WHAT ART OFFERS: HOW TO UNLOCK TALENT THROUGH HANDS-ON COURSES

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Abstract

Fleshed-out characters, roles, and narratives lie at the heart of both art and innovation. Recent revelations that Apple and others are looking for *an appreciation of design* (Brownlee 2014) in their workforce calls for innovation programs to strengthen this approach. This paper will expose the importance of art and design in the entrepreneurial/innovation process. By harnessing the imagination of collaborative teams, crossing boundaries of practice and function, students in college can establish their pathway to innovative and successful careers.
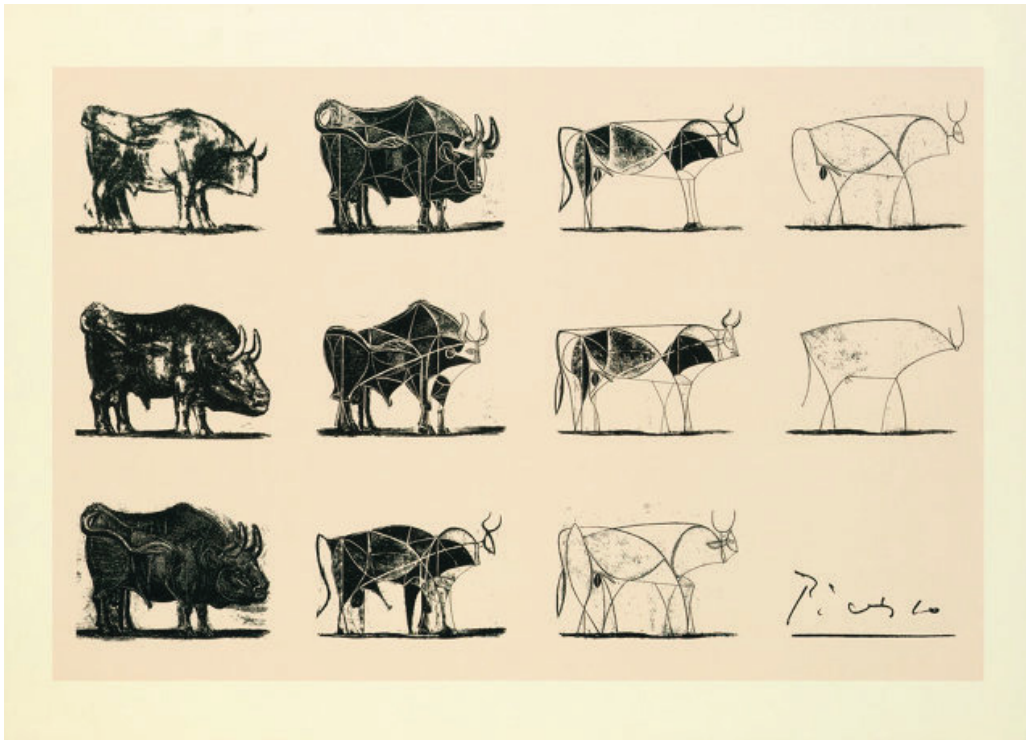
Image at http://www.fastcodesign.com/3034240/how-apple-uses-picasso-to-teach-employees-about-product-design

Playing with the world in new ways as part of a team, imagining together what could be and then creating products and services for that world, sets in motion tools for learning that will be revisited and refined over a lifetime. Ultimately, the practice of artwork as described here offers visceral, quantum level expression to and understanding of the characters and scenarios that play out in any venture.

Introduction

In the heart of Silicon Valley, Cogswell Polytechnical College encourages engineers and artists to work together in collaborative teams to produce mobile apps, animated films, and video games. Founded in 1887, Cogswell has served local ecosystems as their needs have evolved: from surveying, map-making, and garment design and construction; to design of water systems, welding, and aeronautical fabrication; to today's increasingly mobile, digital, and global economies. Throughout, the institutional focus is on developing individual skills applied to team projects that make an impact on society.

Students enter the college with an interest in becoming a coder, a musician, or an artist and with a portfolio of already accomplished work. They are then challenged to both refine their skills and to cross borders to engage in projects that draw from the potential of the entire student body. As a regionally accredited four-year institution, Cogswell offers BS degrees in software engineering, game development engineering, digital art/animation engineering, and digital audio engineering, and BA degrees in digital art/animation, game design, audio production, and media management.

The art program starts with hands-on skill building, then evolves to figure drawing to deepen understanding of anatomy, movement, and emotion as the basis for "character development." Students then use digital tools to bring collaborative projects to life. This approach goes far beyond programs that "teach the tool" by addressing the foundational elements that make the tool valuable in the first place.

To establish art's role in entrepreneurial education, talking about it isn't good enough. Entrepreneurs can feel good with some exposure to art, but they will forget it in an instant if they haven't been involved in art projects themselves. Working as part of a team, boiling down a project to its essence, switching perspectives, and picking up new skills on the fly help entrepreneurs stay on course. By integrating hands-on art and design projects into entrepreneurship education, faculty can provide a rich set of experiences that mirror real-world practice in an academic environment (Duhring 2014).

Most importantly, art in this approach scales from the earliest doodle to the most complex app, video game, or interactive film. Art, when practiced in this context, is not an isolated act. Nor is the refinement of imagination. As part of their college experience, students enter an evolving play-learn-make cycle that will repeat itself throughout their lives. They explore their skill set and aptitude as they relate to the professional options they can pursue. Their college experience, then, becomes a safely scaffolded environment surrounded by guiding faculty and surprisingly gifted peers. It's an environment designed to help students step into being extraordinary.

The following table provides dimensions to consider when developing courses that bring art into educational experiences. Each assignment takes on deeper significance as the scope moves from intimate to social. Along the way, students develop their perspective, voice, and value to teams.

	ASSIGNMENT	OUTCOME	CRITIQUE	EXPERIENCE
Intimate	Sculpt a self-portrait as an alien	A voice and evolving artifact	Self-reflective	Feeling, sensing new possibilities
Personal	Describe and sketch a steam-powered transportation device	A story of usage, place, and behavior	Observed by teachers and mentors	Skill building
Collective	Design key frames for animated film scenes	Imagine the world underpinning the project	Peer to peer mentoring and co-creating	Pipeline responsibility as part of team
Social	Construct soundscapes for client's videogame	User-driven art within product or service	Community adoption and propagation	Critical role in commercial venture

Art For Entrepreneurs And Engineers

Requiring hands-on art projects for those who do not self-identify as artists is similar to teaching science to students who don't expect to become scientists. Practical art skills and the development of a healthy respect for what is learned leads to a deepened awareness of options to bring to bear on future endeavors. In college courses, almost any assignment can be turned into an art project that challenges students to imagine the world in a new way and to create pathways through it by exercising the skills and technologies at their disposal. The context of these experiences can be adjusted to address issues that will come up in a student's chosen profession.

In an approach that is becoming increasingly significant in startups and innovative projects within larger organizations, well-developed usage scenarios and well-articulated personas combine to inform engineers and entrepreneurs of the core values they are bringing forward through the intended use of their products. Artistic renderings enable quick evaluation of many options prior to "hard coding" a final product. Simple sketching, storyboarding, and prototyping methods become tools for developing walk-throughs and quality assurance throughout even complex projects. Simply put, they force the organization to consider the world in a multitude of dimensions and to evaluate options that go unnoticed otherwise.

The learning outcomes offered by the experience of creating art involve not just the skills of producing artwork, but also the disposition to factor complex problems as well as the deep knowledge of the problems that are solved through critical thinking and methodical execution. Students emerge from such programs with an ability to commit themselves wholeheartedly to projects, to understand their role, and to adapt to critiques of their work. They learn to play with new ideas in a fluid way, to toy with a variety of

approaches to a given problem. From such free play, the imagination to try new things, to model imaginary worlds, radically shifts perspectives and opens opportunities for everyone involved. The adaptability required in such art serves to produce articulate and considerate members of entrepreneurial teams.

Skills

Just as coding serves as a starting point for software engineering, basic handwork forms the foundation of art education. Sketching starts for many as a fun way to doodle and to play with line, stroke, and shadow as a basis for increasingly complex structures. Once a student learns to draw lines of varying widths and to shadow, they can combine these elements to program objects and scenes, rendered in real time. They are challenged to consider the properties of light and perspective that shape a two dimensional image. They toy with various approaches until what emerges mirrors for others what the artist sought to convey. A skilled non-artist can develop their craft to such an extent as to inspire their collaborators to think differently, to imagine new possibilities, by forming a simple image for them to consider. Even a single picture can form the basis of decisions, which underscores their value to an entrepreneurial effort.

Basic sculpting skills bring such images into 3D space. Once again, beginning students learn by playing, in this case with clay. They feel the plasticity and toy with their sense of structure, texture, and balance. They learn the language of addition and subtraction, smoothing and adding texture in real time. They create and destroy their work until they find admiration from mentors and peers. What emerges can be surprising, as by simply rolling clay into a log or straw or wire, they can create a leg or finger or wisp of hair. With a simple gesture, an eyebrow is lifted, a nostril flared, or a muscle flexed to express emotion or vitality. Students examine symmetry and perspective to craft works that

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literally stand on their own. Just as a startup needs basic underpinnings, so does each piece of sculpture—it is obviously ill formed otherwise. With a basic level of sculpting skill, non-artists can render product ideas, make characters of customers (or partners), and render reference works that can be examined at all angles to show the effects of point of view, lighting, handling, and usage.

Similar evaluation methods can be applied to painting, dance, music, and acting. Each art has its own language to express, elaborate, and accentuate. Traditionally, colleges have focused on writing skills, and the results are unquestionably valuable. However, when we are talking about creating enterprises and making industry-ready graduates who can commit themselves to making startups successful, a broad exposure to creative methods can only help students become increasingly aware of their own unique perspectives, limitations, and realistic expectations within fiercely collaborative environments. At the very least, traditional hands-on art classes offer engineering and business students the opportunity to stand up to critiques and to develop their voices in ways that can be applied to their chosen specialty.

Art skills should be applied toward telling a story to an audience. In many Fine Arts programs, the concept of coherence is not always considered an important ingredient. Unfortunately, graduates from such programs are not always well suited to startup ecosystems. As associate professor Reid Winfrey says, "Cogswell is a design school. Telling a coherent story, whether in a drawing, an animation, a 3D model or a game, is the most important thing" (Yagi 2014). As students advance, they engage in collaborative projects in which they take on roles in telling a story that is bigger than they are. These collaborations develop the "soft skills" that are a trademark of Cogswell students: the ability to imagine alternative scenarios and to harness their creativity

across the boundaries of traditional disciplines to create new products, services, and experiences using the resources of those involved.

Disposition

Creating artwork yields significant value beyond the expression possible via written words alone. Whether in class, club, or studio environments, students form teams to produce sophisticated, collaborative works, to develop workflows, and to define roles for themselves within dynamic project environments. Describing these with words alone does not do them justice, just as simply describing a business plan does not a startup make. At the heart of Cogswell's approach are project teams that coalesce around bringing characters to life and bringing meaning to the stories they produce together. By way of example, here are two kinds of team approaches: the studio and the agency.

Studio projects involve a mix of engineers and artists who come together over multiple semesters to build an animated film, mobile app, or video game. Since these projects evolve from concept to story and character development, through pre-production and production processes, students must wear many hats. They become co-creators, imagining scenarios and bringing them into being with sketches, clay models, and written scripts. Each scene is storyboarded for evaluation and to inform the team as to the articulation needed for character models, environmental assets, and audio soundscapes. Clay reference models are put under lights to identify how they can be presented with realistic integrity. Character sketches are enhanced to show emotion and emphasis, bringing to light the students' deep understanding of anatomy and movement learned through figure drawing.

After going through multiple large projects, a student becomes a senior team member. These students are given responsibilities that

Figure 1. Interactive ebook emotional timeline, from https://www.youtube.com/watch?v=UTv8U7n_cIg

mirror real world practices, to show "newbies" the ropes and to work collaboratively to solve the very real problems that inevitably crop up. For instance, once all the characters have been digitally modeled and rigged (their anatomy has been programmed to move appropriately when animated), the lighting and textures for scenes require unique skills in which a master rigger might become a junior lighting artist or a novice animator might supervise a group producing texture art to finalize the project. Veterans of such projects take to honing a breadth of skills in order to make themselves indispensable to the team and with an eye toward roles they might choose to take on after graduation.

Another kind of project is that of serving as an agency for external clients, often startups themselves. Typically, startups must focus their scarce resources on building a product that customers love. They don't have the bandwidth to articulate their corporate message or the means to present their brand with sound and animation. While the outcome of such projects might be a one-minute video that exudes the client's brand,

the path to achieving an acceptable outcome provides students with opportunities to play with a variety of possibilities and to respond to real-world feedback. In these projects, the students' artistry must take a back seat to the story they will tell on the client's behalf. They must imagine with the client to describe a world that will unfold with time.

The Cogswell agency teams engage local startups and not-for-profits to generate professional-level work and acquaint students with meaningful roles they might choose to pursue after college. Clients have included organizations such as The Prairie Rainbow Company (game studio), BookShare (not-for-profit), an innovation group at Panasonic, and A-Learn (not-for-profit). Clients pay a nominal fee for participation in these programs.

Client meetings include all students on the project team. Students ask the questions and develop a variety of treatments for the client to consider. They learn to decode expressed views, develop briefs, and receive critiques. In but one aspect of such a project, audio students provide soundscapes to evoke the emotions and energies that often

go unexamined in traditional engineering and business disciplines. Mixing audio with characters and animations affords powerful story options. The students must listen carefully to both what is said and unsaid by clients, who are often unaccustomed to working so closely with the kind of elements that can unlock their narrative and bring their story to life in the world.

As the process continues, alternatives take on a resonance with the client and students can hone in on true needs. Typically, clients are surprised by the options and the freedom they have to choose or discard as they see fit. The team then executes a series of options based on earlier feedback. At the end of a six- to eight-week process, a client makes their final choice, such as what is now on display at Hacker Dojo. Hacker Dojo is a co-working space for engineers and entrepreneurs who are working to bring their ideas into life. It is funded by member subscriptions and provides office space and a variety of support services to its community. Notably, the teams behind the Pinterest service and the Pebble watch started at Hacker Dojo.

In the project for Hacker Dojo, Cogswell students imagined a world where everybody and everything is connected. They worked with the client to develop scenarios where the Hacker Dojo could be seen as an enabling platform for networked learning. They then created video animations and audio sculptures to express that world via the visual element of a puzzle piece that is carried from one project to another.

These design and engineering exercises are not unlike those for a startup (where a problem is identified and a solution developed that provides such a benefit to a target population as to underwrite the costs of production and distribution): they are more easily said than done!

Knowledge
Students working on studio and agency projects exhibit a fascinating ability to access knowledge as needed to become experts quickly. These large-scale projects started with modeling real-world production pipelines, mirroring industry practice to produce videos, games, or animated films. Students with

Video at http://www.hackerdojo.com/

experience in these projects find themselves in advantageous positions when entering the job market: they bring management experience with them right out of college.

In one animated film project, the class decided to make the central character an animated goat. In order to model that goat so that the team might realistically articulate its movements, the lead modeler was prompted to research the bone structure and anatomical behavior of goats. Little did he know that a goat has no top teeth at the front of the mouth. As he designed his goat, what he learned propagated naturally across the team.

This describes what John Seely Brown calls "pull" learning: spreading knowledge throughout teams to radically improve overall performance (Hagel, Brown, and Davison 2010). In this case, no one started the project as a science lesson. After all, the group had played around with many ideas before deciding a goat would be their central character. Now the entire team can tell you more about goats than you might ever wish to know!

In an interactive ebook project (https://www.youtube.com/watch?v=UTv8U7n_cIg) that features a seven-year-old boy as its central character, students immersed themselves in the psychology and physical processes involved with discovering the world outside the family, particularly for boys of that age. They naturally re-imagined their own childhood experiences and integrated surprising features that enable readers to use their fingers to nudge illustrations, to shine a flashlight into the woods, to combine stars into their own constellations, and even to add their own doodles to the boy's sketchpad.

At a quantum level, the knowledge gained by observing teammates while co-developing illustrated and animated stories based on direct feedback through critique and reassessments provides an education that cannot be matched. The knowledge is

tangible, timely, and appropriate to the project at hand. The lessons learned have proven to last and evolve throughout the careers that lie ahead.

On a recent tour of the Industrial Light and Magic studios in San Francisco, two Cogswell graduates were pointed out to a recent guest as "the only artists we let talk directly to the engineers." A recent Google employee points to his experience managing two separate engineering teams on Cogswell projects, which required constant interaction with animators and sound designers, as critical in preparing him for his career. Another alumna speaks of starting out in quality assurance; when it was discovered she had project management experience, she was rapidly promoted and continues to pursue a more lucrative career path.

Art To Venture

Want to get to know your customers? Identify them in practice, develop characters that stand out, and create a story around them. Animate your story with scenarios in which they experience problems getting to where they are going. Share your story and get feedback on your perceptions and descriptions. If what you share rings true, your potential customers will see themselves in your story and offer up their own accounts, along with their appetite to change things if they could. Your customer stories need to be refined continually to provide your venture with perfect knowledge of every aspect of who they are and where they are going.

This is what many call "customer development." It's the lynchpin for validating a business idea and is second nature for experienced entrepreneurs. In its execution, there are no shortcuts. Each new venture must start with a blank canvas and develop a true picture in order to build the right product. The stakes are high and failure must be accompanied by learning in order to pivot into a successful next chapter.

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Unfortunately, most ventures develop these stories with mere words and numbers on paper. As should be clear by now, words and numbers lack the movement, expression, and emotion that surface through pictures, timelines, and animations. Simple slide decks typically illustrate what was written, not what is true at a quantum level. Art, even as illustrated here, reveals what can otherwise only be described as a "gut feeling." When "customer development" is executed in a straight-jacketed way, with a goal of generating hoped-for data and optics limiting field of view, then a venture is doomed out of the starting gate.

When customers emerge in sound and motion, fleshed out in 3D, moving through scenarios that reflect the world as it will be, employees and investors "get it." Creating such new worlds, to make a "dent in the universe" requires more than applying technology to a problem, it also involves articulating possibilities that do not yet exist and behavioral responses that have not yet been imagined (Snell 2011). Without bringing forth the skills we have described here to harness a collective imagination and to document use of the technologies now at our disposal, ventures are limiting their chances for success.

Conclusion

On a recent tour of the Cogswell campus, a visitor abruptly stopped in a hallway and exclaimed "This is what makes this place unique!" He pointed to the open door to his left, which led to a clay-modeling studio filled with students rendering figures poised to leap. Then he pointed through the glass window to his right, which revealed a group of students at keyboards working their way through a Python class. "You force these people together"! It's true. Engineers don't have to go to another building to find an artist. Video game designers can find engineers without looking too far. For colleges to do what is described here might only require such close proximity as is now available at USC (http://

iovine-young.usc.edu/).

Increasingly, employers from startups to studios to enterprises are not looking for what a student did in college. Rather, they are looking for what an individual might contribute as part of their team. A recent graduate who learns by "pull," who commits enthusiastically based on the experience of previous projects, who toys with ideas and who mentors collaborators, stacks up well against more seasoned alternatives. Being comfortable crossing boundaries—mixing coders, designers, and technicians—requires an imagination for what is outside a given skill set. It requires an appreciation for the perspectives of others and for the endless possibilities that can be brought into play.

And, just maybe, as artists become part of engineering teams and as non-artists learn what is to be gained through practice, the problems that are identified and products that are built can more fully benefit the population that uses them. Through the practices described here—sketching behaviors, employing storyboards to describe processes, developing personas to gain insights, painting scenarios, and articulating the narratives that unfold in any business—loosely coupled teams can more effectively execute their plans, engage customers, and persuade investors. What art offers might ultimately be a more refined imagination that opens new worlds of possibility to ventures of all kinds.

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