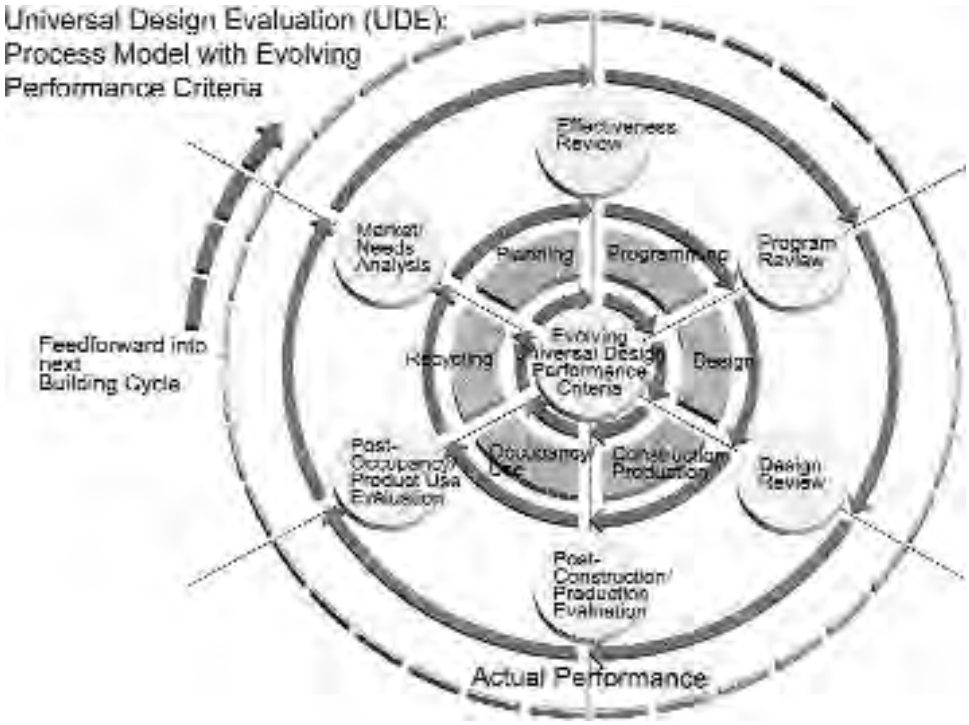

Fig. 2. Universal Design Evaluation (UDE) Process Model.

User Involvement

It is the author's basic teaching philosophy to involve end users, as well as consultants, guest lecturers and other feedback sources in his courses and projects. In the past this has included organizations serving persons with disabilities, such as the blind, and, in a particular instance, the involvement by both undergraduate and graduate students continued over a number of years by visiting and carrying out field-based research at the New Mexico School for the Blind. Projects such as these teach research and data gathering skills, and by definition they have to be carried out with the members of the population that is to be studied.

Furthermore, students involved in these projects learned how to write research proposals for purposes of grant funding, and further, how to write up and publish the results of these studies. In some cases, Master's Theses were prepared by using this approach to studying phenomena with intense end-user involvement. Some of this work received national recognition through several awards, thereby exposing the work of students not just at the local university level, but in the entire country.

Part of this teaching methodology involves field trips to such environments as public places, transportation facilities, shopping malls, Alzheimer care centers, retirement homes, as well as an individual home which was universally designed by the author. These field trips permit direct observation, recording of behavior and interaction with the occupants of the above-mentioned environments. Through the concept of "service learning" mentioned above, students get involved in the community and are asked to synthesize their experiences and lessons learned in the form of reports and presentations to the "clients," pertaining to both positive and negative performance of design features.

Experience-Based Learning

Evaluating facilities in terms of compliance with the Americans With Disabilities Act (ADA) is a standard requirement for courses taught by the author. On occasion this involves students using wheelchairs and checking out buildings and their surroundings for accessibility. Other methods used include direct observation, still and video photography, as well as physical measurements of space, dimensions and ambient environment performance, such as lighting, acoustics, odor, airflow, temperature, etc. In a project called "Vital Signs," which was sponsored by the University of California at Berkeley and the Pacific Power & Electric Company, students first interviewed, surveyed and observed the users of the college complex (see Figure 1 above), followed by physical measurements of lighting levels and sound levels at so-called "trouble spots" that were identified through the user feedback in interviews and surveys. That way, a very demonstrable correlation between subjective responses and objective physical measurements could be established (Vital Signs, 1999).

Analysis of Barriers in the Environment

As indicated above, the analysis of barriers in the environment is a standard component of courses offered by the author (see Curricular Structure, above). In fact, on occasion, this is the only focus of field-based class assignments. Furthermore, it is an important component of the three-day POE workshop modules on building evaluation which the author has conducted world wide, not just with University students, but with architects, planners and facility managers, on both public and private sector buildings.

Sequencing courses in evaluation programming and design has been an experiment the author has attempted on several occasions in the past. The purpose of this approach is to immerse the student deeply into the subject matter, characteristics and capa-

bilities of the end users they are designing for. Therefore, carrying out facility visits to state-of-the-art facilities of the building type in question is a quick method for rapid learning about the building that the student probably knows very little about, such as Alzheimer care centers, complemented by literature research and a more formal evaluation effort. The resulting findings and recommendations can be directly applied to a programming and design project (Preiser, 1982).

This approach permits students to gather data for the evaluation and to compile the program in a collective manner; i.e., by teams of students, while the design will be carried out on an individual basis.

Contact With Industry/Building Trade

Over the years, the author has built and maintained an extensive network of colleagues in professional organizations and industry. Contacts have ranged from serving on the American Institute of Architects' Research Advisory Panel in the 1970s, to chairing committees on programming and post-occupancy evaluation at the National Academy of Sciences' Building Research Board in the 1980s. Numerous conference presentations to such organizations as NEOCON and EURO-FM/IFMA typically addressed issues and methods in building performance evaluation, as reflected in their respective conference proceedings and other publications.

Direct involvement by the author with industry in the form of consulting for client organizations is exemplified by the POE Training Workshops for Kaiser Permanente (Preiser, 1996), an excerpt of which can be found in the section dealing with Practical Work below. In all the other listed three-day workshops, a similar approach was used with the participants being a mix of client representatives (staff, planners, architects, facilities managers), as well as students and faculty representing local universities' schools of architecture.

Course Content

Social, Political and Demographic Context and Issues

The above topics are covered in an elective upper-level course entitled, "Universal Design: Case Studies in Architecture". For information on course context, see the syllabus in Appendix 2 below.

The course uses as a text the Universal Design Handbook, (Preiser and Ostroff, 2001), which addresses these and other items in a comprehensive manner and from a global perspective. The structure of the Handbook with its 10 sections makes a perfect fit for the 10-week quarters our University system provides for:

- Part I, Introduction
- Part II, Premises and Perspectives in Universal Design
- Part III, Accessibility Standards and Universal Design Guidelines.
- Part IV, Public Policy Systems and Issues
- Part V, Residential Environments
- Part VI, Universal Design Practices
- Part VII, Education and Research
- Part VIII, Case Studies
- Part IX, Information Technology
- Part X, The Future of Universal Design

Different, even contradicting, value positions are presented when contrasting universal design in the industrialized world with that in the industrializing countries. For An outline of the Universal Design Handbook, see the Appendix of this book. This text and course also addresses demographic and aging trends, as well as political and social issues that are connected with the emerging movement of universal design.

Theory of Universal Design

While there is no one, coherent theory of universal design, there are a number of elements which the course and its text address. For example, issues of individual accessibility needs and affordances of the designed and built environment are dealt with by Powell Lawton (Lawton, 2001), as well as the notion of healing by design and the impact of the environment on brain development are discussed by John Zeisel (Zeisel, 2001).

While the aforementioned “habitability framework” constitutes yet another element of theoretically linking persons to the environment, person-environment relationships and their effect on the well-being of the occupants of environments or the users of products are at the core of this course in which students read and research topics of their own choice within the framework of the course text categories.

The global network of 69 authors or author groups who have written the chapters of the course text, constitute an invaluable

resource which students can tap into, not only as far as individual chapters and their content are concerned, but also in terms of the resource sections contained in most chapters which list Web sites and addresses of important organizations, publications and other items. With today's information technology and Internet access to resources, this provides students with the most relevant and up-to-date information possible, literally at their fingertips.

Practical Work

Field exercises and service learning, as explained above, are integral components of this course which permit students to get involved in the community. As the name of the course indicates, "Universal Design: Case Studies in Architecture", the course helps students to immerse themselves in particular segments of the population and their respective needs, as far as the designed and built environment is concerned. Using the model of case study based learning, students carry out evaluative research using the universal design evaluation framework referred to above and, by analyzing and comparing the case studies, are able to distill the lessons learned, both in terms of positive and negative aspects.

Examples of specific case studies conducted within the past year are: Alzheimer Care Centers; Family Health Centers; and, laboratory buildings at the University of Cincinnati, the Cardiovascular Research Center and the Molecular Science Research Center (designed by Frank O. Gehry).

In all cases, the objective is, among others, to have the project report become part of the student's portfolio.

An Example of Practical Work: A POE Training Workshop and Facility Visit

Synopsis of Workshop

A 3-day POE training workshop was held at the Kaiser Permanente Northwestern Regional Office in Portland, Oregon. The purpose was to train Kaiser Permanente staff in facility visit and POE methodology and more important, to evaluate a prototype medical office building in Longview/Kelso, Washington, which had recently been completed and occupied (see Figure 3). The structure of the 3-day training workshop was as follows:

Fig. 3. Kaiser Permanente Medical Office Building.

Day 1: POE Training for Facility Visits. Approximately 20 Kaiser Permanente facilities-related staff members participated in lecture presentations on the history, evolution, and methodology of post-occupancy evaluation and facility visits in particular. The presentations included slide lectures and videotapes of previous POE case studies. At the end of day 1, three subteams were formed that would address different areas of the building to be evaluated. Base documentation on the building, such as floor plans, organizational charts, mission statements, etc. were reviewed. This included questionnaire surveys that had been sent to the administrator and supervisory staff of the medical office building prior to the workshop.

Day 2: Data Gathering. On this day, on-site data gathering was carried out in the medical office building. Methods included interviews with administrators and supervisory staff, as well as walkthroughs and still photography of all major building areas. Subteams covered the assigned building areas and personnel, and they gathered intermittently for review meetings and reports to the workshop coordinator. At the end of day 2, subteams were assigned summary draft reports to be presented on day 3. Photographic slides were processed overnight.

Day 3: Reporting. Subteams reviewed their findings and drafted preliminary written and verbal reports to be presented in a final wrap-up session with senior management. All the recommendations in both the written and oral presentations were organized into major sections by area or department.

Furthermore, recommendations were made in three categories of issues:

- Category 1: Issues that could be addressed immediately.
- Category 2: Issues to be incorporated in future buildings.
- Category 3: Issues that require policy changes.

In addition, issues were grouped according to the views of staff and patients (called members at Kaiser Permanente).

Facility Visit

A *facility visit*, like an indicative post-occupancy evaluation (POE) (Preiser, et al., 1988) does what the name implies. It provides an indication of major successes and failures in a building's performance. This type of visit is usually carried out within a very short time span, from two to three hours to one or two days. It presumes that the evaluator/evaluation team is experienced in conducting facility visits and is familiar with the building type to be evaluated, as well as the issues that tend to be associated with it. The following is an overview of data-gathering methods that are typical of a facility visit.

Typical Issues Identified in Facility Visits. According to the author's experience with facility visits, the most common issues in building performance range from technical performance (e.g., poor airflow) to psychological concerns (e.g., lack of patient privacy); leakage, poor signage, lack of storage, lack of privacy, hallway blockage, poor air circulation, poor temperature control, handicapped accessibility, security problems, health and safety problems, aesthetic problems, entry door problems with wind and accumulation of dirt, inadequacy of space for equipment (e.g., copiers), maintainability of glass surfaces (e.g., skywalks or inaccessible skylights), and so on.

While this list of issues appears to identify only negative performance aspects in facilities, positive aspects of building performance are usually identified also. Both positive and negative performance aspects were found and prioritized by the facility visit team, which consisted of architects, planners and facilities personnel of the Kaiser Permanente Northwest Region headquartered in Portland, Oregon. The author then carried out a very similar project for the Southern California Region headquarters of Kaiser Permanente in Pasadena, California, where a facility visit was conducted at the Mission Viejo Medical Office Building.

In the past, the author found that approximately 80 percent of all important issues and information can be identified during a 1-day or half-day visit, depending on the size and complexity of the building, to a facility in a very efficient and cost-effective manner.

Preparatory Work. It is useful to prepare the respondents at a health care facility for the impending facility visit by sending both the structured interview schedule and the quality profile survey to the administrator of the facility. This helps the administrator focus on the types of issues in which the facility visiting team is interested. It is helpful if a limited number of supervisory staff responds to the quality profile survey, which is returned to the facility visit team prior to the visit (see Appendix C for generic interview and survey instruments). Thus, the team will get a good sense of where the problems and priorities lie or where the excellent features are to be found in the facility, even before the site visit occurs.

Archival and Document Evaluation. If possible, as-built drawings of the facility to be evaluated are obtained and analyzed before the visit. In addition, space utilization schedules, safety and security records, accident reports, remodeling and repair records, and any other historical/archival data that may be pertinent are obtained and analyzed. These activities do not necessarily occur on the building site.

Performance Issues. A list of generic building evaluation questions (see Appendix C) is submitted by the evaluators to the client organization prior to the site visit. It is common that the facilities manager or committee delegated to deal with questions of space planning and building performance reply to open-ended questions concerning the performance elements. These questions deal with technical building performance, as far as environmental conditions are concerned. In addition, they deal with functional appropriateness (adequacy of space and health, safety and security issues, for example) and behavioral or psychological concerns such as the “image” of the facility. Replies to such questions represent management’s knowledge not only of problems, but also of successful features of a given facility.

Walkthrough Evaluation. Following a discussion with management about the responses to these performance issues, a walkthrough evaluation is conducted, covering the entire facility and addressing the issues raised earlier. In addition, the evalua-

tors use direct observation and, if warranted, still photography or video to identify and record building attributes that may deserve particular attention. Within a few hours, a walkthrough can comprehensively cover a given building.

Interviews. Individual or group interviews with selected personnel responsible for and familiar with the facility and a debriefing of the client representatives conclude the on-site visit with the client organization. Subsequently, a brief summary of successful and unsuccessful features of the evaluated facility is submitted to the client organization for final verification and review.

Outline of Facility Visit Phases and Steps

This outline of facility visit phases and steps is intended to be generic, to provide the reader with a basic understanding of each step's purpose and results. The phase and steps do not necessarily apply to all facility visits, nor are all items listed, needed, or available in every facility visit.

Phase 1: Planning the Facility Visit Overview. There are several preliminaries to observe in initiating and organizing a facility visit prior to on-site data collection. Liaison with the client organization is a critical aspect of all visits. The client must be briefed on the nature of the visit, the types of activities involved, the resources needed, and client responsibilities in carrying out the visit. After agreement is reached on how extensive a visit will be conducted, historical and other background information that may assist in planning the evaluation is identified and obtained. Coordination with user groups within the building is begun, and potential benefits for participants are outlined.

At this point, on-line searches and reviews of the state-of-the-art literature, including preparation of an annotated bibliography, are carried out (in this case, focusing on health care facilities).

Resources for conducting the evaluation are organized, and a preliminary schedule, work plan and budget are established in which project team members' tasks and responsibilities are defined. At the same time, appropriate research methods and analytical techniques are determined, and sources for evaluation criteria are identified. The three steps included in this first phase are reconnaissance and feasibility, resource planning, and

research planning.

Phase 2: Conducting the Facility Visit Overview. In this phase of the facility visit, findings are reported, conclusions drawn, recommendations made, and eventually, the resulting actions reviewed. The findings of the facility visits are organized, and an effective reporting framework is devised. Usually, recommendations imply that the results from the facility visit must be prioritized, a task requiring continued liaison with the client. Finally, actions resulting from the facility visit are reviewed to ascertain that benefits envisioned in initiating the evaluation have, in fact, been achieved.

The steps involved in this phase are reporting findings, recommending actions, and reviewing outcomes.

Conclusions

The shortcut POE methodology outlined here has proven to be quite effective in troubleshooting and/or prototype testing of building designs. This success is partly due to the following conditions:

- The POE/facility walkthrough is carried out in-house; i.e., by staff members of the client organization.
- The POE results are fed directly into future medical office building designs and thus have strategic importance for the organization.
- Top-level management initiated and supported the POE. They subsequently received and helped implement the findings and recommendations.
- Information control is absolutely essential for this type of POE to be effective. Too often, negative findings lead to finger-pointing and ill feelings about those who committed mistakes. As long as information is released to the public only after clearance by the client organization, this problem should be resolved.
- Training of in-house staff is one of the most effective ways to promote continuous use of POE without having to resort to expensive external consultants.

Experience has shown that the approximate cost of carrying out walkthrough-type indicative POEs or facility visits is USD 0.50 per square foot of evaluated space. This benchmark value held true in this project also, and it shows that significant findings and recommendations can result from a rather inexpensive and expeditious POE effort.

Course Improvements and Future Developments

In the context of the new Masters of Architecture Program at the University of Cincinnati, scheduled to commence in the Summer of 2001, it is expected that the aforementioned course on universal design will become a required course for all graduate students; and thus, it has the potential of impacting the attitudes and design philosophies of our graduates in significant ways. First, their approach to programming and designing environments will be changed toward the inclusion of universal design philosophy and concepts. This could be reinforced through the aforementioned sequence of universal design evaluation programming and design studio work.

Secondly, as graduate students in the cooperative education system carry out internships in firms around the country, their thinking may affect that of their employers over the long haul. Furthermore, students from the School of Design may enroll in this course if it is cross-listed, and thereby influence the work of graphic designers, industrial designers, digital designers, and others in the College.

Finally, as administrators, such as school directors and the position of Dean of the College open up, the new universal design paradigm, as a philosophical and conceptual foundation for design disciplines, may become one of the criteria for candidate selection. Through continuous feedback and feedforward, between students and faculty, as well as the "clients" for case study field research, the course will be refined and its quality improved over time.

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Appendix 1
Generic Evaluation Instruments: Structured Interview and Building Occupant Survey

UNIVERSAL DESIGN EVALUATION (UDE)
Building Evaluation Interview Questions – Indicative Level

We would like to know how well your facility performs for all those who occupy it. Successes and failures (if any) are considered insofar as they affect occupant health, safety, efficient functioning, and psychological well-being. Your answers will help improve the design of future, similar buildings.

Below please identify successes in the building by responding to the following broad information categories and by referring to documented evidence or specific building areas whenever possible. First, please comment on the issues which have been most serious in recent times and then comment on the adequacy of the following:

1) Overall Design Concept
2) Site Design: Contextuality, Access for Deliveries/Waste Disposal
3) Health/Safety Performance
4) Security Performance
5) Exterior Appearance
6) Interior Appearance
7) Activity Spaces Performance
8) Spatial Relationships, Work Flow, etc.
9) Circulation Areas; e.g., lobby, hallways, stairs, elevators, escalators, etc.
10) Heating/Cooling and Ventilation Performance
11) Lighting Performance; e.g., day vs. artificial lighting

12) Acoustic Performance
13) Plumbing Performance
14) Electrical Performance
15) Surface Materials Performance; i.e., durability and maintainability of floors, walls, ceilings, etc.
16) Under-utilized or overcrowded spaces
17) Conformance with the Principles of Universal Design
18) Compliance with ADA Accessibility Requirements
19) Efficiency of Space Utilization: Ratio of gross vs. net assignable area
20) Energy Conservative design/sq. ft./year
21) Other, please specify (e.g., needed facilities currently lacking)

Occupant Survey – Investigative Level

We wish to conduct a performance evaluation of your building. The purpose of this evaluation is to assess how well the building performs for those who occupy it in terms of health, safety, security, functionality, and psychological comfort. The benefits of an evaluation include: identification of positive and negative performance aspects of the building; better building utilization; feedback on how to improve future, similar buildings; or, remodeling of your own building.

In the survey that follows, please respond only to those questions that are applicable to you. Indicate your answers by marking the appropriate blanks with an "X". The key for quality ratings is: EX = Excellent quality; G = Good quality; F = Fair quality; P = Poor quality.

1) Please rate the overall quality of this building:

	EX	G	F	P	N/A
a) Aesthetic quality of exterior	[ ]	[ ]	[ ]	[ ]	[ ]
b) Aesthetic quality of interior	[ ]	[ ]	[ ]	[ ]	[ ]
c) Amount of space	[ ]	[ ]	[ ]	[ ]	[ ]
d) Environmental quality (lighting, acoustics, temperature, etc.)	[ ]	[ ]	[ ]	[ ]	[ ]
e) Proximity to views	[ ]	[ ]	[ ]	[ ]	[ ]
f) Adaptability to changing uses	[ ]	[ ]	[ ]	[ ]	[ ]
g) Security	[ ]	[ ]	[ ]	[ ]	[ ]
h) ADA Compliance	[ ]	[ ]	[ ]	[ ]	[ ]
i) Maintenance	[ ]	[ ]	[ ]	[ ]	[ ]
j) Relationship of spaces/layout	[ ]	[ ]	[ ]	[ ]	[ ]
k) Quality of building materials					
(1) Floors	[ ]	[ ]	[ ]	[ ]	[ ]
(2) Walls	[ ]	[ ]	[ ]	[ ]	[ ]
(3) Ceilings	[ ]	[ ]	[ ]	[ ]	[ ]
l) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

2) Please rate the overall quality of the building site:

	EX	G	F	P	N/A
a) Vehicular access	[ ]	[ ]	[ ]	[ ]	[ ]
b) Parking	[ ]	[ ]	[ ]	[ ]	[ ]
c) Delivery	[ ]	[ ]	[ ]	[ ]	[ ]
d) Waste Removal	[ ]	[ ]	[ ]	[ ]	[ ]
e) Aesthetic quality of views	[ ]	[ ]	[ ]	[ ]	[ ]
f) Landscaping	[ ]	[ ]	[ ]	[ ]	[ ]
g) Pedestrian Access	[ ]	[ ]	[ ]	[ ]	[ ]
h) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

3) In an average work week, how many hours do you spend in the following types of spaces (specify). Note: At the bottom line, please total the numbers of hours spent in each type of space.

Space A ----------

Space B ----------

Space C ----------

Space D ----------

Space E ----------

HOURS	A	B	C	D	E
0–5	[ ]	[ ]	[ ]	[ ]	[ ]
6–10	[ ]	[ ]	[ ]	[ ]	[ ]
11–15	[ ]	[ ]	[ ]	[ ]	[ ]
16–20	[ ]	[ ]	[ ]	[ ]	[ ]
21–25	[ ]	[ ]	[ ]	[ ]	[ ]
26–30	[ ]	[ ]	[ ]	[ ]	[ ]
31–35	[ ]	[ ]	[ ]	[ ]	[ ]
36–40	[ ]	[ ]	[ ]	[ ]	[ ]
40+	[ ]	[ ]	[ ]	[ ]	[ ]

4) Please rate the overall quality of the following areas in the building:

	EX	G	F	P	N/A
a) Space Category A	[ ]	[ ]	[ ]	[ ]	[ ]
b) Space Category B	[ ]	[ ]	[ ]	[ ]	[ ]
c) Space Category C	[ ]	[ ]	[ ]	[ ]	[ ]
d) Space Category D	[ ]	[ ]	[ ]	[ ]	[ ]
e) Space Category E	[ ]	[ ]	[ ]	[ ]	[ ]
f) Restrooms	[ ]	[ ]	[ ]	[ ]	[ ]
g) Storage	[ ]	[ ]	[ ]	[ ]	[ ]
h) Elevator(s)	[ ]	[ ]	[ ]	[ ]	[ ]
i) Stairs/Corridors	[ ]	[ ]	[ ]	[ ]	[ ]
j) Parking	[ ]	[ ]	[ ]	[ ]	[ ]
k) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

5) Please rate the overall quality of Space Category A in terms of the following:

	EX	G	F	P	N/A
a) Adequacy of Space	[ ]	[ ]	[ ]	[ ]	[ ]
b) Lighting	[ ]	[ ]	[ ]	[ ]	[ ]
c) Acoustics	[ ]	[ ]	[ ]	[ ]	[ ]
d) Temperature	[ ]	[ ]	[ ]	[ ]	[ ]
e) Air Movement	[ ]	[ ]	[ ]	[ ]	[ ]
f) Odor	[ ]	[ ]	[ ]	[ ]	[ ]
g) Aesthetic Appeal	[ ]	[ ]	[ ]	[ ]	[ ]
h) Security	[ ]	[ ]	[ ]	[ ]	[ ]
i) Flexibility of Use	[ ]	[ ]	[ ]	[ ]	[ ]
j) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

6) Please rate the overall quality of Space Category B in terms of the following:

	EX	G	F	P	N/A
a) Adequacy of Space	[ ]	[ ]	[ ]	[ ]	[ ]
b) Lighting	[ ]	[ ]	[ ]	[ ]	[ ]
c) Acoustics	[ ]	[ ]	[ ]	[ ]	[ ]
d) Temperature	[ ]	[ ]	[ ]	[ ]	[ ]
e) Air Movement	[ ]	[ ]	[ ]	[ ]	[ ]
f) Odor	[ ]	[ ]	[ ]	[ ]	[ ]
g) Aesthetic Appeal	[ ]	[ ]	[ ]	[ ]	[ ]
h) Security	[ ]	[ ]	[ ]	[ ]	[ ]
i) Flexibility of Use	[ ]	[ ]	[ ]	[ ]	[ ]
j) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

7) Please rate the overall quality of Space Category C in terms of the following:

	EX	G	F	P	N/A
a) Adequacy of Space	[ ]	[ ]	[ ]	[ ]	[ ]
b) Lighting	[ ]	[ ]	[ ]	[ ]	[ ]
c) Acoustics	[ ]	[ ]	[ ]	[ ]	[ ]
d) Temperature	[ ]	[ ]	[ ]	[ ]	[ ]
e) Air Movement	[ ]	[ ]	[ ]	[ ]	[ ]
f) Odorv	[ ]	[ ]	[ ]	[ ]	[ ]
g) Aesthetic Appeal	[ ]	[ ]	[ ]	[ ]	[ ]
h) Security	[ ]	[ ]	[ ]	[ ]	[ ]
i) Flexibility of Use	[ ]	[ ]	[ ]	[ ]	[ ]
j) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

8) Please rate the overall quality of Space Category D in terms of the following:

	EX	G	F	P	N/A
a) Adequacy of Space	[ ]	[ ]	[ ]	[ ]	[ ]
b) Lighting	[ ]	[ ]	[ ]	[ ]	[ ]
c) Acoustics	[ ]	[ ]	[ ]	[ ]	[ ]
d) Temperature	[ ]	[ ]	[ ]	[ ]	[ ]
e) Air Movement	[ ]	[ ]	[ ]	[ ]	[ ]
f) Odor	[ ]	[ ]	[ ]	[ ]	[ ]
g) Aesthetic Appeal	[ ]	[ ]	[ ]	[ ]	[ ]
h) Security	[ ]	[ ]	[ ]	[ ]	[ ]
i) Flexibility of Use	[ ]	[ ]	[ ]	[ ]	[ ]
j) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

9) Please rate the overall quality of Space Category E in terms of the following:

	EX	G	F	P	N/A
a) Adequacy of Space	[ ]	[ ]	[ ]	[ ]	[ ]
b) Lighting	[ ]	[ ]	[ ]	[ ]	[ ]
c) Acoustics	[ ]	[ ]	[ ]	[ ]	[ ]
d) Temperature	[ ]	[ ]	[ ]	[ ]	[ ]
e) Air Movement	[ ]	[ ]	[ ]	[ ]	[ ]
f) Odor	[ ]	[ ]	[ ]	[ ]	[ ]
g) Aesthetic Appeal	[ ]	[ ]	[ ]	[ ]	[ ]
h) Security	[ ]	[ ]	[ ]	[ ]	[ ]
i) Flexibility of Use	[ ]	[ ]	[ ]	[ ]	[ ]
j) Other: Specific issues in universal design	[ ]	[ ]	[ ]	[ ]	[ ]

10) Please select and rank, in order of importance, universal design features which are needed but currently lacking in your building:

1) ----------

2) ----------

3) ----------

11) Please make suggestions in regards to future universal design related improvements in the building delivery process of your building type (e.g., more user input, better programs, etc.)

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12) Demographic Information:

a) Your Room #/Building Area: ----------

b) Your Position: ----------

c) # of years with the present organization: ----------

Checklist Of Useful Documents

Client-Related Information

1) Client mission statement, organizational chart, and staffing.
2) Initial program from building.
3) As-built floor plans (may require updating).
4) Space assignments and schedules.
5) Building-related accident reports.
6) Records of theft, vandalism, and security problems.
7) Maintenance/repair records from facility manager.
8) Universal design and ADA-related audits.
9) Energy audits or review comments from heating/cooling plant manager.
10) Any other feedback concerning the building which may be on record.

Building Type-Related Information

1) Identification of select recent, similar and excellent facilities in the region or country.
2) Programs and other pertinent information on the building type being evaluated.
3) Identification and assessment of state-of-the-art literature (e.g., technical manuals and design guides).
4) Building type-specific performance criteria derived from the seven Universal Design Principles.

Appendix 2
Syllabus for "Universal Design: Case Studies in Architecture"

School of Architecture & Interior Design
Architecture 23-301-547
College of Design, Architecture, Art & Planning
Instructor: Wolfgang F.E. Preiser

1. *Purpose:* Why is Universal Design so important? In a global and aging marketplace, which is rapidly growing smaller through technology and e-commerce, there is a need for a range of human-centered products, facilities, amenities that people need and want. People worldwide are living about 20 years longer. In the United States alone, there are over 50 million people who are permanently disabled, and everyone is likely at some time to experience disability as a mismatch between themselves and their environment. The need has never been greater to design buildings, rooms, public spaces, and products that can be used by all people. This course fosters experiential learning through immersion into field trips and research methodology for exploring the effects of built environments on their users. This may include actual evaluation and field studies of public places and buildings. Involvement in actual field research situations will be preceded by the identification and comparative analysis of key concepts in the research literature.

2. *Approach:* Every week there will be one session with lecture presentations by the instructor(s) and one session for student presentations and discussion. In the lecture presentations, selected articles from the course text and research literature, as well as other examples, will be used to provide an overview of the field of universal design. Case study examples on different building types and user types will be identified in the research literature, including research journals, conference proceedings, reference works, and relevant data bases. Students will identify research topics of his/her choice, and will conduct initial readings into this topic area. This will be followed by a systematic on-line computerized literature search. A project proposal will be prepared prior to mid-quarter. It will be critiqued and executed by the students during the second half of the quarter.

3. *Topics:* Principles of Universal Design; Research Methods; Setting/Building Types; People Types; other.

4. *Requirements:*
   – Literature search on a topic in the course text.
   – A literature review (4+ pages, double-spaced) on three or more articles on universal design. A summary of findings will be presented in class.
   – Project proposal (2 pages, double-spaced)
   – Mid-term literature essay (5+ pages, double-spaced) on universal design issues pertaining to the final project.
   – Final project report (10+ pages, double-spaced)

5. *Readings:* The required text is the Universal Design Handbook. In addition, books on a variety of research methods are available on loan from the library collection. Recommended books for this course are Inquiry by Design and Methods in Environmental and Behavior Research.

Photo: FotoKnutsen AS

2.4 Distance Education in Universal Design

Molly Follette Story, M.S., The Center for Universal Design, North Carolina State University, U.S.A.

A Course Is Born

When North Carolina State University decided to increase its investment in distance education, the university provided funding for the development of Internet courses to several departments to support the instructor's time and the purchase of appropriate web page authoring software. The university also offered a summer course to train instructors in the process of developing such courses.

The College of Design recognized that universal design would be a good topic for a distance education course. This chapter describes the Internet course that was developed by the author with this funding during the latter half of 1999.

The Principles of Universal Design

Interest in universal design is increasing dramatically worldwide among design practitioners, builders and manufacturers and particularly, at institutions of higher learning. As a result, the demand for courses on universal design is increasing.

One of the topics of interest is the Principles of Universal Design whose development was coordinated by staff of the Center for Universal Design at North Carolina State University. Every year, many visitors come to the Center to learn about its work, particularly the work of the late Ronald L. Mace, the Center's founder.

The Principles of Universal Design were one result of a Research and Demonstration Project conducted from 1994 to 1997 at the Center for Universal Design. The project was funded by the U.S. Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR). The authors of the Principles included Ron Mace and nine of his colleagues, a working group of architects, product designers, engineers, and

environmental design researchers from six different U.S. institutions: Bettye Rose Connell, Mike Jones, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, and Gregg Vanderheiden.

The seven Principles of Universal Design were created to support the evaluation of existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments.

Course Description

The North Carolina State University distance education course described in this chapter was structured around the Principles of Universal Design and was designated ID 492, Special Topics in Universal Design. Because it is the home department of the instructor, the course is hosted by the department of Industrial Design; however, the course is appropriate for all design disciplines.

The course objectives were described as follows:

> *The purpose of this course is to give students a basic understanding of the concepts and Principles of Universal Design. It presents the benefits of the universal design approach for people with disabilities and for all individuals. Students will be introduced to the history of universal design, the broad range of human abilities, and numerous real-world examples of designs that satisfy the Principles. By the end of the course, students should have an appreciation for the diversity of the human race and be able to recognize universal designs as well as usability obstacles that have been designed into other products and environments.*

The course, taught entirely via the Internet, is an elective available to anyone at the university as well as anyone who registers with the university to take continuing education courses. The course runs one semester of seventeen weeks and offers three credit hours to registered students.

The course is based on and taught from the book, co-authored by the instructor, *The Universal Design File: Designing for People of All Ages and Abilities* (Story, Mueller and Mace, 1998). Chapter 1 of the book presents a brief history of universal design including the relevant legislation passed in the United States in the second half of the 20th Century. Chapter 2

discusses the range of all measures of human ability and the factors that can affect their variability. Chapter 3 of the book lists and explores in depth the seven Principles of Universal Design and the 29 guidelines associated with them. The chapter includes two to five photographic examples of each of the guidelines, representing all design disciplines from landscape design to product details and from architecture to software. Chapter 4 presents seven case studies, one related to each Principle, of successful universal design implementations.

Course Schedule

This course is taught completely asynchronously over a period of seventeen weeks. The class never meets and the students are never all online at the same time. Each Monday, the instructor posts a new web page with links to any additional materials either on other new pages on the course site or somewhere else on the Internet. The students may work at their own convenience and pace at any time during the week but the assignment for each week is due the following Sunday.

In the first few weeks of the course, the students become familiar with the online procedures and technology and the course content is introductory. The middle portion of the course is dedicated to exploring the Principles of Universal Design. At the end of the course, the students must tie together everything they have learned.

The following section presents in detail the content provided by the instructor and the work submitted by the students in every week of the course.

Week 1. Overview of the Course; Introduction to the Medium

The course deliberately begins slowly to allow the students to get accustomed to the electronic medium and methods of communication. Some of the students are quite experienced but others are novices and need time to learn the techniques and get comfortable.

The assignment for the first week is for each student to introduce him- or herself to the rest of the class on a web-based Forum provided by the university. The Forum is located behind a firewall that requires a university user identification and password for entry. This security measure assures the privacy of the

students from anyone outside the university. The Forum allows anyone that has access to post new questions or respond to questions posted by someone else such as the instructor. The most remarkable consequence of this private arena is that the students write with surprising candor about themselves and their experiences.

Most of the students who take this course are in their 30s and 40s and have professional experience in a related field such as physical therapy, home modification, or job accommodation. These individuals typically desire to increase their knowledge of universal design so they may improve their current work or start a new career. Some of the students have disabilities or have family members with disabilities; these participants enrich the course for everyone with their personal perspectives on the topic.

Week 2. Introduction to the Topic and Appropriate Terminology

In the second week, the instructor introduces the focal topic of the course by defining disability, accessible design, and universal design. She also provides students with the appropriate vocabulary to use when talking about people with disabilities.

Two contemporary definitions of disability are provided. The first definition is included in the new paradigm of disability created by the United States Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR). It states that rather than being a characteristic of an individual, disability is

> "… a product of an interaction between characteristics (e.g., conditions or impairments, functional status, or personal and social qualities) of the individual and characteristics of the natural, built, cultural, and social environments. The construct of disability is located on a continuum from enablement to disablement. Personal characteristics, as well as environmental ones, may be enabling or disabling, and the relative degree fluctuates depending on condition, time, and setting. Disability is a contextual variable, dynamic over time and circumstance. Environments may be physically accessible or inaccessible, culturally inclusive or exclusive, accommodating or unaccommodating, and supportive or unsupportive. For example, on a societal level, institutions and the built environment were designed for a limited segment of the population" (NIDRR, 1999, page 68578).

The second definition of disability is provided by the World Health Organization (WHO) in its classification called the ICIDH-2, The International Classification of Impairments, Activities, and Participation. It is described to be "…a multi-purpose classification designed to serve different sectors and to provide a common framework for understanding the dimensions of disablement and functioning at three different levels: body, person, and society" (World Health Organization, 1998). In the document, WHO presents a matrix of dimensions of the ICIDH-2. Along the horizontal axis are: Impairments, Activities, Participation, and Contextual Factors. Along the vertical axis are: Functioning, Characteristics, Positive Aspects, and Negative Aspects. Table 1 below presents interactions between personal and environmental characteristics and their effects on participation.

These two definitions of disability are complex but complementary and provide an appropriate perspective from which to view disability throughout the course.

TABLE 1. Overview of the Dimensions of the ICIDH-2, *The International Classification of Impairments, Activities, and Participation* (World Health Organization, 1998)

	IMPAIRMENTS	**ACTIVITIES**	**PARTICIPATION**	**CONTEXTUAL FACTORS**
FUNCTIONING	AT BODY LEVEL	AT PERSON LEVEL	AT SOCIAL LEVEL	(…IN INTERAC TION WITH…) ENVIRONMEN-TAL FACTORS AND PERSONAL FACTORS
CHARACTE RISTICS	BODY FUNCTION; BODY STRUCTURE	PERSON'S DAILY ACTIVITIES	INVOLVEMENT IN THE SITUATION	FEATURES OF THE PHYSICAL, SOCIAL ATTITUDINAL WORLD
POSITIVE ASPECT	FUNCTIONAL AND STRUCTURAL INTEGRITY	ACTIVITY	PARTICIPATION	FACILITATORS
NEGATIVE ASPECT	IMPAIRMENT	ACTIVITY LIMITATION	PARTICIPATION RESTRICTION	BARRIERS

The instructor then presents a definition of accessible design:

> *Accessible design is design to accommodate specific individuals or groups of individuals with disabilities. Because it is the ONLY solution for some problems and some users, accessible design will always be necessary, at least in certain situations. Specialized design is usually more expensive than universal design and because it is atypical, accessible design may segregate and stigmatize the users it is designed to accommodate.*

She also presents a definition of universal design:

> *Universal design is a way of designing products and environments so they are usable by and appealing to everyone regardless of age, ability or circumstance. Universal design accommodates people with disabilities, older people, children and others who are non-average in a way that is not stigmatizing and benefits all users.*

Then she contrasts the two types of design:

> *Universal design can be distinguished from accessible design in the way that the accessible features have been integrated into the overall design. This integration is important because it results in the improved general acceptability of the design and in the social inclusion of all individuals using the design.*

Because use of appropriate terminology and behavior are critically important to this course, the instructor then provides links to two web pages that present appropriate ways to talk about and with people with disabilities. The labels people use to describe others matter very much: they can be respectful or derogative and can influence the way individuals are perceived and treated, and even the way individuals perceive themselves. Just as acceptable terms for ethnic groups have changed over time, so have terms for individuals with disabilities.

The first site about appropriate terminology is by Brown University's Office of Disability Support Services and is an adaptation of an article called "Unhandicapping Our Language" by Paul K. Longmore, Ph.D. and Diane B. Piastro (1988). Brown's web page features a chart with three columns: the first column lists terms that are objectionable, the second column explains why each is objectionable, and the third column offers a preferable replacement term.

The second page is on the site of the Inclusion Network of

Greater Cincinnati, Ohio and is called “What is Inclusion?” (date not indicated). The page defines inclusion, then answers the questions, “Why is Inclusion Important?” and “To Whom is Inclusion Important?” Then it presents suggestions for how to talk about people with disabilities in two sections titled “Including Friends With Disabilities” and “Putting People First.” Below that, the page offers “Top Ten Rules for Communicating with People with Disabilities.” At the bottom of the page is a short list labeled “A Legislative Look at Inclusion” that presents relevant U.S. laws and the ways they have affected inclusion of people with disabilities.

The assignment for Week 2 is to answer three questions on the Forum.

1. Have you ever had an awkward conversation WITH someone about his or her disability? Describe your experience.
2. Have you ever had an awkward conversation ABOUT someone and his or her disability? Describe your experience.
3. Have you ever had the experience of being excluded from an activity due to disability, either your own or a companion’s? (NOTE: You are NOT required to reveal your own disability.) Describe your experience. If you have not had the experience, did you realize that people with disabilities are excluded from many activities in our society? Please comment.

Most students have had awkward conversations with or about someone and his or her disability and talking about their experiences helps make all class members comfortable. Some admit their lack of exposure to or even fear of talking with people who have disabilities. Some students reveal their own disabilities or mention that family members or friends have disabilities. The online conversation helps everyone understand that many of their experiences are common and helps them understand the perspective each student has brought to the class.

Week 3. History of Universal Design and Accessibility

In the third week of the course, the students are required to read three essays about the history of universal design and accessibility. The first reading is Chapter One, “What is Universal Design?” from the book *Strategies for Teaching Universal Design* (Welch, 1995; posted on the course web site by permission of the publisher). It offers a history of the movement and the terminology used to describe various efforts toward universal design in the last 25 years.

The second reading is Chapter Two from the same book, "A Brief History of Disability Rights Legislation in the United States" by Polly Welch and Chris Palames (again, posted with permission). It covers laws passed in the second half of the 20th Century and the social and political contexts in which they were created.

The third reading is Chapter One, "A Brief History of Universal Design", from the course text (Story, Mueller and Mace, 1998). It discusses demographics that are changing, relevant federal legislation in the United States, the shift in approach from barrier-free to universal design, the emergence of rehabilitation engineering and assistive technology, changing economic conditions, and changing social climates.

The assignment for Week 3 is to answer three questions on the online class forum:

1. In what ways do you believe legislation has a positive effect on the practice of universal design?
2. In what ways do you believe legislation has a negative effect on the practice of universal design?
3. What motivators for universal design do you believe might be more effective than legislation?

In their responses, the students made it clear that they recognized the importance of the Americans with Disabilities Act of 1990 (ADA) in providing basic access and opportunities as well as raising awareness among the general public in the U.S. They also recognized how legislation can cause minimal compliance without understanding at best, and resentment of and opposition to legislation at worst. They also understood that educating people as to the benefits of universal design for all users is one of the best ways to motivate them to practice universal design.

Week 4. The Range of Human Abilities

The topic of the fourth week of the course is the range of human abilities. People vary a lot in their individual abilities and personal preferences. They are different from other people, from themselves as they were last year, and from themselves when they tried to accomplish a given task under different circumstances. A disability can be severe or mild; permanent or temporary/situational; constant or episodic; apparent or invisible. Disability is a dynamic and contextual variable.

There are three readings for this week of the online course. The

first is on a web site of the Trace Research and Development Center at the University of Wisconsin at Madison (Trace R&D Center) and is called “A Brief Introduction to Disabilities” (Vanderheiden and Vanderheiden, 1991). The site presents information on four major categories of impairment: visual impairments, hearing impairments, physical impairments, and cognitive/language impairments.

To provide a sense of the statistics of disability in the United States, the second reading is the “Highlights” section of the report, “Disability in the United States; Prevalence and Causes” by LaPlante and Carlson (1996).

The third reading is Chapter Three, “Understanding the Spectrum of Human Abilities”, from the course text (Story, Mueller and Mace, 1998). The chapter discusses how human abilities may differ by cause, effect, or situation in each of seven categories: cognition, vision, hearing and speech, body functions, arm function, hand function, and mobility.

The assignment for Week 4 is to respond to three questions on the Forum:

1. Have you ever blamed yourself when you had difficulty using a product or environment?
2. Have you ever modified a product or environment to make it easier for you to use?
3. What accessible features of products and environments have you found yourself using?

Some said they had never done so but most students admitted they had blamed themselves before for having difficulty using a product or environment. This reaction is very common but inappropriate, particularly in this class.

Because no design will ever suit all persons perfectly under all conditions, everyone experiences designs that need to be customized. Most examples cited by the class were examples of products that were not well designed for large portions of the population. Some designs could have been made easier for everyone to use regardless of their capabilities; others could have been made to be adjustable.

Everyone in the class could identify some “accessible” features they used frequently such as lever door handles, OXO Good Grips© kitchen utensils, and various ramps. However, other

features are often overlooked such as clear signage, spoken announcements on trains or subways, and public restrooms without entry doors. The instructor pointed out that the students probably had also used many "universal" features without recognizing them: remote control devices, speakerphones with volume controls, garage door openers, vibrating pagers, electronic programmable thermostats, etc.

Week 5. The Diversity that Surrounds You

The topic of the fifth week of the course is *the effects of design on disability.* As Gregg Vanderheiden pointed out in a white paper distributed at the RESNA 1997 conference in Pittsburgh, Pennsylvania, there are three ways to address the gap between an individual's capabilities and the demands of the built environment:

1. Change the individual;
2. Provide the individual with tools that he or she can use; and/or
3. Change the environment (Vanderheiden, 1997).

The assignment for Weeks 5 and 6 of the course is for each student to go out into his or her own community and meet someone new. The instructor asks each student to make the acquaintance of someone who is different from himself and, if he often spends time with people who have disabilities, someone who is different from others he already knows. This individual would serve as the student's "user/expert," someone who lives with and is expert at using the built environment with his or her particular disability. The user/expert should be someone the student doesn't already know, to reduce the personal complexities and the possibility that he or she will tell the student what he wants to hear. Each student is asked to spend some time with his user/expert in two locations: one place the user/expert knows well such as his home, work or school, and one he doesn't know well such as a store or restaurant he's never visited. The instructor stresses that the purpose of the exercise is to assess the effects of *design* on disability (and not the disability itself).

Each student then writes a report of the experience, answering the following questions:

1. Who was your user/expert? Where and how did you meet him or her?

2. Where did you go? What did you do there?
3. What tools did you notice your user/expert using to make products and environments more usable?
4. What modifications did you notice that your user/expert had made to products and environments?
5. Did your perception of your user/expert's disability differ when you were in each of the two locations and if so, how?
6. How would you characterize the interactions your user/expert had with other individuals in each of the two locations (if any)?
7. How would you characterize your own attitudes and emotions when you were with your user/expert in each of the two locations?
8. What would you conclude from this exercise regarding the effects of design on disability?

The students seemed to enjoy and learn a lot from this assignment. Even students who had disabilities reported that they noticed some environmental barriers for the first time. Some students saw significant differences in the behavior of their user/experts in the two locations visited.

More than anything else, this assignment forces the students to see the built environment through someone else's eyes and recognize obstacles they would otherwise overlook. Observing the lived experience of someone with a disability and discussing it with him or her is much more powerful, meaningful and memorable than any simulation exercise ever could be.

Week 6. The Principles of Universal Design

In the sixth week of the course, the instructor introduces the Principles of Universal Design (The Center for Universal Design, 1997) (see appendix to the introduction):
Principle 1.Equitable Use
Principle 2. Flexibility in Use
Principle 3. Simple and Intuitive Use
Principle 4. Perceptible Information
Principle 5. Tolerance for Error
Principle 6. Low Physical Effort
Principle 7. Size and Space for Approach and Use
The instructor presents a brief history of the creation process of the Principles of Universal Design (in which she was involved) and explains their purpose.

For the assignment this week, the students are asked to read the

beginning of Chapter 3, "The Principles of Universal Design and Their Application" of the course text (Story, Mueller and Mace, 1998). Chapter 3 presents each Principle accompanied by two to five photographs to illustrate each of its associated guidelines.

(The user/expert reports begun in Week 5 are due this week.)

Weeks 7 to 14. Principles 1 through 7

In Weeks 7 through 14 (with a one-week semester break in the middle), the instructor presents each Principle in turn and in depth.

The students' assignment for each of these seven weeks is to find, photograph, and critique an example that demonstrates the Principle under study that week. The instructor requires the following:

A. Read the sections related to Principle X (the Principle under study that week) of Chapter 3, "The Principles of Universal Design and Their Application" and Chapter 4, "Case Studies on Universal Design," of the text, The Universal Design File.
B. Select the best design example you can find of Principle X that is different from the ones shown in the book. The example can be from any design discipline including architecture, landscape architecture, interior design, product/industrial design, graphic design, etc. Choose an example that is meaningful to you.
C. Photograph the design example. In some cases, you may need to photograph more than one view of the design to fully communicate it to the rest of the class. Have the film developed into electronic images (typically, JPG format on disk or CD).
D. Give a full verbal description of the example for the benefit of individuals with visual impairments.
E. Write a critique of the design example.
   – Describe the positive aspects of the example: in what ways does this design satisfy Principle X and what makes this design easier to use than others?
   – Describe the negative aspects of the example: in what ways does this design fail to satisfy Principle X and in what ways does this design fall short of being universally usable?
F. Send the image(s), verbal description(s) and critique to the instructor via e-mail.

In these seven weeks, the students in the course study universal design at the detail level. As they apply each Principle, they begin to recognize the many issues imbedded within. The first task is to photograph the example in a way that will communicate it to others. The next task is to write an effective verbal description of each image, which is a difficult challenge. (What does the image show? What about this design is relevant? What is not pictured but is still important to the design? If you could not see the image, would you be able to imagine it from this description?) After that, the students typically assess their examples against the guidelines associated with each Principle. Sometimes the students overlook obstacles but by applying the guidelines, the students are often surprised to recognize them.

To demonstrate the content of these seven weeks of the course, each of the Principles of Universal Design is listed below along with its definition and some explanatory comments made by the instructor. A brief synopsis of one example of each Principle chosen by a student who took the course follows along with the instructor's response.

Principle 1. Equitable Use
The design is useful and marketable to people with diverse abilities.

This means that we should create designs that appeal to everyone and offer everyone a way to participate. Principle 1 addresses making designs useful and marketable to diverse groups of users concurrently: design for **all** people.

STUDENT EXAMPLE:
Accessible hotel bathroom.
This student identified several features of this room that made it more universally usable than most and she offered several suggestions to improve it.

- Wide door (the student suggested that it should be easier to open than this one);
- Lever door handle on door (it would be nice to have a doorstop);
- Rocker light switch;
- Smooth marble flooring;
- Shower area with no threshold (a supportive tub would be a welcome addition);

– Padded, L-shaped bench in shower (the hotel should offer a roll-in shower chair available on request);
– Wall-mounted showerhead with hose (should be located closer to the bench or offer two showerheads, one near the bench and one on the opposite wall);
– Single-lever faucet controls in shower;
– Paddle faucet controls at sink (room should have an additional adjustable magnifying mirror within reach);
– Open space rather than cabinets under the sink counter; and
– Grab bars used as towel racks throughout the room.

INSTRUCTOR RESPONSE:
This is a beautiful, spacious bathroom that would work well for most people. I agree with your suggestions and offer a few more. I'd like to see a seat at the vanity that could be sat on or pushed under the counter, out of the way. At the sink, I would prefer single-lever faucets to the paddle style because they are easier to control with a single hand. It might also be helpful to locate the faucet at the side of the sink so it is not as long a reach. The plastic drain piping under the sink is a good feature because it is less likely to scald skin that comes into contact with it, although any kind of piping is unattractive to look at and could have been shrouded from view.

I hope this bathroom was available in the mirror-image configuration, as well, for the benefit of individuals who need grab bar support on the left side when using either the toilet or the shower. This is a right-handed room.

Principle 2. Flexibility in Use
The design accommodates a wide range of individual preferences and abilities.

This means that we should provide for multiple ways of doing things. People ought to be able to use the design in any way that suits them personally. Adaptability is one way to make designs universally usable. Principle 2 addresses individual needs: design for **each** person individually.

STUDENT EXAMPLE:
Children's playground.
This student selected a children's playground that had been designed and built to accommodate a wide diversity of children

and support many different play modes. It included many different types of play areas such as a platform with sufficient space to contain a wheelchair, multiple slides, and several sets of overhead bars to facilitate moving around using the hands. In addition, the material covering the ground under the play structure was a thick, dense, resilient material (to reduce injury) with a smooth but textured surface (for easy rolling) that was also porous (for effective drainage).

INSTRUCTOR RESPONSE:
This playground offers kids a wide variety of ways to play, dependent on their preferences more than their abilities. It stimulates the senses with its many colors, textures, sounds, motions, and, I presume, smells! It can be used in a different way each time a child visits, which will stimulate his imagination and creativity. Children can comfortably play by themselves or with many others. This is an excellent example of ***Flexibility in Use.***

Principle 3. Simple and Intuitive Use
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

This means that we should make things work the way you would expect them to work. Principle 3 addresses the **cognitive** issues of design use. A new user should be able to understand how to use the design the first time.

STUDENT EXAMPLE:
Microsoft Word Wizard©
This student chose the "Wizard" feature built into Microsoft's "Word" word processing software application that provides on-screen help. She thought it was a good example of this Principle because the feature was easy to use and provided as much assistance as the user required. A box appeared on the screen that asked questions and offered choices of actions to guide the user in using the application. The user could either click an option or turn off the feature and proceed independently.

INSTRUCTOR RESPONSE:
Early word processing software was simpler to use because the software was less sophisticated and powerful. "Cutting" and "Pasting" were new computer concepts but their names were familiar and descriptive. I remember how satisfying was the

one-to-one correspondence between the screen image and the ink-jet printer output, so WYSIWYG (for "What You See Is What You Get," pronounced "wizzywig") was the rule of the day. You could turn single pixels on or off and produce exactly what you wanted, crude though the resolution was.

These days, word processing software is complicated, indeed. The good news is, computer users can employ only those features they want. In my experience, individuals learn a set of "tricks" and stick with those. Sometimes people who work together share their tricks and the whole group operates at a higher level. ***Very*** *few people know all the features of any software package. Real-time help or tutoring such as Microsoft's various "Wizards" (which are also available in their other software, such as Excel and PowerPoint, etc.) can be very helpful to new users or individuals who are employing features they don't often use. While I find them annoying in Word, I use them in Excel when I'm trying to write an equation and don't know the appropriate format or when creating graphs from data. A user can also set up the computer to read these dialog boxes aloud when they appear, in a choice of voices!*

We have come to interpret "feedback" rather generously. In many cases, the feedback you get to indicate success is that the thing you were trying to achieve happens. This is a good example of cognitive support from a design.

Principle 4. Perceptible Information
The design communicates necessary information to the user, regardless of ambient conditions or the user's sensory abilities.

This means that we should provide for multiple modes of input and output. Principle 4 addresses the SENSORY issues of designs. (For design applications, we are primarily concerned with limitations of sight, hearing, and tactile sensitivity and less with limitations of smell and taste.)

STUDENT EXAMPLE:
Automobile graphic information module.
The graphic information module on the dashboard of this student's automobile was his selection to exemplify Principle 4. It used understandable graphic symbols and warning lights in differing

colors. The module warned the driver of problems with the doors and lift gate latches, the sunroof, and the lamps for the headlights, parking, tail and brake lights, and imminent frost conditions ("ICE"). The use of graphic symbols communicated effectively with users at a glance regardless of their language skills, the icons and lettering used were easy to see, and the colors used helped communicate the type and seriousness of the information.

The student recommended that visual alerts could flash to make them recognized faster. He also suggested that warnings might be more effective if sound were used to alert the driver in addition to the visual indications. He commented that spoken words might be helpful, although the challenge of offering a choice of several languages would be substantial.

INSTRUCTOR RESPONSE:
When we consider the driver of a car, total lack of vision is not a possibility although sight limitations such as presbyopia (age-related far-sightedness) are likely for many drivers. Hearing limitations are common, especially since in addition to dealing with road noise many drivers often talk with passengers, listen to the radio, and/or talk on a cellular telephone. It is important to provide information to drivers both visually and audibly.

The use of icons instead of words is a good way to communicate information quickly. Icons take less cognitive processing than words because there is a closer match; words like "DOOR AJAR" must be interpreted. For this reason, the illuminated word "ICE" might be better understood if accompanied by a snowflake symbol which has come to be understood to connote freezing temperatures. Redundant audible signals can be quite helpful for the reasons you suggest. Voice alerts are available on some cars, but as you point out, they require the user to know the spoken language – and they can become annoying.

Principle 5. Tolerance for Error
The design minimizes hazards and the adverse consequences of accidental or unintended actions.

This means that we should make it difficult to make a mistake, but if someone does, he should not hurt himself or the product. Everyone makes mistakes; but designs should be forgiving. Whenever possible, mistakes should be reversible or at least cause no harm.

STUDENT EXAMPLE:
Rented industrial personnel lift.
This student chose to photograph and discuss an industrial lift her boyfriend had rented to use in his job installing a new sign high up on the outside wall of a building. She was surprised that such a device was available for rent, given the considerable potential risk involved in its use by individuals without training. Because of this risk, however, the machine was well designed and labeled for use by novice operators.

The industrial lift would not operate unless the four legs on the base were adjusted so that the lift platform was level and each of its legs was locked in place. To assist during initial set-up and adjustment, a green light was provided for each leg that would illuminate when it was properly adjusted. Operating the lift required that the unit be plugged into a source of electrical power and the unit be turned on. Raising the bucket of the lift required the operator to pull out one button ("Enable") and then press another button with one hand while turning a knob with the other. The student commented that these procedures were cumbersome and would not be possible for many people but they served to assure the user that "if the basket rises, you've done everything right."

INSTRUCTOR RESPONSE:
While this lift would not be usable by many people, its safety features still allow us to have a good discussion of ***Tolerance for Error****.*

The lift manufacturer thought through the process of use well and, as you say, the lift will not operate unless everything is in order. The "DANGER" panel is certainly daunting especially for individuals who cannot read English but I'm sure they were more concerned with reducing their legal liability than communicating particularly well. Where they used icons (on the instructions and some of the controls), they did it well but they didn't use them everywhere they could have.

The buttons seem large and easy to push, even with the side or heel of the hand, which is good. The red color of the "Enable" button communicates well that it is the one that should be pushed to ***disable*** *the unit if need be. It is not ideal that the controls require two hands for operation, but maybe this is done intentionally so the operator will be vigilant when moving the bucket, which is an act that requires vigilance (Guideline 5d).*

Principle 6. Low Physical Effort

The design can be used efficiently and comfortably and with a minimum of fatigue.

This means that we should minimize **physical** strain and overexertion. While some universal design experts in landscape architecture disagree with this Principle because it defeats the purpose of exercise, most others agree that designs should not physically overtax users.

STUDENT EXAMPLE:
Automatic door opener.
This student chose the button used on a rather heavy glass entry door to a museum to exemplify Principle 6. The main positive attribute of this button was how it made the door easy to open for anyone who used a wheelchair or had their hands full, but he also appreciated the button's appropriate vertical placement on the wall and good visibility. He also mentioned that the door opener mechanism employed here was less visible than the type that uses a pressure sensitive mat in front of the door for activation.

The student identified two main negative aspects of this example. One was that the button was placed on a side wall too close to the adjacent doors. This made the button awkward to reach and forced wheelchair users to press the button and then rush out of the way of the door as it opened toward them. The second negative aspect was the large wheelchair symbol on the big blue button that looked unattractive and stigmatized its use.

INSTRUCTOR RESPONSE:
This is a good universal design being stigmatized away from use by most building visitors. I usually use power door openers just on principle whenever I encounter them. If I'm carrying anything, I feel obligated to press the button to demonstrate to anyone who happens to be watching that they could use it, too! How silly. I agree it's ***that symbol*** *that makes people think it's not "for them." I've noticed that in public places, if a powered door is offered alongside a non-powered door, almost everyone will use the powered one. However, if the powered door bears* ***that symbol,*** *most people will avoid using it. While this behavior is appropriate for parking spaces and toilet stalls, it is nonsensical in doors, so why label them? Let's invent a non-stigmatizing icon for the button that will communicate the same thing without words.*

In your example, if the fixed pane of glass between the door and the button were wider, this placement of the button on the side of the door recess would work just fine. However, as you point out, this narrow pane forces anyone who uses a wheelchair to push the button and then race out of the way as the door opens. This would be particularly awkward for someone who is left-handed, since the button is on the right. I expect wheelchair users who could do so would place themselves a safe distance away and reach around the corner. So, I agree with your suggestion that the button be placed on the front of the building where it would be easier to reach, as well as to see. Alternatively, the space next to the door should be large enough to accommodate a wheelchair or electric scooter... but that's a topic for next week (Principle 7)!

Principle 7. Size and Space for Approach and Use

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility.

This means that we should accommodate variety in people's BODY sizes and ranges of motion. This Principle addresses the physical space incorporated into a design to accommodate the user's body and any devices or companions needed during use.

STUDENT EXAMPLE:
Orioles Park at Camden Yards.
This student chose to share the now-classic example of Orioles Park, a baseball stadium in Baltimore, Maryland. It was designed with input from a committee on accessibility containing individuals from the local community, and the stadium has a number of accessible features. The most remarkable accessible feature is the adaptable seating. About one percent (1%) of the seating distributed around the park is specially designed to either serve as regular seating or be adapted. Each of these seats is supported on a cantilever attached to a post on one side. The seat can be used to support an ambulatory person or it can be folded up and rotated around its post out of the way to create space for a spectator in a wheelchair. Additional notable features of the stadium include wide routes of travel throughout the facility plus accessible concession stands, condiment tables and ticket sales windows. The stadium provides large-print signage, auditory and visual announcements, and amplified headsets.

INSTRUCTOR RESPONSE:
Camden Yards is one of our favorite examples of universal design in public architecture, too, but we didn't have an original photo we could use in the book. Thank you for submitting it and sharing it with the class.

Getting a diverse group of real potential users involved in any design project can have a significant impact on the usability and acceptability of the final results. It is critical to get users involved in the design development process as early and as often as possible, and Camden Yards is a wonderful example of this approach.

Weeks 15 and 16. Tying It All Together

In the final two weeks of the course, the students reassemble the seven Principles of Universal Design and consider how to make a design satisfy all of them concurrently. Over the previous seven weeks, the class had a chance to explore each of the Principles in turn, to see how hard it is for a design to satisfy even one Principle well. It is much more difficult for a design to satisfy all seven of the Principles of Universal Design. Designing for the needs of individuals with a specific disability is relatively straightforward; designing to address the needs of individuals with differing disabilities concurrently is much harder; and designing for everyone is practically impossible.

The assignment for Weeks 15 and 16 is to redesign an imperfect design example to be as universally usable as the students can imagine. They may choose to concentrate on a product or environment already submitted as an example of one of the Principles earlier in the semester or they may select another design altogether. The product or environment must be photographed, described, and then assessed against the 29 guidelines associated with the seven Principles of Universal Design. Each student must also consult with at least three other people who may include his or her user/expert from Weeks 5 and 6. Once they have gathered information, they must each redesign the example to be as universally usable as possible and finally, critique their redesign solution to identify its positive and negative aspects.

In the sixteenth week of the course, the instructor introduces the Universal Design Performance Measures for Products (Center for Universal Design, 2000). The Performance Measures are the result of a NIDRR-funded Field-Initiated Project to develop a means of direct assessment of products against the ideals contained in the Principles of Universal Design. The project was

conducted by the author at the Center for Universal Design in conjunction with subcontractor James L. Mueller of J.L. Mueller, Inc. in Virginia. The purpose of the Performance Measures was to provide a procedure for evaluating how well products satisfy the Principles of Universal Design and their guidelines. The Universal Design Performance Measures for Products were developed with the input of product designers, marketing professionals, and persons with disabilities.

Although the Performance Measures were written to apply only (or primarily) to product design, it was expected that the students would find them helpful as they endeavored to design for universal usability.

The students' redesigns have ranged from simple (entry doors) to complex (entire offices). This assignment gave students the experience of designing for universal use but showed them how challenging this can be.

Week 17. Course Wrap-Up

In the final web page of the course, the instructor talks about international efforts in universal design.

More than 20 years ago in the United States, visionaries like Ron Mace and Patricia Moore began to advocate for and use the term "universal design" to describe design that was suitable for any user regardless of age or ability. Some advocates of this type of design approach prefer to use terms like "inclusive design" to stress the way that designs are usable by and suitable for populations that ***include*** *individuals with disabilities and older adults who would otherwise be excluded. Other advocates like to use the term "transgenerational design" or "lifespan design" to describe designs that are suitable for individuals of varying ages or by a single individual as he or she ages. Consistent with our belief in civil rights for all citizens, the approach in the United States has emphasized that designs should be usable by and suitable for any* ***individual****, regardless of personal characteristics. This approach depends on each individual to be a self-advocate.*

It is interesting to me to note that the favored term in Europe is "Design For All". In Japan, the native term is "kyo-yo-hin", or ***shared*** *design. In these other cultures, the emphasis is much more on design for* ***everyone*** *concurrently. These terms reflect different societal attitudes and stress people's mutual responsibility toward one another more than the rights of any one person.*

The assignment for Week 17 is to review and comment on each other student's redesign. The students are asked to note their observations, comment on the positive aspects of the redesign, and suggest ways to improve the universal usability of the redesign. The students typically provide good, constructive feedback to one another.

Finally, the instructor provides her own comments on each student's redesign effort and offers some closing remarks to end the course.

Discussion

This course has proven to be more successful than originally expected or hoped. While the class size has tended to be small, its composition has been rather diverse with students participating from across the United States as well as Canada. It is hoped that there will be increased international participation in the future.

Because the assignments submitted by all of the students are visible not only to the instructor but to everyone else in the class, Internet courses encourage student participation. With new information presented and assignments due each week, the students must stay on schedule or get left out of the experience. Also, every student has equal exposure and an equal "voice" online. The format of the course makes it difficult for one student to dominate discussions, as sometimes happens in the traditional classroom. At the same time, students are less able to "hide" in the crowd.

The online medium also requires students to communicate well and concisely. They must think through what they want to say and compose their thoughts in advance, which results in more effective and efficient information transmission. In addition, the anonymity inherent in a course in which the participants will most likely never meet each other encourages them to reveal themselves (their knowledge, beliefs and fears) more honestly and fully than is typical in the traditional classroom.

The major assignments in this course require each student to go out into his local community and interact with it in new ways. They must each meet someone new and critique the built environments with which they interact daily in the context of universal design. This 17-week experience is likely to influence the way they perceive design and make them more demanding of design in the future.

The quality of the feedback given by the course instructor to the students in response to their assignments is highly dependent on the instructor's knowledge. However, it has the potential to provide a high level of learning personalized to each student's effort, and posting all student assignments and instructor feedback on the course web site benefits all students enrolled in the course.

The feedback received from the students about the course has been quite positive. The level of discourse online tends to be deep and the amount of learning taking place appears to be unusually high.

Conclusion

This course will continue to be offered once a year but additional offerings are under development.

The author is part of a group of universal design researchers that is working on a project (another Field-Initiated Project funded by NIDRR) to develop a web site of information that will support universal design education for people all over the world. Intended for use by design faculty, students, and practicing designers, the site will contain universal design teaching strategies, instructional materials, project ideas, two-dimensional images and three-dimensional virtual models, and resources. The site will also contain links to an online journal and an online forum for design faculty to use to discuss with colleagues issues connected with their teaching of universal design.

While the universal design community is dedicated, we are well scattered around the world. It is very fitting that universal design be taught through the medium of the Internet in order to share what we know in the most efficient way with the widest possible audience.

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2.5 A Universally Designed Universal Design Course

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Introduction

The Introduction to Universal Design is a three credit elective course taught at the Faculty of Architecture, University of Manitoba, Winnipeg, Manitoba, and Canada. At the time of writing, this is the only course of its kind in Canada. It is unique in that it includes a class made up of a variety of design disciplines and thus the course content is diverse. I believe it also to be unique with the quantity and quality of involvement of user-experts. I developed this course and have taught it every fall for five years. Over the period of time I have moved, removed and continued to try to improve the course. I am describing the course, as a "universally designed" universal design course because of the manner in which I have constructed the course to be inclusive of a variety of design disciplines as well as of the course content and instruction methods.

Background on the Instructor

Before describing the course, I think it is important to understand my background as the course developer, coordinator and instructor. One of the first unique (universally designed) aspects of this course is that I am an occupational therapist teaching in the Faculty of Architecture. I do not have a design background but do have extensive knowledge in universal design as the Director of the Universal Design Institute located in the Faculty of Architecture, University of Manitoba, Canada. The mandate of the Universal Design Institute is research, education and information provision on universal design. As the Director, I am in charge of all projects of the Institute including developing research proposals and conducting research. I thus bring the research findings from the Institute to the course. I have been a coordinator of a beta-test site for the testing of the World Health Organization's ICIDH and am a member of the Environmental

Factors Task Force. I also am a member and chair several building codes and standards committees in Canada and thus bring updates on developments in this area to the course. As Director, I have to keep on top of what's happening in North America and in the world generally regarding universal design and again, this knowledge is brought to the class.

As an occupational therapist, I bring my knowledge of human anatomy, disability conditions, human functioning, ergonomics, occupational performance, assistive technology, human development from neonate to seniors and the interaction of human performance and the environment. I have worked in several areas in my career.

I also have extensive experience with disability. My father had polio shortly after I was born and I therefore grew up with him having a disability. Through this experience I visited and became friends with several persons who had contracted polio and continued to live in an Institution. I learned a great deal from them. In the late 1980's and early 1990's I spent several years as a wheelchair and power scooter user due to fibromyalgia. Thus I also bring my own user-expert experience. As well, I am the Chair of the Canadian Centre on Disability Studies and in tune with the disability studies and the Independent Living movement including knowledge of human rights issues. I have served on several disability-related committees including access committees.

My Philosophy on Universal Design

I see universal design as an evolving, emerging construct. Right now we are all only beginning to understand and develop the components. To get a complete picture of universal design, I believe the construct needs to include a variety of topics: universal design theory, knowledge in human functioning and its relationship to universal design, knowledge of human development and aging, ergonomics, human rights, legal issues, disability studies, demographics, building codes, standards and guidelines, accessibility studies, design theory, disability and aging awareness training, understanding of user-experts critical involvement in the universal design of space, specific universal design products, universal design requirements for the range from indoor to outdoor and from small to large scale, research findings, recent trends. This list is not exclusive and there are more topics that others would add that I might have neglected in this list. In developing the course, I try to touch on all areas of

the construct in the course. I believe that we are all students of universal design; that at this time there is no one that knows all the right answers. This is the way I teach the students. I see myself as a facilitator to their learning: I provide them building blocks and resources and they must then take them away and apply them to their design work.

Structural Issues

The Faculty of Architecture is a multi-disciplinary faculty housing interior design, architecture, landscape architecture and city planning. The Introduction to Universal Design course is offered as a lecture course in the fall term. It is offered at the Masters level as an elective to all students in the Faculty. However, the interior design students can enter in their final year of their undergraduate program since it was only recently that a graduate level in interior design was offered. This is a three credit elective course, which is intended to give the design student an introduction to universal design concepts.

The student is exposed to the following topics: universal design theory, disability awareness, human rights, building code requirements and limitations, applications of universal design with consideration of specific groups, universal design of the indoor and the outdoor environment, assistive technology and universal design, universal design and exhibit areas, historical properties, international perspectives, products, recent research.

Class Composition

The class is open to all disciplines in the Faculty of Architecture. There are usually approximately 20 students in the class. Over the years the majority of students have been from interior design. The next most common discipline is landscape architecture. I have only had two city planning students and perhaps five architecture students in total. This is the only class in the Faculty where students from a variety of disciplines are brought together in one class at the Masters level. When I originally developed the course as a new Faculty member, I had no idea that this was the case. I just set up the course without knowing current customs!

Course Objectives

The course objectives are:

1) To introduce the design student to the concepts of universal design

2) To increase sensitivity of the design student to the needs of a wide variety of individuals
3) To provide the student with a critical review of barrier-free/universal design standards/codes and guidelines
4) To provide examples of universal design in the design process
5) To provide the student the opportunity to explore a universal design topic of their own choice in more depth
6) To provide the student the opportunity to put universal design principles into action in an actual design
7) To provide the student with the knowledge of how to carry out a universal design site audit

Teaching Methods

The instructor primarily teaches this course but several guest speakers are brought in and may include design professionals, persons with disabilities, and a variety of others. The course is taught in the form of lectures, small group discussions, videos, tours and hands on experience.

User Expert Involvement

I have always involved user experts, (primarily persons with disabilities), in the delivery of this course. When the course first began, I had the privilege of having Patricia Falta visiting the Institute on sabbatical. She is a well-known user-expert architect who has been involved in accessibility/universal design issues for several decades. She co-taught several lectures with me the first two years.

For several years I have brought in a speaker with a disability from our local Independent Living Resources Centre (ILRC) who conducts a disability awareness session. This individual and I usually co-teach this session. I have also brought in panels of persons with a variety of disabilities to discuss their needs in terms of the built environment. Whenever I have had these user experts come to the class I ensure that expenses such as transportation costs are covered. In recent years I have been able to provide an honorarium of $50.00 to the ILRC speaker. This is important as many disabled people feel they have been exploited by giving their expertise for free.

In 1997, the Universal Design Institute provided an access-consulting course for six individuals with disabilities. These individuals represented a variety of disabilities including a wheelchair user, two individuals who were blind, a power scooter user, and a person who was deaf. Part of their course requirement was to attend the Intro to Universal Design Course. They were thus part

of the weekly class with the design students and exposed for instance to the sign language interpreter on a weekly basis. One of the intentions of the mixture was for the design students to have needed direct contact with persons with differences and for the access consultants to be exposed to designers. During class group activities, the groups were integrated. Again the groups were mixed for the class group assignment.

Re-design of Entrance to a daycare center. Bev Knutson, Richard Friesen (access consultant student), Kori Miller, Shital Kothary.

Some of the access consultants continued to act as advisors and design crits for this class in the subsequent years. In fact, one of the access consultants became an employee of the Institute. Tanis Woodland is the Administrative Assistant and also provides technical information at the Institute. I have included her as a lecturer in a progressive number of the classes over the past two years. She provides not only her own user-expert knowledge related to persons with visual disabilities and wayfinding issues; she also is a very knowledgeable universal design auditor and has a detailed knowledge of codes and standards. A contract employee, David Rapson is a city planner and a user-expert. He is the Project Manager of the Institute. I have asked him to provide lectures related to codes and standards as well as auditing methodologies and updates on specific projects we are involved in. The presence of these two user-experts, which are known experts in universal design, provides the students with credibility as we speak about including user-experts as part of the design process. In class they discuss their role in design and delivery of projects.

I have always had user-experts as part of my panel of crits for the final assignment. I prepare an evaluation form, which is filled out by all members of the panel. I have made user-experts part of the final assignment on many occasions. I have structured the assignments where the students are matched up either with an individual or an organization that has a specific design problem. In most cases, these people are persons with disabilities and the students must work with the "client" to develop the design solution. I have also had some of the access consultants involved as mentors to the students during their projects.

Experienced Based Learning

I have always had a session where students could experience the use of wheelchairs, crutches, canes, being blindfolded, having their hearing blocked, and having their hands restricted. I have called this session, "Experiencing the Inaccessible Environment" to get away from the concept that they are experiencing a disability. I reinforce that they are not experiencing a disability, rather a difference in moving about and experiencing the environment. I borrow the mobility aids from the School of Medical Rehabilitation. At the Institute, we have a variety of glasses that represent various levels of visual impairment and sets of ear protectors. I usually tape up some people's hands with duct tape so that they cannot move their fingers. I also have brought in different packaging in either this class or a later class, which they must try to open with hands in gloves, or taped up.

To begin the session, I give then a brief introduction to the session and how to use the mobility aids safely. Tanis and I then teach them how to move about while blindfolded and also how to guide a non-sighted person so that they can experience both. I then give them a sheet with a series of tasks on it and they travel in small groups. For instance, they must go to the library across campus and take out a book. There are a number of tasks to ensure that they do move through a number of environments. They must change off and experience the various mobility aids, blindfolds and ear protectors. David has been involved in this part of the class as well. I also did this same exercise when the access consultants were part of the class. Those who were wheelchair users had to use blindfolds and those who were deaf had to use a wheelchair, etc. Many of the user-experts said they appreciated the opportunity to experience the "other side". The students then return to class where they work in goups to fill out a form that helps them analyze the problems they encountered in a variety of built environment areas. We discuss

this form along with their experience and feelings regarding the exercise. Many of them comment on the apparent difference in attitude they perceive from others while in a wheelchair.

Unfortunately I only have two hours for this exercise. I feel that this exercise should be longer, but I don't have more time in the curriculum and I cannot keep the mobility devices for longer than a day as the School of Medical Rehabilitation needs them for their course work.

There are several other experience-based learning exercises that I use. For instance, I have used in-class exercises that require small groups to develop a universally designed restaurant and another where they must design a universally designed automated banking machine.

Contact with Designers/Architects working in the Field of Universal Design

Over the years I have brought in various designers who have designed projects that have included universal design. These professionals have included a landscape architect, interior designer and an architect. In some cases, I have taken the students to the completed project where the designer has discussed the process and the work, while in other cases, the designer has brought slides of their work to the class.

Course Content

The course includes a variety of topics on universal design including considerations of the indoor and outdoor environment. I find that I may add a topic related to a particular research area that I have recently worked on. Sessions are delivered in a combination of lecture, small group exercise, slides and video. In some sessions, we go on a tour or have a guest speaker come to the class. The following are topics that I include in the course. Delivery of these topics will change from year to year depending upon resources, new developments or recent research findings that are available.

Introduction to Universal Design: This provides the basic theory of universal design. It discusses social, historical and demographic perspectives that have lead to the movement towards universal design. There is a discussion of the World Health Organization's International Classification of Impairment Disability and Handicap (ICIDH) and how the environment com-

ponent is related to universal design. This class also includes a discussion and an exercise on the seven principles of universal design as developed by the Center for Universal Design in North Carolina. These seven principles are woven here and there in subsequent classes. I have found the Universal Design Exemplars Slides produced by Universal Design Consultants to be very useful and I use these throughout the course. The proposed Universal Design Exemplar CD-ROM from the Universal Design Center in North Carolina will also prove to be useful in this session.

Disability Awareness Session: This session includes a co-lecturer from the ILRC. The purpose of the session is to discuss myths about disability, proper etiquette and phrases to use to discuss any issues around disability. An excellent movie entitled "All Ways Welcome" is used as the basis for the discussion. Students are given a short "quiz" at the beginning of the session to help them evaluate their level of disability knowledge.

Universal Access: A Human Rights Issue: The purpose of this session is to introduce human rights legislation both from Canada and the USA and internationally to show how universal design is related to human rights: how access to services, products and environments is a basic human right. I have brought in a speaker from the provincial human rights commission who also happens to have a mobility disability.

Liability and Universal Design: The purpose of this session is to discuss liability issues related to universal design. Recent court cases from the USA and Canada are discussed in this session. I have included a lawyer who happens to be blind and specializing in disability rights issues at this point.

Universal Design and Human Functioning: The purpose of these sessions is to relate the functional needs of a range of human abilities to universal design. In this session, I show a video by Susan Duncan entitled: "Crossing the Line" (1999). We discuss how people move in the environment with differing abilities and how they use the environment to cue their movement.

Building Codes/Standards and Guidelines: This session introduces the students to various access/barrier-free codes/standards and guidelines and their content and what they lack in terms of universal design. Students learn via lecture and a hands-on measurement exercise what the content of these is. At this point I demonstrate two of the Institute's publications: *Access: A Guide*

to Accessible Design for Designers, Builders, Facilty Owners and Managers (2000) and *ACCEX: Universal Design Expert Software System (2000)*. The software contains many of the most commonly used codes and standards in Canada and the ADAAG from the USA. The software is a one-stop shop of codes and standards information and also provides expert information. Students can then use the software in the Institute for any of their projects. I have found the ADA series videos from the Center for Universal Design in Raleigh, North Carolina, to be particularly useful for this lecture and for related topics. I have often brought in Dr. John Frye during this lecture as he is a codes expert and developer of the aforementioned software.

Universal Design of Public Indoor Public Spaces: In this session, I try to focus on slides and materials related to indoors public spaces. It includes exhibit spaces as well as information on indoor products. We may go on a tour in this session. I have also discussed applications to retail space in this session and have introduced our recent booklet: "Is Your Business Open to All?" by L. Ringaert, B. Knutson, and D. Rapson (2000) which is a primer on universal design for small businesses.

Universal Design of Historical Properties: This session is interesting as we discuss the often-difficult relationship between historical properties and universal design. We discuss some of the basic principles behind this topic. I show a video and some slides and often go on a tour of a recently renovated historical site.

Universal Design of Outdoor Public Spaces: This session includes discussion on public rights of way and outdoor recreation areas. We may go on a tour at this point to a local landscape architect's recent project.

Universal Design and Housing: discusses universal design features of single and multi-dwelling housing. Students are involved in a mini-group exercise to discuss what the features should be in this type of housing. Several brief videos are shown and discussed. I have on occasion brought in a consumer who built a custom home, have brought in Canada Mortgage and Housing Corporation speakers or have visited a multi-unit housing complex.

Conducting a Universal Design Audit: In this session we either go to another site off campus or conduct an audit at the campus.

Off campus we have audited a local high school and a recreation facility. The class begins with a discussion on what should be included in the audit, various audit checklists, and a demonstration of how to use measurement tools such as smart levels. I have used the video *The Accessible Place of Business* by John Salmon to provide an introduction to conducting an audit. The students are then provided with a checklist and an area and they must go and do a mini audit. They come back to the class and prepare a mini report. Tanis and David assist in this class.

Universal Design and Assistive Technology, Automated Banking Machines and Products: I have handled this class when done in a variety of ways. For instance, I have given them a group exercise where they must develop a universally designed automated banking machine. They must consider all user groups to come up with the final product. I have brought in various speakers for this session including assistive technology vendors and persons with product information. I have also alternatively shown videos from various manufacturers and shown slides.

Universal Design and International Perspectives: Because of my international travels I have taken many slides and am able to show some international aspects. I have also brought in speakers from the Canadian Center on Disability Studies including Olga Krassioukova (International Director) and Henry Enns (Executive Director). That Center is carrying out work internationally and they have many interesting slides showing the level of accessibility internationally. The Universal Design Institute has also carried out a study on codes and standards internationally (Betty Dion Enterprises Ltd. & Universal Design Institute, 2000) and this information is discussed.

Universal Design and Professional Issues: I have presented this class in some of the years. I have tried to have designers who have specialized in universal design in their practices. I also have discussed some models of practice that are emerging as well as the emerging market for universal design.

Assignments and Evaluation

I have tried to be creative with the assignments. There are two assignments in the course. The first is worth 40% and the second is worth 60% of their mark. The mid-term assignment involves the students picking a topic of their choice, selecting three articles (preferably research articles, but these are hard to find in this area) from a search they do in the library and then a

critical analysis of the articles in terms of universal design and in terms of two building codes/standards or guidelines. The purpose of the assignment is many-fold:

A) encourages the students to do a search of library databases for articles.
B) encourages them to do a critical analysis article.
C) allows them to become familiar with one topic and specific aspects of building codes and standards.
D) provides the opportunity for the students to write a paper since many of them do not write papers per se in the design school.

Many of the students use this as a beginning for their literature review in their thesis or practicum. This assignment is due at midterm and is usually a ten page double-spaced paper. I ask them to provide a copy of the articles that they read and I thus keep adding to the article collection at the Institute.

The second assignment is worth 60% and involves multi-disciplinary group work. The intent of the assignment is to match the students up with a real world design problem and have them develop a design. The final product is to be a drawing or series of drawings and a paper. I have been lucky each year in that I have had many opportunities for real world projects for the students. I have had the following projects over the years: re-design of a backyard garden for a wheelchair user; re-design of an office common areas for a disability organization; alumni house re-design of main floor and entrance; re-design of an older home to allow wheelchair access into entrance; re-design of front entrance to a long term care facility; re-design of the Independent Living Resource Center; re-design of an entrance to a daycare; re-design of a turnstile entrance for a large grocery store; re-design of a ramp and entrance at a public market; design of a pathway and accessible canoe launch for a riverbank development; and development of design for a streetscape for a small rural town.

I have always brought in a multi-disciplinary panel to assist in the critical review of these projects. Typically on the final day of class, the students present their work to the panel. I try to include faculty members representing each of the disciplines as well as persons with disabilities who are experts on universal design issues. For instance, Tanis and David from the Institute have been included for the past two years. I have also brought in others that were trained in the access consultant course.

Including the faculty members on the panel is done for a number of reasons. First, it ensures that someone with a design background is giving his or her opinion since I do not have that background. As well, it is an opportunity for me to include some of what appears to be the most keen of the Faculty to be aware of what we are doing in the hope that I can also influence their thinking. I have developed an evaluation form that each member of the panel fills out. The form consists of a rating in each area out of five as well as a place for comments. I aggregate all of their scores with mine to determine a mark for the group. I also aggregate the comments. The students receive the aggregation of the scores and the comments in one document.

I will elaborate on two of the projects that were carried out.

Downtown Winnipeg Forks Ramp Re-design. Geoff Zywina, Patricia Falta (architect/design crit), Shawn Houghting.

Design for a Streetscape

The development of the design for a streetscape for a small rural town was quite interesting. The University Industry Liaison Office sent out a notice that they were looking for courses to match with requests from the community for project. I sent in information on the Universal Design course. It worked out that a small town in Manitoba was looking for design work. The Industry Liaison office matched us up. The small town paid the Office a fee, which would cover any expenses, related to the project. We met in the town with various community people and they expressed their views on what they would like to happen. In this case the present street was adjacent to an abandoned railway line which previously ran through town. The townsfolk wanted to make this street more vibrant and include recreation, parks, commercial areas and attract tourists. Two groups of mulit-disciplinary students prepared their design and programming for the space. Because of the multi-disciplinary nature of the group they were able to address planning, interior design, architecture and landscape issues. Some of the towns-people attended the final presentation and then the drawings and written document were sent to the town. One or both of the designs will be entered into a design competition at the Inclusion for Design conference in Montreal, Quebec, in June 2001.

Walkway system and boat launch

Again the students met with a community organization called Save Our Seine who were requesting the design. The students met with the group initially to find out what their needs were. In this case there was a combination of interior design and landscape students working on the project. The project was well received by the community group and was entered into the Universal Design Conference Competition in Rhode Island in June 2000.

Students comment that they appreciate the opportunity to work together in these multi-disciplinary groups. They comment that it not only assists them in understanding the other professions, the project is strengthened by a variety of in-puts.

Textbooks

I find that there are no real textbooks in universal design at this time and they need to be developed. I have attempted to include a variety of books as mandatory and as optional. From time to time I have placed the Canadian CSA –B651 standard on the mandatory list because at the time it was probably the best access standard/code/guideline in Canada. The students could

also use this in their practice when they graduate. I have also tried several books as course texts over the years. These differ from year to year and include: the Center for Universal Design's book: "The Universal Design File: Designing for People of All Ages and Abilities" (1998), "Universal Design: Creative Solutions for ADA Compliance" by Null &Cherry (1996), and "Beautiful Universal Design by Liebrock" (1999). I also have prepared notes and copies of articles into a bound copy that they purchase from the university bookstore. In these notes is an entire section on helpful universal design-related websites.

I find that by having this as a half-year course and trying to cram a lot into it, I don't have time to regularly discuss the readings in class. I remind them to refer to the readings that accompany each session. Because this is an optional course, I find that the students are reluctant to purchase the textbooks. As well, they are usually at the end of their studies and ready to graduate and they say that they have run out of money. Needless to say, I have not found a good textbook solution and the whole textbook issue remains a dilemma for me.

Course Evaluation

This year I asked the students to keep a structured journal of what they were learning both inside and outside the class. I had set up a sheet of questions outlining some questions to ask them. I asked the students to hand in their journals twice during the term. I did not provide marks for handing them in. The journals were particularly helpful to me as they provided insight as to what was and what was not working in the class. Sometimes when I thought a class was not going particularly well, the journals surprised me in that they commented on how much they enjoyed the class! The journals also gave me a much broader picture of where they were at the beginning of class and their personnel universal design development over the term. This was particularly evident regarding interactions with persons with disabilities as well as an increased awareness of inaccessibility in the community. I would highly recommend this process. I will however, provide some sort of participation mark for them handing it in next year. I obviously will not "mark" the document. The idea is for the student to have the opportunity for a free flow of ideas.

I do have some attendance difficulties particularly towards the end of term. This is a problem since this is such an interactive class and so much of it is hands-on experience. Part of the problem is that this is an optional course and the students feel that

assignments for required studios must take precedent. I have in the past taken attendance and created a system of marks lost depending upon the number of days missed. I do not like this system as I feel like a sergeant major!

Student Evaluation of the Course

Each year I have the students fill out an evaluation of the course over and above the usual university evaluation. My evaluation form gives me more detail and relates specifically to this course. Overwhelmingly the students comment that they would like to see this as a compulsory course. For me another evaluation of the effectiveness of the course is that I will get students who are taking or who have taken the course telling me how they have had to argue for other professors to allow them to include universal design features in a studio project. I have also had other professors comment on how a student from this class is influencing them.

Improvements to the Course and Future Plans for Development

As is the way with any course that is taught, I am constantly changing the methods of delivery and the topics in this course. Part of this is due to various opportunities and/or new developments that I feel that the students should be aware of. I struggle with deciding on should we go on a tour, which takes time and they don't get all the detail a three-hour lecture session would provide. At the same time, it is so important for the students to see real projects. Unfortunately, I have had to cut back on the number of tours over the years so that enough content can be included.

I would like to provide studio time in the class so that they could work on the final project and receive on-going feedback. I find that the way it works now is that they save everything till the end and do a rush job on it. I would like to give the students the opportunity to present what they have learned from their literature review in class since they have become "mini-experts" on the topic. It all boils down to needing to make this a full course rather than a half course.

I would also like to include students from other disciplines such as occupational therapy and engineering. I feel that this arrangement would be mutually beneficial to all. Regarding evaluation, I have found that the final project being heavily weighted with a 60% grade does not really provide enough separation of the abilities of the students. I plan to introduce either another

individual assignment or a small test into the course to assist in providing a better indication of marks.

I feel that this course should be compulsory and not an elective. All of the students should have to take it. I also feel that there should be universal design supplementary lectures and additions to studios throughout the students' design education. In this way, the information can be integrated throughout their theory and practice.

To be an even more universally designed course, it would be helpful to have input into the actual course design from persons from the community and user-experts. More could also be done with more resources to pay guest speakers and additional course developers. At this time we do not have these resources.

Related Activities in the Faculty

In addition to the Introduction to Universal Design course, I also am an advisor to six to eight thesis and practicum students who are incorporating universal design into their work. Most of these students are landscape architecture students. I have had one interior design student and now have a city-planning student. Two of my students have graduated. I am also called upon to provide the occasional guest lecture in a design professor's class and have been invited on occasion to be a studio crit. This year a multi-disciplinary group of us from the Faculty provided advice to a group of multi-disciplinary students for an aging-in-place housing design competition. I also provide a yearly lecture to the year-one occupational therapy students. I have had three interior design students take a reading course from me and apply it to their option in aging elective. We have also accepted two occupational therapy and one city planning intern at the Institute. Their internships focus on research and they become research assistants during their placement.

Conclusion

This has been an overview of the universal design course that I have developed and taught over the past five years through the Universal Design Institute in the Faculty of Architecture, University of Manitoba. I have titled this chapter "a universally designed universal design course" because of the nature of the delivery, instruction, evaluation and content of the course. This course is taught by a variety of people including me as an occupational therapist, persons with disabilities and a variety of guest speakers. Because of the multi-disciplinary nature of the students who take the course, a wide variety of topics in universal design must be covered, thereby providing a very universal design appro-

ach to the course content. The final project comes directly from the community and involves students working with stakeholders to determine solutions. User-experts are involved as design crits and as mentors throughout the project. The involvement of the community and of user-experts is another important tennent of universal design. Thus for a variety of reasons, I have universally designed this course. I continue to perfect this course but acknowlege that the course has room for growth and improvement. I hope that others can learn from my experiences and I look forward to learning from other "students of universal design"who are developing curriculae in this most interesting and challenging area.

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Part 3
Asia and Australia

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3.1 Introducing Universal Design to a Colonial Context

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Universal design has become of paramount importance in architectural teaching practice during the last decades. However, in late capitalist society production is still divorced from social and ethical considerations. Using design curriculum as an example, the authors argue that more inclusive and responsible teaching practice prepares students to realise their full potential in their future careers, which might not be related to design. Equally these pedagogic strategies have potential value beyond teaching in the design disciplines. An inclusive curriculum, by valuing diversity, and introducing the idea of ethical and responsible practice is as relevant to mathematics as it is to architecture or economics. The authors locate their critique of modernity within Western Australian culture, engaging with postcolonial theory and applying it as an emancipatory tool.

Introduction

In Western culture modernist technologies and ideology separated the 19-century designer physically and socially from the object s/he made. This separation of production from social use prompted John Ruskin, in relating design production to wider social and cultural criteria, to argue for the full cultural education of the designer, rather than the technicist training s/he was receiving. As the justification for much funding of design courses is the need to provide vocational training, the utopian educational project growing from Ruskin's philosophy seems to exhaust itself before it reaches the studios of contemporary design instruction. More recently, legislation following human rights movements around the world has raised the urgent necessity for a more inclusive design process, sometimes known as 'universal design'.

At a post colonial conference at Notre Dame University, Fremantle, Western Australia in 1993, Aboriginal writer

Mudrooroo addressed his largely white audience with a bemused query; 'What is this thing known as 'post colonial'? Have I missed something? Have all you bastards gone home?' In raising this issue in such an academic forum, Mudooroo highlighted the quandary for Australians attempting to work within an ethical and socially responsible framework. Not only have we 'bastards' (sic) not left his land, but Australia is still a British colony. The Queen of England is also the Queen of Australia. Post colonialism is arguably capitalism's contemporary face, but within this intellectual arena little account is taken of those who are still colonial, there is little acknowledgment of the ethical dilemmas facing continuing colonial states such as Australia. In this chapter the authors interrogate the ideologies of modernity that underpin both the colonising desires of European nations and design education and processes. Using examples from recent pedagogic projects in Western Australian universities, we argue that an inclusive education encompassing broad cultural and social issues produces more competent analytical designers, and provides a critical foundation for those design students not following prescribed design paths.

Such a pedagogic process also enables the introduction of universal design across disciplines. The principles of universal design or access intersect with principles of inclusive curriculum, social justice and ethical practice. The negotiation of an ethical relationship with an 'other' translates across disciplines and levels of study. This ethical relationship is of as much importance to school curricula as it is to tertiary studies. While architects or engineers may deal with the practical aspects of construction design, raising awareness throughout a population actually militates against the forms of oppression which ultimately create disability, gender or race as defining and subjugated categories.

Aims and issues

The trial architectural design curriculum project presented in this chapter sought to significantly broaden design educational parameters. Its intention was to explore an inclusive pedagogy that embraced the notions of co-inquiry and collaboration, and acknowledged an appreciation of contemporary life experience and diversity. The project had the potential to significantly improve the education offered to students, equipping them with an understanding of the diversity of the community they work in, and skills with which to responsibly solve problems in their

future workplace. The focus was on the cultural and social orientation of the students, consultants and teaching staff in order to further a discussion regarding responsible work practice and ethics. The students were introduced to the concept of 'Universal Design' and worked throughout the semester with a group of community consultants each of whom had a disability. Underpinning the curriculum was a constant interrogation of the modernist concept of the 'universal', the classical legacy of the 'golden mean', and a constructive play with modernist 'modular' or ideal man (sic). By implication this includes not only issues of gender, but also notions of the non-European body, and the ways in which non-European spaces are related to specific cultural contexts.

The trial studio was named *The Universal Design Studio*. The Universal Design Studio did not necessarily promote the use of the term itself or advance its adoption in design schools. Rather students were encouraged to interrogate its ideals within the framework of the history of design functionalism and aesthetic outcomes, and the social responsibility of the design professional. However, the naming of the studio gave it a profile within the school so that other students quickly realised that those enrolled in the project had access to knowledge that they did not. Seen somehow as experts in this field, the 'Universal Design' students became a reference point for all the design students in the school, disseminating knowledge throughout the semester and into the following year. Students were not just taught basic skills, but were also given handbooks and instruction manuals, and most importantly, the wherewithal to make such technical information socially productive. The contextualising nature of their studies meant information was readily applicable at many levels. Students who had completed the studio became increasingly knowledgeable in the subject area, and articulate in raising these issues at all levels of their lived experience. (For detail of the studio curriculum see Appendix)

This case study, one of a number undertaken by the writers at various universities, experiments with inclusive curricula for the design studio. Australian university design schools have a strong focus and emphasis on the development of design techniques and the exploration of aesthetic outcomes. The central aim of this trial programme was to encourage an active participation with a set of 'real' users with whom genuine relationships could be formed. All the consultants engaged in this process have physical impairments, some more obvious or

visible than others. These relationships, it was hoped, would establish in the students a stronger sense of the complex connection between functional, socio-historical and aesthetic concerns by allowing the definition of the 'user' in the practical scenario of architectural design to intersect with these concerns. It also gave the students a sense of responsible and ethical practice, not always an educational concern within traditional design studio confines at university level.

The project was designed to be critical, exploratory and proactive to develop the unique potential that a combination of the creative arts, architecture and landscape architecture, has to offer for alternative, more inclusive pedagogic models. This is a significant development from the modernist design process that often follows a formally institutionalised procedure to solve design problems. The initiative develops existing strategies for making explicit culturally-based differences in the perception of form and the requirement for space and makes these an integral part of the design process. The project also addresses a commitment that The University of Western Australia has to inclusive curriculum which is 'about curricula and teaching practices that by their very nature allow for student differences, be they individual, gender, cultural or racial or socio-economic background differences, which all contribute to differences in learning styles' (UWA, 1996). This commitment is now endorsed by all Western Australian universities.

A specific problem of the learning experience of students in some university design studios is the distance they are kept from real interaction with 'users'. Instead, they are required to understand 'users' who are represented through the creative use of imaginary scenarios that operate uncritically within the dominant paradigms of an institutionalised 'modernist' design culture. Students are required to project onto these metaphorical scenarios an understanding of the social, political and economic forces that define and constrain design practice outside the university environment. Given that most design students at Australian universities are recent school leavers, (seventeen years of age), a high percentage of whom are still partially or wholly economically dependent (upon parents, government assistance and other support mechanisms), much of this projection is naive.

The Universal Design Studio project followed on from a unique studio project to design housing for an Aboriginal community in the north of the state. The student work was commissioned

by the Western Australian Aboriginal Housing Board. There is not scope within this chapter to discuss this project (See Pedersen & Revell, 1998: 1–11) but it was an important precursor of the Universal Design Studio because those students were also introduced to 'real' users who would eventually inhabit the homes they were to design. Students were forced to acknowledge through this project the exclusory nature of much of their previous design instruction, and the way in which their previous conceptualising about design initially resulted in sets of design in which indigenous domestic needs were ignored. The community expressed a need to have their cooking facilities on the verandah, they wished to have housing that was communal, they required safe shelter for women and young children and separate housing for young unmarried men. In negotiating these differing needs for shelter the students became aware of the role that architecture has in disciplining the user.

The disciplined body (in the circumstances of this chapter it belongs to the subject defined by difference of race or difference of physical type) is a body that has to conform, despite the exclusion of such a body from the benefits of mainstream representation and acknowledgment. This disciplined subject has little or no control over his or her environment, both physical and intellectual, and can best be characterised by the term 'subaltern'. The subaltern, while voiceless, is nevertheless expected to be productive. Disciplinary control and the creation of the productive, docile subject is specifically connected to the rise of Western capitalism. This chapter is a discussion of some of the implications of the divorce of production and design processes from the complex realities of socio-historical and cultural contexts. This has occurred in the western world as a result of the conflation of modernity's interest in an undistinguishing functionalism (rooted in a utopian, but ultimately exclusive, idea of the universal) and capitalism's investment in 'forcing the majority, whom it exploits, to define their own interests as narrowly as possible' (Berger, 1978: 154). As the modernist agenda crumbles, or at least is seriously interrogated, it is timely to reconsider the above concerns in relation to design pedagogy.

What is designing?

Pam Roberts, in a recent Western Australian publication, *Promoting Equity & Diversity – A Guide to Inclusive Language & Practice in Engineering*, states; 'Engineers design and create products and services for society by identifying society's needs

and providing solutions' (Roberts, 1999: 2). This text is primarily focused on socially appropriate uses of language in the work environment. It is useful to concentrate on the first paragraph of this text and discuss it in relation to the reality of the Australian community in terms of cultural diversity, and to the design disciplines represented on our university campuses. That is to say, engineering, architecture, landscape architecture and graphic design amongst others. There are many similarities between the disciplines of engineering, architecture and graphic design. These practitioners all 'design and create products and services for society by identifying society's needs and providing solutions' (Roberts, 1999: 2).

Arguably, design is an intellectual and formal problem solving process. However this definition avoids a pair of complex issues associated with design and designing: Who is it that identifies problems and deems them fit to be solved? Is design simply about the finished object, or does the object emerge from a complicated net of material, conceptual and cultural processes? One legacy of modernist design is the assumption that the designer, in the purest, essentialist state, is acultural and ahistorical, responding to demands for functional necessity through rational functional design principles (Crouch, 1990: 63–65). This utopian position is easily disproved by any casual glance about a department store. For every rational piece of functional design there are a hundred useless objects (probably more) designed with the very opposite of practical self-empowerment and emancipation in mind. This is something that Theodor Adorno pointed out sixty years ago when he referred to the culture industry perpetually cheating its consumers of what it perpetually promises (Adorno, 1986: 139), but it is a concept with which the designing fraternity seems reluctant to acknowledge its complicity. Design practices are deeply rooted in ideology. The problem with any ideology is that its hegemonic success means that it becomes transparent, it is all around us but because it is ubiquitous we are unable to see it in operation, and its practices take on the quality of 'commonsense'.

When the design process does not result in a built or constructed object or outcome, the importance of understanding how ideology contextualises practice is immediately evident. Designing a solution may entail a prioritising of resources, of policy making, of allowing certain things to happen and dismissing others. For example, designing a workplace environment that is sympathetic to parenting needs might imply flexible wor-

king hours and subsidised travelling costs for workers, rather than the construction of a crèche on site. To design a solution to a problem involves its location within a complex of social, cultural and aesthetic processes. Further, it is about understanding the physical and ideological construction of the culture that the designer serves. This chapter is itself a design, a design for an inclusive pedagogic practice.

The Western Australian Context

Our writing, indeed much of the theory underpinning our pedagogic project, is informed by a contemporary field of study that has been termed 'post colonialism'. Homi Bhabha writes: 'Postcolonial criticism bears witness to the unequal and uneven forces of cultural representation involved in the contest for political and social authority within the modern world' (Bhabha, 1994: 171). It is important to remember that within the context of Australian history since 1788, (the date of British settlement), this contest has consistently ignored the authority of the indigenous population of Aboriginal peoples. Under the legal ruling of *terra nullius*, it has functioned as if Aboriginal peoples exist somehow outside the discourses of colonialism so that they eventually became invisible in cultural discourse. What are the ramifications for a culture struggling to come to terms with its colonial past? How are the processes and objects of material culture tied in with this central issue of history? A glimpse of colonial Australian decorative design over the last century sees a constant dialogue between designers struggling to find an essential 'Australianness' in design and continually using Aboriginal imagery in an attempt to do so. Far from remaining a legal problem to be fought out in court, the legacy of the colonial struggle between the colonising and the colonised indigenous cultures is manifest in the goods on the shelves in every tourist shop in Australia.

Frantz Fanon writes: 'Every human problem must be considered from the standpoint of time. Ideally the present will always contribute to the building of the future' (Fanon, 1967: 12 –13). In our discussion of inclusive curriculum and universal design, in our contribution to the 'building of the future', we begin by rooting our work in the temporal. This is achieved by situating our writing within a contemporary Western Australian context, with a backdrop of Australian colonial history. To speak of Australian practices is in many ways misleading. Australian federal political constructions, the differing histories and

models of European explorations, invasion and colonial settlements, and the differing climatic and geographic conditions of the six Australian states creates a diverse perspective. Hence our location of this discussion in the particularities of our home state, Western Australia. Perth, the capital of Western Australia has a population of approximately two million people. It is the most geographically isolated city in the world. Add to this the fact that nearly 30% of the population of Western Australia are overseas-born and only 30% of these born in the colonial centre, the UK, and it becomes obvious that understanding cultural diversity, and administering it, is of some significance to the state. More than 11% of Western Australians speak a language other than English at home, with more than 30% of the population in the Kimberley and Pilbara regions in the north of the state speaking Aboriginal languages. Because of this complex diversity, the state also provides translation services for over 50 different languages (Department of Immigration & Multicultural Affairs, 1999).

In the Engineering and Science Faculty at The University of Western Australia 22.5% of the students are women, and 10.8% International full-fee paying. In the School of Architecture and Fine Arts over 50% of the students are women, and slightly more than 10% International students, mainly from South-East Asia, but increasingly from USA and northern Europe. In terms of the overseas population by major countries of birth in Western Australia, 43% are from the UK, 8% from New Zealand, 5% from Italy, 4% from Malaysia, 3% from former Yugoslavia, 3% from India, 2% from the Netherlands, 2% from South Africa, 2% from Germany and 2% from Vietnam. Despite these figures, there is a continuing perception in Australia that the bulk of our migrants are from non-European backgrounds. This is plainly not true. However it is equally obvious that the Australian population is becoming increasingly diverse, and even were it not, globalisation demands that we are able to deal with diversity in a productive and equitable manner.

Gender is as crucial an issue in Australia as elsewhere in the world today, and while we focus on the culturally disciplined body it must be acknowledged that as white middle-class academics in Australia, although not Australian born, our lives are easier, the obstacles to our personal growth via access to education, healthcare etc, far less than the problems we would face if we were, for example, Aboriginal women. Our life expectancy alone is probably thirty years longer that of an Aboriginal woman of our age,

our children far less likely to die in infancy, adolescence or in prison. In Australia it is more difficult to be Aboriginal than to be African or Chinese for example. While Aboriginal peoples represent less than 4% of total population, over 30% of the Western Australian prison population is Aboriginal, infant mortality and general death rates for the Aboriginal population are 4 times higher than the rest of the population, and more than 35% of adult Aboriginal peoples are unemployed. Aboriginal people in Western Australia have only received state education since 1948 and the 'drop-out' rate of Aboriginal students remains disproportionately high. (Western Australian Advisory Committee on Reconciliation (WA), 1996: passim)

As Australians, we tend not to be very good with issues of race. The entire 'Sorry' debate, a populist campaign instigated to extract an apology from the federal government for the excesses of the past in the country's racialised politics, and the refusal of John Howard's liberal government to co-operate in this aspect of national reconciliation only highlights how inadequately the Australian nation is dealing with the complex history of European settlement. Even the idea that racism itself occurs is difficult to accept, often the response to the suggestion that something is racist is in the manner that sexism is reacted to in the example in the engineering inclusivity text (Roberts, 1999: 19).

In the creative arts it becomes even more difficult, discouraging racism or sexism can be taken as censorship. We are keen to maintain freedom of speech, freedom of expression, but at whose expense? For example, in western art history the nude, the body of a woman, has been the accepted focus of the artistic gaze for many centuries – it took the physical attack on the *Rokeby Venus* by a Suffragette before critical attention was brought to bear on this aspect of artistic practice. If drawing a relationship between high art and pornography seems fanciful, it is useful to remember that these forms of artistic expression began their existence in private collections, hidden away for the private pleasure of the lord or master. For example, the vast art collection of the Pinacoteca Ambrosiana in Milan assembled by the ecclesiast Federico Borromeo from 1595, also exhibits small items of jewellery featuring detailed erotic images of women. Time and history has bestowed upon such works the sanctioning label of 'art' rather than 'centrefold'.

Disability is socially produced, as are racism, sexism and all forms of social oppression. These are all constructs, human

invention. The contemporary Western Australian background to the universal design project we discuss in this chapter is one of an institutionalised racism and an institutionalised body fascism that is schizophrenic in its manifestations. The administration of cultural and economic capital in Western Australia is pluralistic and contradictory. For example, the Ministry for the Arts routinely funds curatorial projects that the Minister is unhappy with. The Ministry funds the Perth Institute of Contemporary Arts which is in safe but vigorous opposition to much that the state government stands for. However the geographic location of the institute in Perth's Cultural Centre, next to the state gallery and library, simply reiterates what Jean-François Lyotard foregrounds in *The Postmodern Condition*; that such seemingly oppositional moves are simply 'programmed effects' which ultimately have no 'effect on the balance of power' (Lyotard, 1989: 16). To imagine that the Australian Federal government, its judiciary, its educational institutions and the mass media are working within one closely defined ideology is a crude caricature, but the reality is that 'subalternity and alienation have their roots in economic relations' (Bahro, 1978: 378) and these institutions are the agents by which notions of the subaltern and the alien are formed and perpetuated. The subaltern class is a non–hegemonic group or subordinate class. Not unified, the subaltern class is ruled by the state and their interests subordinated to that of the state. These individuals are not exploited by the state as are the working class in a Marxist model, rather they are disenfranchised and without a speaking position. In relation to the modern state, it can be argued that both Aboriginal peoples and peoples with disabilities fall into this category/class. It is only by an escape from the subaltern existence that the possibility emerges for such individuals to participate in what Bahro calls the 'synthesis of the historical process' (Bahro 1978: 146). By this he means the construction of the individual not just in a legal sense – with for example the right to enter public buildings in a wheelchair – but also in terms of ethical and intellectual individuality, which 'presses in turn for more productive transformation' (Bahro, 1978: 272).

So, while universities and major industry pursue policies of inclusivity driven by economic rationalism, the Australian Federal government refuses to acknowledge Native Title (possibly also due to economic concerns). While the Federal government actively pursues policies that promote an understanding of physical difference, legislating for universal access to government buildings and public places, the mass media

continues to perpetuate the role of the idealised physical stereotype in its never ending quest for liquidity. This see-sawing between disciplinary action and the need to create a culturally productive social docility is well documented. Michel Foucault makes the point that while institutions such as prisons, hospitals, and training institutions were/are historically part of a technology of discipline for working class people, it is the case that cultural disciplining is a universal phenomenon that also operates through universities and schools (Foucault, 1987: 135–169).

Modernity and the concept of the Universal

The legacy of modernity in design education in the English speaking world, much of which is colonial or post colonial, at the beginning of the twenty-first century is a dualistic one. On one hand there is the cultural and ideological legacy of the Deutsche Werkbund's push for the standardised *Typische* form, with its associated ideals of rationalisation, industrialisation and unitised training. This aspiration to a functional universalism where design and its physical and conceptual processes are reduced to the acultural and ahistorical acquisition of skills is in opposition to an educational model which contextualises the design process within cultural and social frameworks. This alternative, which argues for plurality and difference, is best characterised by Doll's metaphorical 'dancing curriculum, where the steps are patterned but unique' and which is located in a world of complex and contradictory social realities (Doll, 1993: passim).

Despite its decline in prestige in academic circles over the last twenty years, the cultural context that Western Australians work within is that of modernity (and continuing colonialism). It is ironic that new movement towards inclusivity in design should adopt that old modernist term 'universal', and this irony was fully explored in our exampled design curriculum project. The cultural and ideological struggle in the first third of the last century saw many attempts to create universalist systems in art and design that echoed the previous century's attempts to create universalist systems of thought and communication. This universalising project was flawed from the start because of its Eurocentric origins. Esperanto is a good example of this. On one hand, Esperanto was a laudable project which attempted to erode cultural difference and exclusivity by the production of an artificial language which communicated across cultural difference. Its universality however, is confined within the paradigms of

European language structures, its vowel sounds are European, its alphabet is European, its cases European. Antonio Gramsci was never happy with Esperanto arguing that it suppressed the differences in power reflected in the contested use of colonised and colonising languages, it created an ambience of cultural competency rather than cultural literacy that facilitated an understanding of cultures that could only ever operate at the most superficial of levels, forever avoiding the deep cultural antagonisms that made such a language necessary in the first place (1).

Language is the vital element in any cultural exchange, Frantz Fanon at the very beginning of the first chapter of *Black Skin, White Masks*, focuses on the importance of language stating; 'For it is implicit that to speak is to speak absolutely for the other' (Fanon, 1967: 17). Marxist philosopher V. N. Volosinov discussing the relationship of the class struggle to language writes; 'Sign becomes an arena of the class struggle' (Volosinov quoted in Moi, 1985: 157). This is language rooted in history, politics and cultural endeavour, not ahistorical and acultural Esperanto. Modernist design with its emphasis upon the 'rational' and 'functional' can be viewed in much the same way as Esperanto. The need for a design that was egalitarian, that was pragmatic and useful began a necessary process in the levelling of what had been oppressive cultural and economic differences (Crouch, 1999: 46–71)

In the process of creating what modernist designers saw as an 'acultural' and 'ahistorical' design form that subsumed cultural variation, an intrinsic refusal to acknowledge difference could only lead to an oppressive form of design. By this we mean a design culture based around a formalised and idealised conception of the functioning European body. This formalised conception was both physical and cultural, where the industrialised culture of the European worker was to determine how the constructed environment was to be conceptualised and built. Modernist universalism created an abstracted (disciplined) body, docile and productive, which operated within a set of functional paradigms that once withdrawn from its original cultural context becomes disempowering rather than emancipatory.

A critique of modernity's rationalism is not a critique of the role of reason, and the role of reasoning in design, or of the utopian aspiration to a universality and transparency of cultural activity. Rather it is a critique of the way in which a historical form of rationality has become redundant, and often oppressive. While

momentarily emancipatory for European culture, the 'rationality' of modernist culture requires interrogation and criticism to make it relevant to new conditions. To paraphrase Foucault; the rationality of the abominable – rationalising the atrocities of the Gulf War, or the bombing of Serbians civilians by NATO planes for example – is a fact of contemporary history. This does not give irrationality any special qualities however. At the core of contemporary moves towards 'Universal Design' are the successes and failures of the last attempts, and the dialectic between the two positions needs constant acknowledgment for 'functionalism' to have value as a design tool.

Design Thinking

Traditionally in the western world design is a teleological, creative, problem-solving process leading to a constructed or built solution (Booth, 1983: 283). The teaching of design takes place in a studio, rather than a lecture theatre. The design process itself typically includes a 'series of sequential steps from project acceptance, design, construction drawings, implementation, post-construction evaluation and maintenance' (Booth, 1983: 283). This basic model is used by graphic designers, interior designers, landscape architects, architects, industrial designers, engineers and scientists to solve problems. Within this tradition design is taught as a linear process dealing with solving one specific problem, each student working alone on their individual problem (Booth, 1983: 283). In addition to such a process an important aspect of design education is the ability of the student to locate a learnt specialism within complex and contradictory social realities, to be aware of the limiting qualities of that specialisation as well as its benefits. Further to this self-awareness is the need to contextualise design practice within cultural systems, and by so doing critique those systems.

Not only the context but also the methods of delivery of models of education can militate against such a self-reflexive process. In our own teaching experience we have found that teaching students to become self-reflexive is an extraordinarily difficult objective to achieve. At the Western Australian School of Visual Arts, Edith Cowan University in Perth, students are encouraged to use this concept as a core principle to locate themselves in the complex of cultural structures in which they operate. To 'locate' a student must perceive his or her emotional, aesthetic and intellectual life and how it is constructed, for good and bad, by education, life experience, the organisation of society and the systems and functions of its institutions. An initial attempt

to promote this analytical attitude was the imposition upon the students of a 'self-reflexive journal'. However this became a site for introverted musings rather than a tool for critical thought and analytical debate. It became clear that students did not know enough about their immediate cultural environment to make the project worthwhile without enormous prescriptive input by tutors that defeated the object of the initial exercise.

Another unsuccessful attempt to encourage students to become self-aware was a graphic design project in which students were asked to 'frame' themselves visually according to their cultural origins. Most were unable to invest the brief with any real critical qualities and produced images that whilst visually successful were touristic, and lacked any indication of understanding the complexities of this piece of self-ethnography. The most direct way of achieving any form of self-reflexivity in young students in our experience, has been to provide them with 'real' experience, and to take them outside of themselves. That is to say, provide a curriculum where as part of their design course they engage with real users over an extended period, and in which their subjectivites are forced to become articulated through outside agencies. By so doing students need to take responsibility for their work beyond the narrow confines of academic achievement. It also requires students to learn to listen to individuals they may not regard as having the same authority as their university lecturers, or possibly themselves. It is this process of learning to work collaboratively in a community environment that provokes self-awareness. We note however, that such courses are often extremely difficult to organise in times of limited resources and the pragmatics of timetabling in the new economically driven universities.

As we have previously mentioned, the form and content of design teaching are intimately linked. Also there is a measurable, as well as a linguistic difference between training and education (Buss, 1995: passim). The problems inherent in the legacy of modernist industrialised training and competency based learning, were spelled out clearly by Bowden and Masters. Graduates emerging from technicist and poorly conceived unitised learning environments;

> *lack the ability to communicate ideas and to discuss and debate issues; are unable to relate, communicate and interact with others from different backgrounds and experience and are deficient in their ability to conceptualise projects from*

broad goals through to ultimate evaluation (Bowden and Masters, 1993: 173).

This is a problem when even potential employers, often cast as the villains of the piece in demanding specialised training to fit industry requirements, are not interested in such limited graduates. A recent report by the *British Centre for Research into Quality,* on the careers of British art and design graduates, observed that the qualities and attributes sought by employers are; 'initiative, creativity, independent judgement, oral communication skills, flexibility and adaptability, analysis, critique and synthesis'. Such qualities were often developed by autodidactic students; 'in spite of, rather than because of the course as often students were left to develop these for themselves with little or no help or guidance from within their programme of study' (Harvey and Blackwell, 1999: 4).

The spectre of specialisation in education, the legacy of modernist technocratic rationalism so ably characterised by Jürgen Habermas, raises its head here, but we don't need to be Habermas to spot this problem (Habermas, 1974, 1984: passim). In an article published by the Australian Graphic Design Association, *How To Get a Job*, Lam Po Tang observes; 'At design school, the subjects you study are organised around areas of technical expertise. Out there, in the world of practising designers and studios, the work follows areas of application of design skills' (Lam Po Tang, 2000). The transmissive educational model of specialist teaching, technicist and unitised, economical when applied to large teaching groups, is increasingly problematic in preparation for the design industry (2). It also runs counter to the ideas about creativity and productive thinking which (should) lie at the heart of design education. A joint research project between British Nuclear Fuels Limited and the Royal College of Art in London observed that the biggest creative constraint for the specialist was stepping outside the paradigms of what s/he personally knew was technically feasible and entering into a metaphorical world (Joyce, Franklin, Neal, Kyffin and Veronies, 1999: passim).

This world of metaphor is not an escape from design solutions, but an entry point, where analogy helps to define physical and cultural problems. The student equipped with these skills is not only increasingly likely to succeed within his/her chosen field of design, but also, and more importantly, move sideways into other areas of cultural endeavour. Schön observes; 'At its best,

the architectural studio is an exemplar of education for artistry and problem-solving, architectural studios are prototypes of individual and collective learning-by-doing under the guidance and criticism of *master* practitioners' (Schön, 1985: 6) (our emphasis). Herein lurks a fatal flaw, for while within this transmissive model there is space for metaphor, that in itself is not enough, because the problem lies in a disconnection from history, culture and subjectivity that occurs with the modernist functional universalising of traditional design practice. Again, to refer to the Universal Design Studio, one of the first exercises given to the students was to 'map' their impaired consultants' bodies and create designs from this knowledge working critically with the concept of the golden mean, to critically interrogate the dominant paradigms of physical proportion until they had conceived an 'amodular' body. One of the students designed a complicated system from her consultant's body and then abstracted these drawings into beautiful small abstract paintings. Surely a very pleasing aesthetic metaphor, but entirely meaningless. However, having established a metaphorical subjective entry point into the issues at stake, later in the semester, more confident with her understanding of the issues of not only impairment but a whole range of social and historical issues, the student produced award-winning designs for a hypothetical Universal Design Access conference.

Conclusion

A recent international conference at Curtin University in Perth, *Re-inventing Design Education in the University* highlights the wealth of contemporary debates around university design pedagogy. It is clear that the role of metaphor as a creative tool is rising in ascendancy in reaction to economically driven competency based training schemes and their conceptual limits. However these debates are not exactly new, *The Journal of Architectural Education* has documented an on-going discussion around issues related to design education since its inception in 1949. What is increasingly imperative in the authors' point of view is the social and ethical obligations of the designer. Dutton's *Cultural Politics and Education* introduces a journal issue devoted to the theme of his article. He notes that not only should we understand education in consciously political terms, but also that education itself – the investigation of knowledge, the curriculum, the social, cultural, and gender relations, the teaching practices – tends to reproduce dominant ideologies and so serve the hegemonic status quo (Dutton, 1991: 69). He

comments further that 'thinking of architectural education in this way is woefully undertheorized by architectural educators. Work in this area is almost non-existent' (Dutton, 1991: 69). Our work falls into this educational investigative category.

More recently than Dutton, Groat challenges the profession to 'reassess architecture's pedagogic conventions and the definitional scope of the field' (Groat, 1996: 166–183). Her paper contends that 'diversity may mean survival for the field' in a professional world known for what Dixon's article, *A White Gentleman's Profession?* describes as 'its lack of diversity' (Groat, 1996: 166–183). While some in educational institutions are addressing the issues of cultural context, of diversity and inclusivity, it would appear there is still a long way to go, and that linking inclusivity, diversity, pedagogy and design itself is virtually unknown. Indeed, at the recent Curtin University conference the authors were the only participants who linked these within a philosophical and socio-historical context (Crouch & Pedersen, 1999: 173–179).

Gramsci's ideas about the institutionalised intellectual can help to redefine pedagogical and design structures. Gramsci stressed the importance of the intellectual not as an institutionalised administrator or scholar, but as part of a wider, moral community. As he argues, the new mode of intellectual life:

> *can no longer consist in eloquence, which is an exterior and momentary mover of feelings and passions, but in active participation in practical life, as constructor, organiser, 'permanent persuader', and not just a simple orator. (Gramsci, 1997: 344)*

In such a model, the role of the Master, or the specialist, is constantly under scrutiny as the paradigms of, in our case design culture, are questioned in practice. There will always be institutional structures that provide armatures for institutional and institutionalised study. Under a Gramscian model however they cease to be external forces which limit and are limited, but can be transformed into a means of freedom, instruments to create new ethical and political forms and a source of new initiatives (Gramsci, 1997: 244 & 359–369).

The International Journal of Inclusive Education promotes contemporary discussions surrounding inclusivity and social justice. For example, McCarthy, Dolby and Valdivia argue issues

of identity and multiculturalism are far more complex than the simple or easy opposition of the West to multiculturalism (McCarthy, Dolby and Valdivia, 1997: 89–100). As they argue, it is the specific and local nature of identity that post colonialism acknowledges. While these writers go no further than discussing this in relation to literature in their article, this chapter deals with these issues in relation to studio practice and design action (3). Indeed we are able to go much further than this, for it is in the application of theory to practice that we are able to enter into what Gayatri Spivak terms a 'responsibility structure' with the subaltern, thus enabling a learning which flows both ways. That is to say, between teachers and students, between disabled persons and intellectuals, between the academic world and the subaltern (Spivak, 1996: 293).

It is in this learning process that the rich core of our project is revealed with its extensive emancipatory potential. In the modern world formal history is the history of the state, there is no history of the subaltern. As Antonio Gramsci reminds us, such a history can only ever be a monograph (Gramsci, 1997: 52). In Australia there is a history that exists before and outside the history of the modern state; the oral histories of Aboriginal peoples whose Dreamtime stories predate formal European history. For the contemporary Australian state these histories have no legal authority. In the modernist design world the amodular body, the disabled body, the racialised body, are all subalterns. These bodies fall outside knowledge, they do not speak. Gramsci proposes an active role for the intellectual, those whom he refers to as, 'organic intellectuals' (Gramsci, 1997: 4). That is to say the intellectual has a role of conscious responsibility to provide a link between the ruling class, the working classes, and what we would term the 'disenfranchised' (or subaltern in the post colonial world). For us as academics it is our responsibility to provide a space to critique the constraints of modernity in such a way that fractures occur. Thus our work may enable moments in which those who have been unable to speak in modernist [design] discourse, the impaired or the racialised, are inserted into the circuit of academic and ultimately, design work. This means for the design disciplines that rather than specialised texts on design being published and exclusionary buildings erected, an understanding of diversity across culture, race and physical type is built into any design considerations from the inception of the process.

Bhabha discusses the 'move away from the singularities of

'class' or 'gender' as primary conceptual and organizational categories', which he sees as having resulted in the awareness of a variety of subject positions currently informing ideas of identity. He argues that it is in the negotiation of the range of subject positions in contemporary cultures, from the 'periphery' or boundary to authorised rule, that dominant discourses in western culture can be challenged (Bhabha, 1994: 1). One can argue that design studios have traditionally been taught within a modernist paradigm in which the studio 'master' occupies the privileged subject position, the position of authority, and the student is deprived of active subjectivity. Post colonial discourse, on the other hand, provides a theoretical position from which each subject may speak. Modernity revisited through post colonial discourse provides a space for what Bhabha terms 'enunciation'. In this way design itself can be interrogated and translated in order to value difference. The use of post colonial theory in a colonial context is of course fraught with problems. Nonetheless, such a curriculum exploring the dialectic relationship between the theory, the colonial reality of Australian society and practice, and between political and social can lay the foundations for a truly emancipatory subjectivity.

One of the key issues of post colonial theory has become that of identity and the space, or site, of difference. Within this space is a play of private and public, past and present, the physiological, psychological and the social. Post colonial theory put to practice within a modernist paradigm has the potential to disrupt the binary oppositions of such a discourse. Within the traditional model of the design studio, within the framework of the modern design aesthetic, post colonial theory's enunciative potential can play havoc with exclusionary and oppressive practice. Post colonial theory can provide a translation service between modernity's limiting binaries and boundaries and more contemporary notions of difference. This can be clearly seen in the trial Universal Design Studio. Working in this instance within a modernist design institution/discourse/paradigm, the students called into active question those principals. Furthermore they quested beyond those modernist boundaries, through exercises of self-reflexivity, metaphor and collaboration, to reach for, investigate and make visible within this particular institution, the profoundly silent subaltern figures that predate the history of modernity. In addressing inclusivity both in terms of teaching strategies and then design itself, this trial project actively explores ways in which we can transform our sense of what it means as an Australian, 'to live, to be, in other times and diffe-

rent spaces both human and historical' (Bhabha, 1994: 256). In interrogating the idea of 'universal' within an inclusive curriculum, the students ultimately ruptured modernist design paradigms. In exploring and mapping a geography of disability as a metaphor for the social, the studio unpacked some of the totalitarian effects of the modernity's desire for the 'universal'. The abnormal body, the disabled body, is traditionally oppressed within institutional confines, those repressive regimes of the modern world which construct an individual's identity. In allowing space for a play of different subjectivities the students found that disability is both a socially and historically relative identity that is produced by society. The modernist ideal of the universal is based on a narrow understanding of the 'able body'. That is to say, there is a presumption that individual subjects can be reduced to identical units. We need look no further than le Corbusier. Under institutionalised economic rationalism, difference is socialised as social oppression. Thus for these design students direct engagement embracing multiple political concerns became an emancipatory process. And for us as academics? Putting ourselves on the line by contesting privileged knowledges in order to empower our students in the margins of academia simply reinforced yet again the idea that knowledge is power.

End notes

(1) To be culturally literate is an entirely different thing from being culturally competent. It can be seen as the difference between being a passive consumer of culture and being a producer of culture, the difference between a cynical appropriation of ideas, and the sophisitcated use of them in furthering the processes of communication.

(2) *A Tale of Two Studios* published by the Australian Graphic Design Association, measures the creative successes of two British design studios. Pentagram, which has a transmissive management model, allocating specialist tasks to teams is nowhere near as successful as Wolff Olins that employs a horizontal, rhisomic model. This has the potential to have profound implications for design education.
http://www.agda.asn.au/dr/Edu/ISS/TaleofTwoStudios.html
19.10.2000

(3) There are twenty-two schools of architecture in Australasia. Some institutions such as Curtin University, combine architecture, construction and planning; others, such as Deakin

University, combine art and architecture; while others combine architecture and building, as does Papua New Guinea University of Technology. The School of Architecture and Fine Arts at UWA is unique among Australian universities in housing three studio-based disciplines; architecture, landscape architecture and fine arts. Thus the UWA school provided an ideal site to trial innovative pedagogic practices related to design disciplines. The Universal Design trial studio took place in 1999. (See Appendix)

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Appendix

The 1999 Universal Design Studio was a funded Equity Project conceived by Annette Pedersen in The School of Architecture and Fine Arts at The University of Western Australia. The course curriculum was designed by occupational therapist Jaye Johnson, architect Romesh Goonewardene and Annette Pedersen. The curriculum had to satisfy course requirements, provide the students with enough information to give them an understanding of recent public access legislation, the mechanical requirements and physical limitations of a variety of disabilities and also address a commitment to inclusive curriculum. This meant a substantial departure from the usual studio programme and a shift in emphasis from studio teaching staff to the students themselves.

The equity funding was used to employ six consultants to work with students in the design studio for the thirteen-week semester. Each of these consultants had a disability. Design studios at UWA usually have six contact teaching hours each week. The contact hours in this studio were extended to nine to include a three-hour life drawing class each week. The life models used in this class were selected to compliment the studio focus on 'amodular' bodies. That is to say, rather than being artists' models they were, for example, extremely aged, heavily pregnant or disabled people. The consultants were invited to join the students in these drawing sessions.

The teaching programme commenced with an intense one-day seminar to introduce Universal Design to the School. All staff and students were invited to attend. An information package was presented followed by a video documentary of Universal Design. Following this the audience were introduced to the consultants. Dividing the audience into groups, each consultant then accompanied them on a tour of the School and its grounds. Each group had to document the accessibility of the School and report back to the studio staff. The idea of the seminar was to introduce Universal Design to everyone in the School and to encourage all the students to begin to think about access in both real and design terms.

The first studio design exercise required the students to work in small groups with their consultants to document various imaginary access scenarios to the University. For example, one group had to document their consultant as an international student attending the university for the first time to enrol. For this group, as their consultant was in a wheelchair, the difficulties of simple things such as negotiating showers in the student accommodation, crossing the road and finding a suitable toilet on campus, proved highly enlightening. This exercise took three weeks. The students had to co-ordinate their work with their consultant without any assistance from teaching staff. At the conclusion they were to design and publish an 'Access Information Package' for the campus Equity Office.

The second exercise was to map an 'amodular' body. This exercise presumed a relationship of trust between the students and their consultants. The students were required to map their consultants' bodies and movements and use them for a design. One of the students 'mapped' her consultant's irregular movement up and down a staircase and used the information to compose a musical score. The time allocated to this exercise was two weeks. At this point in the semester an informal jury was organised to provide valuable critical feedback for the students. The jury included the studio consultants and representatives from the Equity Office, the Student Guild and the State Disability Services Commission.

The third exercise required the students to design a folly within an existing university building, Winthrop Hall. The folly was for an international Universal Design Conference and Fair and had to allow access for all members of the public. As the building was constructed nearly one hundred years ago before any thought of access had occurred to the architect, this provided a real challenge. The students were provided with extensive plans of the building in which to locate their designs and were required to produce a range of detailed drawings and scale models. Three weeks were allowed for this third brief.

The final studio brief was to design a chemistry laboratory and chemistry faculty building allowing universal access. As the university was in the process of constructing a new chemistry building, the students were able to utilise the range of data already assembled for the university architects. Having their consultants on hand to tour existing laboratory facilities highlighted a range of access issues that even the architects had not

considered. Again the students had three weeks in which to complete their design work.

A bibliography of readings selected to complement the studio course was pinned up in the studio and students were expected to complete weekly readings which were then discussed in studio. Although all the students were architecture students, the studio staff were interdisciplinary. That is to say; architects, an artist and an art historian, with a range of other specialists bought in for studio sessions throughout the course. At the end of the semester a Universal Design Feedback Forum was organised for the students and their consultants. This was co-ordinated by the Student Guild. The School usually organises Student Perception of Teaching tests at the completion of semester. However it was believed that while SPOT tests are useful they do not allow for community feedback which was important in this case. Furthermore it was important to both debrief all the participants in this project and to document their experiences for future work.

Photo: FotoKnutsen AS

3.2 Universal Design Education and Development

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Introduction

The concept of Universal Design is widely understood today as "an approach to creating environments and products that people of all ages and abilities are able to use to the largest extent possible". Though this approach is often most beneficial to older people and people with disabilities, universal design benefits every one to some degree. In many parts of the world Universal design is attracting increasing attention. However, in the part of the world, which we call the "Developing world", designers are required to grapple with so many other pressing issues that Universal Design finds little attention in their professional practice. As a consequence Universal Design Education also finds little space in the curriculum of design schools there. Ironically it is in this part of the world that the majority of the world's population with disabilities lives; and that the elderly population is rapidly increasing. Fortunately, significant work is being done at design institutions by students and faculty members making Universal Design Education as an option available and as an activity sponsored by National or International voluntary bodies. This article is based on the author's experience and observations of such complimentary type of Design Education.

The Significance of Universal Design Education

Education is not a mere imparting of knowledge and skills necessary for one to earn a living. It is also to broaden one's horizons. Education is not a mere give and take. It is shaping the whole mind-set of the future generation. The dominant trend in all futuristic thinking is this: more equality, more non-discrimination and more freedom. Universal Design is all this and thus Universal Design Education is better education for the world.

In the past there used to be special schools, colleges and Universities for women. Today such need has become largely redundant. Co-education is preferred and considered “progressive” because any action that brings the discrimination down and equality up is progressive. If progress is measured by how a Nation takes care of its weaker subjects, then Universal Design Education certainly is progressive. Recognition of Universal Design Education as “Progressive” Education is an important step. Only then, will Universal Design Education be perceived positively and accepted universally by all educators and educational institutions. It is necessary to remove the present stumbling block where universal design is looked upon as an act of Social Service. This patronising attitude cripples the spirit of universality.

Limitations of the Developing World

The developing world, which is a majority in terms of the number of people, has typical characteristics quite different from the economically developed world. These characteristics have bearing on the kind and method of Universal Design Education required in those countries.

These characteristics are:

1. Population Pressures

Developing world populations are large and they usually put enormous pressure on the resources available in a country. This leads to scarcity of resources and scarcity of facilities, and the competition constantly increases.

2. Illiteracy

In countries like India a major percentage of the population is illiterate. This has bearing on the kind of media needed for communication and the role of education in the country. There is still prevalence of oral culture where the printed word has limited influence. Even visual literacy is low.

3. Unemployment

As the population is larger than the work available, particularly aggravated by the increasingly labour saving machines and mass production, the employment available in a developing country is getting less and less. This is leading to large-scale migration and brain drain on one hand and increase of poverty on the other.

4. Lack of Capital and infrastructures
In developing economies, most of the nation's capital is utilised towards such basic needs as food, health, primary education, law and order, defence, railways, irrigation etc. Very little capital is thus available for developmental activities like higher education, industrial development, research in science and technology and commercial investment. Lack of capital also leads to lack of infrastructure. Design also gets low priority in such countries.

Pre-requisites for Universal Design Education in Design Curriculum in the developing world

There are some aspects, which are essential pre-requisites for making new changes in the curriculum and for the inclusion of Universal Design Education in a sustainable and effective way. These are more crucial in developing economies where population pressures and rate of unemployment are very high.

These aspects are:
a) Career opportunities
Career opportunity is a key motivator in students opting to study a particular course. When Universal Design would offer a future where economically rewarding jobs and occupations are available in the society/industry, the students would opt for Universal Design Education.

b) Government Policies
Policy directives and laws by the governments are some sure ways of including Universal Design component in all schools and universities nationwide. Such policies should not be merely made in the parliament but should be executed effectively by the local management. There should be legal enforcement and penalties for schools that do not follow the policy. There should also be incentives such as tax rebates as well as scholarships and special grants for schools that do follow the policies.

c) Interest groups
People with disabilities (PWD), people with lesser abilities (PWLA) and senior citizens (SC) are a minority today. But demographic studies show that these groups are increasing in developing countries and may in he future make up such large numbers that their interests cannot be marginalised. These

groups should form associations and organisations to press for their interests to be attended in the education system nationwide. This is already taking place in many developing countries including India.

d) Public Awareness
Finally and most importantly, there should be a general public awareness towards Universal Design Education and its importance to society. Such awareness brings acceptance of Universal Design Education by society at large. It will have very significant impact in the developing world where parents and elders still continue to play a dominating role in deciding their ward's education.

Universal Design Education in the developing World: The institutions

In the above context, the way universal design is approached in the developing world could be shown through an example of the National Institute of Design in India. The approach adopted at other Indian design institutions is similar.

According to rough estimates (as census are not available) India's population with disabilities is a staggering 50 million. If we add to this the growing elderly population and the growing population of the less able, the figures become amazingly vast. In spite of this magnanimity of scale, there is no legal binding by any organisation towards this marginalised population. No design institution in the country offers courses or degree/diploma specialisation in Universal Design; in a recognised way. But fortunately several activities in this area are happening, with the sole initiation of individual designers and design teachers. The methods adopted successfully to sustain design and design studies in Universal Design are significant and would be focus of this article.

The National Institute of Design (NID) is an autonomous non-profit organisation under the government of India. The purpose of this organisation is to support the industries in India with design training, design service and research. These industries in India are diverse and include large-scale industries as well as vast small-scale industry sector; craft production and home based cottage production. As an institution of national importance, the NID's priorities are expressed in its "Internal organisation, structure and culture" document as below:

"NID's concern is the quality of the physical environment and its relevance to human needs. The task is educational-professional education of designer and education in the wider context, through service to industry and the communication links established to provoke informed and sober public discussion. The endeavour is not only to respond to existing demands with discrimination and without preconceptions but to create an awareness of problems of contemporary significance that are as yet generally unrecognised. Its challenge is responsible pace-setting."

NID is small in size with its existing strength of about 280 students and 48 faculty members. It provides comprehensive Education in Design, offering ten specialisations in different areas of Design. These specialisations include Product design, Furniture design, Ceramic design, Textile design, Apparel design, Graphic design, Video programmes, Animation design, Exhibition design and New Media. It is the only design institution in the country having such a variety of design disciplines under one roof.

The programme at NID has two entry levels: one programme of four years' duration is for the school leavers; the other, the advanced entry programme of two and a half years' duration is for graduates of architecture, engineering and fine and applied arts.

The overall structure of NID's programme is a combination of theory, skills, design projects, and field experience. Sponsored design projects are brought into the classroom to provide professional experience. Complimentary studies in Science and Liberal Arts widen the students' horizons and increase general awareness of contemporary issues. Students are involved with real-life projects through NID's Design Service wing and sponsored classroom projects. Thus one learns by doing. This exposure ensures that they leave NID as young professionals, experienced in actual service. Academic evaluation at NID is a system of constant performance review, founded on professional standards and individual potential, rather than on a system of marks and examinations.

There is a common programme called Foundation Programme for one year, after which the students branch out into various disciplines of their choice. However, the education is generalised, and common courses such as Science and Liberal Arts, History of Design, Ergonomics and Design Management

continue to take place. In the Second year students also take up an Open Elective course which is offered across the disciplines. A mix of students from different disciplines opt for their preferred topic offered as Open Elective. The programmes are concluded with a six-month diploma project conducted in the field, usually sponsored by Industry or a non-Governmental or Governmental Organisation. Evaluation is done through work presentation to an expert jury.

Methods of Universal Design Education: Its management and teaching

As mentioned earlier, there is no specialisation offered, nor a department established, nor a curriculum devised to include Universal Design in a structured way. There is also no policy direction for the institution to start Universal Design teaching or practicing or researching. Yet – the NID has been able to sustain Universal Design activities and win a National award for creation of barrier free Environment and for its attention to the needs of the disabled people in December 2000. How is this achieved?

Faculty Motivation

The institution employs design teachers who have strong social values and firm national commitment. In their professional design practice, these faculty members take up assignments related to disability, elderly issues and other subjects in the universal design field. When there are no clients to commission design jobs in this area, these faculty members work on self-sponsored projects in the area. Thus these teachers have become role models for the students and young designers to follow.

Career possibilities

In countries where the economy is poor, most of the young students tend to choose an education that can provide them with well paying careers in future. It is thus necessary to regularly inform them of the career opportunities in the Universal Design area. These jobs may not be able to give higher pay when compared to other commercial careers, but these jobs may provide social recognition, honour and personal fulfilment along with a reasonable pay. The incentive is not in cash but in kind. The campus placement wing plays a great role in explaining this fact and influencing the young minds towards Universal Design as an important and meaningful option.

Exposure and awareness: A Course

In the present design education, the institute aims at flexibility and generalisation. In such education, the skill courses are specific but the project courses are open. The choice of subject to be taken as project course is left to the individual student. As Universal Design is an emerging area of knowledge, it needs to be sufficiently exposed to the students at an early stage at the institution. This will positively influence their choice of Universal Design subjects as projects. At NID Foundation year offers an important course titled “Environmental Exposure”. This course aims to expose the student to the present realities. Special needs are one such reality. It is a field based, experiential type course. The students go out of the campus, stay with a village community and experience their way of life, thus developing an understanding of the people and their way of living. This course creates wonders in moulding the student’s attitudes and in developing value towards Universal Design. Besides bringing the future designers face to face with the user, it encourages open minded thinking so necessary for creative solutions.

Design concepts and concerns: A course

Important among the core design courses being taught at Indian design institutions is the course pertaining to Design process. The course title has changed a few times but it is an essential course, which teaches the student the structured method or various methods of designing. Design method is the heart of Design. Today the scope of this course is broadened to include not only the methodology but also the concepts, concerns and values that form an integral part of the methodology. The course format involves discussions, surveys, and interviews of people, design thinkers and professionals. This course is also offered in the first year of the graduate and postgraduate programme.

Universal Design is an increasingly important design concern. The students are introduced to the area of Universal Design and the design opportunities that are available in that area. This method proved very effective in influencing students in taking up projects and thesis in the area of Universal Design in the advance years of Design learning. Courses such as Design concepts and concerns establish firmly the relationship and relevance of Universal Design to the design profession.

User involvement

A group of visually impaired people testing a product designed for them and interacting with the designer.

The institute maintains a constant rapport with various local organisations dealing with disability and extensively involves experts dealing with disability and people with disabilities in design learning in a number of ways. Such people are used as resource persons, providing information on a given problem or as co-guides in instructing a student in a project related to special needs. They are most valuable in evaluating a design solution and also giving feedback after using a new design in prototype form over an optimum period. The NID has close collaboration with local institutions such as Blind people's Association and B M Institute of Mental health. There is an important advantage in such involvement of disabled individuals and their organisations. Their presence in design institutions, which otherwise are often fashionable and elitist, has positive effects on the Design community. The design students going to these organisations with project work find themselves in the midst of people with disabilities and gain an experience which makes a lasting impact on the young minds. Such experiences spread in the campus and inspire other students to choose Universal Design Education.

Electives

Open elective course. A wallet designed for use by both visually impaired and non-impaired people. The brightly coloured and differently textured strips are so placed inside the wallet that the blind person can recognise the value of a currency note by tracing it along with these strips.

In India design institutions such as NID recognize the need for flexibility in the design education because of the nation's necessity for a vast variety of design services. Most Design schools therefore have Elective courses as important components in the curriculum. These are offered both as departmental electives pertaining to specific area of design and also as open electives which any design student irrespective of his specialisation or department can opt for learning. Universal Design is one of the electives, which is being offered. The elective is made more interesting by using the experiential format. The student adopts a person with the specific disability he is working on. The off-campus experience, the newness of learning and the challenges it offers to designers – all these aspects make the student learner fascinated with Universal Design. The design solutions of such elective courses are made into prototypes and given to people with disabilities for test-use and a feedback session is held. After this, the better solutions are taken for production either at the NID workshops or at the collaborating institutions dealing with disabilities. Both the designer, the therapist and the user are involved in the creation as well as realisation of the design.

Diploma/degree project

Toys for mentally handicapped children – a diploma project. These toys could be used by the non-retarded children as well and be enjoyable. Student: Gayatri Menon.

At a design university the diploma/degree project is the final project which qualifies the student for the award of degree or diploma. At some architectural and design schools it is given as thesis submission, but at the National Institute of Design, it is given in the form of a project lasting six months and more. The topic for the project is chosen by the student in consultation with the teachers and the department concerned. This is an opportunity for influencing students to take up projects or thesis related to Universal Design.

The importance of this method is twofold. Firstly, due to adequate time available, the project allows the students to explore the topic or problem thoroughly and create an implementable and practical solution. Many a time, the design solution is submitted in the form of a working prototype, which could be tested. Secondly, a diploma or degree project is sponsored by an industry or organisation which has a long term interest in the project. In the context of poor economics, the funds made available by the sponsor are crucial for the high quality of work. More important than funds is the fact that the industry or organisation is likely to implement the project. As we are aware, the ultimate aim of design is not merely a brilliant creative solution. The ultimate aim of design is a product or communication or an environment or a system that reaches the people for whom it is designed and which improves the quality of life around.

Universal Design Education for non-designers

Good ideas don't confine themselves to any professional specialisation although some professions such as Arts, Architecture and Design are popularly considered creative. However, the fact is that all human beings are creative. It is common experience that many non-designers do get great break-through ideas but often these ideas die prematurely as these were not developed further and taken to conclusion. In special areas such as disability, old age and less ability, the users (the disabled and the elderly) and people dealing with these users such as therapists, nurses, family members and voluntary workers are particularly most knowledgeable. They often come up with innovative and amazingly beautiful solutions. Such individuals will be very useful for the cause of Universal Design if they were given design training. The National Institute of Design plans to start M.Phil. or Ph.D. level programmes for such non-designers. Such programmes need to be tailor-made based on the candidate's background, educational qualifications and experience. Since the programme is offered to people who are already working, the learning format needs to be flexible. It is guidance based and uses computer technology for distance education.

Promotion

Universal Design Education needs to be promoted actively in developing economics where there is increasing pressure on limited finances. Without such promotion Universal Design Education will have a danger of being marginalised. Promotion is done in the following three ways at the National Institute of Design:

Recognition through awards
Apart from encouraging students to participate in competitions in the field of Universal Design, the institute also channels external private funds, fellowships etc towards universal design.

Mass Communication
Projects in the field of Universal Design are published widely through local media –
newspapers, magazines and television.

Intellectual Activity:
Seminars and workshops are organised from time to time to keep the focus of faculty and students on Universal Design. Such an activity also helps bring external experts in this area close to the institute and interact with the faculty and students.

Creation of Positive Climate

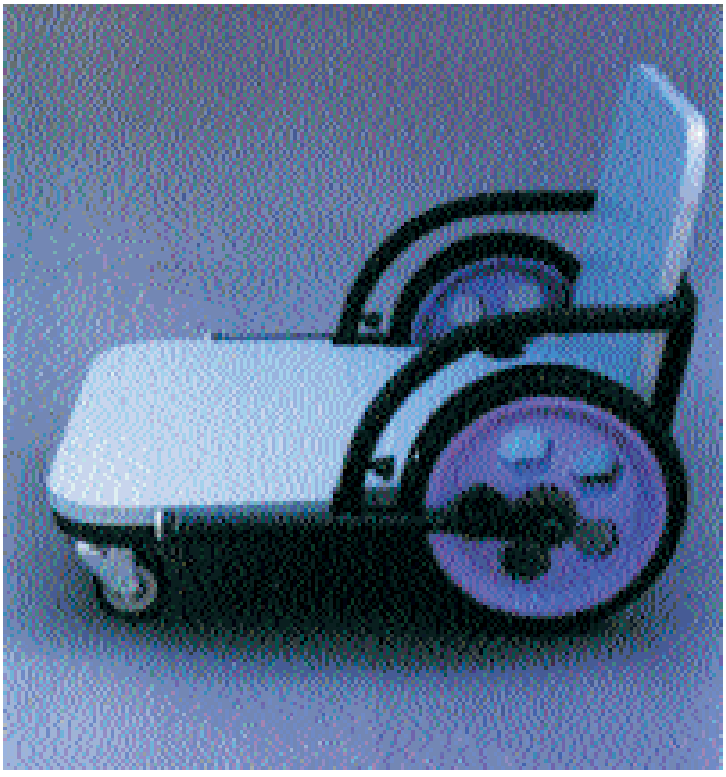
It is necessary to establish, on campus, a positive climate in which Universal Design Education will grow. One of the instruments of establishing such a conducive climate is the physical environment. The institutional campus itself is made barrier free and efforts are constantly made to improve the access further. Old structures are modified to become barrier free and Universal Design is carefully considered while planning new structures. The other important instrument is the appointment of staff/faculty with special needs and admission of students with special needs. Disability should not be an impediment to the opportunity to learn or to work. It may mean special effort and establishment of special machines and special facilities but that is worthwhile. In developing countries, this expense can be met through approaching industrial houses and international organisations for sponsorship of equipment and facilities. The co-habitation and co-education of able and disabled students together is an important step in removing the mental barriers.

Content of Courses

Cultural contexts

Universal Design is the need of the present times, but this should not be confused with Design in one cultural, economic and physical context being suitable in any other and different context: It certainly will not be suitable because the contexts are crucial determinants of the design solution and its relevance. This is a basic principle to observe while working out contents for Universal Design and special needs courses. One major

example is the design of wheelchairs, which brings access to the lower limb disabled, sick or the elderly. However, wheelchairs are of no use in countries like India where the major population is rural and performs all household work at ground level. Besides, in all the rural areas there is severe lack of outdoor paved surfaces on paths and roads. Even the ground inside the house is mostly unpaved and indoor spaces are too small to allow easy manoeuvring of the wheelchair. A team of design students from NID and Queens University (Canada) worked on this problem and designed a Ground Level Assistive Device for India (GADI) which is a suitable Indian design alternative for a wheelchair. The design also takes into account the local materials, village skills and low expenses. This product is presently being manufactured by the local "Blind People's Association" and is found to be extremely useful in the wake of the Earthquake disaster which struck Gujarat in January 2001. The "GADI" can be used for a variety of needs by others including as play material for children. It could be used by anybody in any situation which requires a slight elevation from the ground.



Ground level Assistive Device for India (GADI) – An international collaborative student project.

The Importance of Challenge

Young people thrive on challenges. Designing an assistive device for persons with disabilities is a laudable intention and good social act but not a challenge to design. In a market either with non-existent or with prohibitively expensive ugly devices for the disabled, even a mediocre design can win laurels. If the young students were to take to Universal Design, there should be challenges. A good solution for a disabled person is a good solution for everybody. Designers should see to it. If the lift switch is located so that it can be reached by a wheelchair user, an abled person can also reach it. The car Ford Focus takes care of elderly and thus takes care of the young too. The challenge therefore is to design devices or communication that are creative solutions relevant to both abled and the disabled; rich in aesthetic value and highly competitive in a commercial market when placed next to other products. All other aspects being equal, universality is our added value and the edge over other designs.

Approaches to Universal Design

Universal Design as addressing diversity rather than patronage

People with special needs should be recognised as special people: Speciality is diversity and is not to be treated as something that is missing. This requires an attitudinal correction. Or else there is danger that any difference or diversity could be labelled as less-ability. History tells us the glaring example of how Jews were considered inferior to others. In countries like India girls are still considered inferior to boys. These discriminations will perpetuate unchecked unless the sane world resists them now. A democratic way is to look at a difference only as a diversity without making any comparative judgement. Diversity is a value in itself. It enables diverse abilities to co-exist without prejudice and delivers help to whoever need it without patronising but as a sense of duty by other responsible social beings.

Attitudinal Changes Required

The core of Universal Design attitude is the acceptance of the fact that every human being is less able in one way or another (a matter of degree) and at one time or another (a matter of time). Even young, healthy people can grow old or become pregnant and can thus experience lessened abilities. Alternatively situations and environments can also cause

limitations on a healthy, young person's abilities. Noisy environments can impair hearing and dim lighting can limit vision.

The research project for the elderly at the Royal College of Art, London, is very appropriately " named Designing for our future selves" to highlight this aspect. At NID a Post diploma programme was announced in 1998 as "Design for the less abled" to include all kinds of limitations. The attitudinal shift that needs to be inculcated in the young learner is that Universal Design is not designing for "them" out there. It is designing for "ourselves'" in a comprehensive way, to include all people possible, for all times possible. In a somewhat exaggerated way it is "Design for all and for all times".

Traditional value base

Developing societies are often also less literate societies. Education for these societies should be viewed broadly and not confined narrowly only to literacy. Confining to literacy would mean excluding the majority population from our concern.

Fortunately, many developing countries are tradition bound. These traditions often have admirable social and familial norms, which are essential to promoting positive attitudes towards people with special needs. The important aspect to note is that these traditional norms are so deeply rooted that they are still holding in this new millennium in spite of modernisation and technological progress. In Indian society, for example, respect to elders is important. The elderly are consulted when important decisions are made, and are given prominent place in religious rituals and social events. Compassion towards the poor is promoted through Hindu religious concepts such as "Daridra Narayana" – which means God lives in the poor (so you must serve them) and "Atithi Devo Bhavah", which means the guest is like a divine opportunity (so you must feed him).

While many religions portray God as omnipotent having a physically perfect form, some of the gods in India's Hindu religion are less perfect, and therefore more like humans. Hindu religion has "Bala Krishna" – God as child, with all childish vulnerabilities and "vamana" – God as dwarf. Some of the traditional games in India are also worth mentioning here. These games indirectly develop the child's compassion towards the disabled and the less able. Such games are the "Blind fold game" and the one legged game. These games will have the

same effect as the simulation exercise used in Universal Design Education: without actually naming them so.

In traditional societies, which are most prevalent in the developing world, traditional social and family structures are dominant even now. Decisions about young people's education are made by the parents or other elders in the family. In the past in the joint family, any person in the family with special needs is automatically cared for by others. He or she is accepted and facilitated as normally as a child is accepted and facilitated in a home. People With Disabilities are treated not with pity or a patronising attitude but with an attitude which recognises the individual's special needs. They are given work appropriate to their special abilities. Inculcation of such a value base is necessary in the school/college education where Universal Design Education is being given.

Conclusion

While the scale and magnitude of the demographic situation of the people with lesser abilities (the disabled elderly and the weak) is amazingly vast in India and other developing countries, there are traditions in these countries which have inherent Universal Design principles. Under the constant pressure of modern living; new technologies and increasing urbanisation, many of these traditions are now threatened with extinction. The present need is to prevent such extinction and redefine these traditions to address the contemporary contexts.

Man always looks at new developments and new technology with curious suspicion. This suspicion is more prevalent in the poor and the disadvantaged. There is no denying the fact that the fruits of most new developments and technology reach first the people who are already in the front and this obviously increases the gap between the developed and the developing, and between the abled and the disabled. Realising this fact and applying new technology such as information technology for Universal Design is essential in developing countries. Let it be emphasised that the new technology is new opportunity and hope for better as well. One would see such applications all over India.

People are also thinking minds. More people also mean more mind power. As there is increasing number of problems, the number of solutions is also increasing. In India, a number of

innovative technical and design solutions relevant to the people's needs here have originated from the people themselves. These solutions also take into account appropriate materials and appropriate production methods. Furthermore there are therapists, nurses and social workers full of knowledge and wisdom who act as a springboard for innovative design solutions.

In view of the above factors, the essential considerations for developing Universal Design courses in developing countries, ought to be as below:

a) Upholding and re-articulating the traditional principles of Universal Design to meet the changing needs of the society. This provides a value base and an attitude essential for Universal Design Learning.

b) Surveying and documenting the various design solutions created and successfully applied by different people at different locations in the country. The authors of such solutions may not be trained designers and solutions may need design support in refining and developing. But such solutions rooted well in the problem contexts are excellent educational and inspirational tools.

c) Design is not an isolated activity but a team effort. A continuous dialogue and collaboration with people in the field is crucial in developing course content as well as in sustainable monitoring and course correction as we go along.

d) Design teachers must actively pursue the application of new materials and new technologies in creating new universal design solutions. This could be done as a classroom project or a commissioned professional project. One such classroom project is "Mandala", carried out by the design students at the NID. The project is to find means of reintegrating senior citizens into the community. The solution is usable by anybody. It uses the advanced technology of Apple computers. Another project presently in the planning stage by the author is the use of the modern material Titanium for Universal Design solution.

The future holds the prospect of Universal Design Education at many design schools in India because there is an increasing demand from the people. The National Institute of Design will soon be starting a regular Post-graduate and other advanced

level programmes in the area of Design for special needs, and Universal Design will be part of these programmes. In future the Institute plans to establish a centre for special needs with Universal Design at its core. This centre will not only support education at the institute but also Universal design activity in the country by developing Universal Design standards, codes for barrier-free environment; research through fellowships, reference materials; policy guide lines for government etc. Such a centre will not only be a resource for other design institutions in the developing world but also be a model to be adopted.

The key challenge faced by the world today is globalisation. Technological changes have revolutionised communications and brought people face to face. But people are diverse since their places, climate, and cultures, religious beliefs and roots are different. In my personal opinion and perhaps an exaggerated simplification, disability is only a difference from ability. At least it needs to be seen that way. Our tolerance to difference of any kind – be it another religion, another skin colour, another country or another need – will be the most important step towards world peace and harmony.

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3.3 Universal Design: Tertiary Education and Promotion in Asia

Prof. James D. Harrison and Kenneth Parker, Singapore University

1. Tertiary Universal Design Education in Singapore

Introduction

There exists some published work on the education of Universal Design, Accessibility and Mobility topics and it is not the intention to examine these topics. But, in order to effect change – to promote the development of a truly non-handicapping built environment for the widest spectrum of users, there is a pressing need to heighten awareness.

Raised awareness can lead to a greater involvement with issues, and from this follow solutions and improvements. Without the awareness (or low threshold of awareness) of a problem – there is little impetus to tackle the problem. For example – if there are perceived to be very few wheelchair users then there is a lower priority given to them in providing an environment for them; in effect there is a «chicken and egg» situation – perceived few users so little need to provide for them/little provision for users and hence little use!

«The mind is its own place, and in itself
Can make a heav'n of hell, a hell of heav'n
What matter where, if I be still the same,»
John Milton, Paradise Lost

So the challenge is to examine how awareness can be raised, attitudes changed, and the whole educational machine kick-started to involve students, educators and those in a position to modify the built environment in a real, social and human topic area.

«The American Institute of Architects has had as its mission statement «the increase of public awareness to good design». (Pressman, 1997)

But awareness should catalyse empathy, not sympathy, and lead to a condition of active advocacy – a process of change for the better.

Some numerical examples illustrate that the minorities of persons with a disability, although small in percentage terms, are significant in number:

- By 2030, one in every four Singaporeans will be aged 60 and above. Projections by the United Nations see the number of people 60 years and older increasing from the present 550 million to 1.2 billion in 2025 (The Straits Times, 1998).
- In Western Australia in 1993 a report (Alessandri, Leonard & Bower, 1996) grouped disability into five main categories: physical (69%), sensory (18%), psychiatric (8%), intellectual (3%), acquired brain injury and stroke (2%). The report finds that 305,000 Western Australians have a disability (18% of the population), within 25 years the number with disabilities is set to almost double to more than half a million. Almost 3 in 4 people with disabilities live in metropolitan areas and the most common types of disabilities are physical (about 13% of the Western Australian population).

Minority users of the built environment can be categorised as:

– Persons with physical disabilities
– Persons with sensory disabilities
– Persons with cognitive disabilities
– Persons with multiple disabilities
– Elderly citizens

The Imperative for Accessible Design

A building incorporates many aspects of functional requirements, which are given different priorities according to the building's use and other factors, often rather arbitrarily arrived at by designer or client during briefing (the specifying of a building or project). At the most basic level, all buildings (and the built environment generally) have to conform to certain minimum standards of safety, structural soundness, energy consumption, health and hygiene aspects and similar functions. In recent years, developing standards worldwide have begun to require that buildings used by the public should also be accessible for a

wider range of users than simply the «normal» fit young adult, and allow for safe and convenient use by a wider range of people, including those who have disabilities (permanently or temporarily), are elderly or are encumbered by pushchairs (baby buggies/strollers), wheeled luggage and so on. In many countries this is reinforced by legal requirements such as codes or building byelaws or, more generally, by anti-discrimination acts.

In the book chapter «Rethinking the Border in Design» by John Seely Brown and David Duguid the following is stated:

> *«Part of what makes a building «well designed» is the way its designers marshal center-periphery relations. A building stands distinct from, yet related to, its environment.» (Yelavich, 1993)*

Architecture has been ascribed three characteristics, the last of which distinguishes it from mere building: «Commodity, Firmness and Delight». The functional requirements, structural stability and so on are taken care of in the first two, but it is the third – the introduction of a more intangible aspect of aesthetics which many see as the vital part of creating architecture, rather than making a building. The three should not be mutually exclusive, but it is the subjective which provides the more heroic, creative and artistic aspects and which often distinguishes the great architects from the hacks. Sadly, this belief often leads to less able designers hiding behind visual devices to cover up mediocre design.

In the education of the architect, current thinking is to attempt the difficult task of integrating the technical (including functional planning) with aesthetic decision-making. Of the two aspects, it is the aesthetic that is the more exciting and (apparently) creative, and students are encouraged to experiment with visual qualities (in design schemes on paper or the computer screen, rather than real buildings) as these generate enthusiasm and imagination. The more quantitative side of practicality remains the dowdy poor relation, often considered only as an afterthought, or included unwillingly to satisfy tutors' requirements.

The topic of Accessibility usually falls within the category of the technical and quantitative. As a design generator it is not attractive and can rarely be particularly glamorous. Although most people want to live a long life, they have no desire to get old, with the consequent deterioration that it entails, or to

become infirm or disabled, even from a glamorous skiing accident. For the young university student this is especially true, as his peers will invariably be young and fit, but it also holds for most of us. How then can the teaching of accessibility, as a vital fundamental principle for design, be inculcated at the right point in education – just when ambition, excitement and creativity are at their peak in the young mind, and ageing and infirmity are distant specks on the horizon of life?

Architectural Education

Project-based Learning

The process by which architects learn to design buildings tends to be an elusive one, even if the goals are reasonably well defined. For the most part these use methods that are primarily heuristic and personally explored. Most learning, apart from lecture courses on the more technical or theoretical subjects (construction, structures, history of architecture etc.), uses the method of project work, wherein students are set design problems, of differing degrees of complexity or with special sets of objectives. In the development of a design scheme, to be presented as drawings, models (or, more often today, as computer-generated graphics), the student will be expected to undertake various exploratory work as he/she sees fit, to find exemplars, analyse site and functional requirements, make calculations of critical technical parts (beam sizes, use of energy related to heat loss/gain of the building envelope), and so on. In planning, recognition of function and user needs will be developed into a planning strategy, with circulation, relationships of rooms and activities, layout on site and many other aspects, relative to the given constraints of the project. In most Schools of Architecture, accessibility issues tend to be learned by default, if at all, and present just one of the functional aspects, along with fire safety and escape, services routes etc., and it may seem a minor diversion compared to some of the other, more pressing parameters – unless one is a disabled person, of course!

Lecture Course Content

As well as learning through design projects, taught subjects account for a proportion of the teaching time. Topics of accessibility may find their way into lectures in various ways: by the discussion of buildings codes, for instance, or an appreciation of the optimum types of materials to be used for non-slip floo-

ring surfaces, or the specification of appropriate components for sanitary accommodation, handrails and many other details which go to helping a person use a building more conveniently or safely. Building services courses should include information on the need and scope for making a building accessible and usable, for example through the specification of lifts, the requirements for accessible sanitary accommodation, control and alarm systems for use in elderly people's habitats. Generally the inclusion of such items in the curriculum is very much a matter of how informed and concerned the teaching staff are about matters of accessibility, and may be minimal or even entirely lacking.

Levels of Approach

In most Schools of Architecture, access issues can be introduced and followed up at the following levels:

- Undergraduate
- Postgraduate (taught course)
- Postgraduate (degree by research)
- In-practice Continuing Professional Development (CPD)

Learning is a cumulative process, in general, and emphasis will depend on the kind or previous exposure that the learners have already experienced. In many cases, the teacher may be starting from scratch, at any of these levels. Experience suggests that any approaches to the teaching of access issues, whether they are spread over 6 days, or 6 months, should have the following common sequence:

1. Benchmarking the individual's current knowledge base and previous experience, preconceptions and reasons for wishing to study this topic;
2. Raising accessibility/design awareness, through:
   - examples, visits
   - meetings and contact with users, etc.
   - simulation exercises
3. Pragmatic analysis/application of Codes and functional requirements;
4. Holistic practical application of principles, from strategic down to detail level – designs, appraisals/surveys, peer education;
5. Summation, feedback, debriefing, group appraisal of product. Review of changes in knowledge and attitude since the first «benchmarking» exercise.

Awareness and Knowledge

Much of the inertia in introducing accessibility into teaching curricula in Schools of Architecture and related courses in planning, interior design and design-centred engineering is through a lack of teachers who are aware and knowledgeable about the topic. This presents a very significant constraint to creating an accessible world (Harrison and Parker, 1997). Feelings of embarrassment, uncertainty about political correctness and lack of real knowledge combine to deter many from addressing the issue in their teaching.

> *«We are our experience which consists of reflecting the world in the magic mirror of awareness. Anything else that we might regard as constituting «us» is unconscious and so has only indirect reality for us.» (Nunn, 1996)*

A lack of awareness of the need for, and realisation of, accessibility will be as equally prevalent amongst teachers as in students, and this is a problem that should be addressed as a matter of urgency. In fact, it may be the teachers who are less able to make the shift in mindset than the students. Often the first reaction to being confronted with the question of access is to think of ramps as the first answer, rather than the «level-thinking» approach, which reconsiders the fundamental organisation of floor levels and vertical circulation from the outset. From experience, a reasonable proportion of young minds in Schools of Architecture are willing to address social issues and matters of concern in design; it is more that they may be misled by tutors into being made to feel that these are either irrelevant or too complex to handle. When given choices to decide their own thesis topics, or to select from a given number of hypothetical design solutions, there does not appear to be any discernible reluctance on the part of students to select those that have social issues as part of their content.

There may, however, be strong attitudinal barriers put up by the teaching side; accessibility (along with other practical problems) is seen to stifle creativity – or at least the production of exciting-looking project work, which can easily be identified as «creative». Other objections given may range from a belief that access issues are either too specialised for undergraduates to confront, or are too trivial (and this attitude persists in architectural practice, too, where architects consign these areas to detail design by draughtsmen who are familiar with the requisite Codes and building regulations).

In reality there is no lack of information on designing for persons with disabilities, but these, along with codes on accessibility, tend to look very complicated to the newcomer, or fail to convey the real reasons why such modified design thinking is necessary.

Demystifying Accessibility

Any attempt at introducing accessibility as a universal principle in the teaching of architecture must tread the fine line between being identifiable as appropriate and applicable, related to students' experience and sensibilities, and avoiding becoming seen as «do-gooding», in a patronising way. This last attitude will perpetuate the problem of consigning designing for persons with disabilities to the limits of «special needs» – with separate routes, facilities and entrances, rather than being inclusive and relevant for all users in the same place.

It may also be difficult to find appropriate and simple examples of good design of accessibility in action; in itself, the best accessible design is indistinguishable from everyday good design. Only a trained eye, or a person who has experienced the barrier-strewn world at first-hand elsewhere, will appreciate the integration of level floors, convenient handrails and all the commonplace things that go to make up the building that accords to universal design.

Methodology of Learning

Basic Design Courses

Students of architecture generally start out their architectural education with open minds. Basic design courses provide exhilarating projects through which the student learns to weigh the design parameters, as well as find ways and new confidence to explore creative ideas and apply imagination. Training in observation, recording and analysing, and communicating intentions should be an intrinsic part of the first year studies. Identifying human needs, and providing for these by planning, design of three-dimensional spaces and utility objects forms a part of this, along with the why and how of making a building in all its aspects. (Harrison, 1996)

> *«Skills training begins with an explanation of the skills to be learned. Since this is the first in a series of skills training sessions, the information is intended to establish a positive orientation to skills training and to the potential for behavioral change.» (Beddel & Lennox, 1997)*

Anthropometrics and Ergonomics for First Year Students

One commonly taught project in almost any first semester will cover aspects of anthropometry and simple ergonomics – the dimensional aspects of the human body and applications of this to functional design of everyday objects and places. Traditionally, however, the exemplars for the human physical dimensions have been taken from sources that have been concerned with medians and the «average» man and woman. It has even been found that data being used in one School of Architecture in a developing country was based on American army personnel – who would have been selected as conforming to certain height and weight constraints. Current enlightened thinking appreciates the fact that there is no such thing as an «average user» and that designers should consider those who have limited physical mobility and manipulation, as these are the most vulnerable and thus the most deserving of considerate design. A tall man may be able to reach down, but a short person, such as a child, will have to bring a stool to stand on in order to reach a tall switch, for instance.

Anthropometric dummies can be constructed to aid the appreciation of a diverse range of user abilities.

This first introduction to the relationship between the physical world and human needs is a vital part of the formative process of the designer, but very few Schools of Architecture have this approach in place. The ideal course would cover mean and median sizes of the human body, and also incorporate such circumstances as the limited reach, manoeuvrability and eye-

height of a person sitting in a wheelchair, or an appreciation of how a person would use a staircase if they had a paralysed leg. Following the analytical part of the projects, a related design exercise would be set; both to consolidate the knowledge acquired and apply this in a practical way.

To make this academic exercise all the more significant, situations where students are designing for real clients would be ideal. Few Schools of Architecture have faculty members with physical disabilities, so user-groups, from disabled peoples' associations or senior citizens groups, could be brought in to help to devise design projects, meet students and pass on their experiences, including what they find good and bad in the built environment, and act as critics for reviews of project work.

Empathy and Simulation Exercises

> *«Certainly, the ability to enter the private world of another person in a nonjudgmental way is essential to our use of the concept of empathy.» (Beddel & Lennox, c1997)*

a. Introduction

In order to bring students to an understanding and appreciation of the range of obstacles faced by people with disabilities they need to see, at first hand, what constitutes a barrier or a difficulty. Whilst passive observation of a user, either in real life or through a video film, is a telling way, a far more memorable method is to require the participant to try using a wheelchair, or to be temporarily disabled in some way, and then to have to cope with a familiar world in a new way.

Opinions vary about the efficacy of simulation exercises, in which participants are «disabled» in various ways, and have to use assistive devices in order to move around. (Further information on this topic has been published (Harrison and Parker, 1997b)). In order that they do not underrate the limitations that a person with a disability has to bear, it is really necessary for the exercise to be sustained over a reasonably long period, and the subject(s) to be honour-bound not to cheat. Obviously it is impossible to really feel the whole range of frustrations and handicaps that a wheelchair user, for instance, has to face in a typical journey to work, or trying to use public transport. But it is generally a memorable experience and, provided that the subjects are properly briefed and the exercise properly conducted, is likely to have more of a beneficial effect than cause real misunderstanding.

A Simulation Exercise, experiencing the barriers presented by the built environment to persons with physical and sensory disability.

b. Briefing

It should be said that the correct briefing and conduct of the exercise is most important; it may trivialise the exercise to allow students simply to «play» with wheelchairs or walking frames for only a short period. Initially, embarrassment may manifest itself in horsing around, but after a time the gravity of the problems should begin to be felt. The opening part of a well-conducted exercise should follow a well-defined route, which provides both sufficient barriers and also purpose-designed amenities to demonstrate how easy it is for a designer unwittingly to cause a barrier to, say, a wheelchair user, and also how simple matters such as a wide and easily-opened door can make life a lot easier.

c. Inter-disciplinary Personnel

Personnel for the conduct of the exercise should include an experienced Occupational Therapist, who will explain the nature of some of the more commonly-experienced disabilities, as well as how to use the assistive devices provided, to strap up legs, demonstrate how a wheelchair should be handled and adjust crutches. They should accompany the groups around the first stage, until each individual is familiar with their allotted «disability». Safety is an important consideration and, in order not to cause actual physical danger to the students, the briefing should apprise them of possible hazards. The Occupational Therapist should also attend the debriefing session, which should be held at the end of the exercise. For discussion at this

session, students should be required to log all the difficulties and feelings that they had during the exercise, and to then compare their experiences.

Occupational Therapists are excellent at describing different abilities and instructing on the correct use of assistive devices.

The participation of an experienced designer or disabled user will also be useful, to explain everyday situations and how they can be overcome, and to accompany the group at the start. Ideally the given exercise route should not present too many insurmountable barriers, but also demonstrate the importance of ramp slope, door openings, floor finishes and many other design considerations. One useful experience is for the trainees to see how a person needs grab rails and space in the right places, in order to transfer from wheelchair to toilet and back again. To the majority of architects and architectural students this comes as a complete revelation.

d. Logistics

In theory the simulation exercise is a very good thing, but logistically it may have drawbacks. The class size in a School of Architecture could have around 100 students, so would need to be broken down into smaller groups, with the exercises phased over the academic year. Hire or loan of the right amount of suitable equipment might be difficult or expensive, too, and the pressure on time will be a problem for both trainers and students. For smaller elective groups, of students from higher years, more sustained exercises would be possible and associated projects could be tailored to their stage of academic development.

More limited objective exercises could be devised, with equal success, in which groups of students concentrate on one aspect of accessibility (such as staircases for ambulant disabled and elderly people, or a swing door). By selecting a suitable example, testing it themselves under simulation conditions, observing how real-life users cope with it (and possibly interviewing these subjects and/or making a video of the item in use), as well as measuring and analysing its success or weaknesses, students could collectively cover a whole range of design aspects as a design guide for their use – possibly to be published on the World Wide Web or the educational establishment's Intranet.

e. Debriefing

The experiences of the participants should be discussed in a group, led by an experienced facilitator. Recording, on a flip-chart or overhead projector transparency, is useful to emphasise the value of each individual's response, and also to help share collective experiences.

From the individual's point of view, reference to his/her original «Benchmarking» statement will prove invaluable, to show how much attitude, awareness and (recent) experience has been affected by this exposure. Individual participants should be encouraged to write up their findings, perhaps in the form of a logbook, and continue to keep this updated with experiences and new information during the course of the academic session.

The debriefing is an essential component of Simulation Exercises and Access Audits.

Associated Design Exercises

In conjunction with the simulation exercise, simple planning exercises can be devised, in which full-size mock-ups of spaces can be created and tested by their designers, using the range of assistive devices. Generally such exercises will be limited to fairly simple situations; as staircases and ramps, for instance, would be difficult to construct without more sophisticated test rigs. The use of masking tape on a conveniently tiled floor (each tile being 300 mm square) has proven useful at the Asian Training Centre on Ageing, School of Nursing, University of Chiang Mai (ATCOA) training sessions on designing for the elderly and disabled. Here, different types of toilet and bathroom configurations are explored by groups of up to 5 people, and drawn up after conclusion.

Another possibility would be to arrange for a small group of students to design a space for a particular individual – a wheel-chair user, perhaps, and to work with that person to propose adaptations of his/her working space, kitchen or other functional area. Unfortunately, willing real-life subjects are all too rare, but in an enlightened institution they might be employed as part time studio demonstrators or the equivalent.

A washroom 'mock up', using sticky tape for walls and a chair as the water closet, being tested for use-ability.

Access Surveys

Access surveys provide a useful way to identify the range of barriers that many buildings and the built environment (which includes streets and transportation facilities) present. They can focus one's appreciation of the accessible qualities of an environment, and will help to attune students' minds to identifying handicapping or potentially hazardous conditions in many aspects of the built environment. Standard survey forms (or «audit» as it is sometimes referred to) may be used but, as a learning exercise, it can be advantageous for students to design their own survey forms in the first instance. They would then try them out in a limited exercise, as a learning exercise, before amending them and comparing these to existing forms. These might differentiate between interiors of buildings and outdoor spaces or streetscapes, according to the context. Surveys should have a positive outcome, possibly in the form of a set of proposals for upgrading, or an information sheet to help a disabled person choose which buildings to visit. Without a useful end product, the impression that the participant takes away is primarily a negative one, and may confirm misconceived ideas that access issues are always non-creative.

Design Projects & Design Theses

Critical Analysis

One of the problems associated with the teaching of accessible design is that there is a continuing dearth of good examples to demonstrate that it can create and not hinder elegant design. When students experience their everyday habitats from a wheelchair, or grope their way round in a blindfold they might conclude that everything about accessibility is negative. Whilst it is easy to be critical, this should be undertaken in the spirit of analysis, followed by synthesis and proposals for improvement. Any critical study of a building or place should conclude that, whilst the (unintentionally-placed) barriers that we find in our built environment are random and individual (since they are not actually intended to be barriers, but are so by default), the well-designed and accessible environment can be perceived as a holistic system. In this light, design intentions are more than the piecemeal removal from a design already in process; they are a fundamental part of a whole system of design – and one that is delightfully simple, once grasped.

So that young designers do not see designing for accessibility always as a negative and constraining factor, design projects

should test the designers' ingenuity, whilst throwing the responsibility of creating user-friendly architecture onto them. From experience, the majority of students will rise to this challenge, even if it is out of sympathy rather than empathy – the latter being the ideal motivational source.

Design Project Work

In a School of Architecture, design project work, although rarely built, is a serious task. Responsibility for many aspects of the complete building, from constructional system, through environmental control and human comfort strategies, to specification of materials, components, or fixtures and fittings, may all be required to be covered (in principle if not in detail) in the more advanced project work. Depending on the level of development of the students, such applications will become increasingly sophisticated as they progress, and the parameters will increase with the scale and complexity of the project vehicle.

In work in the lower and intermediate years, it would be reasonable to expect that some demonstration of planning for elderly people or people with disabilities would be evident in project work. In order to emphasise certain points on accessibility, a tutor might set a project which had a «special needs» requirement, such as a housing project for elderly people, through which the students might experience applying the principles of design for safety and independent personal mobility as basic criteria in their design solutions. Where codes on accessibility are already in force, students would normally be required to satisfy these, as a bare minimum, in any project that is designed for public use.

Elective Work

Much of what has been discussed previously would be equally applicable for postgraduate or more experienced design students, either if they had not experienced this teaching at a lower level, or if they wished to continue studies in this field, (for instance, if their dissertation proposal covered some aspect of accessibility or sensory limitation.)

Electives can allow many activities to take place, provided that they relate in some way to the betterment of design or its cultural or technical bases. From experience gained in running electives with Masters students of Architecture (with recent professional practice experience), there is reason to be optimistic for the longer-term future of accessible buildings. In a semester of 13 teaching weeks, groups of between 8 and 16

students, who had chosen this elective over other different topics, came to the subject with little or no previous exposure to it, but rapidly developed experience and confidence to trust their own judgment and to collect their findings in a form which could be passed on to others.

A 'typical' elective programme structure (by week):

1. Introduction and discussion. The nature of barriers and disability. Definitions and attitudes.
2. The concept of Non-handicapping Environments, Universal and Inclusive Design. Video presentations and discussion.
3. Simulation exercise. Feedback on experiences.
4. Discussion. Special needs. Physical, sensory and intellectual disability. Potential architectural solutions.
5. Design for visual impairment.
6. Design for hearing impairment.
7. The wheelchair and ambulant disabled – ergonomics, ramps, etc.
8. Mobility and safety in the built environment. Hazards and the need for codes and legislation.
9. Access audits for buildings, streets and transportation systems.
10. Aesthetic aspects, advocacy methodologies.
11. Products and solutions, high and low technology answers for specific spaces and activities.
12. Lifetime homes, adaptable housing, design for "our future selves".
13. Future developments, codes and legislation. Awareness into action.

But, it should be noted that the above can be delivered in a different order and can be adapted to capitalise on any 'live' projects that may arise. Coursework and project work can also cover specific areas and, where possible, guided peer learning is a preferable modus operandi. It is also beneficial to visit various disability groups to show that these topic areas are related to the quality of life of people.

In the first year of running the Masters Elective course, the group underwent a simulation exercise, meeting with disability groups, social workers and occupational therapists. As part of the submission requirement, the group were asked to select a topic and medium to demonstrate what they had learned during the elective. From the contacts made, they chose to make a video which primarily tracked and recorded some aspects of the

daily life of a willing subject, who is a paraplegic. They simply filmed some of the more difficult situations that he faced, and compared it to an able-bodied person in the same situations. This was backed up by interviews with occupational therapists, and footage of discussions amongst themselves. The intention was that this would form the starting point for the elective group in the following year – which has proved a useful gambit in subsequent years.

Measurement and assessment are key components of an Access Audit.

In following years the groups produced analytical appraisals based on building surveys, of transport interchanges, and of environments as used by people with sight and hearing problems. In each case this was their own chosen topic, and has formed a resource for other students (as well as being shown in overseas contexts, to encourage other teachers to set up similar courses). In the academic year 1997/98, elective students produced a useful wayfinding map, for use by people with disabilities, of Orchard Road in Singapore, the main shopping and hotel area; this complemented a brochure listing accessible buildings which is produced by the Handicaps Welfare Association and the Tourist Promotion Board in Singapore, which is updated every few years. By carrying out this work in conjunction with the major disability group in the country, the students have a positive goal, which raises the profile of access as a valid topic, in education as in other aspects of life.

Dissertation Topics: Individual Study of Accessibility Topics

Each year a number of final year students choose a topic related to some aspect of disability, design for ageing or more specialised areas related to special needs provision for their elective. Sometimes this is a primer for the subsequent design thesis work, but not necessarily. At the National University of Singapore, students are able to choose the stream in which their topic most naturally rests; amongst these, the most obvious ones are building studies, environmental studies or urban studies. Supervisors for these topics would not necessarily be architects, but could be building services engineers, or from other specialised fields.

Research and Postgraduate Work

As with dissertation topics, areas for higher degrees by research may benefit from mutual relationships between supervisor and research student. This is already true in the sciences and engineering, but appears to have been slower to catch on in Schools of Architecture. The setting up of a dedicated research centre, or unit within a more generalised one, would be an ideal way to encourage more researchers and generate greater interaction between allied disciplines.

Reciprocal Teaching

Cross-discipline teaching, and joint project work should be encouraged; for example an “Introduction to Universal Design” class can be conducted with students studying Industrial Design.

The success of teaching accessibility in Schools of Architecture depends to quite an extent on the contribution of people from outside, who have experience and expertise – including disabled people who have first-hand knowledge of using accessibility aids and the built environment with all its faults. Specialists in the field of Occupational Health and Rehabilitation can prove useful contributors, although many professional designers have scant idea what they do, or how their expertise might help in the design of a building to be user-friendly. Similarly, many medical and health professionals are unaware of the potential contribution that the architectural profession could bring to rehabilitation and adaptation of homes for disabled people and many similar situations.

Occupational Therapists can make a useful contribution to the running of simulation exercises and, just as they can help architectural students, so can design teachers reciprocate by assisting in the teaching of simple aspects of building adaptation, reading and preparing sketch proposals for home adaptations and so on. At the National University of Singapore, a member of the Architecture staff regularly runs a short workshop with student Occupational Therapists from the School of Health Sciences at a local Polytechnic, to demonstrate aspects of drawing; in return their tutor comes into the School of Architecture to help conduct simulation exercises. As well as the synergy of sharing skills, it also means that students learn some awareness of parallel professional skills, which may be useful in the future.

Teaching the Teachers

Many teachers of architecture continue to equate designing accessible environments with liberally dispersing long ramps floor to floor and large blue wheelchair/handicapped users signs. Or their limited knowledge of building codes may feel that disabled users will be adequately served, just as long as the rules are satisfied to the letter. As a result, they may discourage their students from attempting to explore more logical and workable solutions in design project work. Alternatively, they may feel that engineering solutions, with a plethora of specially designed lifts and hoists, automatically opening doors and other expensive features should create an accessible building. In this, there is surely a need to acquaint all studio teaching staff and specialist lecturers with the principles, value and relative simplicity of designing for universal accessibility; such a possibility is so obvious, and yet there have been few, if any initiatives specifically for this amongst Schools of Architecture. And even if there were, they would probably only attract those who were already reasonably knowledgeable and committed.

2. Advocacy and Promotion of Universal Design in Asia

Continuing Professional Development: Short Courses

Schools of Architecture which have the expertise, and can call on the services of outside specialists, have a duty to extend their knowledge to today's practitioners in as many ways as possible. One of the most significant of these is in the form of a taught workshop course, which is aimed specifically at the design professions – architects, engineers, planners, and anyone involved in the commissioning or running of buildings. Depending on the participants' specialisms and backgrounds, courses could follow many of the aspects discussed previously.

Whereas full-time students have broadly similar background knowledge bases, maturity and experience of learning, professionals who partake in in-career upgrading (or who are coerced to attend courses to maintain their professional recognitions) are more diverse in their educational needs and wants. For this reason, a more participative learning style is recommended. For example, the participants can be requested to develop their own access audit checklist and will, later, be more appreciative of a 'real' checklist when this is provided.

In Chiang Mai in Northern Thailand the Asian Training Centre on Ageing (ATCOA) runs an annual course on designing for elderly and disabled people, aimed at professionals and caregivers from mixed disciplines, which some architectural teachers have attended. To date, there have been few other educational initiatives in Southeast Asia.

This is clearly an area in which there is a need for the development of courses and teaching materials that are attractive and usable in different places.

> *«Understanding others involves more than intuition or «gut» feelings. Such an unstructured and subjective approach to understanding others is not sufficiently rigorous or reliable to be useful.» (Beddel & Lennox, 1997)*

Lectures and discussions have their limitations and simulation exercises have a role to play in changing, and adding to, people's experience and heightening empathy and involvement. Meeting the end users with disabilities and seeing the «human

face» and real need for non-handicapping built environments is genuine and, to some, quite emotional.

However, not everyone agrees that simulation exercises are the answer:

> *«These are degrading no amount of explanation can be used to show how this exercise devalues people with disabilities. (If I copied my father's walk to find out what it was like, I would be modelling his position rather than recognising his attributes and strengths as a human).» (Felix, 1998)*

This is not easy to answer, but the above refers to the European experience and not to simulation exercises in Asia. Obviously, there are cultural and behavioural differences («horses for courses») and the disability movements are well developed and empowered in the West (with legislative acts – for example, the Americans with Disabilities Act (ADA) and various anti-discrimination laws and codes). When run properly, simulation experiences are very powerful tools (and, incidentally, they are a tool currently used in U.K. hospitals when training nurses and Occupational Therapists). Examples of four major simulation programmes in Asia, all with positive results, are described below:

– The Asian Training Centre on Ageing (ATCOA) in Chiang Mai, Thailand, runs courses about designing for persons with disabilities and the lasting impact is seen from the many participants who keep in touch (networking).
– The United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) held a training/awareness course in May 1997 in Bangkok, Thailand. This exercise was instrumental in supporting a UN Pilot Project to improve the street facilities for a one square kilometre of Bangkok in advance of the FESPIC Games (Harrison & Parker, 1998). The success was so great that over 20 kilometres of tactile paving strips (a textured surface that has a number of designs which can inform a blind person through contact with a cane or directly via their feet) and safe footpaths and street furniture have been installed (with facilities for wheelchair users, the deaf and the blind) which benefits all users.
– The «Day in a Wheelchair» event in Singapore on 14 March 1999 was probably the largest simultaneous simulation exercise held to date. This had a number of agenda – to provide a simulation exercise for about 150 able-bodied participants

(spread over 17 routes in Singapore), to bring the problems of access to the built environment, and the problems of independent wheelchair-bound living, to the attention of the public, politicians and the media. Two research questionnaires were issued to the participants to gauge their pre and post experience feelings and attitudinal shifts, and the findings were positive.
– Simulation exercises conducted on the Elective Course «The Accessible Environment" at the School of Architecture, National University of Singapore. This course is targeted at level one Masters in Architecture students and has proven popular and influential, being well subscribed for six consecutive years.

Other Initiatives

The awareness and confidence of professional designers needs to be increased, as a matter of urgency (Harrison and Parker, 1997a). Research work done by units looking at aspects of designing for disability and the creation of accessible environments should address this need, and the dissemination of good examples, (including case studies, specific design solutions, cost appraisals etc.) is one way in which this could be done.

Ongoing research and technical studies can help professionals by applying expertise to:
– commentaries on current and proposed design codes and building regulations;
– writing readable articles on accessibility topics, in professional journals, including critical analysis of built examples;
– development of award schemes, to encourage professionals (and, equally important, clients and building owners) to specify and create accessible buildings.

3. Discussion

Priorities in teaching accessibility-oriented education in Schools of Architecture and allied design may be summarised as:
– introduction to anthropometrics for disability as a part of basic design courses;
– continuous stress in design project work on need to design for barrier-free environments;
– consistent approach to technical and constructional aspects;
– elective courses, with simulation exercises and project-based goals;

– encouragement of integration of current research topics into postgraduate and thesis work;
– teaching the teachers;
– continuing professional development courses, to inform and update professionals' skills;
– interpretation of existing legislation on accessibility in the built environment, building codes and implications of other pressures, such as Anti-discrimination Acts; comparison with other countries' codes, and feedback to code-makers;
– mutual links between other disciplines with similar aims and with user-groups, particularly welfare associations of disabled people;
– need for a database of a range of exemplars, ranging from high- to low-tech, and including no-cost solutions.

Overcoming the initial uncertainty about how effective such teaching should be is the most significant hurdle. It is necessary only to demonstrate that access is achievable, and by what means, and that even the simplest improvement could make a world of difference to a person who is now handicapped by the unconsidered environmental mistakes of their habitat.

We are nearing the end of the United Nations «Decade of Disabled persons, 1993–2002». It is thus timely to ask why and how we are preparing our future generations of designers of the built environment to provide habitats for everyone without discrimination relating to age or ability.

Those with intellectual disabilities should not be forgotten, and a safe, well-signed, built environment will prove better and less intimidating for this user-group too. But, as this cohort grows in numbers and percentage terms, their wants and needs will require attention – especially if and when life spans increase dramatically, with advances and application of medical technology, to 120–130 years.

Who should decide the form that future habitats may take? When professional planners, urban designers and architects are involved in decision making at strategic levels, they must transcend the boundaries of their own disciplines, to listen to the views of other parties who have knowledge of other particular aspects of how to make the urban structure work, not just more efficiently, but with greater diversity and with greater emphasis on human quality of life values, which are less easy to quantify. Taking the holistic view is not easy, and implementing it

demands new attitudes to be developed – but its benefits will be far reaching – both in the number of people that it serves and in the long-term satisfaction that it brings.

The main forms of active discrimination are well known – sexual discrimination, religious discrimination and racial discrimination. Developments in anti-discrimination legislation and education help to reduce prejudices and change society's attitudes and tolerances. Discrimination is found in many other forms – sometimes intentionally but often occurring unintentionally, through ignorance or apathy. Where persons with disabilities and elderly persons are hindered by the built environment, and thus unable to use it in the same way as the majority of the population, this may be defined as discrimination (Imrie, 1996). Experiential discrimination occurs where certain individuals or groups are denied the same experience as others.

But increased awareness is not the «end goal' – this is just the catalyst to change towards achieving a truly accessible environment. There are many «barriers» to be overcome – attitudinal, physical, mechanical, technological, economical, social and cultural – but the resulting habitat will be worth the struggle and effort and the benefits are many in both the near and long terms. An investment in non-handicapping built environments is an investment towards a better quality of life, and can be a common goal for all inhabitants.

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Photo: FotoKnutsen AS

3.4 Collaborative Design Studio for Universal Design in Chiba University

Professor Kaname Yanagisawa, Ph.D., Department of Design and Architecture, Chiba University, Japan.

Background

The Department of Design and Architecture at Chiba University was founded in 1997, when it was reorganized from two departments, the Department of Industrial Design and the Department of Architecture. There are two courses taught independently: industrial design and architecture.

We are trying to combine various studio programs to promote student exchange and give the students a wider view of design, from product to architecture. The collaborative design studio was started in 1998. In the second collaborative studio in 1999, we aimed to have both courses participating together in the Universal Design Competition.

Outline of the collaborative design studio 1999

Theme: Designing a restaurant interior from the viewpoint of universal design

Period: December 1999 to February 2000.

Process: The work was undertaken in close collaboration between the faculty staff and students from both the Design and the Architecture courses. At first, a lecture on universal design was given to both groups of students. The students then used the existing building as a case study for a survey, presented their findings and exchanged ideas. In the next stages, the students used the case study as basis for the design of a universally designed restaurant.

Result: It was the first time both groups of students were able to exchange ideas and gain knowledge of each

other's fields. The students learned the concept of universal design through the collaborative work between the two courses.

Feedback: We hope to continue the idea of making a mixed group with design and architecture students next year, thus promoting more mutual understanding.

Case study and review

Students surveyed the existing building as a case study and analysed it from the viewpoint of universal design. This included elements such as non-physical barriers, useful spaces for all generations, colours and textures that aid orientation, or comfortable environment. They took two weeks for the case study and its presentation.

On the day of the review, the faculty staff first made a brief comment on the students' works. The students from both courses then looked closely at the presentation board before presenting their schemes individually. To conclude the session, the faculty staff of the architecture and design course reviewed the works and exchanged opinions.

Both architecture and design students looked closely at each work.

Design work and review

On the design of the restaurant, the architecture students worked individually. The design students formed groups of 3–4 students who worked together, which is normal practice in the design course. Although the architecture students and the

design students did not cooperate directly, they exchanged ideas informally quite often during the design stage.

Common to both groups was that they made an effort to introduce the idea and feedback to their design work from the last case study review. Some students chose to design a new building, while other students designed a scheme for renewing an existing structure. This part of the studio went on for a period of three weeks.

On the day of the final review, students of both courses, architecture and design, made a presentation in turn. Faculty staff of the architecture and design course and three guest critics reviewed the works, and exchanged opinions.

A group of design students gave a presentation to the others.

Types of design solutions

Each student or group of students created various kinds of interior spaces in the restaurant. The faculty staff concluded to realize the studio in which both architecture and design students would make a group together for more cooperation. There were few differences between the approach and results of architecture students and design students, but the students understood the concept of universal design in slightly different ways, and consequently chose different design solutions. The types of design solutions were as follows:

1. Physical solution

A lot of students thought that the concept of universal design is the same as barrier free design. They tried to avoid steps, making a flat floor, or introduced a slope and an elevator. Some students made wider circulation or corridor spaces for easy movement for elderly and handicapped persons. These physical solutions might be fundamental to universal design.

2. Environmental or cognitive solution

Some students considered colour or material an important issue in universal design. They thought that friendly colours and coordination of materials would make people feel comfortable and make the environment understandable. Both issues may of course be of particular importance for elderly and handicapped people. Other students introduced systems to provide easy listening music, aroma, nice view of nature, for healing and joy. All these environmental and cognitive approaches have relevance in a universal design context.

3. Selectiveness for all types of people

Some students considered that selection of place for different users of the restaurant would be important. They therefore introduced various types of places that could be chosen according to user's preference or ability, presenting a variety of colours and decoration, food types and interior atmosphere, size of room and seating arrangements, seating styles and levels of privacy. As universal design is the design for all types of people, having multiple choices might well seem a reasonable idea.

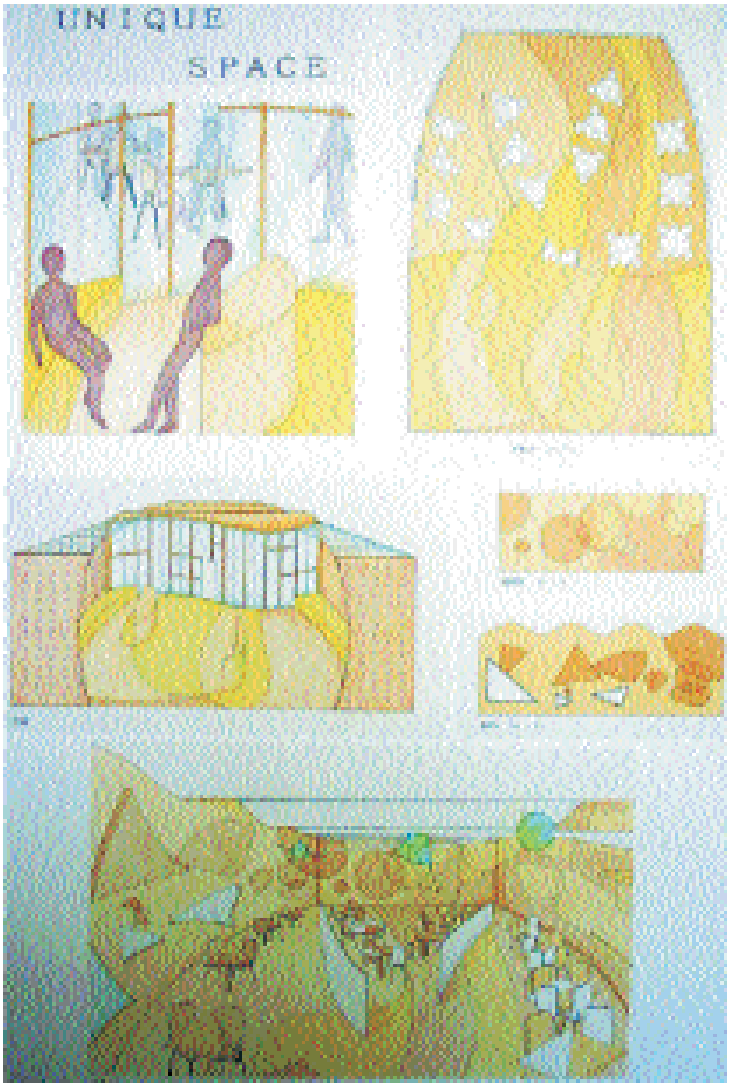
4. Exchange between generations

Some students introduced a place to promote intercourse between different generations. An example of this is a design where the restaurant has an area designed both for children's play and for elderly people – promoting contact between them. Given that there are sufficient attractive spaces for all generations, everybody might have a chance to get together. We should create places where everybody can meet – children and elderly people, handicapped and non-handicapped people, males and females, residents and visitors.

Some results from the studio

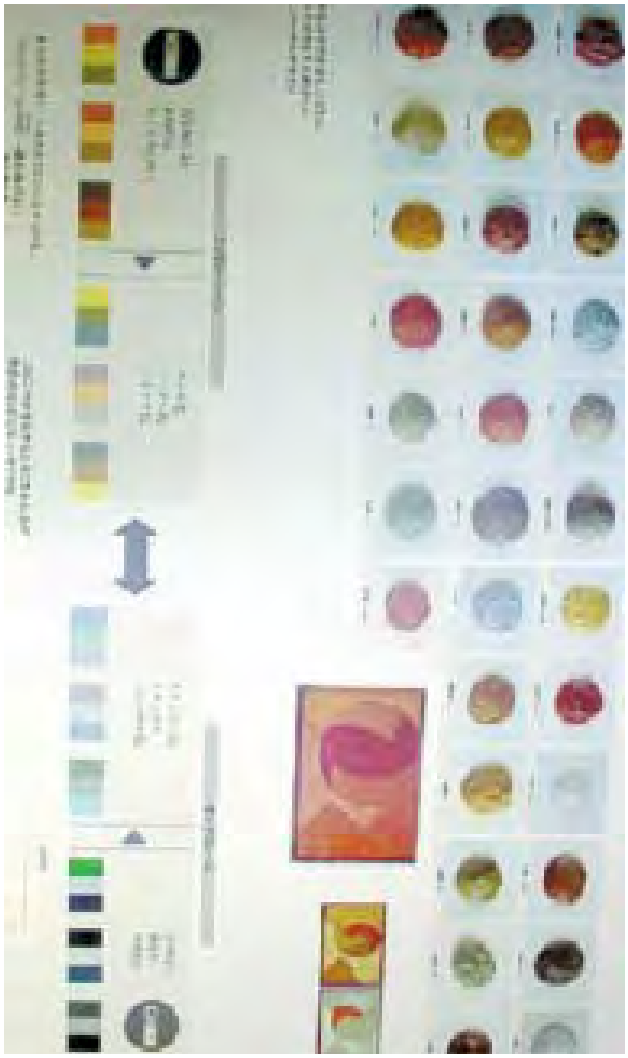
Mr. Yasuyuki Iguchi, Architecture student

This student focuses on psychological comfort. He uses various and distinctive colours, materials, and geometric forms on walls, ceiling, and floor, creating an easily understandable and comfortable space.



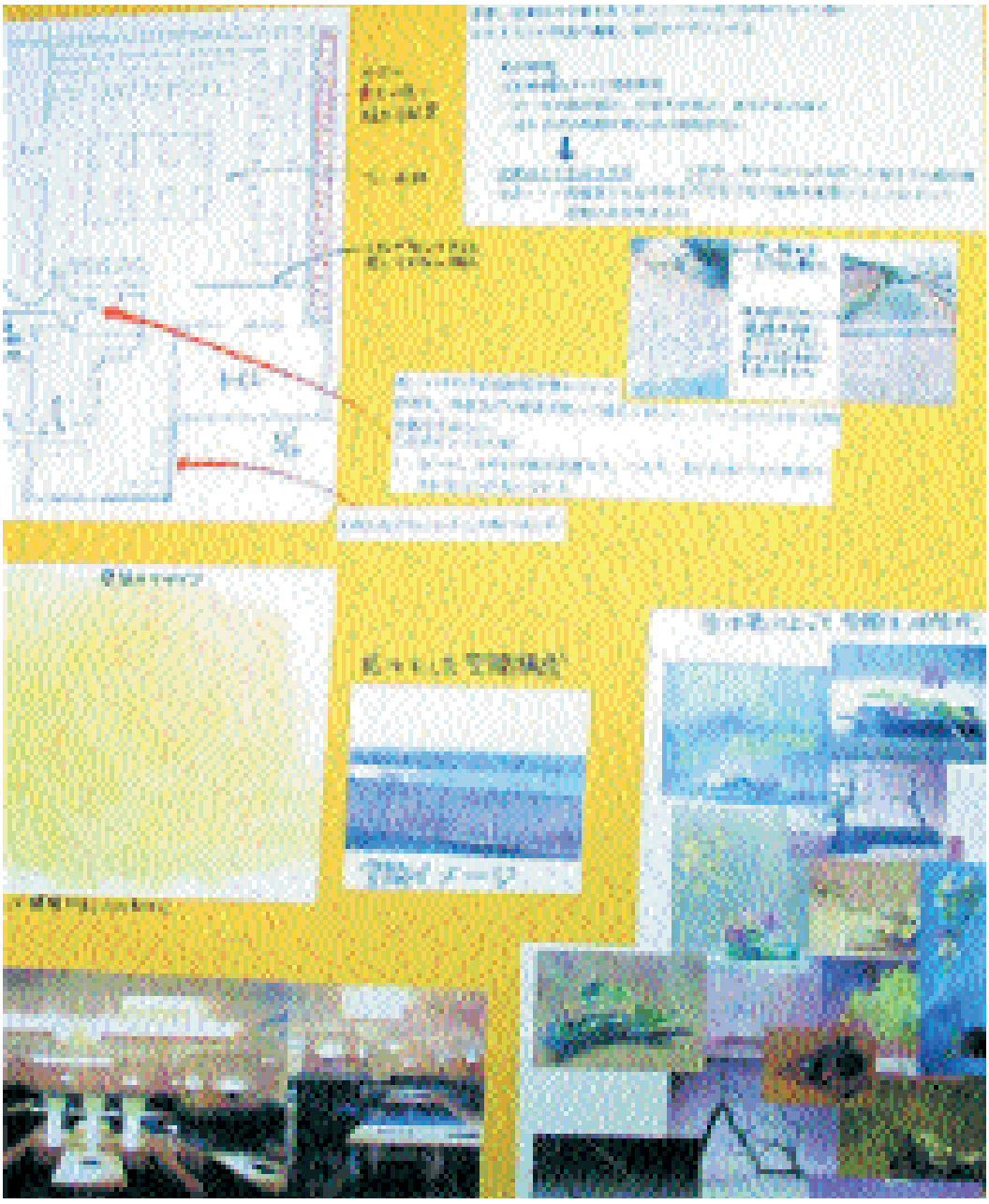
Ms. Yoko Oikawa, Architecture student

This student created several small buildings, offering a diversity of colours and materials. She studied the psychological effects of colours and materials, and applied them in her design. The result is several small rectangular buildings, which look different and have different sizes, spaces, colours and materials, to match individual taste.



Mr. Yosuke Kitazawa, Architecture student

This student chose to refurbish an existing building. He designed its interior from the viewpoint of universal design. He widened the hallway and rearranged the setting of furniture and partitions for easy moving. He also introduced several devices to give a comfortable feeling to visitors.



Ms. Akiko Itai, Architecture student

This student designed a restaurant that can change its interior setting according to season and time. Furniture, decoration, partition, lighting, food, and table settings are removable and changeable, adjusting to summer and winter, or daytime and nighttime. Visitors might enjoy a different atmosphere in a space each time they go.

Mr. Jun Murakoshi, Mr. Shun Hashizume, Ms. Akiko Tanaka, Ms. Yukiko Koide, Mr. Yutaka Yoshiyachi, Design students group work

This group designed a building to promote exchange between different generations. They put wooden decks and other communication spaces, like those that old Japanese houses used to have.

Ms. Junko Tanaka, Mr. Kentaro Sekine, Ms. Kyoko Higashihara, Design students group work

This group designed several types of dining spaces in a building to meet different people's needs and interests. These include a large open space, a space with table and furniture, Japanese tatami-matted space, a cave-like space, an outdoor terrace and outdoor garden. They also designed unique outdoor paths for attracting children's play.

Photo: Jon Christophersen

3.5 Universal Design Competition for Students 2000 Nagoya/Japan

Prof. Makoto Yanagisawa, Nagoya City University and Tadao Shimizu, Chiba University, Japan.

Background of the Participating Universities

There are design and architecture departments in many Japanese universities and colleges. Many of the design-related departments are found in the faculty of art or in art colleges; the rest are in technological or educational schools. On the other hand, most architecture-related departments belong to technological schools, colleges or universities. From an educational point of view, design and architecture therefore seem to be separated.

The reason for this separation is that design, in its early days in Japan, was interpreted as an applied art. It was consequently logical to situate the design education in the schools of art, while architecture, where the focus was on structure and materials that resist such external forces as earthquakes, became a part of the engineering schools. However, as the idea got disseminated that both design and architecture are important for the creation of environment in which people live and that both are essential for the enhancement of the quality of life, the wall between the two was lowered and now, mutual relationship and the importance of the collaboration is being discussed in the field of education.

Essentially, universal design should be taken into consideration as a basic element whenever something is being planned or designed. Therefore, universal design is now being used as a catalyst for considerations to promote the collaboration and harmonization of design and architecture. Universal design is getting much attention as a subject which should engage various

fields, across the conventional boundaries of design and architecture and including information design. Universal design is a comprehensive theme covering diverse subjects such as tools, architecture and urban issues. Unfortunately, universal design is not yet nationally recognized, and with few exceptions, the course is not officially incorporated into the curriculum.

About the competition

Six professors of design and architecture with particular interest in universal design organized a committee to hold the competition for students. As organizers and planning committee members, they encouraged students both nationwide and at their schools and universities.

However, through the nationwide promotional activities, the entries were not limited to the students of design and architecture; there were also entries from students majoring in information design and education and from landscape architecture students – the latter attend schools of agriculture as well as those who are. This proves that the competition has made a great contribution to the dissemination of universal design. The general interest in this subject was reflected in the number of inquiries made to the Secretariat. The fact that judging was open to the public and the applicants proved to be encouraging for the students and provided an opportunity of exchanges among the participants.

The objective of the competition

This student competition was held in the spring of 2000, organized by Prof. Makoto Yanagisawa, Nagoya City University, and sponsored by Matsushita Electric Works Ltd.. The objective of the competition was to provide an opportunity for design students to enhance their understanding of universal design and help them to reflect the acquired knowledge in their own projects.

Entries and judging

By the closing day (2000, Mar. 1st), 45 entries were submitted from ten Universities and six Graduate Schools in Japan. The jury committee was composed of six judges, selected from Japanese schools of architecture and design:

Makoto Yanagisawa (Nagoya City Univ./Chair person)
Toshiharu Arai (Kanazawa College of Art)
Kazuo Kawasaki (Nagoya City Univ.)
Takahito Saeki (Kobe Design Univ.)

Tadao Shimizu (Chiba Univ.)
Gen Taniguchi (Nagoya Univ.)

Judging was done in two stages. During the first stage all entries were scrutinised and a short list of 12 works were selected for the final stage. Uniquely, the judging process was open to both the entrants and the public. At the second and final stage, held on May 6th at Nagoya City University presentation hall, each of the finalists presented their works for an audience of more than 170. After the presentations, discussions and voting, the judges selected three prizewinners and nine honourable mentions.

Future development

There are requests to continue this type of competition. It will be ideal if it becomes an international open competition not limited to the Japanese students. But at the same time, we should take into consideration cultural, social and economic differences that each individual country has in terms of universal design. No set of established values or standards should be imposed. Further international exchanges of information will become more and more important.

The prizes

The first prize

The first prize was awarded a proposal entitled «Japanese traditional Veranda + mud room = mud veranda?» by Tsukasa Sasaki, Shiho Mohri and Genki Tanaka. All are second year students at the Master Course of Architecture at the, Graduate School of Nagoya University.

In their work a survey was conducted to assess the current situation of a traditional commercial area adjacent to a station. The result shows an increase of older people, decrease of the younger generation, and decline of business due to large-scale suburban shopping establishments. As a consequence, houses and properties in the area have been sold off, causing several to be vacant. Based on these facts, the authors have proposed to use a vacant lot to put up a temporary building with a Japanese traditional veranda and mudroom. Their intention is to create an arena for direct communication among neighbours, thus enhancing the relationship among a broader range of people in the community and helping them to create a development as well as developing ideas for its implementation. Japanese traditional Verandas and mudrooms function as semi public spaces, brid-

ging the private and the public open space. Spaces with such a function can be found in any traditional residential area in Japan. In this proposal various ideas and devices are introduced to attract and facilitate the gathering of the neighbours including access for old and handicapped people to the temporary building. Members of the judging committee highly evaluated the fact that this work has introduced universal design in a broad perspective, and that it is not limited to the solution of existing barriers but also incorporates extensive future visions.

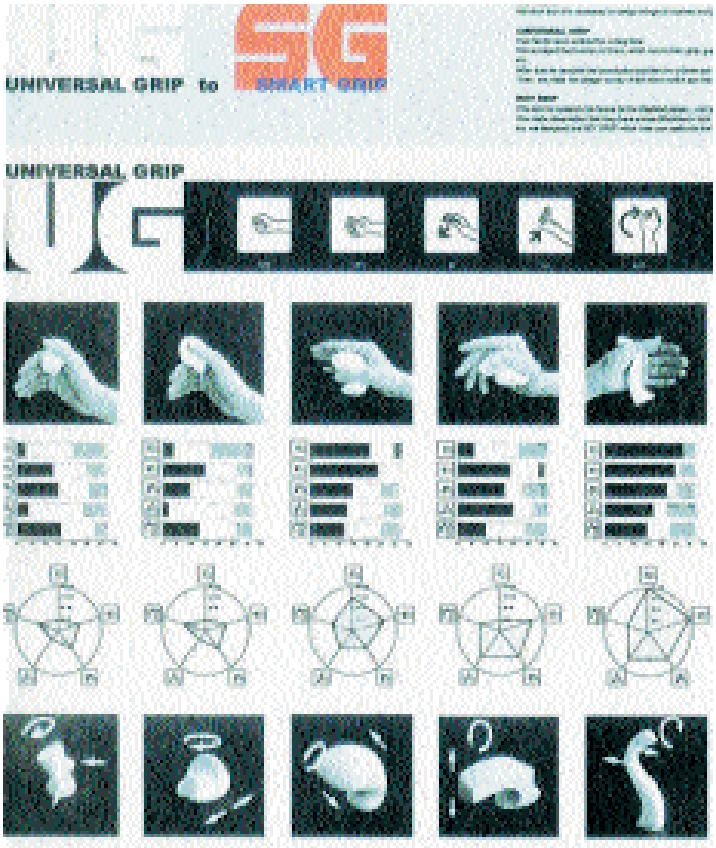
"ENGAWA" + "DOMA" = "ENDOMA"
"Engawa" and "Doma" have been the traditional spaces for connecting interior and outdoor space. They have been instrumental in creating openness of the house providing delicate interplay of the interior space with the outside urban and natural environment. But most of Japanese contemporary houses don't have such spaces. Using the open spaces that are everywhere in the town, we tried to make the places for intergenerational communication. This trial is UD for reconsidering the milieu of all.

Authors: Tsukasa Sasaki and Shiho Mori, Dept. of Architecture, Nagoya Univ.; Motoki Tanaka and Shinichi Kurimoto, Dept. of Civil engneering and Architecture, school of eng., Nagoya Univ.

The second prize

The «Universal Grip», by Goshuu Sawada and Hideki Kato, senior students of Life Environmental Design Dept. of Nagoya City University, received second prize.

The authors had started out with a basic question of how people change the way of gripping things according to the shape of the object. They analysed this using numerous models, which were tested in collaboration with the residents at nursing homes. Based on the findings, they made a design proposal for a key holder. Further studies comparing the proposed object with existing products in the market to find out the advantages of the former and the disadvantages of the latter are expected.



UNIVERSAL GRIP to SMART GRIP

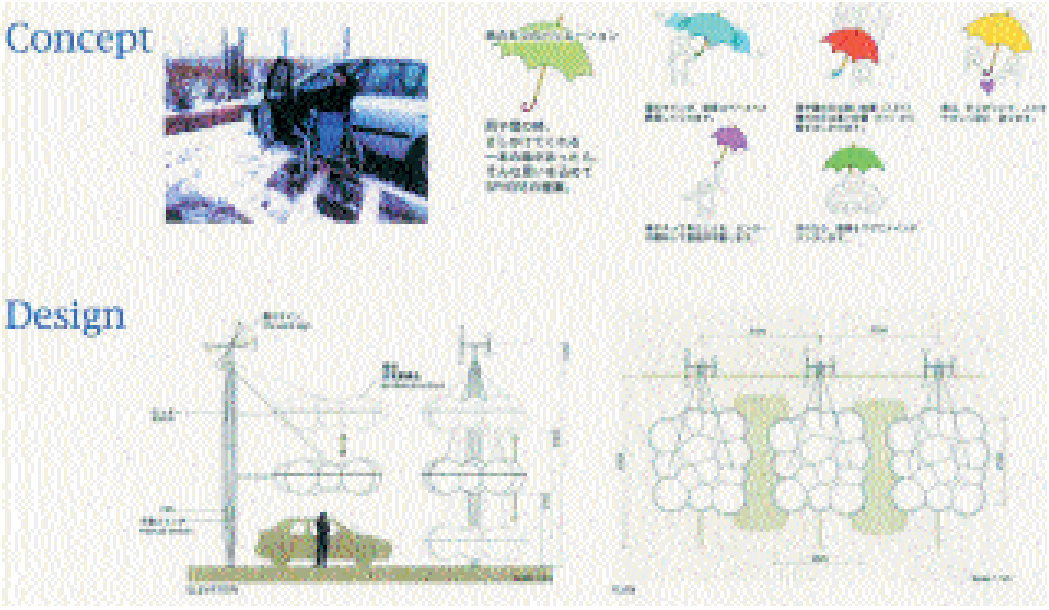
We think that it is necessary to design things to impress and please their users, which means that it is important to know human beings well. Our hands have evolved for a long time. We surveyed the function of them, which are to hold, grip, grasp, catch, clutch, grab, beat, hit, slap, strike, twist, scratch, turn, tear, knock, etc. After that we reached the conclusion that five of them are the most important to live our everyday life. Then, we made the design survey of the forms which are friendly for every body, including those who have handicaps in their hands.

Authors: Takehide Sawada and Aicih Prefectual University Fine Arts and Music Design Master Course, Hideki Kato, Nagoya City University School of Design and Architecture Department of Human Environmental Design

The third prize

The third prize was warded to a work titled «Hearty Parking Sphere», a design by Megumi Morishita. The author attends the second year of Environmental Design Engineering at the graduate school of Fukui University.

The proposal is a simple roof for parking lots made of thin air bags. The height of the roof can be adjusted according to the time of day and changes of climate. It is a user-friendly design particularly with regard to wheelchair users, old people and others who may need much time to get in and out of the vehicles. Although there might be structural problems with strong winds, it was highly evaluated as a visionary proposal from a young student.



HEARTY PARKING

For the people who drive cars, a parking lot connects roads with architecture. While a road is space for cars and an architecture is people but only as incidental facilities of a architecture for cars. To get on or off cars in the rain or the snow is very uncomfortable in a parking lot without a roof, especially for the handicapped. Many parking lots don't function as an interface of architecture with cars.

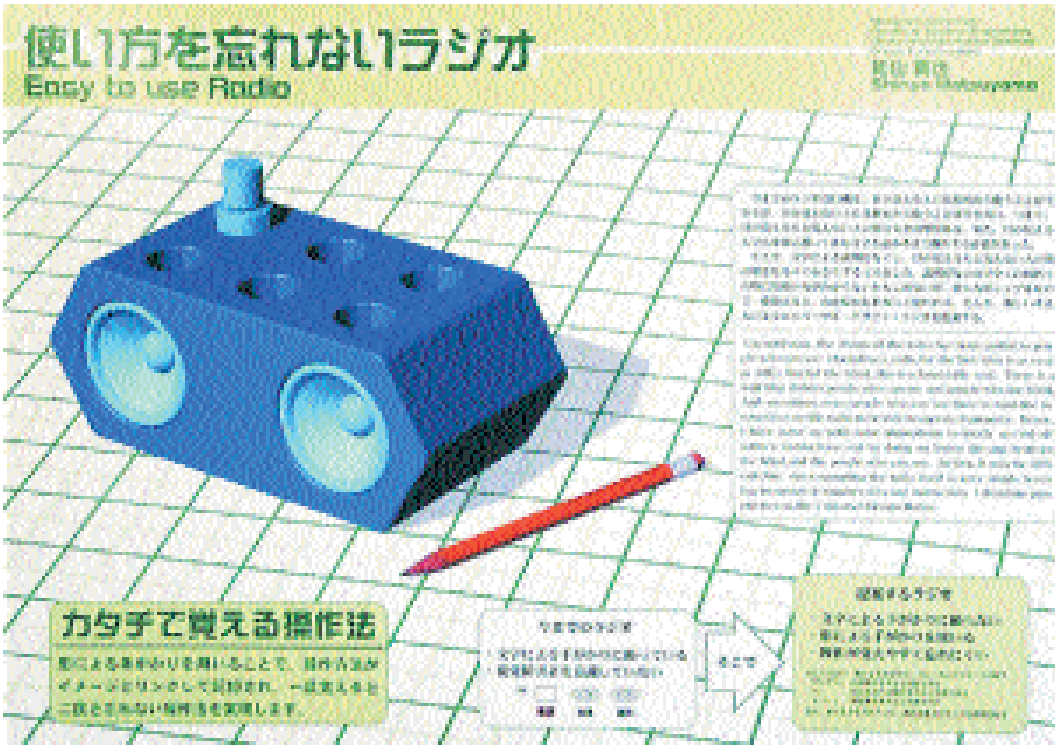
For the effective interface function, I would like to propose a design of a parking lot with a concept of "HEARTY PARKING", which is comfortable for people on a rainy or snowy day. At the time of getting on and off of the car in the rain, you might have experienced that someone has held an umbrella over your head, which has made you very pleased. My design comes from those experiences of an umbrella by someone else, and it is designed not only for bad weather but also for the night. Considering the general and comprehensive idea of UD, I would like to propose a parking lot with a partial roof of the design of an air skin structure.
Author: Megumi Morishita, Fukui University graduate school, Master of engineering

Honorable mentions

Proposals receiving honourable mentions included the following:

– A detachable handle to hold cups securely, particularly suited for people who have reduced strength problems with hands and fingers.
– A design to enjoy all four seasons in an urban park without being aware of handicaps.
– A design for an urban park which can be used by everybody in all four seasons, regardless of handicaps.
– A unique and delightful radio with a design based on the result of a survey which showed that a simple shape and simple handling which respond to the fingers are effective for the visually impaired and people with memory disorders.

FOURP Our Cup with Four Points
– An environment and furniture at a children's playground where people of different generations can play with children. This design proposal is based on a study conducted on site and the furniture was actually made and used for experimental purposes.
Author: Tomoko Yagi, Art education senior at Fukui University



EASY TO USE RADIO

Authors: Shinya Matsuyama, Wakayama University, Faculty of Systems Engineering Design and Information Sciences Design Fundamentals

Summary

Interestingly and favourably, when seen as a whole, the entries to the design competition were by and large based on honest research. Also, it was impressive that the design solutions were attempted not only for a single objective but had social implications, taking the surrounding situations into consideration. Students may be interpreting «universal design» as an expanded concept in which people and nature live in harmony, not limited to solutions of physical problems. It is indeed the direction that the organizers of the competition had anticipated.

Judges' comments

Prof. Toshiharu Arai (Kanazawa University of Art and Craft)
Universal design is based on the concept that people are really living life cycles with a wide variety of abilities and that they are continuously building different relationships. When we look

at that fact, new or intrinsic relations are conceived between people and tools. A common subject assigned to the competition must be to understand the problems as facts and how to find a solution _ not just for the sake of problem solving, but to look for creative solutions with a universal dimension. Logic as a base of things and formativeness as a form of things; how can they be represented in design clearly and balanced? It is exactly what was requested.

Judging the entries was very stimulating as it encompassed whole life space including environment, architecture and product design. Design activities originate from specific sites or situations but there are many different answers to their developments. I thought that in the universal design competition, the process itself could be a study of universal design since it is still in the cradle. Now I feel that it was right to believe so including the process of public judging. Future challenge in the area of product design is to create 1/1 model or 1/1 model of details to check the function and finish the final design based on such models.
I would like to extend my deep appreciation to all the students of various fields who have participated in this competition.

Prof. Kazuo Kawasaki (School of Design and Architecture. Nagoya City University)
The term «universal design» is rapidly gaining ground. Especially in Japan, it is almost like a craze as the aged society arrives. Under such circumstances, students have seriously worked on the ideas and drawings to embody the philosophy of universal design. This was the first competition of its kind, yet entries were versatile, ranging from tools and equipments for daily life to urban landscape. We had about fifty entries but were able to go through the first-stage judgment actively and carefully. Applicants showed models and made visual presentations in the second stage presentation. I believe that the public judging was innovative and of great success.

My judging criteria were on what issue the applicant's awareness is focused and what his/her theme is, i.e. awareness and understanding of a problem. Drawings and designs are important, as solutions for the problems while understanding should be transformed into design expressions as social answers.

Based on such personal criteria I verified the originality of the ideas in the first-stage judgment. In the second-stage, I checked

if the answers and solutions were expressed clearly and concretely and if the messages could be transmitted as an expression. I judged that every prize-winning piece is persuasive enough as solutions, while unsuccessful winners' pieces remained only as answers and were not stimulating enough as solutions. However, the differences were slight and it was difficult to rank them.

This competition required appropriate written expression for the concept in the first-stage and presentation skill in the second-stage. While interpretation of the philosophy of universal design itself was new, this new methodology for a design competition was innovative and successful.

I sincerely hope that this type of competition will be widely accepted and continued. Lastly, I would like to pay respect and express my appreciation for the efforts taken not only by the winners but also by all applicants.

Prof. Takato Saiki (Kobe Design University)
"Enchantment of Universal Design" – this competition for the students brought me some discoveries.

The first discovery is that the entries by the students from various fields contributed to make the presentations and judging in the second-stage very exciting. For those applicants who are usually studying designs in one's specialized area, it must have been a new experience to participate in the public judging. Recently, there are various competitions, small and large in scale, but most of them are planned and carried out within specific areas and directed towards those involved in that field. Naturally, the results are presented only to that specific area of expertise. In contrast to such competitions, «Universal Design Competition for Students» was indeed in line with the objectives of universal design; designs of relations, sharing of social issues and creation of safe, comfortable and enjoyable environment. Entries were full of youthful and healthy ideas to accomplish afore-mentioned objectives.

What was particularly impressive to me was the fact that the applicants were not simply interested in the creation of a product but had social viewpoints, had undertaken field work and tested the designs. They actually went to town and visited institutions and reviewed the designs directly. Contents of many presentations have shown remarkable improvement compared to

the first-stage judging. It made me feel that the design should always be in response to the changing society.

Another discovery was that the students did not limit the designs to a visible expression. They linked it to the rules of life and social information systems and their proposals were based on that. People who are somewhat retreating in their closed world are brought back to the ordinary world, and the designs of the invisible world were experimented to give them energy in the life space. The students looked at the mechanisms of old life and society, which are almost forgotten in the course of evolution and discovered them as design sources.

Judging of the works of such diversified areas was a new experience for the judges as well but I felt it stimulating as responses to the questions raised by open-minded students.

Prof. Tadao Shimizu (Design Engineering Dept. School of Engineering, Chiba University)
This was the first competition of this kind and I assume the applicants must have felt somewhat lost as to how the theme should be tackled. It was a thought-provoking experience for the judges as well. However, it was most delightful to have entries from various fields with different views and angles.

What was impressive to me was, as represented in the first prize-winning piece, that the students worked on universal design not only as a direct solution to satisfy the functional requirements of the goods or space but tried to expand their efforts even to emotional aspects. Relatively limited time might not have allowed the applicants to create anything based on serious testing. However, the very basic of universal design lies in the idea of paying attention to a wide range of people and situations around us and to find the most relevant solution rather than individual completeness. Therefore, this trend is most welcome. As was described in the qualification, most of the prize-winning pieces were not mere ideas but based on some research and further development of the findings. I respected that point. Currently the market is full of products reflecting irresponsible thinking of «Let's try. If it goes well, that's OK. If it doesn't, let's forget about it and try something else.»
I personally believe that universal design should retain a rather critical attitude toward such current state.

Prof. Gen Taniguchi (School of Engineering Nagoya University)
Whether it could be a product, building or urban planning, for those who are engaged in the design-related occupation, universal design is becoming essential in order to survive in this industry. Therefore, it should be incorporated in the educational program for future designers. Looking at 45 entries I felt the efforts of both applicants and educators were fully rewarded.

The first prize-winning work is an idea to revitalize a once-active old street space. It is excellent because the proposal incorporates the concept of universal design. This can be a suggestion for Japan to free herself from scrap-and-build or consuming-and-developing society.

The second prize-winning piece, «Universal Grip», was highly evaluated as it expressed the process of a man's motion of «gripping» which creates various attractive forms.

«Hearty Parking Sphere», the third prize-winning work, is still incomplete in its detailed technical processing but it is exciting as I visualize the beautiful landscape it would add to a town. It is one of the proposals I wish to be materialized.

When I thought of a society full of equipments like «Can I help you?» I was first sceptical, thinking that it would promote the alienation of man. But recently, I attended a meeting to study universal design in airports and there, an apparently healthy person who actually was hard of hearing talked about his problem of letting others know of his difficulty. It made me feel that there is a potential for such equipment. For me, who am specialized in architecture and urban planning, this competition was a good opportunity to learn about ideas in the design field.

Prof. Makoto Yanagisawa (School of Design and Architecture. Nagoya City University)
I wish to put the spirit of universal design into the minds of the students. I wish to nurture the spirit of caring in their minds. I wish them to be patient enough to work up from concepts to concrete ideas. This competition for students was based on these wishes. Before Prof. Shimizu made a presentation in America on the results of the competition, I made the following short speech:

Although I will be 70 years old next January, I don't know yet how institutions for the aged should be. I may not understand it well until I myself get physically weak. It must be too demanding to ask young students to think about environment and products for every type of people. But designers are always requested to think about the world that they have never experienced. This must be an excellent opportunity for the students to work on the most challenging assignment.

I was excited to find 45 entries on the closing day. Moreover, most of the work showed the results of the applicants' hard work and it made me happy. The date of public judging happened to be a holiday due to the schedule of all judges but to my big surprise, the hall was full of people and the chairs provided there were not enough. Under such circumstances, it must have been hard for the judges to have public judging but I believe it was good for the participants.

I would like to express my sincere thanks to the very, very busy judges who have worked without any remuneration. The exciting poster is a work of Prof. Kawasaki and we owe much to Matsushita Electric Works Ltd, which has supported us financially. Also, I would like to mention the names of the people who have helped us in organizing the event. Mr. Mikio Higashiyama a member of Society for Health Design Study from Eba Corporation., Mr. Yuzo Kurahashi of Nihon Shooter Ltd., Mr. Sakamoto of Nagoya Isu Co. Ltd., Ms. Ami Wada and Ms. Miyako Matsushita of Yanagisawa Lab. Many of the students of the Nagoya City University, the students of Yanagisawa Lab in particular, helped us extensively. I hope this competition will be a significant milestone in the education of universal design.