Collaborative Learning in Industrial Design

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Abstract. This paper discusses the benefits of collaborative learning in design education, arguments for why it should be implemented in university curriculums and will include interviews with students and educators from different programs. Collaborative Learning is a powerful tool that has the potential to increase the quality of students entering the design workforce. Students have more success–after graduation when they have real-world experience and in turn are satisfied with their involvement in the classroom. Collaborative Learning lays a foundation for students to learn from the industry and apply the knowledge into their work and creative process. It is a necessary paradigm for schools to adapt in order to prepare students to enter the competitive world of design.

Keywords: Collaboration · Learning · Education · Innovation
Technology · Future · Competitive · Culture · Environment

1 Introduction

We are on the verge of a monumental shift in design, technology, engineering, architecture and innovation. There are self-driving vehicles, a plan to colonize Mars, artificial intelligence is as smart as a six-year-old, our world is running out of resources and we need people to solve some of the greatest problems humanity as ever encountered. This might be a lot to handle, but I believe we can prepare ourselves by educating our students to work with others, to collaborate with professionals, learning from other disciplines and leading with an open mind. I believe this generation of students can be those problem solvers we desperately need. Solving problems begin with learning to work with others, and applying what we learn to progress and advance our personal interest, inventions, ideas, theories, etc.

Collaborative Learning involves groups of students working together to solve a problem, complete a task, or create a product. This approach allows students to learn from each other's creative processes. Although much can be gained from peer education in the classroom, expanding outside of the classroom can offer additional educational enrichment. Including industry professionals in the collaborative learning process can provide students with a unique real-world experience in collaboration at the professional level.

Several American universities have incorporated collaborative learning into their design curriculums. The University of Cincinnati has one of the most successful co-op internship programs in Industrial Design. This symbiotic relationship between businesses

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and schools not only encourages innovation and student growth, but also creates a strong alumni cycle where students become professionals and continue this collaborative relationship with their alma mater. A successful partnership between industry and education is one of many aspects that have earned the program the recognition of being top ranked Industrial Design School by DesignIntelligence, and I.D. Magazine.

Another example of collaborative learning can be found in the University of Illinois at Chicago's (UIC) Interdisciplinary Product Development Program (IPD). IPD Program at UIC is a two-semester curriculum that integrates the latest technologies with best practices for innovative product development. The course encourages collaboration between students from three different colleges within the university. Students in Industrial Design, Engineering, and Business work together in cross-functional teams to research and develop new product concepts, each with a designated role in accordance with their chosen career paths. This program pushes students to work together in cross-functional teams to solve problems, come up with innovative designs and propose solutions to their corporate sponsors.

These are a few examples of success. Unfortunately, not all schools have the foundation to support these types of partnerships. The majority of public design education programs in Mexico do not have working partnerships with other university disciplines, let alone a relationship with industry. A major setback of this uncollaborative university environment is that it produces students who are unprepared for the expectations and demands of a career in design, potentially hindering global design innovation.

2 Relationships Make Collaborations

1. Universidad Autonoma Metropolitana – Azcapotzalco/University of Illinois at Chicago. About thirty years ago, Vincent Paglione began a collaboration with the Universidad Autonoma Metropolitana – Azcapotzalco (UAM) that would change the lives of many students and educators. Vincent held numerous positions at the University of Illinois at Chicago, where he mentored students in the School of Architecture. Some of his collaborations included raising money to fund a cultural trip to UAM so students can expand their horizons, meet new people, learn a new language, try new food, get out of their comfort zone, and discover a new culture. Vincent recently passed, but his legacy lives on – Professors Stephen Melamed and Hector Silva continue his work with the Mary & Vincent Paglione Design Challenge. This challenge is a partnership between UIC's College of Architecture, Design and the Arts and the Universidad Autonoma Metropolitana – Azcapotzalco in Mexico City. Teams from both schools design a solution to address human migration during natural disasters. The winning teams are each awarded a cultural trip to Mexico City and Chicago, respectively. Research Professor Luciano Segurajáuregui of the Universidad Autonoma Metropolitana – Azcapotzalco is on the other end of this collaboration with Professor Melamed and Professor Silva. "Collaboration is very important at our university, it's one of our university principals – to collaborate with any members in our society to create a better country", Professor Segurajáuregui states in regard to the Mary & Vincent Paglione Design Challenge [1].

A few years ago, Professor Segurajáuregui was involved in a collaboration project in the state of Veracruz, which involved students collaborating with the community, unfortunately the project was cancelled after five years due to the increase violence in the area.

For UAM Industrial Design student Valeria Valdez, entering the Mary & Vincent Paglione Design Challenge was a no brainer. She states that the competition was an opportunity to work with her peers on solving a sustainable issue that matters, to design something that can change the world and bring attention to natural disasters, and the people involved [2]. In 2016 her team of two won the Mary & Vincent Paglione Design Challenge at the Universidad Autonoma Metropolitana – Azcapotzalco and was awarded a cultural trip to Chicago, IL, where for a week long she toured the Windy City and got to meet with designers from TEAMS Design, Beyond Design, Design Within Reach, and students from the University of Illinois at Chicago respectively. "It was amazing to see how people (designers and students) think and work outside of our environment. The thought process and how development comes to be is very interesting, intriguing, and exciting. As a student, I can take this information back to my school to share and show them what collaboration is like in other parts of the world," states Valdez.

The collaboration between the Universidad Autonoma Metropolitana – Azcapotzalco and the University of Illinois at Chicago is an example of building an international relationship that fosters cultural exchanges, professional development and advocates for collaboration. Professor Melamed who represents the University of Illinois at Chicago is no stranger to collaboration. Along with a couple of other colleagues, Melamed founded the Interdisciplinary Product Development Program at the University of Illinois at Chicago in 2002. "IPD has trained more than 500 undergraduate and graduate students in the best practices of a multi-functional approach to the front end of product development since its inception. Corporate partners – spanning diverse industries such as mobile communications, consumer electronics, household appliances, healthcare services and instruments, among others – have collectively received over 1000 new product concepts (some of which have resulted in patent applications) along with supporting user and market research. IPD is part of a small set of academic programs across universities worldwide, which emphasize close collaboration with industry partners to generate innovative solutions to applied problems while training the next generation of new product professionals" [3].

While at the University of Illinois at Chicago, Professor Silva founded the student-led Advanced Design Sketching (ADS) non-profit organization to encourage students to be productive during the summer months. ADS provided motivation to students by giving them access to the best designers around the world. Silva began reaching out to talented students and professional designers from around the world to offer their insights on design sketching. These testimonials have allowed Silva to create a one of a kind video library for students and professionals to reference in their quest to perfect their own sketching techniques. With the momentum of the summer workshop, the Advanced Design Sketching organization began organizing the first ever conference focusing on design sketching. Taking place at UIC this past October, the conference featured big names in design from all over the country. According to Silva "Advanced Design Sketching works because of a strong collaborative foundation and giving

community, we can't function without others being involved. Design is a language, you have to be fluent in it, and you have to surround yourself with fluent speakers" [4].

As the Chair of the IDSA Chicago Chapter, Silva has established collaborations with studios such as Garmin, MNML, LUNAR, TEAMS Design and others, to host events that benefit both students and professionals. During Silva's tenure as Chair, IDSA Chicago has doubled in membership and has expanded beyond the Chicago region to bring these events to student chapters at the University of Illinois at Urbana-Champaign, UIC, University of Notre Dame, and the Milwaukee Institute of Art & Design.

Silva states that "collaborative learning is central to his teaching philosophy in order to promote reflective thinking and improve the students' communication skills within the context of design. Collaborative efforts encourage a richness and depth unseen by singular identities. Collaboration can identify pre-existing strengths and encourage new skill sets to develop. Design education must evolve to a collaborative educational environment, able to cross media boundaries, taking design out of isolated academia and unite resources with other departments and other institutions". Professors Melamed and Silva are the perfect duo to pick up where Vincent Paglione left off and continue the legacy he left behind.

There are disadvantages of collaborating with others. According to the Medium article "Advantages And Disadvantages Of Collaboration In The Workplace—All You Need To Know About It" written by Rakesh Khushwaha, he breaks down the disadvantages of collaborations in the work place down to three pillars:

1. **Too Many Faux Leaders.** When people are working in a collaborative group, we have seen many times that it ends up with too many people trying to lead the group. The result is that there are not enough members who are willing to take a backseat and simply do what it takes to get the job done.
2. **Conflicts within the team due to different working styles.** When a number of different people work together to collaborate on a single project, there are chances of conflicts within the team due to different working styles of the individuals.
3. **The Incidence of Group Think.** There is the looming threat of group think while bringing different stakeholders together for the common good. It usually occurs when the stronger personalities within a group are so influential that they manage to take over the discussion and supersede their ideas as the result [5].

Khushwaha makes a good argument, the more people involved in a collaborative effort, the less output or direction you'll get. Working together might not work for people's working styles or personalities. Depending on your client or situation, it's very important to review the collaboration efforts or proposals and see if working together with someone is the right fit for both parties. (Khushwaha, Rakesh. "Advantages and Disadvantages of Collaboration In The Workplace—All You Need To Know About It" Medium (2015)).

The advantages of working together outweigh the disadvantages. There is more that connects us than separates us. Research Professor Luciano Segurajáuregui states that "some of the negative aspects of collaborating with industry is that we have to be careful with our collaborating partner. Collaboration should be beneficial to both parties involved, and sometimes one can take advantage of the other, especially when

students are involved – some companies view this as free labor, or don't cooperate with the end result or design. We've had an instance where our students in design and engineering worked extremely hard to meet a deadline for our industry partner and later found out that our partner would not allow our students to utilize the project in their portfolio, or give physical prototypes back to the school - even though it was originally agreed that the university had the rights to the content and outcome of this project; it's a tough situation to be in as an educator and advocate of collaboration". Segurajáuregui hopes there is change on the horizon and is able to bring industry leaders into his classroom; to create a collaborative environment for his department and students alike.

2. University of Cincinnati DAAP Co-op Program. One of the most successful collaborative efforts at an undergraduate level is at the University of Cincinnati's DAAP Co-Op program. The program is called "Cooperative Education" and it requires students to attend school year-round with five semesters of accumulative professional experience. According to the DAAP website – "During the college years, students obtain firsthand knowledge of professional practices, expectancies and opportunities. At the same time, they are offered a realistic test of their career interests and aptitudes. Participation in the program enables students to make more intelligent selections of post-graduate positions. As graduates, their professional practice experience makes them more valuable to employers and increases their qualifications for more responsible career opportunities". Sooshin Choi was the Director of the School of Design at UC in 2012, he believes that "DAAP is more progressive compared to other design institutions because of its key components of curriculum, co-oping and learned collaborative skills." There are schools who encourage students to get internships during summer, but nothing of this scale – the internship program at DAAP is well executed and organized. Students get real world experience, not just once, but three or four times in the course of their undergraduate education. "Co-op gives students real world experience and opportunities to discover a particular pathway or passion within their field before graduation, this makes the students committed to their area of design and allows them to establish professional connections within the design industry" states Choi [6] (Fig. 1).

This symbiotic relationship between businesses and schools not only encourages innovation and student growth, but also creates a strong alumni cycle where students become professionals and continue this collaborative relationship with their alma mater. A successful partnership between industry and education is one of many aspects that have earned the program the recognition of being top ranked Industrial Design School by DesignIntelligence, and I.D. Magazine.

DAAP Industrial Design Assistant Professor Juan Antonio Islas Munoz believes that in some way DAAP is ahead of many companies in the industry and design studios. Munoz said that "students come back from various internships with new interest, new expertise, new technologies and trends, and are very excited to apply this to their work. The co-op program allows the students to be at the for-front of science, tech, manufacturing, and engineering, etc. We have a couple of students that were very interested in virtual reality (VR) so the program invested in the technology; we now immerse this technology in the classroom; this gives us an advantage and puts us ahead of other

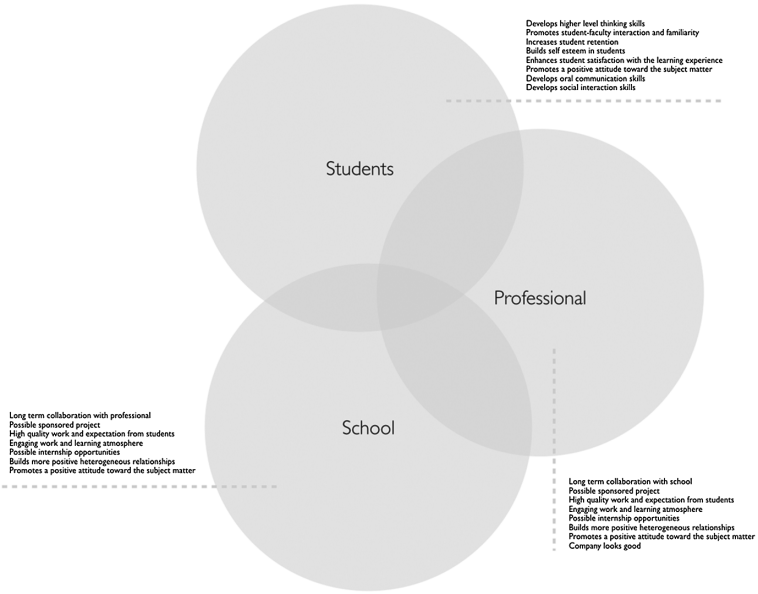

Fig. 1. Collaborative Learning in visual format: This graph represents how all parties of the collaborative learning spectrum benefit but also exchange and share the benefits. DAAP's Co-op Program represents this graph perfectly.

design programs. It also puts us ahead of industry, not many people have invested in VR equipment yet, so we feel we're on the right path for our students" [7].

3. An Optimistic Future. Medical miracles will one day be normal, engineering feats will be standard, things that can only be achieved in Hollywood using CGI will one day be solved – and it will be all thanks to people collaborating with other people, of different experiences, and cultures. The future will be determined by how well we prepare our students, by whom they learn from, and who they aspire to be. The future will be determined by the clashes of ideas and opinions, by cultural exchanges and shared information. The future will be determined by collaborators. The best learning doesn't come from the classroom, it comes from learning from others' experiences. Tesla CEO Elon Musk is notorious for encouraging inter-departmental collaborating, but also with other companies outside of Tesla, most recently SpaceX – in which he also runs as CEO. "Each company (Tesla and SpaceX) is determined to build better products – cars for Tesla and rockets for SpaceX. That determination makes it necessary, and even inevitable, for both to share research behind building their materials". During Tesla's quarterly call, Musk said "this cross-fertilization of knowledge from the rocket and spacecraft industry to auto and back and forth I think has really been quite valuable" [8]. It also helps that both Tesla and SpaceX have autonomous ambitions – Tesla with the self-driving car and SpaceX with trying to recycle rockets so they land back to Earth autonomously.

It's really important for students to gain motivation and inspiration, it's hard to do that in such competitive arena, instead of forcing them to have them go out of the classroom and seek their own motivation/inspiration, Silva began a video library (about 75 videos) where professional designers and students from other schools provided him with their advice on design, design sketching, advice on the journey, process, etc. It helps them develop a passion and not just acquiring skills to check them off because they need to pass a class or fulfill an assignment. With passion, they'll utilize these skills. Our duty as educators is to encourage future designers; enable them to actively contribute to fields of study outside of industrial design. I strongly believe that we need to inform young designers to be highly motivated thinkers capable of creating innovative solutions to unanswered questions.

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