Update: Use of Results for Program Improvement

**Outcome(s):**

**Outcome VII:** Studies related to end-user psychology, human factors and user interface.

**Decision(s):**

The faculty decided that the students need to conduct more physical research and testing during the design process to enhance the user experience and design manufacturability. The faculty has decided to increase the requirements of physical prototyping in the courses of ID 400 Advanced Industrial Design Studio, starting in the academic year 2013 to 2014. The outcome will be measured via traditional design critique in the 2015 senior project presentation.

*Full report is included on following pages.*
Assessment in the Design disciplines is rarely accomplished through single instruments matched to single outcomes. The design Artifact (visual, physical/spatial, temporal, and/or interactive object(s) through which makers think about, manipulate, and express a set of relationships among audiences/users, contexts, and material form) are the typical evidence through which faculty assess outcomes. These artifacts are, by definition, holistic expressions and used to assess multiple aspects of student performance. The Portfolio (a collection of artifacts as evidence of student performance over time) is also considered in determining course and curricula outcomes. Furthermore, a typical evaluation tool in studio-based courses is the Critique (peer and faculty evaluation of artifacts in response to well-articulated project criteria). In such critiques, students make oral and visual presentations of their own work and respond to the work of other students. Such critiques often do not result in physical evidence or in quantitative data, especially with respect to singular outcomes. Therefore, the Department of Graphic Design and Industrial Design has chosen several occasions for the formal assessment and documentation of outcomes (i.e.: Mid-Program Residency Reviews, End-of-Program Senior Exit Reviews, among others). Undocumented critique results and faculty impressions from studio meetings, however, are no less formative in making curricular improvements. This less formal assessment is discussed in faculty curriculum retreats and may respond to issues not raised in formal assessment activities.

THE ARTIFACT: As mentioned, a defining characteristic of design is the artifact: the visual, physical/spatial, tactile, temporal, and/or interactive object(s) through which makers think about, define, manipulate, and express a set of relationships among audiences/users, contexts, and material form. Audiences and users exhibit meaningful differences that must be accommodated by the artifact. The context (of reception and/or use) has cognitive, cultural, social, economic, and technological dimensions that can be addressed to greater or lesser degrees by the maker’s choice about the design of the artifact. A student’s recognition of the “goodness of fit” among these competing priorities is manifested in the artifacts they make and such understanding can be evaluated by faculty who have been trained to distinguish among basic, proficient, and advanced performances.

THE PORTFOLIO: Student performance in design demands assessment over time. Failure is considered a normal part of the learning process. Good students learn from unsuccessful as well as successful solutions to problems and adjust behavior in response to subsequent challenges. Faculty in the College of Design are less concerned with any single moments of excellence than with a progressive record of performance that shows mastery of concepts in more than one context and in a variety of forms. Design students are encouraged to rework solutions, to refine previously critiqued outcomes, and, ultimately, to explore concepts from many perspectives. The portfolio is work accumulated across time, a progressive record of performance and the acquisition of skills and knowledge.

THE CRITIQUE: Students learn to make critical judgments about their work and the work of others through open, peer evaluations in response to well-articulated criteria. Typically, students make oral and visual presentations of their own work that are then evaluated by other students and faculty. Dr. Jack Noonan, former director of the Center for Teaching Effectiveness at Virginia Commonwealth University, studied various forms of assessment used in university classrooms. Among all strategies, he found that the design critique was the most effective in shaping student behavior for success; among all students in the university, design students were best able to articulate their “next move” following failure and took responsibility for their own future success.
SECTION I: The most recent bulleted list of program objectives and outcomes.

PROGRAM OBJECTIVES

The professional BACHELOR OF INDUSTRIAL DESIGN degree program prepares students generally for entry into the practice of industrial design and provides a strong general education. Further, the faculty recognizes the obligations of teaching in a field that shapes the physical and social environment. In response to these obligations we seek to promote a respect for learning and creating, to impart a responsibility for decisions, to teach a respect for materials as resources, and to give our students the tools they need to deal successfully with the changes they will confront in their lives.

The curriculum in the BACHELOR OF INDUSTRIAL DESIGN degree program is consistent with professional standards for the practice of Industrial Design. Undergraduate admissions policies, mission, curriculum, and course definitions reflect the Department's philosophy that in order to be of value as a professional, a designer must learn to use their entire intellect, along with developing the abilities of inventive form-making.

The curriculum for the Bachelor of Industrial Design articulates specific student outcomes in individual course outlines, while generalized objectives for the degree state that graduates of the program will be able to:

- Analyze problems and define problem variables and requirements.
- Employ appropriate methods for solving problems, selecting strategies, and generating a range of innovative solutions that demonstrate the ability to meet the needs of users and manufacturers.
- Critically evaluate design solutions, and recognize and refine the desirable qualities of the most advantageous concepts.
- Make informed decisions regarding the selection of materials and manufacturing processes.
- Effectively use computer technology and relevant software programs.
- Communicate effectively in visual, written, and oral presentations, and demonstrate the ability to analyze and evaluate the visual, written, and oral presentations of others.

COMPETENCIES

It is the belief of the Industrial Design faculty that graduating Bachelor of Industrial Design students demonstrate all essential competencies for Industrial Design, as documented in course syllabi; illustrated in examples of student work; and evidenced by the success of graduates in positions of responsibility in design offices and corporations around the country. Learning objectives match essential competencies (below in **BOLD**); detail where such objectives are measured; and articulate measures used to determine minimum levels of achievement by students in the program.

I. A foundational understanding of how products work; how products can be made to work better for people; what makes a product useful, usable, and desirable; how products are manufactured; and how ideas can be presented using state-of-the-art tools.
Students may not proceed to upper-level coursework without mastering required formative studio and service courses content, as well as foundational instruction covering user needs assessment, market analysis, product development and prototyping, and fabrication. In this way, faculty can guarantee that competency has been met, both through curricular requirements and by evaluative practices. Over the course of their studies, all Industrial Design students evidence the ability to generate multiple solutions to design problems through a variety of materials and processes, and are able to articulate connections between need, concept, and articulation for all proposed solutions. With this, all students demonstrate the ability to describe the role of context in the definition of design problems and predict outcomes of design solutions; the ability to describe design problem parameters that evidence analysis of user and production issues; and, ultimately, the ability to critically evaluate design solutions in terms of relevance to specific target users, the market and larger society. The Capstone Studio, taken in the last semester of the senior year, requires students to demonstrate this competency in self-defined and/or applied projects that tackle complex problems.

II. Knowledge of Computer-Aided Drafting (CAD), Computer-Aided Industrial Design (CAID), and appropriate two-dimensional and three-dimensional graphic software.

Electronic media are integral to most study in the program and matched to practices in the profession. With that, students are expected to develop over the course of their studies an understanding of tools and technology, including their roles in the creation, reproduction, and presentation of concepts and projects. Relevant tools and technologies include, but are not limited to, digital drawing, digital photography, 2D and 3D digital modeling, rapid prototyping, manufacturing, and presentation and display for both print and screen. Dedicated work in a three-credit support course technology progression requires the mastery of technological tools in support of students' formal development. Students purchase their own computers and software, and are technologically proficient by the middle of their junior year. While students understand computer technology as a tool, the program goes further to frame electronic media as a creative medium, as well as fabrication and presentation platform.

III. Understanding of the history of Industrial Design.

History and theory are taught in dedicated foundational first- and second-year courses (D100 DESIGN THINKING I and D102 DESIGN THINKING II; D102 DESIGN CULTURE AND CONTEXT I and D103 DESIGN CULTURE AND CONTEXT II; ID416 INDUSTRIAL DESIGN HISTORY), but the curriculum also integrates such study in core studio and support courses. Faculty deliver lectures as part of studio-based instruction and project briefs demand integration of theory and history. One other art/design history survey elective course is also required for all majors.

IV. Functional knowledge of basic business and professional practice.

Development of the student’s particular understanding of the context of Industrial Design in the corporate and business environment is specifically addressed in ID 262 Professional Practice in Industrial Design. This 3-credit seminar course examines issues and situations encountered in the various settings of industrial design practice. Topics include organizational structures, basic business/marketing strategies, patents, trademarks, copyrights, and contracts. The course also addresses the manner in which students approach companies for employment, and class time is allocated to the development of effective resumes and the student’s portfolio.

V. The ability to investigate and synthesize the needs of marketing, sales, engineering, manufacturing, servicing, and ecological responsibility and to reconcile these needs with those of the user in terms of satisfaction, value, aesthetics, and safety. To do this, industrial designers must be able to define problems, variables and requirements; conceptualize and evaluate alternative; and test and refine solutions.

Studio coursework frequently uses case studies, models of best practices, and specific methods for solving the complex problems as found and reflected in practice and industry. Students often work in collaborative teams; develop project definitions, research, and workflow patterns; produce, test, and refine prototypes and production models against stated criteria; deliver final work various presentation formats; and explore contemporary methods of design practice (such as conducting competitive market audits, engaging in ethnographic studies, authoring needs assessment statements and branding positions for proposed new products and services, etc.) In the capstone studio, seniors engage in discussions dedicated solely to the transition from school to work and examine a range of best practices, project types, and professional behaviors.

VI. The ability to communicate concepts and requirements to other designers and colleagues; to clients and
employers; and to prospective clients and employers. This need to communicate draws upon verbal and written forms, two-dimensional and three-dimensional media, and levels of detailing ranging from sketch or abstract to detailed and specific.

Integral to all studio activities, upper-level coursework asks Industrial Design majors to demonstrate the ability to communicate ideas in various pertinent formats (printed, screen, and physical) at various stages of project development, as well as the ability to consistently throughout their studies to make formal presentations of their ideas and to respond critically and constructively to the work of others. These, in turn, inform and define all assessment opportunities for faculty and peers such class critiques, end-of-project presentations, end-of-semester reviews and student exhibitions. Moreover, through various applied studio activities, funded studio projects, service learning initiatives and high-profile student and trade competitions, students are also provided with ample opportunity to engage with and learn from clients, industrial design professionals, and industry partners.

VII. Studies related to end-user psychology, human factors and user interface.

Students engage human-centered design principles as they pursue research-based upper-level studio work and elective coursework in related disciplines. Students are reminded to see impacted users, as well as all other involved stakeholders, as key participants in every design problem. A student’s understanding of the capabilities, limitations, and variability of human physical and cognitive makeup is specifically addressed through the course ID445 HUMAN-CENTERED DESIGN. The course is an introduction to the spectrum of human physical and cognitive capabilities as they relate to user interaction with designed products and environments. Topics include an overview of anthropometrics and ergonomics, applications of functional limits and psychological factors in design, and the principles of Universal Design.

VIII. Opportunities for advanced undergraduate study in areas which intensify skills and concepts already developed, and which broaden knowledge of the profession of Industrial Design. Studies might be drawn from such areas as Engineering, Business, the practice and history of visual Art and Design, and technology, or interdisciplinary programs related to Industrial Design.

In studio, students often work on sponsored projects in a team approach, which simulates best working methods of professional practice. These projects are generally sponsored by nationally/internationally recognized corporations and offer students the resources to undertake design challenges in the classroom and studio that involve the complete cycle of the design, engineering, and marketing of new products. Various other opportunities are also made available to Industrial Design students through frequent funded practicum studio work, market-driven cross-disciplinary research, extension and engagement (service learning) initiatives, and one-off and cyclical competitions.

IX. Opportunities for internships, collaborative programs, and other field experiences with industry groups.

Industrial Design students are encouraged to pursue internships starting in their junior year. The College and Department periodically publish a college-wide list of professional opportunities (freelance projects, jobs, competitions, etc.) for the benefit of our student body (currently enrolled undergraduate or graduate students). College listserv posts and/or targeted departmental e-mails typically reach students with a description opportunity/project at hand, contact numbers, and, whenever available/appropriate, fine-grain details such as conditionals, time commitment, compensation, etc. If all stars align (scope, timing, and interest), opportunities published typically bring out a match within our majors. Matches “connect” professionals to student talent with or without a for-credit arrangement between student and employer. Students can choose to either act as “free-agents” or engage our “for-credit” ID 494 INTERNSHIP INDUSTRIAL DESIGN.

The program also supports both a “DOUBLE MAJOR” and “MINOR” degree path option for students and a “for-credit” ID 495 INDEPENDENT STUDY framework; sees frequent sponsored/funded projects in upper-level coursework; and guides students in the pursuit of formal national and international competitions.

X. Participation in multidisciplinary team projects.

Multidisciplinarity is at the heart of our common-to-all students First Year Experience. First-year studios and service courses see freshman from all College of Design majors working together in a variety activities, assignments, and projects. Student work is jointly reviewed, assessed, and exhibited. Industrial Design majors, transitioning into a disciplinary degree path still continue to
pursue cross-disciplinary and multidisciplinary course opportunities through open studio (“swing studios”) and/or electives regularly offered at the College and sister departments. Later in the Industrial Design curriculum, junior level and above, students are again provided with further collaborative and multidisciplinary opportunities as unique studio projects often see the inclusion and participation of other majors.

ASSESSMENT TOUCHPOINTS
The Department offers comprehensive freshman, sophomore, junior and senior core studio sequence; special studios that undertake work for clients, three levels of technology-based learning, in addition to courses in materials and processes, ideation, technology, human factors, history, professional practice, and internship. Students may also undertake independent study registration, when elective coursework does not fulfill their interests. A capstone studio prepares seniors for their job search and requires an independently defined final project. The format of the first two sophomore semesters of the upper-level program (each with a 6-credit hour studio combined with three 3-credit hour support courses in the Fall semester, and two 3-credit hour support courses in the Spring semester), places high demands on a student’s time management skills. Students cover early on the basics of materials and processes, ideation, and digital technology within their first year of upper-level study. This allows students to apply, refine, and integrate this very knowledge in junior- and senior-level studio coursework.

The Department engages in an ongoing assessment of the appropriateness of its mission, curriculum, and course offerings through review and discussion of student performance at faculty curriculum retreats, and through feedback from the profession, regarding the abilities and quality of our graduates.

Regular systematic evaluation of student performance and curricular effectiveness
The Department observes regular end-of-semester reviews of student work in each studio and studio-support class and evaluate the effectiveness of assignments towards promoting desired learning experiences and skill development. The Department also maintains a regular review of curricula to ensure updating, as necessary. To this end, the Department pursues the following:

- Syllabi collection (for all classes) and student studio work documentation (for all studio-based classes).
- Bi-weekly dedicated teacher meetings to review learning objectives and outcomes, discuss and refine lesson plans, and evaluate student performance.
- Periodic departmental meetings and beginning- and end-of-semester retreats with all faculty (full-time faculty with Curriculum Committee oversight).
- End-of-semester studio reviews (final critique, open studio pin-ups, and evaluations by faculty of class performance).
- Mid-Program Residency Reviews and End-of-Program Senior Exit Reviews (full portfolio reviews with evaluation by faculty of student performance).
- Periodic exhibitions (First Year and advanced-level studios, Mid-Program Residency Reviews, and Commencement Show).

Student evaluation of instruction
Finally, students evaluate the effectiveness of instruction in every course, every semester (NCSU's ClassEval system). This procedure provides statistical summaries for faculty and administrators. Summaries tell faculty how they rank on a variety of items with respect to other colleagues in the Department and University mean.

------------------------------------------------------------------------------------------------------------------------------------------------------------------------

SECTION II: Report the outcome(s) measured in 2012/2013, using the following template for each outcome.
*Each outcome measured can usually be summarized in one page or less

<table>
<thead>
<tr>
<th>Program Outcome:</th>
<th>Functional knowledge of basic business and professional practice. The ability to communicate concepts and requirements to other designers and colleagues; to clients and employers; and to prospective clients and employers. This need to communicate draws upon verbal and written forms, two-dimensional and three-dimensional media, and levels of detailing ranging from sketch or abstract to detailed and specific. Opportunities for internships, collaborative programs, and other field experiences with industry groups.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Courses:</td>
<td>ID 400 Advanced Industrial Design Studio</td>
</tr>
</tbody>
</table>
**Method for Assessment:**

End-of-Program Senior Project Reviews (partial and full portfolio reviews, respectively, of student performance with evaluation by faculty and guest lecturers, critics, and practitioners).

**Population and Sample Information**

Population: 10. Sample: 10. (All graduating seniors are in this course).

**Implementation of method:**

Department and faculty-implemented; overseen by Undergraduate Program Coordinator, with participation of guest lecturers, critics, and invited practitioners. Course project with rubric; end of semester studio reviews are open to all other faculty and guest lecturers and critics within major. End-of-Program Senior Project Reviews open to all other faculty and guest lecturers/critics within major, and see participation of guest lecturers, critics, and/or practitioners.

**Brief Summary of Results**

In Spring 2013, the senior industrial design class was sponsored by JLG, one of the biggest construction equipment manufacturers in the world, to redesign their construction lifts. Intensive interaction between the students and the company took place the entire semester. The students created a line of new products as their senior projects. The final project reviewed was participated by JLG and Industrial Design faculty. The company and faculty were both very pleased with the professionalism and quality of the projects. JLG is incorporating many designs into their product lines.

**Comparison of findings to determine improvement**

The Industrial Design faculty noticed that there were significant improvements in the quality, creativity, practicality, and research in this year’s project, compared to last year, especially with the input from the industry. All the main skill sets that students learn over the years were integrated and applied in this project, including CAD, communication, business analysis, form development, and user research. One area needs improvement is the interaction with engineering. Design students could have further advanced their manufacturability with the inputs from the engineers.

**Interpretation and Decisions**

Continue to build on the systematic, research-centered, industry-collaborated project approach to the senior studio.

---

**SECTION III:** Please identify at least one learning outcome you will measure in 2013/2014, using the following template for each outcome.

| Program Outcome: | Functional knowledge of basic business and professional practice. The ability to communicate concepts and requirements to other designers and colleagues; to clients and employers; and to prospective clients and employers. This need to communicate draws upon verbal and written forms, two-dimensional and three-dimensional media, and levels of detailing ranging from sketch or abstract to detailed and specific. Opportunities for internships, collaborative programs, and other field experiences with industry groups. |
| Relevant Courses: | ID 400 Advanced Industrial Design Studio |
| Method for Assessment: | End-of-Program Senior Project Reviews (partial and full portfolio reviews, respectively, of student performance with evaluation by faculty and guest lecturers, critics, and practitioners). |
| Timeline: | Reviewed in May, 2014. |
| Faculty or staff Responsible: | Undergraduate Program Coordinator (w/ studio and studio-support faculty) |