

Integrating Universal Design Content in Third Level Curriculum

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Abstract

The purpose of this study is to inform future integration of Universal Design content in third level curriculum. It was arranged by the National Disability Authority, Centre for Excellence in Universal Design and was prepared by TrinityHaus, School of Engineering at Trinity College Dublin. The research comprised a combination of secondary (desk) research focusing on a review of teaching Universal Design at third level colleges and primary research on the teaching of Universal Design at Trinity College Dublin.

The secondary research phase included a review of national and international literature and online resources (Chapter 2: International Review of Teaching Universal Design on Design Curricula). This review recognises the evolving practice of Universal Design in the delivery of Education and differentiates it from the focus of this research on teaching about Universal Design principles and processes for application in design related fields of study. The international third level design curricula reviewed in this study is presented in Table 1 according to its Subject Area, in Table 2 according to its Design Technique and in Table 3 according to its Methodology of Instruction. On the basis of this review, an overview of international approaches to teaching Universal Design is provided.

For the primary research, an interview questionnaire was developed (Appendix A). A series of face-to-face interviews with lecturers and other relevant staff in Trinity College Dublin was conducted using the questionnaire as a guide as discussed in Chapter 3: Findings from the Primary Research: Exploring Universal Design Teaching in Trinity College Dublin and Universal Design in Practice at Trinity College Dublin. Selected respondents quotations from the interviews are listed in Appendix B and respondents' comments on Trinity College Dublin policy regarding accessibility and Universal Design are found in Appendix C.

On the basis of the findings, conclusions are made about the shortfalls of current teaching practices of Universal Design, as well as discussion of successful approaches both nationally and internationally. While the research did not find clear evidence of what are the best methods or whether current practices are producing the best outcomes, recommendations were developed from the findings to inform further integration of Universal Design content in third level curriculum (Chapter 4: Discussion and Recommendations). Outlines for Universal Design curriculum modules were subsequently developed from the research including one as a sample for early stage lecture/introduction content approach and one as a sample for a later stage laboratory/project based approach (Appendix D).

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Chapter 1: Background

What is Universal Design?

Universal Design is a design philosophy that aims to create an inclusive, sustainable society, where every person can participate to the greatest extent possible (Preiser & Ostroff, 2001; Council of Europe, 2007). It is defined in Irish legislation as “the design and composition of the environment so it can be accessed, understood and used to the greatest extent possible by all people regardless of age, size, ability or disability” (Government of Ireland, Disability Act 2005).

In practical terms, there is no one method to achieve Universal Design. Rather, Universal Design offers a framework within which a range of different user centred, human-centred, user led and participatory design approaches are used with design tools to empower the designer toward design solutions in line with Universal Design principles. It has been described to comprise the following three key elements (Christophersen, 2002):

1. User-Designer interaction:

Any design tool or technique, applied by designers, which aims to more closely align the requirements of the end user and the resulting end product(s).

2. Understanding people:

Information which promotes further understanding of the target market (i.e. the entire population), such as information on demographics, statistical data, descriptive information of the range of human abilities and the consequences of impairment in any of these abilities, an understanding of how human’s interact with their surrounding environment, and so on.

3. Evidence-based findings:

Any retrospective information on experiences (positive and negative) of existing products or environments, such as the results of post-occupancy evaluations, can be fed back into the design process to better inform future designs.

Universal Design Teaching and Irish Legislation

Key areas of focus for policy development – nationally and globally – over recent decades have addressed issues such as social inclusion, disability equality, human rights and equality, and sustainability (e.g. Brundtland 1987; Walsh, 2004; UN, 1948, 2006; also see Government of Ireland, 2006, 2007; DoEHLG 2007). These movements paved the way for an approach to design that promoted sustainable and inclusive solutions. At the very heart of these issues is an obligation to meet the diverse and changing needs of all people, as well as an urgent need to address the challenges of Ireland’s rapidly ageing population (Government of Ireland, 2006). Universal Design provides a framework through which these challenges can be addressed.

Recognising this, in 2001 the Council of Europe adopted a resolution entitled ‘The Tomar Resolution – On the Introduction of the Principles of Universal Design into

Curricula of all Occupations Working on the Built Environment '. This document, created to influence and shape legislation and policy at a European and national level, outlined recommendations to member states with regard to the teaching of Universal Design to built environment professionals.

As a member state of the Council of Europe, Ireland was encouraged to bring national policy and legislation in line as follows:

- Education and training of all occupations working on the built environment should be inspired by the principles of universal design.
- For the purpose of taking early action to promote a coherent policy to improve accessibility, the concept of universal design should be an integral and compulsory part of the mainstream initial training of all occupations working on the built environment, at all levels and in all sectors.
- Adequate further training should be made available for active professionals, such as architects, engineers, designers and town planners. Their attendance should be strongly encouraged.
- Curricula should be developed with the co-operation of users, including organisations of and for people with disabilities.
- The concept of universal design should be brought into focus for other professions working with the built environment, such as regional planners, property developers, estate agents, landscape architects and landscape gardeners, as well as interior designers. It should also be brought to the attention of users, customers and clients, including organisations and bodies representing them.
- Awareness of the difficulties people with disabilities encounter in the built environment should be raised as early as possible.
- Education, training and awareness-raising should provide everyone dealing with the built environment with the necessary understanding, knowledge, skills and values to instil new attitudes and behaviour towards achieving a built environment that is universally accessible.

These and other related initiatives (e.g. European Commission, 1996) informed Ireland's Disability Act (2005) which provided for the establishment of a Centre for Excellence in Universal Design as part of the National Disability Authority. A specific role of this Centre, as set out in the Disability Act 2005, Part 6, Section 52, 19C (3):

"In relation to assisting and promoting the introduction of the principles of universal design to courses of education and training, the Centre shall liaise with vocational and third level educational institutions and with professional bodies to -

(a) encourage the training in universal design of persons providing-

(i) courses of education and training in universal design for persons preparing to engage in work affecting the environment, or

(ii) courses of training for persons engaged in such work,

(b) ensure as far as practicable that courses of education and training in the principles of universal design are provided for persons engaged in such work, including architects, engineers, town planners, systems analysts, software designers, transport providers and designers of passenger transport vehicles and passenger vessels,

(c) ensure the development of appropriate curricula so that the concept of universal design forms an integral part of the aforesaid courses,

(d) ensure as far as practicable that examinations recognised by professional bodies in such courses include material relating to those principles.”

Challenges in Teaching Universal Design

Many challenges occur related to teaching Universal Design. By its very nature, design is a very dynamic field of study that constantly reinvents or rebrands itself reacting to market priorities. Universal Design as a taught area of content encounters organisational challenges related to available resources, competing priorities and immaturity of the field. A key challenge exists from a misunderstanding that Universal Design is only about accessibility for disabilities. Accordingly, the implementation of Universal Design in built environment design curricula has been uneven on an international level (Preiser and Ostroff, 2001; Kennig and Ryhl, 2002; De Cauwer et al. 2009).

The European Commission (2009) acknowledges “it takes time for attitudes and institutions – political, educational, etc. – to adapt to what is new, in particular when the new element is difficult to define and grasp... Many educational institutions have not yet adapted their curricula to the changing nature of design.” The Council of Europe (2007) has encouraged the Governments of member states to “set up a framework for the education sector to instil the principles of Universal Design” and suggested that “the allocation of money to Universal Design training programmes may be a means of raising awareness within the education sector.”

The Irish Government is implementing these recommendations as part of its Disability Act 2005 and has established a Centre for Excellence in Universal Design (CEUD) at the National Disability Authority. The CEUD has arranged for the preparation of this research project by TrinityHaus at Trinity College Dublin to further inform its role to promote Universal Design in third level education.

Project Objective and Scope

The objective of this research project is to report on the current status of Universal Design teaching in Trinity College Dublin (TCD) as compared to international best practice and to undertake the outlining of sample curriculum materials for implementing Universal Design content at third level in Ireland.

The scope of the project includes:

- A review of Irish and international literature and educational practice on Universal Design and related curriculum content;
- Reviewing and documenting practices of teaching Universal Design at TCD;
- Interviews with key stakeholders in TCD concerning opinions, attitudes, practices and outcomes related to increasing the profile of Universal Design thinking in the teaching of design;
- The development of outline curriculum materials in the form of coursework and training modules applicable to use in undergraduate and postgraduate level engineering and related design programs.

Teaching Universal Design and Teaching with Universal Design

When researching about teaching Universal Design it is common to find a significant amount of resources on Universally Designed education. In education, the potential for Universal Design is two-fold. Firstly, Universal Design content can be incorporated into the curriculum for teaching design (the scope of this study). In addition, a Universal Design approach can be applied to teaching and learning to make it more accessible and usable by a wider range of students. This includes making aspects of the educational environment and educational methods more accessible.

Universal Design applied to education methods and environments have potential to benefit all involved. This trend is associated with a move away from earlier education structures toward a more “Universal Design Education” approach. These practices are commonly labelled Universal Design for Instruction (UDI), Universal Design Learning (UDL) or Universal Instructional Design (UID). According to McGuire et al. (2004) “All learners, including those with disabilities, would have access to instruction and assessment that is flexible and adaptable. The general education classroom and curriculum would foster accessibility.” This approach toward more Universal Design education is being applied in school policy and practice involving eligibility, instruction, assessment, accommodations and modifications.

Chapter 2: International Review of Teaching Universal Design on Design Curricula

Introduction

This chapter comprises a review of national and international literature that directly or indirectly addresses the incorporation of Universal Design (or equivalent subjects) into design curricula. The focus is placed on architecture and engineering curricula, as Universal Design is most established in these fields. The key findings from the review of courses are depicted in Tables 1 through 3. Finally the findings on barriers to the uptake of Universal Design on design curricula are discussed in order to better inform future initiatives.

Design Education

Design is not new. It has been a way of fulfilling human needs throughout our history. Throughout the evolution of design education it has been important to understand people and their interaction with the environment. "The architect should be equipped with knowledge of many branches of study and varied kinds of learning.... For without these considerations, the healthiness of the dwelling cannot be assured." (Vitruvius, circa 100BC) This quote from Vitruvius suggests that successful design problem solving in the practice of architecture is dependent on the knowledge of, and integration with practices from a range of disciplines. Architects create the environments desired by the people of their time partly through the application of engineering practices and through the utilisation of engineered solutions. Examining design in the fields of architecture and engineering is expected to inform how more disciplines involved with design can also be further integrated with Universal Design.

Design in Architecture

Education for designers that are accredited to practice in Ireland in the built environment field begins with a degree from a recognised school of Architecture. At such time the individual is eligible to become an Associate member of the Royal Institute of Architects of Ireland. (RIAI, 2009; UCD, 2009)

At this stage the architect must gain a minimum of two years of approved practical experience, at least one of which must be in an EU country. On achieving these minimum requirements, the architect is eligible to take their Examination in Professional Practice. Once passed, the architect can apply for Registered Membership of the RIAI. RIAI Registered Membership must be renewed on an annual basis, and renewal is dependent upon completion of a certain amount of Continuous Professional Development each year.

Early architectural training, across the globe, relies heavily upon studio-based teaching (Lawson 2004; Heylighen et al. 2007). The studio setting follows the master-apprentice model, where a group of students are assigned to an instructor (an architect) who provides mentorship. The mentor presents design problems to the

students and guides them towards a solution. The studio provides a place for transition (Winnicot, 1971; Heylighen et al. 2007).

Design in Engineering

Engineering education offers a large number of areas in which an engineer can specialise: e.g. Aeronautical, Agricultural, Automobile, Building Services, Civil, Control, Design, Electronics/Electrical, Manufacturing Systems, Marine, Mechanical, Minerals/Mining, Municipal, Structural, Traffic, among others (Engineers Ireland, 2009; TCD, 2009; UCD, 2009). Engineers Ireland (2009) is the professional body that represents all engineering disciplines in Ireland. Membership is approved on a case by case basis. Individuals may join as an Ordinary Member (MIEI), Technician (Tech IEI) or Other (Affiliate, Companion or Student). Engineers Ireland also offer professional titles based on educational qualifications and competencies gained from experience in the workplace. The titles are Fellow CEng FIEI, Chartered Engineer CEng MIEI, Associate Engineer AEng MIEI and Engineering Technician EngTech IEI. These titles are recognised nationally and internationally.

Engineering training programmes typically begin within a third level qualification such as a degree, or in some cases a diploma or certificate. The early years of study in engineering are largely theoretical with a strong focus on mathematics and science (TCD, 2009; UCD, 2009). As the student progresses into the final years, group and individual design projects are carried out. Laboratory settings may be used, which mimic working on site or small scale structures may be built by the student or team.

Students are strongly encouraged to gain practical work experience in industry during summer months and some engineering firms maintain links with academic institutions to provide summer and graduate internships. Engineers may later specialise in a desired area of practice. This generally requires further study, work experience or both.

How Universal Design is Taught as Part of Other Courses

Examples from the international literature review on how topics associated with Universal Design concepts are being taught in related courses found similarities to how Architecture and Engineering use the combined approach of theoretical and practical training. Most course content was found to be predominantly theoretical at early stages (e.g. the first two years) and practical training becoming increasingly prominent in later years.

The following tables represent how theoretical, practical and combined teaching approaches have been used in teaching Universal Design, although this knowledge is primarily applied in other related areas of practice. The theoretical phase of teaching Universal Design has typically involved lecturing design students at the early stage of their education on design ethics and values, the social implications of design and issues of design exclusion. Content related to User – Designer Interaction and Understanding People were found as lecture content, including the Seven Principles of Universal Design (The Center for Universal Design, 1997), to be

common on a range of Universal Design related modules for differing courses of study (see Table 1: Subject Areas Covered on Universal Design Related Courses).

The practical phase of Universal Design teaching has involved training students in particular design tools and techniques such as simulation, personas and direct interaction with users, experts, other stakeholders.

(see Table 2: Design Techniques Taught on Universal Design Related Courses). Further the study analysed whether the Universal Design education courses employed a range of hands-on teaching methods, such as design studios or workshops for Designer – User interaction, design development, apprenticeships, etc (see Table 3: Teaching Approach or Teaching Element Used on Universal Design Related Courses).

The universities listed in the tables with courses having Universal Design related subjects and techniques were identified from previous related research reviews. There was no one best set of subjects, techniques or approaches determined from the research. It was not determined whether the courses were still being taught or if they had resulted in successful preparation of the student. How the course content and methods were associated with accreditation or with certification outcomes was not explored.

The findings from the international literature review on subjects and techniques taught and approaches used, are depicted in Tables 1 through 3. In the third column of each table, under “Examples can be found at”, all universities found in the research having courses with subjects, techniques and approaches of interest were listed. The total number listed, or frequency of universities that associated with subjects taught and methods employed were used by these authors to help inform the research report Recommendations, Conclusions and the design of the Outline Course Modules in Appendix D.

Table 1 Subject Areas Covered on Universal Design Related Courses

Subject Areas	Human Abilities	Example(s) can be found at	Reference(s)
Human Diversity		Loughborough University, UK; Norwegian University of Science and Technology, Trondheim, School of Architecture; Norwich University, UK; Oslo School of Architecture, Norway; University College Dublin, Ireland; University of Diepenbeek, Belgium; University of Oregon, USA; Faculty of Architecture, University of Manitoba, Canada; University of Salford, UK;	LU 2009 Ronnevig 2002 Afacan 2006 Ronnevig 2002 Morrow 2001 Kennig and Ryhl 2002 Afacan 2006 Ringaert 2002 University of Salford 2009
Recognising multiple facets of identity (i.e. appreciation that a person's interaction with an environment		University of Oregon, USA;	Welch & Jones 2002

Subject Areas	Human Abilities	Example(s) can be found at	Reference(s)
may be equally influenced by factors such as ethnicity, gender, race, physical size)			
Every day living design		Loughborough University, UK; University of Diepenbeek, Belgium; University College Dublin, Ireland;	LU 2009 Kennig and Ryhl 2002 Morrow 2001
People-environment relationship		University of Diepenbeek, Belgium; University College Dublin, Ireland; University of Oregon, USA;	Kennig and Ryhl 2002 Morrow 2001 Afacan 2006
Human Abilities	Sensory abilities	Norwich University, UK; University College Dublin, Ireland; University of Diepenbeek, Belgium;	Afacan 2006 Morrow 2001a,b Kennig and Ryhl 2002
Human Abilities	Cognitive	University College Dublin, Ireland; University of Diepenbeek, Belgium;	Morrow 2001a,b Kennig and Ryhl 2002

Subject Areas	Human Abilities	Example(s) can be found at	Reference(s)
	abilities		
Human Abilities	Psychomotor abilities (e.g. fine motor skills, balance, reaction time)	University of Diepenbeek, Belgium;	Kennig and Ryhl 2002
Human dimensions and form; Ergonomics; Human Factors; Anthropometrics		Loughborough University, UK; Norwegian University of Science and Technology, Trondheim, School of Architecture; Norwich University, UK; Royal Danish Academy of Fine Arts, Copenhagen;	LU 2009 Ronnevig 2002 Afacan 2006 Kennig and Ryhl 2002
Lifespan Design		University of Oregon, USA;	Welch and Jones 2002

Table 2 Design Techniques Taught on Universal Design Related Courses

Design Techniques Taught	Specific Practice	Example(s) can be found at	Reference(s)
Seven Principles of Universal Design		University of Diepenbeek, Belgium; North Carolina State University, USA;	Kennig and Ryhl 2002 NCSU 2009
Design by Story Telling		University of Cambridge, UK	EDC 2009
Lifespan Design (design that addresses the changing needs of people at all stages of their life cycle)		University of Oregon; USA	Welch and Jones 2002
Persona		University of Cambridge, UK	EDC 2009
Extreme users		Royal College of Art Helen Hamlyn Centre, UK	HHC 2009
Simulations		University of Cambridge, UK University of Cincinnati, College of Design, Architecture, Art and Planning, USA; Faculty of Architecture, University of Manitoba, Canada;	EDC 2009 Preiser 2002 Ringaert 2002
User pyramid design approach		University of Cambridge, UK	EDC 2009

Design Techniques Taught	Specific Practice	Example(s) can be found at	Reference(s)
Design pattern analysis		University of Diepenbeek, Belgium;	Kennig and Ryhl 2002
Evaluation checklists		North Carolina State University, USA;	NCSU 2009
Post-design evaluation		Tama Art, Japan; Kansas State University, USA; North Carolina State University, USA; University of Diepenbeek, Belgium;	Kennig and Ryhl 2002 Afacan 2006 NCSU 2009 Kennig and Ryhl 2002
User engagement	Interviews	Tama Art, Japan;	Kennig and Ryhl 2002
User engagement	Focus groups	Royal College of Art Helen Hamlyn Centre, UK	HHC 2009
User engagement	Observational studies	Tama Art, Japan;	Kennig and Ryhl 2002
User engagement	Video recordings of users	Tama Art, Japan; Royal College of Art Helen Hamlyn Centre, UK	Kennig and Ryhl 2002 HHC 2009
Rehabilitation Design – designing for specific barriers or impairments		University of Cambridge, UK	EDC 2009

Table 3 Teaching Approach or Teaching Element Used on Universal Design Related Courses

Teaching Approach	Specific Method	Example(s) can be found at	Reference(s)
Lecture	Speaker	All	All
Workshop	Multiple presenters with discussion	University of Western Australia, Australia; Queensland University of Technology, Brisbane; Tama Art, Japan; University College Dublin, Ireland; North Carolina State University, USA; Technical University of Krakow, Poland;	Kennig and Ryhl 2002 Kennig and Ryhl 2002 Kennig and Ryhl 2002 Morrow 2001a,b NCSU 2009 Kennig and Ryhl 2002
Project	Directed student work	Tama Art, Japan; University College Dublin, Ireland; State University of New York at Buffalo, USA; University of Diepenbeek, Belgium;	Kennig and Ryhl 2002 Morrow 2001a,b Kennig and Ryhl 2002 Kennig and Ryhl 2002

Teaching Approach	Specific Method	Example(s) can be found at	Reference(s)
Design studio	<p data-bbox="775 220 1077 408">Student directed projects with dedicated support spaces and equipment.</p> <p data-bbox="775 456 1077 523">Includes formal student presentation.</p>	<p data-bbox="1104 220 1541 252">Kansas State University, USA;</p> <p data-bbox="1104 300 1272 331">Mackintosh</p> <p data-bbox="1104 379 1552 446">State University of New York at Buffalo, USA;</p> <p data-bbox="1104 494 1585 526">University College Dublin, Ireland;</p> <p data-bbox="1104 574 1608 606">University of Diepenbeek, Belgium;</p> <p data-bbox="1104 654 1496 686">University of Oregon, USA;</p>	<p data-bbox="1684 220 1865 252">Afacan 2006</p> <p data-bbox="1684 300 1865 331">Afacan 2006</p> <p data-bbox="1684 379 2000 411">Kennig and Ryhl 2002</p> <p data-bbox="1684 459 1921 491">Morrow 2001a,b</p> <p data-bbox="1684 539 2000 571">Kennig and Ryhl 2002</p> <p data-bbox="1684 619 2011 651">Welch and Jones 2002</p>

Teaching Approach	Specific Method	Example(s) can be found at	Reference(s)
External involvement	Community members (e.g. children, older people, people with disabilities)	North Carolina State University, USA; State University of New York at Buffalo, USA; Tama Art, Japan; University College Dublin, Ireland; University of Cincinnati, College of Design, Architecture, Art and Planning, USA; University of Diepenbeek, Belgium; Faculty of Architecture, University of Manitoba, Canada; University of Western Australia, Perth;	NCSU 2009 Kennig and Ryhl 2002 Kennig and Ryhl 2002 Morrow 2001a,b Preiser 2002 Kennig and Ryhl 2002 Ringaert 2002 Kennig and Ryhl 2002

Teaching Approach	Specific Method	Example(s) can be found at	Reference(s)
External involvement	Professionals – external people brought in to appraise or advise on student projects	<p>North Carolina State University, USA;</p> <p>Queensland University of Technology, Australia;</p> <p>State University of New York at Buffalo, USA;</p> <p>University of Cincinnati, College of Design, Architecture, Art and Planning, USA;</p> <p>University of Diepenbeek, Belgium;</p> <p>Faculty of Architecture, University of Manitoba, Canada;</p> <p>University of Oregon, USA;</p> <p>University of Western Australia, Australia;</p>	<p>NCSU 2009</p> <p>Kennig and Ryhl 2002</p> <p>Kennig and Ryhl 2002</p> <p>Preiser 2002</p> <p>Kennig and Ryhl 2002</p> <p>Ringaert 2002</p> <p>Welch and Jones 2002</p> <p>Kennig and Ryhl 2002</p>
Miscellaneous	Professionals – design appraisals, conducted by students, of design professionals' work	Architectural Association, UK;	Walker 2002
Miscellaneous	Simulation	<p>North Carolina State University, USA;</p> <p>University of Cambridge, UK;</p>	<p>NCSU 2009</p> <p>EDC 2009</p>

Teaching Approach	Specific Method	Example(s) can be found at	Reference(s)
Miscellaneous	Assistantships / Apprenticeships	North Carolina State University, USA; Tama Art, Japan; University College Dublin, Ireland; University of Diepenbeek, Belgium;	NCSU 2009 Kennig and Ryhl 2002 Morrow 2001a,b Kennig and Ryhl 2002
Miscellaneous	Use of multi-media in classroom	Virginia Polytechnic Institute, USA;	Afacan 2006

(Tables 1, 2 and 3 include courses titled as Universal Design and courses titled as related to Universal Design topics)

Strategies for Integrating Universal Design into Design Curricula

In a review of global efforts to incorporate Universal Design into architecture and design curricula, Kennig and Ryhl (2002) divided initiatives under two categories:

1. Initiatives to incorporate Universal Design into the design curriculum that were led by an individual or group of teachers at the faculty in question; and
2. Initiatives that were borne from a large-scale pilot or research project.

In their review of Universal Design teaching strategies, Kennig and Ryhl (2002) concluded that the probability of successful long-term integration of Universal Design on the curriculum of an academic institution, once the teaching project has been completed, is higher when the initiative was part of a larger project (i.e. category 2 listed above) and particularly when the project had been spread over several years.

The design and implementation of a “large-scale” initiative can be dependent on many variables related to the educational institution. The two following examples inform strategies on methods and frameworks for content and context when considering initiatives.

Whether part of a small-scale initiative or a larger project, three general methods of incorporating Universal Design into the design curriculum have been described (Welch and Jones, 2001; Morrow, 2001a,b; Afacan, 2006):

- Infusing Universal Design into an existing course;
- Infusing Universal Design into a studio problem;
- Infusing Universal Design into the entire curriculum.

Between 2001 and 2002, a Special Interest Group of Universal Design experts, built environment professionals and educators met to “develop a framework for teaching inclusive design within built environment courses in the UK” (CEBE, 2002). The Special Interest Group identified the following as “the key elements that lead to success” when teaching Universal Design, grouped under the headings of course content and course context:

Course Content

- The interrelationship between design quality, best practice and inclusive design are drawn and emphasised.
- Students come into direct contact with a varied range of user groups.
- Students are able to source and apply quantitative and qualitative information regarding the fit between humans and the built environment.
- Students are encouraged to develop inclusive methods of representation.

- The pragmatics of inclusive design are supported by a theoretical and critical framework.
- Personal experience is valued and positive attitudes towards all people in society are fostered.
- Students are aware of both benefits and obstacles of inclusive design.
- The complexity of inclusive design is understood and accepted.

Course Context

- Inclusive design principles are integrated from an early stage and are a substantial part of the curriculum.
- Courses adopt an interdisciplinary and multi-professional approach.
- Inclusive design is supported by alternative pedagogies and explicitly valued by appropriate modes of assessment.
- Continual Professional Development (CPD) is understood as essential to sustaining inclusive design practice.
- Courses are delivered by people who are fully aware of inclusive design principles.

Understanding Why Universal Design Is *Not* Taught

A recent survey of built environment institutions (De Cauwer et al., 2009) aimed to understand why the design philosophy was not being taught, ultimately to inform future implementation and to maximise success. The following four issues were provided by interviewees as reasons for **not** teaching Universal Design:

- The concept is still viewed with scepticism. It is seen as “rather unscientific” and “utopian”.
- Universal Design was perceived as getting in the way of “the development of the necessary knowledge and skills”.
- A lack of time to teach Universal Design on an already full curriculum. It would “either overload the programme unnecessarily or imply dropping other topics”.
- Universal Design was perceived as a small part of a larger issue of “accessibility and other standards imposed by the authorities”.

Whereas Universal Design seeks to provide for universal accessibility by all users of an environment, the related discipline of Sustainable Design seeks to provide for long lasting design with the least environmental impact. Interestingly, similar attitude based barriers have been encountered (Leal Filho 2000; and see Thomas, 2004) during attempts to incorporate sustainability on design curricula:

- The subject is unclear and too broad.
- Lack of personnel with expertise on the subject.

- A lack of resources prevents it from being included on the curriculum.
- Sustainability lacks a scientific basis.

The general approaches for incorporating sustainability or sustainable design have been identified (Dyer, 1996; Woods, 1994; from Thomas, 2004) and are similar to those applied in Universal Design teaching:

- Introducing environmental or sustainability issues on an existing course;
- Development of a stand-alone course on the subject;
- Infusing environmental or sustainability issues into all courses, so an understanding is developed in the context of the discipline, the programme, and the course material.

Chapter 3: Findings from the Primary Research: Exploring Universal Design Teaching at Trinity College Dublin and Universal Design in Practice at Trinity College Dublin (TCD)

Background and Methodology

Trinity College Dublin was selected as the research site for this study as it contains a wide variety of programmes and a strong basis in Engineering including a history of teaching Universal Design. Additionally, it operates under significant policy related to accessibility in its facilities and offerings.

In order to determine the degree to which Universal design is included in Trinity College Dublin curricula, interviews were carried out across a range of academics. Representatives from Engineering, Computer Science, School of Business, Occupational Therapy and Physiotherapy were interviewed. These 10 interviewees were academic staff with lecturing hours.

The goal of the consultation was to gather opinions, attitudes, practices and outcomes related to increasing the profile of Universal Design thinking in the teaching of design. A semi-structured questionnaire was developed to guide the interview process (see Appendix A).

Qualitative data was collected through confidential, recorded face-to-face, in-depth interviews. The interviews lasted approximately 40 minutes each. The respondents were given background information on the purpose and the sponsor of the research.

The interview questionnaire focused on:

- Understanding of Universal Design
- Introduction of Universal Design to Curriculum
- Current Universal Design Teaching
- Future Universal Design Teaching

Discussions were also held with 5 representative European experts in the field of Universal Design. These discussions were non-structured but covered the same material as the formal interviews held with Trinity College Dublin academic staff. The findings from the experts are reported here, alongside the results of the Trinity College Dublin staff findings. Selected quotations from the interviews and discussions can be found in Appendix B.

Additionally, the responses of the Director of Graduate Studies of one School, the Disability Services Office and the Director of Trinity College Dublin's Centre for Academic Practice and Student Learning (CAPSL) were also collected. Trinity College Dublin policy and practices documents relevant to Universal Design in the campus Built Environment, Web Accessibility and

Student Services were also reviewed. A summary of the excerpts from the questionnaire sections relevant to Universal Design policy at Trinity College Dublin is provided in Appendix C.

Findings and Discussion from Primary Research

Universal Design Practice at Trinity College Dublin

Trinity College Dublin has policy and programmes in place to address Universal Design in the campus Built Environment, Web Accessibility and Student Services. The terminology associated with the activities of these areas of policy, programmes and practices associate closely with accessibility and diversity. The degree of understanding of Universal Design in these practices was not determined although there appeared to be a strong focus on disability.

Defining Universal Design and Shaping Universal Design Teaching

A key issue identified in the primary research was the need to define and shape what exactly is meant by Universal Design and what exactly teaching Universal Design should involve. There were disparities in the understanding of the term Universal Design among respondents. Therefore it can be supposed that these disparities will be passed on to students, both in their understanding of Universal Design and in how it should be applied. It was apparent from the primary research that discussion around the subject of Universal Design remains largely disability-focused.

Irish legislation (Disability Act, 2005) defines Universal Design as:

- (a) the design and composition of an environment so that it may be accessed, understood and used – (i) to the greatest practicable extent, (ii) in the most independent and natural manner possible, (iii) in the widest possible range of situations, and (iv) without the need for adaptation, modification, assistive devices or specialised solutions, by persons of any age or size or having any particular physical, sensory, mental health or intellectual ability or disability, and (b) means, in relation to electronic systems, any electronics-based process of creating products, services or systems so that they may be used by any person.

The key points from this definition are – “regardless of age, size, ability or disability”. Interestingly, age was only mentioned once in the interviews, and this referred to “older people” (i.e. age in a narrower disability-related context and not age in the broadest sense of the term to include all ages). Size was not highlighted at all in the interviews. Furthermore, wider concepts related to Universal Design as per other jurisdictions were not discussed, for example, consideration of gender, culture, nationality, educational background, socio-economic status, etc. However, engaging with people with disabilities during the design process is only one aspect of Universal Design. Therefore it is

important to include a wide range of users, apply user-centred methodologies, and the focus should look beyond disability.

The Importance of Universal Design Champions

The primary research highlighted the importance of individuals in driving Universal Design teaching at third level. These may be individuals with experience on how accessibility problems and barriers negatively impact a wide range of people. Knowledge of Universal Design and its application in curricula can reside with individual teachers that champion or prioritise Universal Design as a topic of importance.

The Importance of Communication and Collaboration between Disciplines

The uptake of Universal Design by teachers from a wide range of disciplines was highlighted by a number of respondents as a necessary future strategy for implementing Universal Design. One example suggested the potential for collaboration among teachers involved with medical professionals, physicists and engineers to work together on solving a design problem. Another example included the potential for communication between design professionals and occupational therapists or speech and language therapists.

Lack of Resources

Limitations in resources were perceived as being a barrier to further expansion of Universal Design teaching. Lack of funding and lack of room on the curriculum were highlighted as issues.

Chapter 4: Discussion and Recommendations

Barriers to Uptake of Universal Design

The concept of Universal Design was introduced over twenty years ago (Mace, 1985). Uptake by the design industry has been supported by a considerable amount of quality research from respected researchers and designers (e.g. see Preiser & Ostroff, 2001), but it has been slow and uneven (Duncan, 2007).

Factors contributing to this slow uptake may include an established industry practice of designing mainstream products targeted to the so-called 'typical' user (Klironomos et al., 2006; Story et al, 1998), the design industry and education system being slow by nature to respond to new influences and movements (Keates et al. 2000; Morrow, 2001b), and a failure to make the study of people's needs an explicit part of a design course (Morrow, 2001b).

Defining what can be Classified as Universal Design on Design Curricula

Confusion exists within the design industry as to what exactly Universal Design is. For example, a designer who successfully meets the minimum requirements of Accessible Design Standards might be under the misconception that that this is synonymous with Universal Design (Ostroff, 2001).

From Tables 1-3 it can be seen that Universal Design teaching varies considerably between institutions. Many subjects that are taught as "Universal Design" can in fact be named as separate design approaches or subjects: for example usability or ergonomics, and so on. All are in the spirit of Universal Design, however all existed before the term "Universal Design" was even coined (Mace, 1985). In some cases it is seen that design work focuses on solving for specific limitations to eliminate barriers with limited priority to address the wider population that may also be impacted by the same design need.

Consider how three different courses could list "Universal Design" as part of their curriculum: one that teaches usability and ergonomics, the second that brings design students in contact with people with disabilities during the course of a design project, and the third that provides a lecture in first year on diverse needs of people. All three are valid examples of teaching Universal Design techniques, but are all three equally effective? In what context or design stage is which technique most effective? And are these examples sufficiently informed to incorporate the diverse factors across a range of age, size, abilities and disability?

Many disciplines can benefit from being more informed on Universal Design. Effective application in different disciplines may require that specific goals and objectives be identified and that tailored approaches are prepared for each.

Therefore a need exists to define exactly what is meant by Universal Design (Inclusive Design, Design for All, etc.) to ensure that it is in fact being taught in an accurate and optimal way. If Universal Design is simply an adoption of design approaches that consider the diverse needs of populations, this needs to be stated. Otherwise the same subjects will be taught under different guises and the adoption or recognition of the Universal Design philosophy will be diluted.

Advancing Universal Design

Introducing and furthering Universal Design will likely be optimised from both a top down and bottom up approach. From the top (push), government can further promote practices that incorporate Universal Design solutions for its constituents. Promoting and applying Universal Design thinking in public endeavours can be a way toward cost savings and maximum positive impact. Examples of good practice in government projects and procurement can be prepared as models to inform the preparation of resources to further enable Universal Design education.

The end user or consumer may best drive a bottom up (pull) approach as people become more able to recognise Universal Design in the choices they make. A combination of consumer interest and market response has the potential to drive the need for Universal Design. Manufacturers will respond with requirements for designers to apply Universal Design in their practice. More large corporations will seek staff with abilities to apply Universal Design in their organisations.

Both government and consumers are in a position to further Universal Design in a practical way. To accomplish this will require that more people in decision making positions are informed about the potential benefits of Universal Design and how to realise it. Knowledge on Universal Design can be facilitated through government initiatives and educational endeavours. Key experts can be prepared with the ability to apply and communicate research findings and evidence from successful examples of Universal Design. Exemplars of best practice achieving desired outcomes can be disseminated among public outlets. Universal Design will be more likely to advance if taught so as to demonstrate its advantages in many disciplines rather than by focusing too much on disability.

Attitudes of Designers, Design Teachers and other relevant Stakeholders

Universal Design does not intend to stifle creativity and artistic expression in any way. The skills and natural talent of designers should be harnessed to

create design solutions that are accessible and usable, and also desirable. However, there is a tendency to associate Universal Design with accessibility standards and building codes (Ostroff 2001), which likely contributes to negative attitudes towards the design philosophy.

The UK's Centre for Education and the Built Environment (CEBE, 2002) described Universal Design as "an attitude that needs to be promoted". Attitudes influence – and often determine – how people behave (Schafer & Tait, 1986). A survey of industry attitudes towards Universal Design identified the following (Keates et al. 2000):

- Members of industry were willing to implement Universal Design as long as:
 - It was either easy to do or that a consultancy would do it for them.
 - It did not increase the cost of the product or service.
- There did not appear to be widespread acceptance of the need for Universal Design training programmes for designers.
- There did not appear to be widespread appreciation of the potential increased market of more accessible products.
- There was a common misconception that Universal Design is another name for design for elderly and disabled people.

A designer's attitude can potentially be influenced by factors such as his/her expertise, personal motivations, tendency to conform to the social norm and by his/her view of other designers which he/she respect and admire. The attitudes of teachers at early stages of training, the attitudes of mentors or supervisors, and the attitudes and actions of professional bodies representing designers are likely to all shape an individual's entire design ethos.

Transfer of Knowledge

"Many professional architects would attest to the great divide between what is taught in university and what must be known to practice." (Heylighen, 2008). In the Architecture Industry, a lack of communication between practitioners and academics has been reported (Watson and Grondzik, 1997; Neuckermans, 2004; Heylighen, 2008). It is claimed that knowledge and findings from Architectural research are not necessarily being successfully transferred to practicing architects (Neuckermans, 2004). And some architects in practice are surprised to hear of the existence of PhDs in Architecture (Khemlani, 2005).

The author found no discussion as to whether or not research findings are at least being transferred to teachers of Architecture. If this was the case, at least undergraduate and more recently qualified architects could benefit from this newly discovered knowledge.

Perhaps of more concern, however, is the apparent lack of communication from practising architects back into design education (Heylighen, 2008). It has been suggested, that the profession “tends to be highly secretive” (Heylighen et al. 2007) and that there has been a failure to develop a common architectural “language” (Habraken, 1997), both of which appear to influence sharing of information and dissemination of innovative design solutions.

It is also generally understood that some industry and commercial entities have developed very strong abilities to accomplish Universal Design although much of this knowledge is held as proprietary and may not be readily available to inform or apply to education initiatives. There appears to be potential for the design industry (comprising both academic and professional designers) to learn from the medical and law profession models: building an evidence base of designing practices and exploring methods of recording and disseminating information (a) between designers (b) from professional designers back into academia, and (c) from teachers in academia to design students.

The Role of Design Organisations and Academic Bodies

SEEDesign (an EU-funded project, comprising major design organisations representing six European countries) aimed to “improve the effectiveness of the support provided for local SMEs relating to design issues in Europe, creating a network for the dissemination of good practices on this field” (SEEDesign, 2009). The project consortium recommended (SEEDesign, 2007) that policy makers “stimulate design education on various levels, from primary school to postgraduate courses, and ensure that education is focused on the demands and needs of the local economy”. They highlighted the need to “coordinate the various stakeholders in education, industry and government involved in design activities so they work towards common objectives”.

The former president of the Royal Institute of British Architects (RIBA) highlighted the need for RIBA to build up and disseminate the Architecture profession’s body of knowledge and its responsibility in transmitting it to succeeding generations of architects (Duffy, 1997). Accordingly it has been suggested that professional institutes could potentially act as “vital allies in sharing the knowledge available—and thus in catalysing sustainable and inclusive design” (Heylighen, 2008). The role of design organisations and academic institutions and the manner in which these organisations communicate and share information are critical to the optimal implementation of Universal Design across design curricula generally.

Next Step - Recommendations

It was found that some of the educational content that is necessary for a working knowledge of Universal Design can be integrated into general design education, relevant to many fields of design. Although, extensive specific courses of study for those individuals who want to specialise in Universal Design are not available unless individually arranged.

For the majority of designers that may be focused on design issues such as environmental impact, conservation of heritage, aesthetics, energy efficiency, etc. as their particular area of interest or study must be shown that Universal Design is a very important and should be a part of all of these courses. However, before this can be done, courses specifically on Universal Design should be developed so they can then be disseminated (either in part or in whole) to other courses.

Overall successful implementation of Universal Design in education requires:

- Support for and promotion of Universal Design from those individuals and organisations in a position to change the attitudes of designers, including professional design organisations (e.g. RIAI, Engineers Ireland), respected teachers and public figures in the built environment design community, and directors and managers of design firms who are in the public eye.
- Preparation of Universal Design curriculum materials by a consortium of experts for use among a range of levels and disciplines.
- Expert preparation of key individuals as trainers of Universal Design teachers.
- Training for academic staff and teachers of Universal Design, to ensure it is being taught accurately and effectively and to ensure the course content is up to date and of the highest quality.
- Practical support (i.e. in the form of finances, time, resources) for staff in academic institutions to incorporate Universal Design into their curriculum.

Universal Design teaching should include:

- A combined theoretical and practical approach.
- Ideally as part of a larger project or initiative (and therefore not dependent upon an individual and at risk of being lost if that individual leaves the institution).
- Should be integrated at an early stage of curriculum development.
- Should be taught both at early stages of third level education (undergraduate) as well as continuous professional development.
- Subjects and skills covered on a course should include:
 - Terminology and definitions
 - Human abilities and behaviour.
 - Quantitative data such as anthropometrics and statistics on demographics.
 - Methods of user-designer or community-designer engagement or observation.
 - Cognitive, sensory and physical human factors in design.
 - Functionality and desirability.
 - Inclusive communication of information.

- Selected design techniques such as inclusive design process tools.

Approach for content at different levels (Sample Universal Design Course Outlines)

The aforementioned subjects and skills list may be presented at any level or stage of interaction with students being taught about Universal Design. It is recognised although that prioritisation and time allocations for content subsets will differ depending on the level of student experience. In Appendix D is an example of an Early Stage course module on Universal Design that could be embedded into a program of engineering or related coursework. Parts of this content, as per an overall agreed plan of approach, should be used and repeated at different stages of the coursework. An overview of this “granular” approach can be seen in the CEN Workshop Agreement Draft “Curriculum for training professionals in Universal Design” (CEN, in preparation), which is currently under development.

An early stage exposure to Universal Design may be a single lecture as part of an introductory module. Content for first year engineering students should prioritise initial understanding based on examples of good and bad design. Of key importance would be to provide context that closely relates to what is familiar to the student (current technology), as a way to prompt interest and initiate commitment to the subject. Important at this early stage is to introduce the concept of human diversity and ranges of abilities. Drivers related to related legal requirements for Universal Design and how this will impact on the future roles of the students should be covered. The general structure of Universal Design can then be discussed through its overarching principles and guidelines, with exposure to user participation practices and its associated design selection criteria techniques. A key objective would be that this content be considered by the students for use in all areas of their studies.

At a later stage or final year level, a more practical approach to learning and applying the practices of Universal Design in final projects, masters work or industry collaborations would be expected (Appendix D, Later Stage module). Based on a workable understanding of Universal Design, the priority here would be on utilising some of the recognised tools and techniques in the course project work related to the student’s area of specialisation. For example, the student’s research would reflect a wide range of user factors, abilities and requirements. Their methods would engage user participation and their design process would apply tools and techniques for ensuring universal design solutions. The outputs of their work would represent use of applicable standards and specialised technologies. Their later stage study and application of Universal Design is assumed to be project based and facilitated through involvement with a laboratory, studio or field study environment.

The Early Stage and Later Stage sample draft module outlines for teaching Universal Design found in Appendix D are structured on a Trinity College Dublin course outline format. They are structured under the heading of Course

Organisation, Course Description, Learning Outcomes, Course Syllabus (with content outlines and project examples), Recommended Text, Teaching Strategies and Assessment Modes.

Summary

The United Nations has recognised Universal Design as critical to shaping inclusive and sustainable environments. The Council of Europe highlighted the need for member states to incorporate Universal Design throughout all design professions. In Ireland, the Disability Act 2005 provided for the establishment of a Centre for Excellence in Universal Design in the National Disability Authority, with a primary purpose of promoting standards, education and awareness of Universal Design on a national level.

A review of international Universal Design teaching was conducted. Primary research was carried out in the form of interviews with third level teachers in Trinity College Dublin to help form an overview of Universal Design teaching at undergraduate and postgraduate levels. On the basis of these findings outline curriculum modules were developed for use in early stage introduction approaches as well as a later stage practical approach module outline.

The recommended outline modules include introduction to social, economic, legislative and business rationale for Universal Design. The practical aspects of the Universal Design modules include methods of engaging with users, the application of Universal Design principles to design projects and the use of selected design tools and techniques and approaches to engage industry collaborations.

Different pedagogical approaches were found in the teaching of Universal Design including, lectures, workshops, seminars and design project based activities. However, there is no evidence of a comparative study that definitively establishes a guideline of best practice in the teaching of Universal Design. In addition, no study was found that determined the overall effectiveness of teaching Universal Design in third level institutions. Therefore, it could not be established in the present study that graduates practice Universal Design in their careers.

The identification or creation of Universal Design experts at various levels appears to be necessary to the introduction and further application of Universal Design principles in academic curricula. Further research is required to inform how best to teach Universal Design for students in different disciplines. Research will also be needed to examine how best to assess Universal Design content and competencies in exams, awards and associated accreditations. In particular, additional research is needed to examine the teaching approaches that lead to embedding Universal Design principles and processes across a range of courses and to ensure that they lead to utilisation of the knowledge in professional practice after graduation.

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Appendix A: Questionnaire

This Topic Guide was used during the course of the primary research

(Interviews with staff members in Trinity College Dublin on Universal Design (UD) teaching at Trinity College Dublin)

Background

- Reason for doing the study
- Sponsor of the study
- Confidentiality

Respondent Profile

- Role and responsibilities
- How long in current position
- Length of time in teaching

Understanding of UD

- What do you understand by UD?
 - What does it include/what not?
 - How is it the same/different from Inclusive Design?
 - How important is UD? Why do you say this?
 - Who is it important to? Why?
- Agree common definition / understanding of UD

Introduction of UD to Curricula

- Why did you decide to include UD in curricula?
 - When did this happen?
 - Who had a main influence in the decision?
 - What were the key motivations?
- How easy/difficult was the introduction of UD in the curricula?
 - What were the barriers/obstacles? How were they overcome?
 - What were the key selling points? Why was it easy to introduce UD?
 - What was the initial level of interest/take up by students?
 - How was UD sold to them?
 - Could students easily see the benefits? Which? & Why?
 - Exactly what process was involved in introducing UD in the curricula?
 - Is this process unique to faculty/TCD?

Current UD Teaching

- In which courses/modules is UD taught?

- Why?
- What are the benefits/gains?
- Who made that decision?
- How much time is allocated to UD?
 - Has this changed since the introduction of UD? Why?
- Exactly what's the content?
 - Unprompted response, then probe with list
 - Again, has the content ever been changed? Why?
- What teaching methods are being used?
 - Why?
 - What works well, what not so well?
 - Have the teaching methods ever been changed? Why?
- How are students assessed?
 - How important is re their overall result?

Future UD Teaching

- Is there any scope to expand UD teaching?
 - Same course/module?
 - Different courses/modules?
 - Are there currently any gaps in UD teaching?
- What would be the value/benefit of further UD teaching?
 - To students
 - Lecturers
 - TCD
 - Industry
 - Consumers?
- Is this something you have considered already?
 - Can you make any suggestions/recommendations of how to increase the level of UD teaching in TCD/Ireland?
- What might encourage further UD teaching?
- What do you see as the main barriers to more UD teaching?
- Are there any other up and coming areas in design that will increase in importance over the next few years? Which and why?
- How can it be ensured that UD remains important?
 - Who needs to push UD so that that it is/remains on the agenda? Why do you say this?

Final Comments

- Is there anything else you would like to add?
- Is there anything else about UD and the teaching of UD (here in TCD) that we have not covered and would be useful for me to understand?
- Is there anyone else you think I should talk to as part of this survey? Who & why?

Thank You & Close

Appendix B: Questionnaire Responses Excerpts and Discussion

Understanding of Universal Design

All interviewees who participated in the survey were aware of the term Universal Design. This is to be expected as the selection process for interviewees was that they work in disciplines that have some element of design or accessibility.

This definition of Universal Design is a summary of what most said it means to them:

“Designing Products, Services and Processes so that they are accessible to people of all backgrounds and abilities, without adaptation”

Terms such as Environments, Buildings, Communications Procedures and Organisations were also included in the definition by some of the respondents.

Only one interviewee considered that it is:

“... design taking into account accessibility issues for people of various disabilities.”

This is in direct contradiction to the interviewee who said:

“..it is not disability or accessibility design”

What is interesting about these two respondents opposing viewpoints is that they are members of the academic staff in the same School.

It appeared from the sample interviewed, that if an individual has no direct contact with accessibility, either personally or by professional association, they appear to associate Universal Design as design for:

“Not the mainstream”

While those working with people of restricted accessibility said:

“If you design for the slowest or the weakest person or the person with difficulty moving then you design for everybody”

All but one interview respondent regarded the terms Inclusive Design, Design for All, User Centred Design and Universal Design as synonymous. While the remaining respondent was of the opinion that Inclusive Design addresses the

average and a few typical profiles that are non-average and that: “Universal Design pushes the envelope morewith Universal Design we cater for all”

When asked about the importance of Universal Design it was unanimously believed to be important: “Absolutely” and “it is essential”

One respondent qualified this with: “It is important to everyone here (TCD) bearing in mind the legislative background. We are bound by various acts – 2004, 2002”

When asked who Universal Design is important to, the respondents provided a range of responses:

“It is most important to disabled people and people with a vested interest in disability”

“Any programme with a significant design component”

“It is important economically because we are designing for our future selves”

“Everybody, it is not just older people or people with disabilities. It is also people who have transient difficulty with movement. It is important to design with everyone in mind”

Most respondents agreed that it was important because it is important to design for everybody. But there were two interviewees with more specific opinions on why Universal Design is important:

“We are living longer and therefore are a little more infirmed and so we will need these kinds of things and it’s cheaper in the long term. It takes more forethought but it is cheaper because trying to maintain 2 parallel universes; 1 for the “average” and 1 for people with various disabilities and impairments is too expensive. So it is cheaper to be inclusive from the word go but it is harder”

“Good design does not affect the eco system and is affordable and is as usable by as many people as possible.”

Introduction of Universal Design to Curricula

The interview respondents who currently include Universal Design on their curriculum were asked how and why it was included. According to the respondents, where Universal Design is included in the curriculum, the individual teaching the subject was instrumental in having it included. One of the lectures did say that the key motivation for including Universal Design in the curriculum was that:

“I don't want to be encountering these barriers”

This respondent also expressed the same motivational drive as all other respondents: that including Universal Design on the curriculum results in better engineers and better designed environments.

When asked about student responses to the Universal Design course content, one respondent involved in the teaching of Occupational Therapy said:

“They love the course, we have done a fair bit of evaluation of it and we have always had really positive feedback for it. They do seem to take it on. We set specific examine questions on Universal Design when we had written exams and they were generally fairly well answered”

While a respondent involved in Engineering teaching said:

“When I started out, engineering students tended to dismiss things that can't be captured in an equation. So, to a large degree it was a question of this is all touchy feely stuff and we'll have to write an answer to an essay in an exam and forget all about it. And that will be that box ticked and we can continue in our narrow little world. But it has changed over the last couple of years. I'm getting increasing numbers of people actually doing serious bit of coursework. I get them to write an essay that will either design something new or redesign something existing and we begin to see the little grey cells ticking over and actually addressing the issue and coming up with things that are more usable. And they are getting involved.”

Current Universal Design Teaching at Trinity College Dublin

There is a specific Universal Design component in the curricula of both the Engineering and the Occupational Therapy undergraduate courses. Both courses have been running for 5 years.

In Occupational Therapy there is a lecture and workshop series of 2 hour workshops that are linked together. Students do case study work and group study work in the seminars.

The current assessment is based on the student's portfolio made up of worksheets produced for each time. There is no longer a written essay because students work their way through.

Feedback from lecturer: “A couple of them do quite well and I found with accessibility audits particularly they have done well.”

In Engineering, students have 4 contact hours of formal lectures, outside reading and an essay. This has not changed over time.

Assessment: There is a multiple-choice exam with a number of questions on Universal Design and a question based around the coursework. The coursework is not obligatory but the exam question is. You do not have to pass the question to pass the exam.

Feedback from lecturer: “take up was poor in the beginning but now it is getting big. I would say 50% do it and 40% do coursework.”

Future Universal Design Teaching in Trinity College Dublin

When asked if there was scope for expanding Universal Design teaching at Trinity College Dublin, one respondent said:

“There are too many things competing in the curriculum... I would be in favour of doing design and just leaving Universal Design as part of that. I would not separate Universal Design from design”

All other respondents said that it would be beneficial to have Universal Design taught more extensively in Trinity College Dublin.

Responses on how to the expand Universal Design teaching on the respective curricula included:

“The School of Engineering is moving to semesters and modularisation and revisiting the way engineering is taught. One option is introducing required humanities options in each year to expose students to the ways that non engineers think and present information and ideas. Also the design modules which are quite a departure from traditional teaching are being reassessed. Therefore it would be useful to integrate Universal Design into a practical design activity, to front load a design project with surveys, a literature survey and a user survey before students put concept to paper. Lectures would be minimised and assessing user requirements would be a priority.”

“In Physiotherapy there is opportunity to look at the undergraduate [curriculum]. This is accredited by a specialist body so it cannot be changed completely. But there is an opportunity to look at it differently.”

The importance of a Universal Design champion was highlighted by one respondent:

“[Expanding Universal Design teaching] requires a dedicated lecturer specialising in Universal Design because it is a departure

from the way design is taught, and because you would need a champion of it and whether that champion would have to do it all or they infused that enthusiasm into others, it would be a time-intensive thing to do and a lot of lectures would resist that level of loading.”

When asked what form Universal Design teaching should take, one respondent made the point:

“An intensive course is a good idea but it can be very difficult for timetabling getting everyone in the same room for a solid 2 weeks. It might work really well every Friday afternoon in one term. With advance planning this can be fitted in the timetable. If the course is only over two weeks you will only get surface learning because people don’t have time to go and reflect....The benefit with a 2 week module is that it can be opened to industry”.

Communication between disciplines was highlighted by a number of respondents as important:

“There needs to be more awareness built into all disciplines, so that the graduates of those disciplines can come together in an innovative way. So 2/3 years from graduation a medic, a physicist and engineer might think to come together to solve a problem.”

“More collaboration would be great, particularly in aspects of engineering, physiotherapy, Occupational Therapy, speech and language so that all the different aspects can come together to look at the issues.”

“Having an element of Universal Design in all the final year courses such as engineering, psychology and other disciplines.”

“In Physiotherapy Universal Design would fit in very, very well in a future general interdisciplinary taught masters programme that covers disability and rehabilitation. A high level masters programme that would look at rehabilitation models, Organisational behaviour and some high level topics and a module on Universal Design would be something that would be very helpful. A masters level in rehabilitation would meet the needs of people who want to specialise in physical medicine and rehabilitation. And that would potentially cross Physicians, Physiotherapists, Occupational Therapists, Speech and Language Therapists, Psychologists, etc.”

When asked who would benefit from more extensive Universal Design teaching most respondents said that this would benefit end users. No respondent mentioned a benefit to Trinity College Dublin.

One respondent said it would be of benefit to: “the graduates but most lecturers would see it as a burden”.

When asked what might encourage expanding Universal Design teaching, responses included:

- Funding
 - “if there is money out there backing Universal Design then it will expand but at the moment, money is backing nano, money is backing bio.”
- Legislation
- Growing Pressure From Industry
- Collaboration
- Awareness
- Push By Economists
- Push by Insurance Companies

When asked to identify the main barriers to introducing Universal Design on the curriculum, respondents identified the following:

- Lack of skills and knowledge required to teach it
- Limited resources
- A lack of perceived need “Maybe you would need to educate people to understand that there is a need to know more about this. There might be a sense of “what’s that got to do with me?”, that’s the designers and the architects and the IT people and the people who do the systems and structures”.

Appendix C: Universal Design in Trinity College Dublin Policy

The term Universal Design, or related terminology, is used in a number of Trinity College Dublin policy statements.

The College mission statement itself states: “The College is committed to excellence in both research and teaching, to the enhancement of the learning experience of each of its students and to an inclusive College community with equality of access for all.”

Built Environment

In line with the College’s mission statement, in the TCD Strategic Plan of 2006 it was stated that: “Universal design principles in planning the development of our physical facilities will be adopted as far as possible and we will aim to improve physical access to our College buildings”. The design of new buildings for TCD must comply with the principles of Universal Design. It is the

College's goal to promote the design of products, environments and communications to be as usable by all people to the greatest extent possible without the need for adaptation or specialised design.

Section 2.5 of the College's Development Control Plan (DCP) states: "where possible and practical, both internal and external areas of College should incorporate wheelchair access. In the case of new buildings and landscaped areas, this access should be incorporated into the original designs."

Whenever possible, arrangements are made to ensure that students with disabilities have full and similar access to the same facilities for study and recreation as the rest of the University community.

There is a Special Needs Committee that provides guidance in these matters and a formal channel for raising issues affecting students with disabilities. From the available information it is not clear to what extent this policy is implemented.

Web Accessibility

The College has a policy statement on Web Accessibility:

"The College website aims to be accessible to all users including people with disabilities for whom the internet can be a very valuable communication and information tool. Technical tools are constantly being developed and refined which convert text on web pages to the spoken word and thereby make information accessible to people with disabilities, particularly those with visual impairment and reading difficulties. The degree to which web pages are accessible to users with disabilities is defined in terms of priority levels (Web Accessibility Initiative - WAI) and all new websites within the College website are required to be universally accessible at priority levels 1 and 2 except in very exceptional circumstances. Those responsible for existing College websites will be encouraged to make the changes necessary to achieve accessibility at this minimum level. It is strongly recommended that websites should be developed with a view to achieving accessibility at priority level 3."

Website templates are provided by the Web Office in the College the meet the requirement for Web Accessibility Level 2 Priority. See Appendix B – TCD Web Accessibility.

Student Services

An on-going task of the heads of all student services is to "identify issues of concern to non-traditional students and develop a series of interventions which may include Universal Design, curriculum development initiatives etc. to encourage greater responsiveness by staff and students". The Disability Service and The Centre for Academic Practice and Student Learning (CAPSL)

are the two student services that are most active in the area of accessibility, most relevant to Universal Design.

The Disability Service aims to provide appropriate advice, support and information to help staff, students and potential students of the College with disabilities.

CAPSL assist the College in developing a framework for supporting best academic practice and the highest quality of student learning.

CASPL run 'The Inclusive Curriculum Project', a 3 year project funded from the Strategic Innovation Fund for a project titled 'Auditing the Curriculum for Diversity'. This project will provide tools to assist in identifying potential barriers to learning within curriculum design whilst linking to appropriate enabling strategies. This project will assist the academic community in developing a more inclusive approach to the design of teaching, learning and assessment strategies that will enable students from non-traditional learning backgrounds to participate more fully in Higher Education. The development of this project is a partnership between the Disability Service, CAPSL, access initiatives in College and the academic community.

Appendix D: Universal Design Draft Course Outlines (Modelled on the Trinity College Dublin course outline format)

1. Early stage module (e.g. first year of course)
2. Later stage module (e.g. final year of course)

1. Universal Design - Early Stage Module: (Lecture)

Lecturers: [insert names]

Course Organisation

This optional course runs for the XX weeks of XX Term. It normally comprises X lectures per week. In addition, students have a number of assignments based on X site visits, X workshops and X laboratory sessions.

Term	Start Week	Hours of Associated Practical Sessions	End Week	Lectures		Tutorials	
				Per Week	Total	Per Week	Total

XXX	x	X	x	x	xx	x	x
Total Contact Hours: xx							

Course Description

The module provides a detailed introduction to the Universal Design philosophy and a theoretical understanding of design tools and techniques.

In a growing and aging society, where the need for sustainable (both social and environmental) design solutions is critical, Universal Design has been accepted globally as a means of meeting existing and future needs. More than a set of practical design rules or prescriptive design guidelines, Universal Design is a way of thinking, requiring the designer to consider the consequences of design, and placing the needs of all people at the very heart of the process.

The background will include an overview of the Seven Principles of Universal Design, stressing that these merely act as a starting point. The rationale for Universal Design will include social, economic, legislative and business cases. Recent advancements and developments taken from related fields (including ergonomics, usability engineering, user centred design, health and safety research, software engineering, etc.) will provide a more practical understanding of the evolving design approach.

Learning Outcomes

On completion of this course, the student will:

- Be familiar with, and have a theoretical understanding of Universal Design as it is applied in engineering;
- Have a complete understanding of the legislative requirements for Universal Design;
- Have a complete understanding of the business and social benefits of Universal Design;
- Be aware of the development and application of new research concepts and advances in the field;
- Appreciate the benefit of consulting with end users.

Course Syllabus

Universal Design introduction

- Background

- Legislative Requirements
- Business case - benefits for designer or design firm
- Economic case - benefits for e.g. Irish industry and Government spending
- Social case - e.g. aging society, ability as a continuum, human rights and equality
- Relationship to the Sustainability agenda

Universal Design approaches

- Human Diversity
- User engagement
- User-centred design tools and techniques - personas, focus groups, user consultation, task analysis, simulation, post design evaluation
- Expanding from designing for a sample of representative users toward truly designing for all people
- Design for cognitive, sensory and physical human factors

Application of Universal Design in Engineering

- Stages of design (how Universal Design fits into design steps)
- The engineer, the end user, and the design stakeholders

Design research

- Understanding research publications
- Evidence-based design research
- Related guidelines and standards

Case studies

- Built Environment
- Products
- Services
- Information and Communication Technologies (ICT)

Recommended Texts

- Universal Design Handbook: Preiser and Ostroff
- Building for Everyone 2010: National Disability Authority, Ireland.
- Inclusive Design for the Population: Keates and Clarkson
- Countering Design Exclusion: Keates and Clarkson

- Centre for Excellence in Universal Design website www.universaldesign.ie

Teaching Strategies

The teaching strategy is lectures and tutorials. These are designed to provide the student with a sound knowledge of the theory behind Universal Design.

Assessment Modes

70% of the assessment is due to a two hour examination held during Trinity Term. The remaining 30% is allocated for continuous assessment of tutorial activities.

2. Universal Design - Later Stage Module (Laboratory / Studio)

Lecturers: [insert names]

Preferred Prerequisite: Universal Design – Early Stage Module

Course Organisation

This optional course runs for the XX weeks of XX Term. It normally comprises X lectures per week. In addition, students have a number of assignments based on X site visits, X workshops and X laboratory sessions.

Term	Start Week	Hours of Associated Practical Sessions	End Week	Lectures		Tutorials	
				Per Week	Total	Per Week	Total
XXX	x	X	x	x	xx	x	x
Total Contact Hours: xx							

Course Description

The module provides a detailed explanation of and a practical understanding of Universal Design.

In a growing and aging society, where the need for sustainable (both social and environmental) design solutions is critical, Universal Design has been accepted globally as a means of meeting existing and future needs. More than a set of practical design rules or prescriptive design guidelines, Universal Design is a way of thinking, requiring the designer to consider the

consequences of design, and placing the needs of all people at the very heart of the process.

The theoretical part of the module will reintroduce students to the Universal Design philosophy including social, economic, legislative and business cases and providing an update on more recent developments in these areas. Recent advancements and developments taken from related fields (including ergonomics, usability engineering, user centred design, health and safety research, software engineering, etc.) will provide a more practical understanding of the evolving design approach.

Practical aspects of this Universal Design course will include learning how to engage with users, learning how to apply lessons learned from previous design projects, learning how to use inclusive design tools and techniques, and practice applying these in projects and industry collaborations.

Learning Outcomes

On completion of this course, the student will:

- Be familiar with, and have a practical understanding of Universal Design as it is applied in engineering;
- Have a complete understanding of the legislative requirements for Universal Design;
- Have a complete understanding of the business and social benefits of Universal Design;
- Be aware of the development and application of new research concepts and advances in the field;
- Be capable of consulting effectively with end users;
- Have an understanding of design as it is applied in Industry;
- Have applied, demonstrated or translated a Universal Design approach;
- Have developed team work and interpersonal skills.

Course Syllabus

Universal Design re-introduction

- Background
- Legislative Requirements
- Business case - benefits for designer or design firm
- Economic case - benefits for e.g. Irish industry and Government spending
- Social case - e.g. aging society, ability as a continuum, human rights and equality
- Relationship to the Sustainability agenda

Universal Design approaches review

- Human Diversity
 - User engagement – from individual to community
 - User-centred design tools and techniques - personas, focus groups, user consultation, task analysis, simulation, post design evaluation
 - Expanding from designing for a sample of representative users toward designing for as many people as possible
 - Design for cognitive, sensory and physical human factors
Application of Universal Design in Engineering (show in project)
 - Stages of design (how Universal Design fits into design steps)
 - The engineer, the end user, and the design stakeholders
Design research review (show in project)
 - Understanding research publications
 - Critical appraisal of research
 - Evidence-based design research
 - Related guidelines and standards
Case studies review (select for area for project)
 - Built Environment
 - Products
 - Services
 - Information and Communication Technologies (ICT)
Site visits (select one for part of research paper assignment)
 - Demonstration of Universal Design construction techniques (lifetime homes standards)
 - Post occupancy evaluation of accessible buildings (audit)
 - Commercial/corporate design services studio
 - Usability testing services laboratory
Workshops – Universal Design Tools and Techniques (apply in project)
1. Use of Personas
 2. Simulation techniques
 3. Universal Design Toolkits
 4. Human factors in design (age, size, abilities, disabilities)
 5. Using demographic data, population statistics and research to inform design
 6. Direct user engagement techniques

7. Design evaluation techniques

Project 1: Student team project (example)

The class is divided into teams, with individuals mimicking the typical roles of professional design teams. The aim of the project is to demonstrate the constraints of a true design project and for the students to explore how these constraints can be resolved without hindering the Universal Design agenda.

Project 2: Industry collaboration project (example)

Individuals or teams of students work in partnership with industry on a project. The aim of the project is for design professionals to demonstrate how Universal Design works in the real world, to maintain strong links between academia and professional designers and for the projects to encourage continued application of Universal Design in design firms.

Project 3: User centred design project (example)

Individuals or teams of students work in partnership with members of the community on a project. The aim of this project is for design students to experience working directly with end users throughout the design process and to learn how to engage with users during, for example, the early exploratory/research stages, during the brainstorming/concept development stages and during the prototype evaluation stages.

Project 4: Evidence-based design (example)

Individual students develop a design concept, X No. of features of which have been informed by sound evidence-based findings. The aim of this project is for design students to learn how to make informed conscientious design decisions. Design decisions, brought through to concept stage, will be based on the information gathered from research (information gathered in Workshop 5), design evaluation (information gathered in Workshop 7) and end user engagement (information gathered in Project 3).

Recommended Texts

- Universal Design Handbook: Preiser and Ostroff
- Building for Everyone 2010: National Disability Authority, Ireland.
- Inclusive Design for the Population: Keates and Clarkson
- Countering Design Exclusion: Keates and Clarkson
- Centre for Excellence in Universal Design website
www.universaldesign.ie
- Individual research papers to be provided as part of coursework material

Teaching Strategies

The teaching strategy is a mixture of lectures, workshops, site visits and project reports. These are designed to improve the student's ability to appraise and communicate as well as to provide the student with a better knowledge of the practical elements of Universal Design. Finally, the project reports include a final presentation to provide the student with training in communicating design concepts.

Assessment Modes

30% of the assessment is due to a two hour examination held during Trinity Term. The remaining 70% is allocated for assessment of project work.