From margin to mainstream – inclusive design making waves

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Abstract

This paper reports on the development of the two sides of the design education equation – student and tutor. The student perspective is viewed primarily through the lens of the RSA's Europe-wide design competition *Inclusive Worlds* (part of the RSA's Design Directions programme – www.rsadesigndirections.org), which has encouraged students to produce a range of products, services and environments to enhance everyday living. The tutor's perspective is viewed primarily through the lens of the Inclusive Design Curriculum Network, a Thematic Network funded by the Fifth Framework Programme of the European Commission (IDCnet at www.idcnet.info). From both perspectives – tutor and student – specific outcomes have emerged: new teaching materials, modules, and courses on inclusive design or which advocate the principles and methodologies of inclusive design; new products coming to market which have embedded within them the principles of inclusive design; and a new generation of professionals, now in practice and influencing mainstream design. Recommendations are made for successful educational practice which leads to successful professional practice.

Keywords: Inclusive design, curricula, user-centred research

1. Introduction

In 1986, the ground-breaking London exhibition, New Design for Old, alerted industry and design to the urgent need for better, age-friendly design in an era of rapid population ageing. That exhibition triggered the growth of a world-wide movement to make design more inclusive of older people and to make their needs and aspirations central in mainstream design. It also signalled the beginning of the RSA's commitment to progressing and promoting the principles of inclusive design and user-centred design through its awards programme for students and the establishment of an Inclusive Design Online Resource (www.inclusivedesign.org.uk) [1].

The Royal Society for the encouragement of Arts, Manufactures & Commerce (RSA) (www.theRSA.org), founded in 1754, is an independent, non-aligned, multi-disciplinary registered charity with over 25,000 Fellows. It encourages sustainable economic development and the release of human potential through a programme of projects and a national lecture programme consisting of over 100 events every year. Its manifesto, categorised by five distinct challenges – Encouraging Enterprise, Moving Towards a Zero-waste Society, Developing a Capable Population, Fostering Resilient Communities, Advancing Global Citizenship – shapes all current and future work. For example, the RSA's online Inclusive Design Resource – a website in a contemporary format which draws together key contextual case studies as well as information on business practice and legislation – forms a key contribution towards meeting the goals of the Fostering Resilient Communities challenge.

This paper reports on the development of the two sides of the design education equation – student and tutor – and makes recommendations for successful educational practice which leads to successful professional practice.

The student perspective is viewed primarily through the lens of the RSA's Europe-wide design competition. Evolved from the New Design for Old project, *Inclusive Worlds* (part of the RSA's Design Directions programme – www.rsadesigndirections.org) has encouraged students to produce a range of products, services and environments to enhance everyday living. Many of the designs have been patented or registered but, perhaps more importantly, these designers are now carrying through the principles of inclusive design into their professional careers – the effects of which are now becoming apparent.

The tutor's perspective is viewed primarily through the lens of the Inclusive Design Curriculum Network (IDCnet), a Thematic Network funded by the Fifth Framework Programme of the European Commission (IDCnet at www.idcnet.info). The aim of the project was to integrate information and identify core knowledge sets and skills for model curricula in Design for All, specifically for ICT products and services. The network, which formally ran from August 2002 to May 2004, was born originally as a support to the eEurope Action Plan (www.europa.eu.int/information_society/eeurope), which noted the need to create recommendations for a European curriculum for designers and engineers in Design for All. The project then evolved into an initial support to the activities of the European Design for All e-Accessibility Network related to the curriculum (EDeAN at www.edean.org).

From both perspectives – tutor and student – specific outcomes have emerged: new teaching materials, modules, and courses on inclusive design or which advocate the principles and methodologies of inclusive design; new products coming to market which have embedded within them the principles of inclusive design; and a new generation of professionals, now in practice and influencing mainstream design.

2. The tutor's perspective

2.1. Inclusive design in curricula

Curriculum development in the area of inclusive design has been slow and patchy, but much has been learned from the experience gained in the last three decades from Universal Design in the built environment. Recently, we have seen the dissemination of specific guidance and resources as part of the IDCnet project, which examined curricula, specifically for information and communication technologies (ICT), across Europe. Even though focused on ICT, many of the concepts are applicable in the teaching of other disciplines, e.g., Computer Science, Human-Computer Interaction, Ergonomics, Rehabilitation Engineering, as well as Product Design, and therefore can serve as a starting point for other subject areas.

A taxonomy was developed to illustrate the core knowledge and skills which are – or could be – taught under the umbrella of inclusive design [2, 3]. The refined framework of this taxonomy is shown in Fig. 1. The top tier of the taxonomy, such as the general category dealing with 'Awareness,' is relevant to all disciplines, while the lower tier of the taxonomy is specific to ICT, such as 'Accessible interaction' and 'Accessible content'. The taxonomy illustrates how sectors other than ICT could be represented, such as those for the Built Environment or Transportation Systems, and how we can learn and draw from other disciplines for a truly inclusive and multidisciplinary approach.
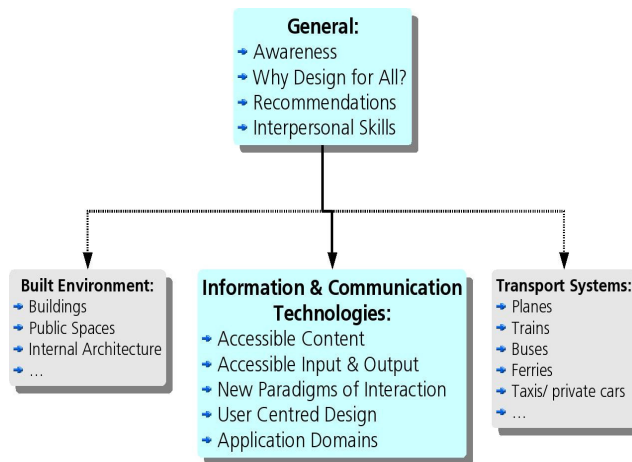

Fig. 1: Taxonomy of Core Knowledge and Skills

Drawing from IDCnet's teaching pilots, which helped to validate the usefulness of this taxonomy, support is publicly available to the tutor of ICT, including suggestions for topics, teaching materials and strategies for inclusive design, as well as methods of user involvement [4]. It is not suggested, however, that a 'universal' inclusive design curriculum be adopted, as each category must be adaptable to national and

cultural differences, where appropriate. However it serves as a helpful starting point and planning methodology for curricula development.

Examples of specific materials used to teach a particular topic have also been collected in order to demonstrate methods of teaching various aspects of the taxonomy. One such method to raise awareness of inclusive design is an Empathic Modelling Workshop [5].

2.2. Empathic modelling workshop

Empathic modelling is used by one of the authors in teaching inclusive design at Loughborough University in order to enable the students to simulate the deterioration of physical and perceptual abilities in carrying out everyday tasks. This encourages students to think about how we take our senses and abilities for granted, as well as what coping strategies and adaptation techniques might be used by older and disabled people [5].

In brief, the method consists of performing various visual, dexterity, hearing and mobility tasks wearing simulation materials. For examples, spectacles simulating a range of visual impairments are worn whilst reading the newspaper and using different intensity light sources to emphasise the difference that increased lumination can make (Fig. 2). Buttons are taped onto the knuckles to simulate the effect of older and arthritic fingers, causing discomfort or pain, and the students perform tasks like opening packets and jars of food. The detailed steps and 'props' which are used can be found in Nicolle and Maguire [5].

Fig. 2: Empathic Modelling Workshop

2.3. Impact on students

Before undertaking the simulation tasks, students are asked to think about the experience and consider its further implications. They are reminded, however, that user-centred design demands the inclusion of 'real' end users when designing and evaluating products and services, and empathic modelling provides just an introductory awareness raising session, albeit a highly productive one. This is clearly emphasised as the students take the device(s) off at the end of the session — an opportunity not offered to older and disabled people. Later in the course, this workshop leads to a follow-on lecture and discussion on the demographics of ageing and disability, the physical, sensory and cognitive capabilities of vulnerable users, and methods for meaningful and ethical user involvement in user requirements and evaluation activities. The students take this knowledge with them into their final year projects, and (hopefully) into their future careers, where participative design, user-centred design and inclusive design become synonymous.

Where possible, it is enlightening to track our students' inclusive design practice once they leave university, but this is not always an easy task. The following section offers examples where this has been successfully achieved at the RSA. Here it can be seen that inclusive design is 'making waves' within the RSA's Design Directions programme.

3. The student's perspective

3.1. User-centred research

Action research, specifically user-centred research, has been a key element within the RSA programme. In order to support this, the RSA has provided links with appropriate groups of older people (via organisations such as Age Concern which has established consultative groups and the University of the Third Age), and produced specific help guides and reference material. In addition, workshops have been held with tutors and students, including the Workshops held at the final GENIE meeting in Helsinki, August 2001 – these provided experimental and learning opportunities for students to work with older people and identify potential design solutions [7]. Working with like-minded colleges and tutors such as the Royal College of Art, Loughborough University and Glasgow School of Art has also been extremely beneficial. Since

the introduction of user-centred design within the scheme, the nature of winning solutions has completely changed – from student-oriented solutions to intelligent and well-thought through proposals for products, systems and environments which would really improve quality of life for a broad range of people. For the first time students have taken into consideration needs and aspirations of groups of people usually ignored in the design process. Designs range from complex medical devices through to products that make life easier and more tolerable such as improved packaging for microwave oven food.

3.2. Some winning examples

The RSA has now encouraged and nurtured a whole generation of students who have worked with users and have found that this experience completely changed their view of the design process. The following are examples from students who graduated from Glasgow School of Art.

Natalie Scott has patented her design for a monitor to aid the management of diabetes and is hoping to get it into production. She found that the apparent *restrictions* of designing inclusively led her to a more innovative and simpler solution than she might otherwise have attained. Lancitor (Fig. 3) is a blood analysis monitor for visually impaired diabetics that would also benefit other users, combining lancet and monitor in one product. The product pricks the finger with one touch of a button while button two winds on the test strip roll (which is pre-loaded) for the next use. Nodules on the buttons are used to differentiate between the functions, and a locking device would operate when the product was not in use. The roll is replaced like a camera film, by slotting it into the product. Natalie is now working in the inclusive design team at Scientific Generics, a leading integrated technology consultancy with an international reputation for commercialising science and technology.

Allan Sinclair found his experience so valuable that he is now working on an inclusive product which is pushing the limits of what is possible and using new technology to create a better solution for all. '*The biggest impact that the project had on me was with user research, testing, feedback and the variety of methods there are to achieve these things.*' He is also still talking to a manufacturer about his winning design.

Fig. 4: Motigait

His **Motigait** (Fig. 4 above) is a rehabilitation product which helps disabled children to develop walking skills and also acts as a physiotherapy tool for adults to allow rehabilitation of weak muscle groups, for instance to help restore function after a stroke or sports injury. The product consists of a flexible neoprene harness that supports the user while allowing movements critical to rehabilitation, such as rotation. The lifting mechanism assists and guides the user rather than forcing the occupant into a standing position. The frame construction moves away from square section steel tubing in order to dispel the stigma attached to such products.

Fig. 5: Uniport

Fig. 3: Lancitor

Vhairi Maxwell's **Uniport** door (Fig. 5 above) provides a solution to the problems mobility impaired users encounter with access to residential properties. Vhairi collaborated with sociologists specialising in housing policy and a surgeon researching finger injuries sustained from doors. Model making enabled her to prove her concept and to return to users for additional comments on the design. A curved vertical handle reduces the distance which the user has to reach and allows for a wide height range. The door does not use a traditional hinge, but operates on sliding rails, moving to the side to allow easy passage.

One of the RSA's central aims in running *Inclusive Worlds* is to have a positive impact on the manner in which students approach future design projects. Professor Alastair Macdonald, who tutored the above students (Head of Product Design, Glasgow School of Art) gives the following examples of how this happens:

'It happens in two ways. The first is that in teaching designer engineers about inclusive design, they have developed a more comprehensive understanding of the 'human model'. So instead of producing just an engineered product which has some ergonomic considerations and some styling, the increased level of user research and collaboration together with these new human models has developed a high level of near-market awareness and appropriateness in the designed product. Secondly, in teaching non-designers about inclusive design, their level of understanding of how inclusive design can help address societal goals common to their own discipline develops a heightened awareness of how to work with designers and to commission forms of design to meet these ends.'

3.3. Following through

It is the intention of the RSA scheme, as part of a broader framework, to secure the central role of inclusive design in mainstream professional design practice. Since 1986 the RSA has been able to track the progress of some of its winning designers and notably we now have winners of the scheme working in academia, major design teams in industry, and design consultancies. Here are three examples:

Jeremy Lindley won an award in 1990 for his design of a gas pre-payment meter. Now Head of Design at Tesco, one of the world's largest retailers, managing a team undertaking retail environment design projects, Jeremy has embedded the principles of inclusive design into the Tesco design strategy from everything from signage to trolleys.

Mike Woods won an award in 1993 for his kitchen timer design and is now Creative Director at the product design consultancy Tangerine, which was established in order to meet genuine customer need. He specialises in product visual identity strategy and a recent success includes the Sky+ Box. Tangerine was recently involved with the '24 Hour Inclusive Design Challenge' a competition for designers sponsored by Scope and organised by the Helen Hamlyn Research Centre and Design Business Association, which answers a specific brief in 24 hours. The 2005 brief was for a transport related inclusive concept, and Tangerine and Applied Information Gap (AIG) won the award with their product 'Babelfish' a portable navigation device worn as a necklace and which gives sonic clues and feedback in large transport hubs (www.hhrc.ac.uk). Mike is currently a judge on the 2006 DBA Inclusive Design Challenge.

Calum Armstrong's design for the RSA scheme was for a simple, cost-effective solution to the problem of scalds and burns caused by bathwater that is too hot. The Thermosplash was a bath plug and float made from thermochromatic plastic which changes colour according to the temperature of the bath – providing a colour change to denote too hot or too cold – thus helping mothers bathing babies and older people who need to take extra care. Calum developed his design following his RSA award and began negotiations with a children's product company to get the product into production. Calum is now a member of the design team for Electrolux, based in Italy and is continuing to practise the inclusive design methodologies.

4. Summary and conclusion

This paper has considered how new curricula input has helped students shape their approach to design. It also assessed the impact of this development, examining what students have produced as a result of exposure to inclusive design principles and learning. Through tracking the progress of some of the winning designers from the RSA scheme, it is expected that learning outcomes will be even more evident in years to come when the students have entered the profession and have had the opportunity to build upon the foundation of their early inclusive design experience. What should then be apparent is how these students are able to demonstrate that they can work as part of a

team, understand the importance of determining client needs, know how to use techniques and methods to capture a wide range of user requirements, and understand and apply inclusive design knowledge across a range of sectors and application areas.

The authors propose that inclusive design needs to be promulgated throughout the future design education agenda, but also integrated within the curricula of a range of related disciplines. Drawing from some of the exploitation strategies of the IDCnet project [4] and from the EDeAN Workshop recently held on ethical guidelines [8], we would propose the need for:

- Creating a vibrant research and design community, whereby users will participate as equal and respected partners in developing inclusive design solutions.
- Ensuring that ethical considerations for working with users in student projects should be embedded in courses and not added on as an afterthought, and that all projects should be signed off for ethical clearance.
- Making strategic alliances with other disciplines in terms of teaching materials and course offerings. For example, inclusive design can be forged with other disciplines, including Human-Computer Interaction, Ergonomics, Business Management, and Information Science.
- Pooling of resources, instead of "reinventing the wheel". IDCnet has now been absorbed in EDeAN, and the teaching materials described in this paper are available from their websites. In addition, the RSA's Inclusive Design Resource (prescribed to many students, e.g., on the reading list of some modules at Loughborough University) will be maintained and enhanced through EDeAN in order to provide a sound basis for inclusive design education.
- Continuing to recognise the achievements of both students and professionals who have adopted the inclusive design approach.

Acknowledgements

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