Design For an Aging Population: A Multi-disciplinary Design Retreat

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Abstract

In an effort to raise students' awareness of the engineering opportunities and responsibilities associated with the aging of the U.S. population, the University of St. Thomas hosted a 3-day intensive, multi-disciplinary retreat for undergraduate and graduate students on "Design for an Aging Population." The retreat, organized by professors in Psychology and Engineering, provided crash courses in aging and the design process, and incorporated a team design project. This paper will discuss the retreat schedule, as well as results from pre- and post-retreat interest surveys. Of particular note, the surveys showed a significant increase in non-engineering majors expressing an interest in taking an engineering course. Additionally, there was a pronounced increase post-retreat in engineering students reporting a desire to work on projects with students from other majors.

Introduction

According to the National Center for Health Statistics, the current life expectancy in the United States is 77.9 years, and is expected to climb to 84.0 years by 2050 (http://www.cdc.gov/nchs/fastats/lifexpec.htm). This rising life expectancy, combined with the birth spikes in the middle of last century (the "baby boom"), has led to an unprecedented number of Americans over the age of 80, and an even greater increase in the number of Americans over the age of 60. With this increase in the size of the American elderly population, society must examine carefully ways to improve the quality of life for this population and their caretakers. Designing products and services created with the specific needs of this demographic in mind is a complex, multi-disciplinary challenge. Engineers will certainly play a role in this process, but they will need to be well versed in a variety of disciplines.

To address this issue, the University of St. Thomas sponsored a three-day, multi-disciplinary retreat, coordinated by Professors AnnMarie Thomas (Engineering) and Roxanne Prichard (Psychology). The retreat, which was open to students from any majors, was successful in attracting a multidisciplinary group; 17 students from 11 majors, including nine students from engineering, attended the retreat. The retreat also featured guests from the eldercare and elder design industry, as well as faculty from the Schools of Business, Social Work, Liberal Arts and Sciences, and Engineering. Activities included lectures, discussions, films, and the chance for student teams to brainstorm, research, and pitch new products for this growing market.

The pedagogical aims of the retreat were as follows:

1. Introduce students and faculty to the physical and spiritual challenges facing the elderly and their caretakers.
2. Create an intensive, immersive experience where students and faculty from different majors can think creatively and analytically, interact and learn from each other.
3. Generate a set of design concepts which will be evaluated and presented, and which may possibly be developed into formal projects in the Design for an Aging Population laboratory at the University of St. Thomas.

Participants

The retreat was open to any student at the University of St. Thomas. Undergraduate and graduate students from all majors were free to apply, though advertising focused primarily on undergraduate students. The application required that interested students discuss in a paragraph or two 1) why they were interested in the retreat, and 2) one area in which they believed there was a real need for better designed products for the elderly.

Due to the generosity of our sponsor, the University of St. Thomas' "Beyond Career to Calling" office, we were able to accept all 17 students who applied for the program. The breakdown of student participants was as follows.

Major	#
Mechanical Engineering	8
Electrical Engineering	1
Mathematics	1
Psychology	6
Accounting	1
Business Marketing	1
General Business	2
Spanish	1
Social Work (undergraduate)	1
Social Work (Masters)	1

Gender	#
Male	11
Female	6

Expected Graduation Year	#
2007	3
2008	8
2009	3
2010	2
2011	1

As can be seen from the above charts, the student participants were, with only one exception, undergraduates. Many of the students were engineering majors or, in the case of freshman, intended to declare an engineering major. Therefore, we counted freshman as the major they intended to declare at the time of the retreat.

The facilitation of the retreat was dependant on the participation of an array of experts in design, aging, and manufacturing. Non-student participants included:

- two Mechanical Engineering professors (Dr. Michael Hennessey and Dr. AnnMarie Thomas)
- two Psychology professors (Dr. Mary Anne Chalkley and Dr. Roxanne Prichard)

- a Business Marketing professor (Dr. Carmina Cavazos)
- a Social Work faculty member (Maggie Anderson)
- a representative from Catholic Eldercare, a Minneapolis based group of senior residences (Marilyn DuBay)
- the founder of Open Design Forum, a design consulting firm (Nicholas Powley)
- a designer whose work in the past has focused on the design of residences for the elderly (Katherine Bennett)

Retreat Schedule

The specific goals of the retreat were to provide participants with 1) an introductory understanding of the aging process and the specific needs of the elderly and their caretakers; 2) an introduction to the many stages of the design process including research, brainstorming, prototyping, patent applications, and marketing; and 3) an opportunity to showcase this understanding by working in teams to design and pitch a new product for the elderly or for their caretakers.

Prior to the retreat, students were asked to read a common set of texts, so that participants would have a common set of knowledge and vocabulary from which to build. These readings included:

- "Faith and Work- One Engineer's Perspective," by Barbara Yarusso (1996)
- Selections from Pope Benedict XVI's "Deus Caritas Est" (2005)
- "The physiological effects of ageing on the activities of living" by A. Farley, et al. (2006)
- Selection from The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm, by Tom Kelley (2001)

The retreat began with a welcome dinner and hotel check-in on Friday night. The choice of having an off-site retreat as opposed to an on-campus event was a conscious decision; we hoped to foster a greater sense of community and time for rich discussions by having the retreat participants living and eating together for two and a half days. Following dinner, retreat participants introduced themselves and briefly discussed their interest in the retreat. Students also anonymously completed pre-retreat surveys, which were designed to assess their academic and professional interests and their self-perceived aptitudes in the design process.

Next, in order to introduce retreat participants to the challenges of elderly living and to the complexities of the design process, we showed two films: "Living Longer… Living Better?" (2000) and "The Deep Dive" (1999). After a brief group discussion of these two films, we ended the night's activities by announcing the student teams, which consisted of four to five students from a variety of majors, and the design challenge for the retreat. The students were informed that on Sunday afternoon their team would have to present a poster board and give a formal presentation pitching their idea for a product designed for individuals in the "aged 65 and older" demographic. Although work on the project did not officially begin until Saturday afternoon, it was our hope that students would be more

engaged with the Saturday morning lectures if they knew that they were going to have to directly apply the information in their projects.

The activities on Saturday morning were designed to deepen students' understanding of how physical, sensory, and cognitive changes specific to the aging process can impede the activities of daily living. After an early breakfast, a psychology professor gave a detailed lecture on the physiology of aging. This lecture was followed by an hour long panel discussion on aging led by another psychology processor, a representative from Catholic Eldercare, a School of Social Work faculty member, and an individual who had done work on the design of group housing for the elderly. The panel, regarded by many students as a highlight of the retreat, provided specific and personal examples of how particular aging changes have affected individuals. Students responded very well to these personal stories, which edified concepts (e.g., the dangers of nocturnal wandering) about which the students had previously read. Because the panel was unscripted, students were free to ask any questions they wished. The discussion was quite fruitful, and conversations which began during the panel interview continued informally during lunch.

The activities on Saturday afternoon were designed to deepen students' understanding of the many stages of the design process. Faculty from the Schools of Engineering and Business, and experts from the field, offered a series of mini-lectures on topics which included Computer Aided Design and Manufacturing, successful product marketing, a case study on lighting design for the elderly, and a hands-on activity on new materials and technology. After these structured activities, students broke into their design teams and spent the afternoon brainstorming ideas for products. Students were encouraged to dream up as many ideas as possible and 'plaster the walls' with ideas at this stage.

After dinner, retreat participants convened for a group discussion on the ethics and responsibility of designing products for the elderly. The pre-retreat readings were heavily referenced as participants discussed difficult and controversial topics such as socioeconomic inequity and personal versus shared responsibility in the care of the elderly. Common themes that emerged were students' previous unawareness of the issues surrounding aging. Many students admitted to not having thought through what the aging process will be like for their parents or for themselves. Finally, at the conclusion of the ethics discussion, student teams reconvened to do some late night work on their projects. At this point, students were encouraged pick one idea from their 'wild and crazy' brainstorming session to develop for their presentation.

Sunday morning commenced with a lecture on patent searches and applications, which provided students with a more thorough understanding of the final stages of the design process. Following this lecture and demonstration, student design teams continued working on their group projects by creating visual representations and a marketing pitch for their product.

After lunch, all retreat participants gathered for the final presentations of the team projects. While this paper will not go into the details of the student projects, two of the four teams chose to focus on products for the bathroom, one group looked at

communication devices, and the fourth group focused on hearing aids. Following a brief summary of the retreat goals and the activities of the last two days, students completed post-retreat surveys and returned back to campus.

Student Survey Results

To assess the retreat's success, pre- and post-retreat surveys were given to the students. The surveys were completed anonymously, but were marked so that individual pre- and post- surveys could be compared. Surveys were completed by 100% of the retreat participants and pre- and post-retreat differences were evaluated with paired t-tests ($\alpha < .05$).

As this retreat was organized by professors in the Psychology and Engineering Departments, we were curious as to whether students, following the retreat, would be more be interested in taking psychology or engineering classes in the future. Because the majority of the students were upper-classmen, our intent was to encourage learning outside students' majors rather than a change in major. As can be seen from the table below, both engineering and non-engineering students showed a significant increase in their interest in taking courses outside of their major. Additionally, there was a significant increase in students' interest in working on academic projects with students from other majors. This increase was particularly pronounced for engineering students.

Please rate your interest in the following experiences (on a scale of 1[low] to 5 [high])	**Pre-Retreat**	**Post-Retreat**
Taking an engineering class (non-engineering student responses)	**1.8**	**3.2**
Taking a psychology class (engineering student responses)	**2.8**	**3.7**
Working on academic projects with students from other majors (all responses)	**4.0**	**4.4**
Working on academic projects with students from other majors (engineering student responses)	**3.6**	**4.3**

(For all tables, significant changes between pre- and post-retreat responses are indicated by bold text.)

The next set of questions were designed to assess how comfortable students were in generating ideas, presenting those ideas, working with individuals from other fields, and getting a product to the market. In all areas regarding idea generation, presentation, and multidisciplinary work, students showed either an increase in agreement or, in one case, no change in agreement. Interestingly, while students showed an increase in their perceived knowledge of the process for taking an idea to the market stage, they showed a decrease in their agreement that they foresaw themselves getting a product produced and/or sold. This may imply that after learning more about the necessary steps in getting a product to market, they found the process more daunting.

Agreement with the following statements (on a scale of 1[low] to 5 [high])	Pre-Retreat	Post-Retreat
I am confident in my ability to present my ideas to a diverse audience.	3.76	4.12
I feel that consulting with people from other disciplines can enhance my understanding of my own field	4.76	4.76
In the next ten years I see myself taking a job that allows me to interact with people from different disciplines	4.35	4.47
I am confident in my ability to generate multiple solutions to a specific problem.	**3.94**	**4.35**
If I had good new idea, I would know how to pursue getting it to market.	**2.65**	**3.82**
I foresee myself someday designing a product that will be produces and/or sold.	3.76	3.53

A final set of questions assessed students' desire to work on projects relating to aging and eldercare, their knowledge of the issues presented by these fields, and their commitment to considering the ethical implications of their field. Following the retreat, students showed significant increases in their awareness of aging-related issues, as well as in their desire to work, or volunteer in this field, and in their commitment to consider the ethical and moral implications of their future professions.

Agreement with the following statements (on a scale of 1[low] to 5 [high])	Pre-Retreat	Post-Retreat
In the next ten years, I see myself taking a job or a volunteer position relating to aging or eldercare.	**2.76**	**3.24**
I understand how the physiological and psychological effects of aging can negatively impact one's daily living.	**4.41**	**4.88**
I see a real need for better designed products and services for the elderly.	**4.29**	**4.71**
I will strongly consider the ethical and moral implications of my vocation, before accepting any job.	**3.94**	**4.29**

Suggestions for Future Retreats

In the post-retreat surveys, participants were also asked to evaluate the strengths and weaknesses of the retreat. While most of the feedback was overwhelmingly positive, most participants, when asked to name a weakness of the retreat, commented that there was insufficient unscheduled free time. While the busy schedule allowed us to accomplish meet our pedagogical aims, students felt that they would have liked to spend more time getting to know the other participants during unstructured activities. Another student suggestion was to invite individuals from our target design demographic (those

ages 65 years and older) to join us for the entirety of the retreat. This would allow for more first-hand feedback on the ideas that the students were presenting.

Conclusions

This Design for an Aging Population retreat was the first such event at the University of St. Thomas. Excellent quantitative and qualitative reviews were received from the student and faculty participants; students rated the retreat as a whole as a 4.67 on a 1 (not at all useful) - 5 (very useful) scale. The retreat was also a major success in creating a multi-disciplinary environment in which to explore the process of designing products to better meet the needs of the elderly. We attracted a diverse group of students and faculty; 17 students from 9 majors (and multiple minors) and faculty from the Schools of Business, Social Work, Arts and Sciences, and Engineering joined together to discuss and share ideas. Students rated the usefulness of this experience (working closely in a multi-disciplinary environment) extremely highly (4.77). We were also pleased to find that after the retreat, students from all majors showed significant increases in their interest in taking classes outside of their majors and in their ambitions to work professionally in multi-disciplinary groups. Two major research projects that involve direct collaborations between students and faculty of the Engineering and Psychology Departments have emerged as a direct result this retreat. Pending funding, we plan to continue this retreat biannually.

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