COMMUNITY DESIGN CHALLENGE, PRODUCTS STRIVING FROM CONCEPT

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ABSTRACT
DIT's Product Design programme, Enable Ireland, and people with disabilities in the community have teamed together to create a unique Assistive Technology and Universal Design learning environment, significantly supported and resourced by the entire team. In this environment students realise very quickly that using 'off-the-shelf' generic Assistive Technology devices for people with varying degrees of disability leads to Assistive Technology abandonment, and that their innovative designs can play a key role in addressing this issue. A reoccurring theme from people with disabilities in the community is why aren't these innovative designs being made? Reacting to this Enable Ireland, in partnership with Dublin Institute of Technology launched a Community Design Challenge in Microsoft on Monday, December 3rd 2012. This competition is open to all students nationally and internationally, and is sponsored by Leckey, a company which specialises in designing and manufacturing specialist seating and postural management devices for children with disabilities. This competition will finish in August 2013, when a winner will be chosen with a view to getting this design to commercialisation. This paper aims to describe the benefits and risks this synergistic approach to potentially reducing the product life cycle has for the community, students and business.

Keywords: Community, product-life-cycle, assistive-technology, Leckey

1   INTRODUCTION

Dublin Institute of Technology (DIT) and Enable Ireland National Assistive Technology (AT) Training Services [1] pioneered an innovative teaching programme which is unique to Irish engineering education. Its Level 8 BSc in Product Design was launched in 2004, in response to changing demands in the landscape of engineering internationally. A key component of the 4th and final year was the development of a Medical Design module; within which there is a particular focus on educating students about assistive technology (AT).

This new module was first rolled out in 2007 and was structured to enable students to learn about AT in an experiential manner by exposure to real life experiences [site visit with client follow up]. The fundamental concepts of AT design are delivered over a six week period comprising six hours of small group teaching. The learning outcome for this portion of the module is the development of a AT device concept through engaging with the real world of practice.

Both DIT and Enable Ireland staff involved in this innovation are passionate about both real world learning and community engagement. To this end considerable investment is made in both staff and facility resources. Small group teaching, a particular feature of DIT, enables deep learning through interactive class discussion, and facilitates deep engagement with the material fostering a good learning environment. Having small groups also permits a manageable site visit to Enable Ireland which matches DIT's investment in resources by freeing up staff to both meet and support students, provision of facilities for the visit and facilitating clients to attend (Figure 1).

Figure 1. Nadine a visually impaired paralympian discussing her product needs with Product Design students Ned, Mark and Rachael

2   BACKGROUND

Assistive technology is useful for individuals with severe physical and communicative disabilities, as it offers an opportunity for independence and greater engagement with mainstream society [2]. Conditions that result in either motor or speech impairments, for example, create significant barriers to computer usage [3] and may render the person even more isolated. Several contemporary computerized devices offer great independence opportunities for this cohort; such as alternative and augmentative communication devices and specially powered wheelchairs [3]. However due to difficulties in coordination, usage of some of these utilities is often limited, and as a result, off the shelf equipment are likely to be unsatisfactory [4, 5]. Even adapted devices are doomed to abandonment with resultant frustration for users [4, 5]. Limited consultation with users about their needs and requirements further contributes to abandonment [6]. However while there is a great deal of interest in the use of and attitudes to assistive technology in the educational setting [7], there is limited application or use of specific design research or consideration of the community user (rather than the student). Discussions on this topic predominate in the special education literature but receive less attention in engineering design journals [8]. Furthermore the focus of the research is often on participating individuals with co-existing learning disability [8], and little is known about users' specific needs [8]. As a first step in address this research gap, this medical design module aims to involve engineering design students in the development of assistive technology in collaborative with community partners who have disability.

3   ENGAGING THE COMMUNITY IN EDUCATION DELIVEREY

To address any potential 'theory-practice' gaps the student cohort (n=30) engage in a two-hour site visit to Enable Ireland's AT training service in Dublin. Enable Ireland supports clients with physical disability. Its AT training service aims to match clients to AT products and provide a training service to staff to assist them in supporting, developing and modifying AT devices.

Students realise very quickly that AT devices are not the 'panacea for all ills'. Indeed the challenges of using 'off-the-shelf' generic AT devices becomes immediately clear, as people with varying degrees of disability experience difficulty adapting to and using these generic devices. Remarkably there is a reported abandonment rate of 70% for certain AT technologies.

Students are encouraged to keep this notion of abandonment very much in mind when they are developing their design concept, and they are encouraged to (and supported by Enable Ireland) engage with both clients and staff, to seek their feedback, on their emerging designs. The students have complete freedom with the AT design, but are expected to draw upon theoretical concepts delivered in class in order to support their ideas. It is expected that the design will be responsive to clients needs.

Once the design is complete, it is presented as a 2,000 word report and a poster, the latter of which is presented at a DIT open event to which the aforementioned clients, who have worked with the students, are invited. Being a medical module all learning outcomes are contained within the report meaning no grade is obtained from the actual design, this allows the student academic freedom to express their design. It is only the potential customers (Assistive Technology user and providers) that provide feedback. This method of removing the learning outcomes from the community engagement gives flexibility and protection to the academic process. This process is empowering for both the student and the community, which if not managed can turn to frustration and disappointment. To avoid this constant management of expectations must start at the beginning of the process.

4 IMPACT OF COMMUNITY ENGAGEMENT ON THE STUDENT COMMUNITY

At least two students have successfully progressed these ideas to MSc/PhD level, and many students go on to take part in DIT/Enable Ireland's annual Community Design Challenge, with one winner emerging from the cohort. Additionally some of the more innovative and practically useful designs are chosen specifically by AT users at the open event for an exhibition in Enable Ireland (Figure 2 & 3). All of these successes led to greater student confidence within DIT with regard to AT design. As a result, successive groups of students are encouraged by their outgoing final year peers towards positively interacting with this module, and to date no negative feedback or resistance has been encountered. Conversely students (with little or no experience of dealing with clients with disability) look forward to meeting clients, interact extremely well with clients, and develop good working relationships. Clients report favourably on students, and enjoy the special attention that the project confers upon them.

Within days of the Enable Ireland visit there is class reflection on the visit where all aspects of the experience are open for discussion. This module is evaluated at the reflective class using a Likert Scale and at the end of semester using DIT's standard student evaluations.

A key Likert Scale question within the reflective feedback is;

"How much has this experience changed your perceptions of design?"

The Mode response was 100% and the average was 83%. In an incredible journey from theory to practice, through engagement with clients, students learn about responsive design.

The following are the mode comments from Student feedback;

- Students like having user feedback, rather than relying solely on their academic advisors.
- They enjoy the visit to industry to see the facilities first hand and like meeting staff directly involved with using designs in practice.
- They are generally shocked as the design issues of Assistive Technology devices are highlighted by their users.
- Overall students prefer the real world experience, rather than learning design simply from textbooks and/or classroom experiences.

Figure 2. Sample of student Assistive Technology concepts exhibited in Enable Ireland & Microsoft

5   THE IMMPACT ON THE COMMUNITY

Over 100 students have completed this module. The projects have been extremely successful, with many innovative designs emerging. One client, Tony* was particularly pleased and emotional about a suggested design for specially designed arm support to reduce tremor. Indeed many clients and students have had very positive emotional reactions to both the design outcome and the presentation at the open event.

This module encourages and empowers students to develop AT Design concepts, indeed the success of the students' designs has lead to the creation of a partnership between DIT and key external organisations, whose aim is to support students to bring their design to fruition. These partnerships include, disabled members of our community, Paralympians, Enable Ireland, British Telecom Ireland, Microsoft (Figure 3, student disseminating his work at an event hosted by Microsoft), and Leckey (a Northern Ireland based researcher & manufacturer of Assistive Technology). It resulted in an Irish Research Council Funded PhD (€67k) and several job opportunities for students. This teaching initiative has also received positive feedback from the academic community with research links developing with Glasgow University. The initiative has been described and delivered (by students/clients/DIT staff) at four national/international conference presentations. Students' work has also featured in Enable Ireland's Annual Report. Indeed such was the success of the student experience, these designs (posters) were featured during a short piece on Irelands RTE1 "NationWide" TV program where students spoke favourably of the benefits of this module. Successive evaluations reveal the benefit to students of meeting clients who use AT technology.

*pseudonym

*Figure 3. Mr Andrew Deegan [Enable Irelands Assistive Technology Design Winner]
speaking about his design and experience of community engagement at an event hosted
and supported by Microsoft Ireland in 2008*

6   DISSEMINATION DRIVING INNOVATION

Exhibiting student design concepts has generated a lot of debate from all sections of our society, adding greatly to students and staffs perception of design. A reoccurring theme is why aren't these innovative designs being made? Debate then tends to move to the difficulties of bringing a product to commercialisation.

To achieve commercialization of a product, it was decided to create a strong partnership with a company that was strong corporate and social responsibility, and is successful in bringing similar products to commercialisation. This strategy was inspired by a Harvard business review article discussing corporate and social responsibility, dated December 2006, in which contains the statement;

> "When a well-run business applies its vast resources, expertise, and management talent to problems that it understands and in which it has a stake. It can have greater impact on social good than any other institution or philanthropic organization" [9]

Hence a partnership was created with a company called "Leckey". Leckey [10] is a globally recognised pioneer in the research, design and development of clinically focussed, posturally supportive products.

Together Leckey, Enable Ireland, and DIT have created a community design challenge specifically aimed at bringing a design concept to commercialisation. This challenge is structured so that it strongly aligns itself between Leckey's research and development mission statement, Enable Irelands mission statement and DIT student learning outcomes.

7   CONCLUSION

What differentiates this approach from others is that it has outcome and impact, both on the student and the community that is pervasive and far-reaching. While on the one hand the outcomes of this element of the module appear modest (product design), the enactment of this results in a powerful and emotive journey for the student, one that not only promotes learning in the real world, and engages and empowers community partners, but has fostered the development of influential partnership across industry and practice. Through the fostering of community relations, and building relationships between industry/facilities and DIT that this module has created, pathways have been developed that pave the way for the Engineering community to positively engage with AT design and disability services in Ireland that can have far reaching consequences and raise awareness of the need for Universal Design. In May 2013 a winner of the Community Design Challenge sponsored by Leckey will be chosen and the process of striving to bring a concept inspired by the community to commercialisation.

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