1-1-2017

Lessons Learned from a 10-Year Collaboration Between Biomedical Engineering and Industrial Design Students in Capstone Design Projects

Jay R. Goldberg
Marquette University, jay.goldberg@marquette.edu

Pascal Malassigné
Milwaukee Institute of Art Design

Published version. *International Journal of Engineering Education,* Vol. 33, No. 5 (2017): 1513-1520.

International Journal of Engineering Education Vol. 33, No. 5, pp. 1513–1520, 2017
Printed in Great Britain

0949-149X/91 $3.00+0.00

Lessons Learned from a 10-Year Collaboration Between Biomedical Engineering and Industrial Design Students in Capstone Design Projects*

JAY R. GOLDBERG
Department of Biomedical Engineering, Marquette University, P.O. Box 1881, Milwaukee WI 53201, USA.
E-mail: jay.goldberg@mu.edu

PASCAL MALASSIGNÉ
Department of Industrial Design, Milwaukee Institute of Art & Design, 273 East Erie Street, Milwaukee, WI 53202-6003, USA.
E-mail: pascalmalassigne@miad.edu

Engineers and industrial designers have different approaches to problem solving. Both place heavy emphasis on identification of customer needs, manufacturing methods, and prototyping. Industrial designers focus on aesthetics, ergonomics, ease of use, manufacturing methods, and the user's experience. They tend to be more visual and more concerned with the interaction between users and products. Engineers focus on functionality, performance requirements, analytical modeling, and design verification and validation. They tend to be more analytical and more concerned with the design of internal components and product performance. Engineers and industrial designers often work together on project teams in industry. Collaboration between the two groups on senior capstone design projects can teach each to respect and value the unique contributions each brings to the project team, result in improved design solutions, and help prepare students for future collaboration in industry. Student feedback and lessons learned by faculty and students from a ten-year collaboration between engineering and industrial design students from Marquette University and the Milwaukee Institute of Art and Design, respectively, are presented. Students learned to communicate with people in other disciplines, appreciate the complementary skills of each discipline, and value different approaches to problem solving.

Keywords: industrial design; multidisciplinary teams; capstone design; design collaboration

1. Introduction

To appreciate the role of industrial designers in the design process, it is helpful to understand the three main aspects of product design [1]. First, the technical aspects involve the assembly of parts and systems that allow the device to meet the technical requirements. Second, the human factors aspects deal with how well the user interface enables the user to interact with the device, encourages correct performance, and discourages and prevents incorrect performance. Third, aesthetic form can communicate how to use a device to achieve the intended result, and can make a product easy to use. Although the appearance of a device has little effect on its user interface, it can have a strong psychological influence on the end user. All three aspects of design help create value and enhance the overall perception of quality. A well-designed product satisfies all customer needs, meets all required specifications, incorporates basic human factors principles, and is sensitive to aesthetics and market perception [1].

Engineers and industrial designers are problem solvers who use their design skills to develop new products that meet their customers' needs. Their approaches to problem solving are different, and they emphasize different aspects of design. Engineers focus on the technical aspects of design such as functionality, performance requirements, analytical modeling, and design validation. They tend to be more analytical and more concerned with product performance and the design of the internal components that make the product work [2]. For example, engineers developing implantable medical devices are concerned with issues such as corrosion, wear, degradation, strength, and fatigue life. They perform calculations, use a variety of analytical tools (such as finite element analysis), and conduct bench tests to ensure that products are made from materials with the appropriate design characteristics (strength, biocompatibility, biodurability, etc.) and will safely perform as required. Industrial designers focus on aesthetics, ergonomics, usability, safety, and the user's experience. They tend to be more visual and more concerned with the interaction between users and products. For example, industrial designers are concerned with the psychological impact of a product's design on the user or potential customer, usability (ease of use, low potential for error), safety (no sharp edges or other potential hazards), quality of the overall

* Accepted 22 May 2017.

product experience, and perceived value of the product.[1] Engineers and industrial designers share a heavy emphasis on the customer, manufacturing methods, costs, and prototyping, and make extensive use of Computer Aided Design (CAD) and 3D modeling.

When engineers enter the workforce, they will be expected to work on multidisciplinary teams typically consisting of members of research and development, marketing, production, finance, regulatory affairs, and other departments. Depending upon the type of products being developed, industrial designers are often assigned to the project team to work with engineers on the design of the new product. Industrial designers are uniquely qualified to assist with specific aspects of product design. However, many engineering students (and faculty members) are not aware of what industrial designers do and the role that they can play in new product development. Effective collaboration between biomedical engineers and industrial designers requires an understanding and appreciation of the contributions each can make to the project and team. To prepare these groups of students to work together during their careers, a formal collaboration between biomedical engineering students from Marquette University (MU) and industrial design students from the Milwaukee Institute of Art and Design (MIAD) was created in 2006.

2. Previous work

A search of the engineering and industrial design education literature was conducted to find examples of current and previous collaborative learning activities between engineering and industrial design students. Proceedings of the Biomedical Engineering Society, American Society for Engineering Education, engineering education journals, and various industrial design publications were searched. Very few papers were found that described other similar collaborations and provided evaluation or assessment data pertaining to these collaborations. Applicable publications are included in this paper, and examples of other similar collaborations are described here.

Early results of the MU/MIAD collaboration described here have been reported previously [3–6]. A few similar collaborations have been established at other schools, involving different levels of collaboration between students from different disciplines, and inclusion of industrial design (ID) topics in freshman and/or senior capstone design courses. Some universities have a college of engineering and a school of art and design, making it easier to create and manage collaborations between the two disciplines.

The MU/MIAD collaboration was established in 2006, prior to most similar collaborations that exist today at other schools. It involves engineering and industrial design students working together on senior capstone design projects. It includes an ID module during the fall semester of the two-semester MU senior design course consisting of presentations by MIAD faculty on aesthetics of design, communicating ideas, converting specifications into concepts, and a hands-on workshop on creating mock-ups and prototypes.

At the University of Cincinnati, business, industrial design, and biomedical engineering students are teamed with a physician to study a particular medical device, learn how it is used, and determine how it could be improved. Each student brings his/her unique skills and knowledge to the project team. The business students identify stakeholders and determine regulatory status, the industrial design students conduct task analyses, and the engineering students analyze the device and determine how it functions. This experience provides students with the opportunity to work on multifunctional teams and develop "cross-language skills" needed for careers in new product development. Engineering students complete this course prior to enrolling in the required senior capstone design course. The business and industrial design students are invited to continue their multifunctional team experience via participation in senior capstone design projects [1, 7]. Faculty involved in these collaborative design project experiences at the University of Cincinnati have made some interesting observations concerning transdisciplinary learning among students in different disciplines [8]:

- Engineering students were familiar with the legal and regulatory requirements for detailed record keeping of project activities and decisions. However, industrial design students were unfamiliar with this practice. This presented a challenge as they were encouraged to record and document their activities.
- Engineers are perceived as thinking in a more linear and causally linked form as opposed to the more lateral or free thinking style of industrial designers. An appreciation for the merits of both styles of thinking was necessary for all team members to feel that they were successful contributors.
- The recognition of the value that each discipline brings to the project team was an essential component of effective transdisciplinary learning. During technical design review meetings where design progress was presented to faculty, engineering students learn to value the industrial design student's ability to communicate complex

procedural diagrams coupled with new device concept drawings. The industrial design students learned to value the engineering student's ability to conduct, analyze, and present test data to prove the technical and clinical advantages of different designs. Students developed an appreciation of each other's complementary functional strengths.

At the University of Illinois at Champaign-Urbana, collaboration between engineering and industrial design students began in 2008. Teams consisting of two engineering and two ID students work together on projects during the freshman and later years. Design thinking is introduced in the freshman graphics course, which includes lectures on ID topics [9].

More recently, at the New Jersey Institute of Technology, students from the Department of Biomedical Engineering and the School of Art and Design began working together on senior capstone design projects. Teams are required to design and build devices to help people with disabilities [10].

Some schools offer programs that combine engineering and industrial design throughout the curriculum. For example, Loughborough University in England offers undergraduate (BEng) and graduate (MEng) degrees in Product Design Engineering [11]. In September 2015, Harvard University announced the creation of a new two-year, multidisciplinary master's in design engineering, which is a joint program between the School of Engineering and Applied Sciences and the Graduate School of Design [12].

3. MU/MIAD collaboration

From 2006 to 2016, six pairs of junior level MIAD industrial design students, enrolled in a one-semester industrial design course, were each assigned to one of six existing senior capstone design projects consisting of senior level biomedical, electrical, computer, and mechanical engineering students. The project assignments were based on MIAD student preferences. Examples of recent past collaborative biomedical engineering projects for the 2013–2014, 2014–2015, and 2015–2016 academic years are shown in Table 1. One mechanical and one computer engineering project were part of these collaborations and are not included in Table 1.

Only a few of the projects included in the collaboration were industry sponsored due to non-disclosure and intellectual property policies of the sponsors. Some were student-generated ideas (from Marquette students), and many were client driven projects that focused on the design of assistive technologies for a specific client with disabilities. A few were service learning projects with a focus on the unique healthcare needs of developing nations. All non-industry sponsored projects were funded by grants or departmental funds. Prior to the start of the projects in August, Marquette students ranked their top eight choices and teams were formed by Marquette University capstone design course instructors according to student choices and skills needed to successfully run the project.

The schedule and structure of the collaboration is illustrated in Table 2. The MU capstone design course began in August each year. In November, MU teams interested in working with MIAD students presented their projects to the MIAD students. In December, MU students proposed a final concept for further development to MU students and faculty, and in January, presented these concepts to the MIAD students who then selected the projects they wanted to work on. Note that currently, MIAD students do not begin active participation in the collaborative projects until January, and formally end participation in late March.

Due to scheduling limitations of the MIAD industrial design program, collaborations began in January and ended in March. Beginning in January, the MU and MIAD students worked together to further develop and refine concepts proposed by the MU students at the end of the first semester of the two-semester multidisciplinary capstone design course. Prototypes were built using resources from both schools which included a machine shop and 3D printers located in the MU Discovery Learning

Table 1. List of recent collaborative biomedical engineering projects

Project Type/Title
Assistive Technologies:
• Personal Hygiene Assistive Device
• Assistive Device for Manual Wheelchair User
• All Terrain Walker for Improved Playground Access
• Hand Cycle Mount for Spinal Cord Injury Patients
• Adapted Game System for Spinal Cord Injury Patients
• Project Dress-Up: Assistive Technology for Independent Dressing
• Automatic Pill Dispensing Device
• PoolShark 1000: Adaptive Pool Cue
Industry-Sponsored Projects:
• Redesign of Road Bike Handlebars (Trek Bicycle, Inc.)
• Hemodynamic Monitor (Cardiac Profiles, Inc.)
• Improved Design of Head Holder for CT Scanner (GE Healthcare)
• Gestural Controls for Medical Devices (GE Healthcare)
Service Learning Projects:
• Human Powered Oxygen Concentrator
• NEOX: Non-Electric Oxygen Concentrator
Other Projects:
• Improved Design of a G-Tube Feeding Device
• Biofeedback System to Improve Body Alignment

Table 2. Schedule and structure of the MU/MIAD collaboration

	Marquette students	**MIAD students**
August	Start project	–
September	Define project	–
October	Identify customer needs	–
November	MU students present projects to MIAD students	
December	Propose concept to MU faculty and students	–
January	MIAD students select projects, **Begin collaboration**	
February	Create project schedule, present project status updates	
March	Begin prototype construction	
	Begin testing prototype	Final presentation to MIAD faculty
	End collaboration	
April	Verify/Validate design	–
May	Present final design to MU faculty and students	–

Laboratory, and clay, modelling foam, metal, woodworking, painting, finishing, and sewing equipment and 3D printers available at MIAD or the MIAD 3D Laboratory. Designs were verified by the MU students and validated by the team. The MU students continued their work and completed their projects in May, when the course ended.

The goals of these collaborations were for students to (1) learn about each other's disciplines, (2) be exposed to different approaches to problem solving and ways of thinking, and to (3) enhance students' design education, and (4) improve the quality of prototypes created by the project teams. In May 2015 a qualitative email survey, consisting of four questions, was used to solicit feedback from all members of the teams regarding what they learned from their experiences working together and their suggestions for improving the collaboration. The survey was open for one month.

4. Results

Responses to the survey questions below were received from 9 of 30 MU students (30%) and 9 of 12 MIAD students (75%) participating in the collaboration. Quotes representing common themes are presented below:

What did you learn about each other's discipline?

> "Industrial design is less technical/math based; with more thought on emotion and interaction of the device." (MU student)
>
> "We have very different approaches to solving a problem and we could complement each other in a respectful manner." (MU student)
>
> "Through this project I have learned that engineers and designers can get along. By this I mean they can work together to create products." (MIAD student)
>
> "I learned much about the differences and similarities between ID and engineering. I gained a lot of valuable insight into the process of designing for engineers and how to communicate with them." (MIAD student)

What did you learn about working with engineering/industrial design students?

> "Communication is essential. Each major has its own vocabulary and what makes sense to one group may not to another. Learning each other's language is essential." (MIAD student)
>
> "Engineers did not know how to visualize at all. It was so exciting to be able to help them with this. Likewise, my lack of knowledge in terms of engineering was readily supplemented by the engineers. Great balance." (MIAD student)
>
> "I was able to visualize more clearly how each other's strengths can be used to come up with a great design. Our team was blessed with a passionate, kind-hearted, and willing group of industrial design students that enjoyed our project." (MU student)
>
> "Time and communication between cross disciplines are keys to producing quality products that meet the project needs. The most effective team clearly communicates the product design specs and needs amongst each member with adequate leeway time to complete tasks dependent upon such information. Too much leeway time with gaps in communication can lead to wasted energy in making alterations of designs with improper focus." (MU student)

What differences/similarities in problem solving, design, and project management did you observe between engineering and industrial design students?

Similarities:

> "Identifying the problem; attacking it one piece at a time; devoted and passionate about the project. Both followed schedules, gave presentations, needed to explain their ideas to other disciplines." (MIAD student)

"We both value the customer and want what is best for them. Both disciplines are very compassionate." (MU student)

"Both set deadlines based upon project deliverables and presentations." (MU student)

Differences:

"Engineers focus on how the device will function; MIAD students focused on the human interface and appearance." (MU student)

"Engineers had a solid grasp on 'what it needed to be', and designers had a grasp on 'how it needed to be'. "All of the functions included were planned out and tested thoroughly by engineers, and placement and appearance in accordance with those factors are what design students brought." (MIAD student)

"MIAD students created multiple physical drawings of possible solutions to design issues. Engineering students performed analytical analysis using engineering principles to model possible solutions to design issues." (MU student)

Do you have any suggestions for improving this collaboration?

"It would be better if the collaboration could start a bit sooner so that both groups are on the same page throughout the beginning of the project." (MIAD student)

"Have designated meeting times to help with more collaboration with MU students." (MIAD student)

"It would be nice if they (MIAD students) were able to stay with us until we are 100% done." (MU student)

"Meet during class time as well as having scheduled class time for engineers and designers to collaborate." (MIAD student)

"The MIAD students should definitely start the project at the beginning of the year and maybe stay on the project for the entire year. Eight weeks is not long enough, especially if you want to get several prototypes. Thankfully, we were able to make three prototypes while the MIAD students were on board, but had they started this project with us sooner I think we could have had a much better prototype." (MU student)

5. Discussion

The results of the survey indicate that the MU and MIAD students recognize that each discipline has a different focus, its own language/vocabulary, and different approaches to problem solving. Engineers noted that ID students emphasized aesthetics, and used drawing and sketching as preferred tools for design and communication. They were impressed with the skill demonstrated by the ID students when using these tools. ID students noted that engineering students emphasized more analytical approaches to design with a focus on functionality, and testing to verify designs. Both groups noted that there were many common aspects of the design and project management processes that were shared between the disciplines such as problem identification, passion for the project and the quality of the final design, use of schedules to manage the project, and communication of project status through oral presentations. They viewed differences in approaches to problem solving as being complementary to the skillsets of students from both disciplines, and felt that both groups could work well together with mutual respect to solve problems.

Survey results indicated a strong desire among students to work together from the start of the MU capstone design course until the end. Students preferred to join the team and begin work on the project in August instead of January, and continue working until the project is completed in May, instead of March. MIAD students wanted to be involved as early as possible in the design process, including identifying customer needs, establishment of target product specifications, and concept generation and selection. They suggested that class time be provided to meet as a team.

Students concluded that good communication was required for a successful project experience, and that learning each other's disciplinary language was essential to understanding each other. They recognized the need for engineering and industrial designers to be able to explain their ideas to people from other disciplines.

As previously mentioned, we have found (anecdotally) that the two disciplines communicate design ideas differently. Both groups use sketches as a basic communication tool but the ID students often have better sketching skills than the engineering students. As a result, sketches made by ID students are often more effective in communicating ideas. This is partially due to the differences in the design curricula, and not a lack of drawing ability among engineering students. Drawing, sketching, and the use of digital design methods are typically emphasized more in ID programs. Figs 1–3 illustrate the differences in how engineering and ID students often communicate their designs.

Figure 1 shows a boxy, industrial looking design with many rectangular components and 90° angles. Figure 2 also shows an industrial looking design with many right angles. However, in this image, the actual hand ergometer is shown mounted to the stand at an angle to provide a sense of scale and show how the product will be used by a patient lying in a hospital bed. Figure 3 shows a more tubular, aesthetically pleasing design. An image of the hand ergometer, patient lying in bed, the angled platform, and the bed itself is included to provide a sense of scale and show how the stand would work and be used. These features are often included (and typically required by ID faculty) in sketches and drawings created by the ID students.

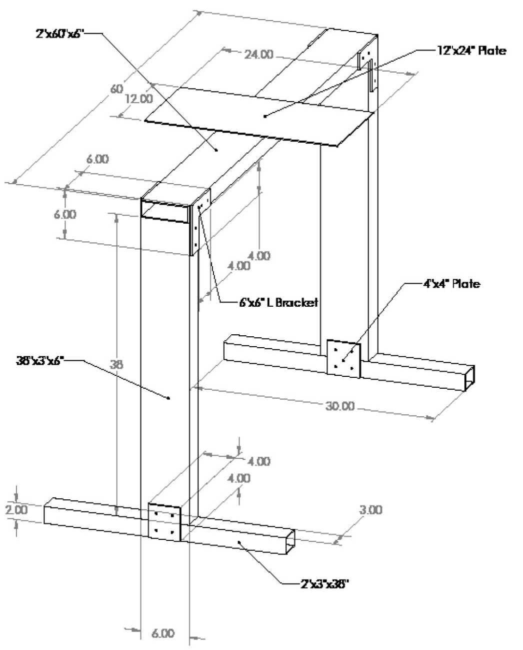

Fig. 1. Drawing made by an MU engineering student to communicate a proposed design concept for a movable stand to hold a hand ergometer over a patient's bed to allow the patient to exercise while lying flat on the bed. This drawing was generated in early December, just prior to the start of the MU/MIAD collaboration in January.

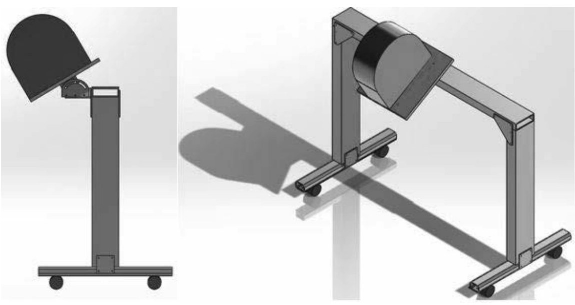

Fig. 2. Drawing made by an MU engineering student to communicate the final design for the same project described in Fig. 1. This drawing was created in early May, following the end of the MU/MIAD collaboration in March of the same year.

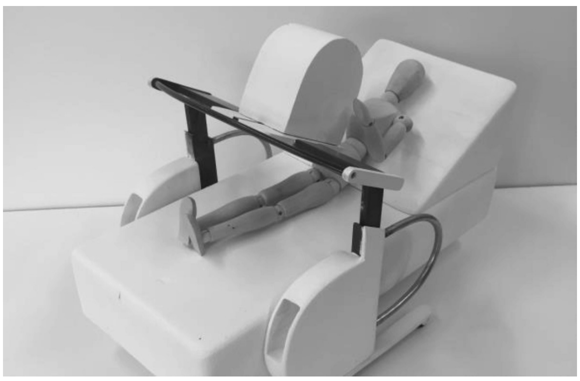

Fig. 3. Computer-generated image, created by an ID student in March, of the same final design presented in Fig. 2.

6. Recommendations

During the first ten years, we have learned many lessons regarding the structure and management of our collaboration between engineering and industrial design students. Based on our experience, observations, and feedback from students, we recommend the following for capstone design instructors interested in establishing similar collaborations at their institutions:

- Capstone design faculty should carefully screen potential collaborative projects to determine if significant industrial design work (other than just aesthetic improvements) is actually needed. ID students can make significant contributions to capstone project in areas other than aesthetics and may feel undervalued if their only role on the project is to "make the design look nice".
- To improve outcomes, all teams should be allowed to volunteer for a collaborative project, and not be required to do so. Forcing students to participate in this type of collaboration often leads to poor outcomes. Students who participate need to understand the advantages and value that this type of collaboration will bring to the project and team regarding the quality of the final deliverable. They also need to accept and respond to the additional communication demands that this type of collaboration requires.
- When soliciting participation from ID students, engineering students should be presenting their projects, not capstone instructors. We have found that this form of peer-to-peer recruiting is more effective in attracting ID students to the project team than when faculty present project information.
- If possible, allow both groups of students to work together from the start of the project until the end to improve continuity throughout the entire project. This will allow all students to participate in the customer needs identification process, establish target specifications, and contribute to the early generation of design concepts. It can enhance team building, build trust among team members, and create a sense of joint project ownership and greater commitment to the project and team.
- To avoid confidentiality and non-disclosure issues, industry-sponsored projects should be carefully considered before approving them for potential collaborative teams. Industrial design students need to be able to include their work in their design portfolios when conducting job searches and thus may not be willing to sign agreements that limit their ability do so.
- To better prepare for engineering/ID collabora-

tions, it would be helpful to introduce ID topics to engineering students early in the engineering curriculum, encourage development of 3D modeling skills (with tools such as SolidWorks), and provide opportunities for students to develop sketching and visualization skills.

- Encourage students to share the title of "designer" with ID students and faculty. Often, industrial designers refer to themselves as "designers" and engineers as simply "engineers". Similarly, engineering students often think only of themselves as designers. Recognize that both groups are designers (and problem solvers) who emphasize different aspects of design and bring complementary design skills to the project team.
- Engineers often view the design process as linear (disciplined) and industrial designers view it as non-linear (chaotic). Recognize that the process involves iterations that require looping back to previous stages, but that to properly comply with international standards and regulatory requirements, some stages may need to be completed in a specific order.

7. Conclusion

We found that engineering and industrial design students tend to emphasize different aspects of design, reflecting the emphases of their respective curricula. Student feedback and instructor observations over the first ten years indicated that these collaborations helped students (1) learn to communicate with people in other functional disciplines, (2) develop an appreciation for the complementary skills each discipline brings to the project, (3) learn that there is more than one way to solve a problem, and (4) develop an appreciation for different approaches to problem solving and ways of thinking. Evaluation of final prototypes indicated that the overall quality of product design increased when engineering and industrial design students worked together. We found that the most successful collaborations involved students with excellent communication and teamwork skills.

Acknowledgments—The authors would like to thank the National Institute of Biomedical Imaging and Bioengineering for their partial support of this collaboration through Award Number R25EB013070.

References

1. W. A. Hyman and M. B. Privitera, Looking Good Matters for Devices, Too, *Medical Device and Diagnostic Industry*, **27**(5), 2005, pp. 54–63.
2. M. Prince, Industrial Design Meets Engineering, *Appliance Magazine*, **66**(5), June 2009.
3. J. Goldberg, Biomedical Engineering/Industrial Design Collaboration in Senior Design Projects, Senior Design, *IEEE Engineering in Medicine and Biology Magazine*, **26**(4) 2007, pp. 98–99.
4. J. Goldberg, *Capstone Design Courses: Producing Industry-Ready Biomedical Engineers*, Morgan and Claypool Publishers, 2007, pp. 57–60.
5. J. Goldberg, M. B. Privitera and P. Malassigne, Benefits of Collaboration between Biomedical Engineering and Industrial Design Students, *Proceedings of the 2007 Annual Meeting of the Biomedical Engineering Society* (CD ROM), Los Angeles, CA, September 2007.
6. J. Goldberg and P. Malassigne, Lessons Learned from a 10-Year Collaboration between BME and Industrial Design Students in Capstone Design Projects, *Proceedings of the 20015 Annual Meeting of the Biomedical Engineering Society* (CD ROM), Tampa, FL, October 2015.
7. M. B. Privitera and B. J. Zirger, Letting the Grain Out of the Silo: Transdisciplinary Product Development Education, *Innovation*, Winter 2006, pp. 49–51.
8. J. Goldberg, P. Malassigne and M. B. Privitera, Engineering/Industrial Design Collaboration in Capstone Design Projects, *Proceedings of the Capstone Design Conference 2010* (CD ROM), Boulder, CO, June 2010.
9. J. M. Leake and D. Weightman, Engineering and Industrial Design Education Collaboration, *Proceedings of the American Society for Engineering Education* (CD ROM), Vancouver, BC, Canada, June 2011.
10. New Jersey Institute of Technology, Mixing it Up at NJIT: Engineering and Design Students Work Together, http://www.njit.edu/features/innovations/biomed.php. Accessed January 2, 2016.
11. Loughborough University, Product Design Engineering, http://www.lboro.ac.uk/study/undergraduate/courses/departments/mechanical-manufacturing/product-design-eng/. Accessed January 2, 2016.
12. *Harvard Gazette*, Harvard University, Where Design, Engineering Meet, http://news.harvard.edu/gazette/story/2015/09/where-design-engineering-meet/. Accessed January 2, 2016.

Jay R. Goldberg, PhD, P. E., is Clinical Professor of Biomedical Engineering, and Director of the Healthcare Technologies Management Program at Marquette University and the Medical College of Wisconsin in Milwaukee, WI. He teaches courses involving new product development and medical device design. His experience includes development of new products in urology, orthopedics, GI, and dentistry. Dr. Goldberg earned a BS in general engineering from the University of Illinois and an MS in bioengineering from the University of Michigan. He has a master's degree in engineering management and a PhD in biomedical engineering from Northwestern University, and has six patents for urological medical devices. He is a licensed Professional Engineer in Illinois and Wisconsin.

Before moving into academia, he was director of technology and quality assurance for Milestone Scientific Inc. (Deerfield, IL), a start-up dental product company. Prior to that, he worked for Surgitek (Racine, WI), Baxter (Deerfield, IL), and DePuy (Warsaw, IN). Dr. Goldberg is a co-creator of the BMES-idea national student design competition, writes a quarterly column on senior capstone design courses for IEEE *Pulse* magazine, and has published two books on preparing biomedical engineering students for careers in the medical device industry. In 2012, he received the Engineering Education Excellence Award from the National Society of Professional Engineers.

Pascal Malassigné, FIDSA, is the Senior Professor & Chair of the Industrial Design Department at MIAD. Until recently he was an Adjunct Assistant Professor in the Department of Physical Medicine & Rehabilitation, Medical College of Wisconsin and a Research Career Scientist at the Milwaukee Veterans Affairs Medical Center. Professor Malassigné is the recipient of many design awards and patents and is widely recognized for his design research work. He devoted for over 30 years all his non-teaching activities to designing assistive and mobility products for individuals with disabilities for the Department of Veterans Affairs. He is the author of many articles and has lectured and made presentations on his work nationally and internationally. Professor Malassigné has over 40 years of Industrial Design teaching experience and prior to joining MIAD, taught Industrial Design at Georgia Tech and Virginia Tech. He received his undergraduate degree in France and his Master of Industrial Design from Syracuse University. Professor Malassigné is a Fellow in the Industrial Designers Society of America and served as the first president of IDSA's Design Foundation. His service to IDSA includes positions of Secretary Treasurer, Regional Vice President, Education Vice President, Wisconsin Chapter Chair and Board member. He is also a member of the Human Factors & Ergonomics Society, Rehabilitation Engineering Society of North America, and other professional organizations. Design Intelligence named Professor Malassigné as one of the Most Admired Industrial Design Educators in 2006.