Creative

Chaos

Learning Lessons on Inclusion & Innovation

SECOND EDITION

Drew Davidson et. al

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Learning Lessons on Inclusion & Innovation (Second Edition)

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Preface & Acknowledgments

What you are about to read is the work we've done at Carnegie Mellon University's Entertainment Technology Center (ETC) to better understand how creative teams work best, how they can be managed, and how they can be supported when they have issues. While this may sound like a clear set of problems, in reality it's challenging to support group dynamics as the creative process is often chaotic. Teams and managers are juggling interpersonal relationships, external client relationships, ever-adjusting project scope and requirements, and any number of other unforeseen issues that invariably crop up when you are trying to build something innovative, useful, and usable.

The idea for this book started when Laurie Weingart, from CMU'S Tepper School of Business, visited the ETC. She observed the semester-long team projects our graduate students design and develop with companies, non-profits, and ETC faculty. She thought these projects—which students produce during three of their four semesters in our Masters of Entertainment Technology (MET) program—would make for a great petri dish for a study on small group innovation. She proposed the idea to the ETC faculty, and we all agreed to collaborate. Laurie mounted a four-year study with two doctoral students—Kenneth Goh and Gergana Todorova—and the support of ETC faculty, staff, and students on project teams in order to figure out exactly how creative innovation happens.

Once her data was collected and analyzed, the three researchers presented several papers at academic conferences and shared their results with the ETC. We believe these findings illustrate the "creative chaos" inherent in the dynamic process of collaborative design and development with interdisciplinary teams. We were excited to see how the data resonated with the faculty's qualitative understandings of how we were teaching.

This research provided us with an opportunity to update our curriculum. We worked with Laurie, and a new doctoral student, Anna Mayo, to dig into the data anew for more insights. We also reached out to Anita Woolley, a Tepper colleague, who shared insights from her studies on collective intelligence. And we incorporated new ideas such as the playtesting workshops that Jodi Forlizzi, in CMU's Human-Computer Interaction Institute (HCII), has helped us offer.

As we began the process of refining how we taught at the ETC. Dulce Pacheco, from CMU's Portugal partnership with the Madeira Interactive Technologies Institute, ETC Teaching Professor, Scott Stevens, and Laurie and her doctoral students launched a one-semester follow up study that built upon the findings from the earlier four-year study.

One issue we always strive to address at the ETC is how to best evaluate group projects. While our students are designing and developing products, we aren't simply grading on how good a project might be. We're training managers and leaders who will collaborate with diverse, creative teams when they graduate. As such, we evaluate the process the teams go through, their work together, and their work with external partners.

To that end, the ETC engaged in three evaluations, examining the effectiveness of our assessment of students and their project teams. To begin, the ETC faculty worked with CMU's Eberly Center for Teaching Excellence and Educational Innovation's Emily Weiss, Chad Hershock, and Marsha Lovett on another semester-long study that focused primarily on the effectiveness of the assessment and evaluation of our graduate projects. From 2015-2020, we also had an ongoing study with CMU's Institutional Research and Analysis's Laura Velasco, Sarah Hailey and Shannon Foster, conducting student entrance and exit surveys focused on the overall learning outcomes of the program. Finally, the ETC had a program review with Estefania Harbuck, Jenny Kim, Doreen Lorenzo, Jane Pinckard, Rade Stojsavljevic, and Lance Weiler serving as the review committee.

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Carnegie Mellon University was built on the principle of "applied knowledge." The university, and the ETC, focus on learning through practical application of theory, information, and innovative problem solving. This principle has guided us as we share information from these ongoing studies, and as we apply this research to the work we are doing so that we can improve our own processes.

We wrote about Creative Chaos for the ETC website, and I include this topic in a lecture I give each year in the ETC Fundamentals class that all of our students take during their first semester. This in turn led to invitations to give this talk at various conferences and forums. To show the range of interest in this topic, here's a list of events and groups to date where I've shared this information:

- Meaningful Play
- Dust or Magic
- Education Summit at the Game Developers Conference
- Design & Development Division Board for the Association for Educational Communications & Technology

- The Michigan Department of Natural Resources
- Bayer Innovation Symposium
- Houghton Mifflin Harcourt Studios
- Create Festival
- Serious Play Conference
- Thrival Innovation + Music Festival
- Maker Educator Institute at the Pittsburgh Maker Faire
- Games + Higher Education + National Impact
- Games for Change
- Let's Play PA
- East Coast Game Conference
- CMU'S Integrate Innovation Institute
- Games for Engaged Learning
- Bosch Innovation

After one such talk, my colleague Mary Flanagan noted that capturing this information in a short book would be a useful resource to share. During the writing, ETC Press Editorial Director Brad King helped focus this from a talk into a book. While I've been compiling all of this creative chaos together, I want to acknowledge that everyone mentioned above has contributed to this effort, sharing insights and expertise, reading drafts and helping shape the book overall. The process of creating this book exemplifies creative collaboration. We've all worked together and made this a much better book. Thanks to everyone involved.

Creative Chaos

Creativity is a wonderfully complex and chaotic process.

Borrowing from Mark Twain, the difference between when the creative process goes well and when it doesn't is the difference between lightning and a lightning bug. At the ETC, we describe what we teach as "creative chaos" because when you are making things with other people, you are never *really* in complete control of the process. You are collaborating on interdisciplinary teams striving to make inventive work while balancing budgets, deadlines, and clients. This can be both exciting and exhausting.

Our ETC students are learning how this works by collaborating on project teams three of the four semesters they are in the program, which gives us a great opportunity to study how creative chaos happens and then share what we've learned about how to best support creative work with inclusive diverse teams and to help them make the magic happen.

The ETC is the premiere professional graduate program for interactive entertainment as it is applied across a variety of fields. Founded in 1998,

the ETC offers a unique two-year master's degree in entertainment technology (MET) that is jointly conferred by Carnegie Mellon University's School of Computer Science and the College of Fine Arts.

With an emphasis on leadership, innovation and communication, we create challenging experiences through which students learn how to collaborate, experiment and iterate solutions. We excel at the intersection of technology, art and design through interdisciplinary project work that focuses on a range of areas, spanning from learning, health, training, social impact, civics, and entertainment. And, our project teams develop games, animation, location-based installations, augmented reality, mobile devices, robotics, interactive performances, and transmedia storytelling. Our project work and project teams are always adapting and expanding what we do as the landscape of art, technology, design, as well as society and industry morph and change.

The ETC is simply different: We strive to design experiences that educate, engage, and inspire through a balance of educational goals, professional development, and engaging experiences—or what we refer to as "Learn. Work. Play."

Introduction

This book is organized into two major parts. Creative chaos describes the dynamic process of collaborative design and development within interdisciplinary teams as they work to create something together. To articulate what this means, the first part provides an overview of the ETC and our research on how diversity, inclusion, and innovation are related, and also how we support these three associated ideas through our project-based curriculum. The second part extrapolates from this to share some best practices from the lessons we've been learning about the creative process and how to make the most of creative chaos.

Overview

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On the ETC

ETC

Randy Pausch, one of the ETC's co-founders, liked to say that the ETC was the world's best playground (with an electric fence). He meant that doing innovative work is difficult when you can do whatever you want. Creative work needed constraints. Constraints come in the form of time or budget limits, and the goals of a project. These can be extrinsic exercises, like requiring a team to design a tabletop game instead of a digital one. But mostly they're intrinsic to the reality of the design and development process itself, as teams have to deal with the limited resources they have, the goals of the client, the needs of the user demographic, or many other possible constraints. These provide a context within which a project team can work.

Randy's statement also gets at the heart of the educational endeavor. In order to learn, students need to be challenged so that they can grow. Rhett Allain notes that in education, the challenge and confusion of figuring out the answer is the sweat and effort of learning. Likewise with creative teams, in order to do successful work they have to be willing to do the hard work and court failures on their way to the right solution. These all provide constraints within which creativity can flourish. If you want to do something extraordinary, you need boundaries between what is normal and what is special. And that's where the magic happens.

ETC Mission

The ETC's mission is creating inclusive and interdisciplinary educational opportunities that prepare students for professional careers through project-centric learning, conservatory instruction, community engagement, and industry collaboration.

This mission focuses on shaping students into creative leaders who imagine and build exemplary experiences to entertain, educate, transform, and inspire. Accomplishing this requires meaningful communicating and collaboration across disciplines, and our curriculum is constructed to help support this process.

Art | Technology | Design

The ETC was started twenty-one years ago (as of the 2020/2021 academic year), co-founded out of CMU's College of Fine Arts and the School of Computer Science. This connection was intentional. The founders wanted the program to equally value art, technology, and design as the interdisciplinary foundation would allow the ETC to grow, change, and adapt, including a variety of other fields within the program.

Entertainment Technologies

The strength of the ETC is the breadth of our focus on entertainment technologies. We explore games, animation, theme parks, museums, immersive reality, mobile, robotics, interactive performances, crossmedia, and so much more.

We're interested in how all of these could be used in fields such as education and learning, health and medical, civic engagement, and of course, entertainment. The ETC explores where entertainment technologies intersect with society, which often touches parts of our daily lives that we might not even consider. This wide range serves as the foundation from which our team projects tackle various design and development challenges.

This range is also reflected in the careers of our alumni. Here's what we've found:

- about fifty percent go into the video game industry;
- about ten percent go into Hollywood (animation studios and effects houses);
- about fifteen percent go into themed entertainment (theme parks, museums and science centers);
- about twenty-five percent go into technology (e.g. Apple, Google, Microsoft); and
- one or two students will go onto Ph.D. studies, and there's often one spin-off company formed around their student project work.

On Creativity

Teaching Creativity

At the ETC, we're teaching our students the skills and tools of creative management. We want them to learn that they can both tap into their imagination and focus together on innovative work as they learn how the magic of creativity works. The on-going challenge in trying to teach individual and group creativity means maintaining a balance amongst three factors:

- giving direct instruction to teams;
- providing support guidance to those teams; and
- allowing enough freedom so that people can truly explore, engage, and sometimes fail in the creative process on their own.

In order to strike that balance, we think of creativity in two ways:

- as a skill that you can improve; and
- as a process that you go through in order to do creative work.

We consider creativity as both a skill and process, we believe the chaos of creativity can be taught. Our balancing act is between teaching individuals how to tap their own creativity and enabling teams to do creative work together.

One lesson we've learned: The collaborative, creative process requires support. We don't just set project teams free and hope they develop innovative products with their partners. As Teresa Amabile notes, a supportive environment and intrinsic motivation are essential to the heuristic process and social psychology of creativity.

This holds true across art, technology, design and other fields. A recent study by Kim Van Broekhoven, David Cropley, and Philipp Seegers highlights that STEM fields require the same kind of creative thinking as the arts. They show how creativity is general in nature regardless of the field, relying on teams being open to new ideas, employing divergent thinking, and maintaining a sense of flexibility.

So our focus on, and support of, creativity is beneficial for all of the interdisciplinary students collaborating on teams together.

Creative Production

We've talked about creativity on two levels: individual imagination and team processes.

When we speak about creativity at the ETC, our emphasis is on the creative production done by a team working together. That doesn't mean we don't care about individual creativity, we do. However, our emphasis in the MET program is on the design and development process an interdisciplinary team engages in as they work on a creative project together.

So, what are the skills that teams need in order to navigate this creative chaos?

When engaging in creative work, Teresa Amabile and Steven Kramer say the secret to success is to empower people through meaningful work. This process requires communication and collaboration because teams must have constructive discussions both internally and externally. This communication is a challenging process as groups experience internal disagreements, external issues with a client, or both, and more.

Tim Leberecht considers the development of these communication systems to be an artful and playful process in which you should be open to adapting to the evolving needs of the production. In order to succeed, teams must have the support to help the group have constructive discussions as opposed to disruptive arguments. Good communication is necessary for teams to collaborate successfully on projects.

Good communication also helps teams to develop trust and respect for each other which helps creative production happen in a constructive manner. This occurs as teams spend more time working together. But, teams must actively make sure they work to maintain both trust and respect in order to work well together on creative production.

This brings up an interesting point. As Teresa Amabile said, teams need support *and* intrinsic motivation in order to be successful. That requires leadership and management, which at the ETC means something a little different than you might think:

- Leadership means team members taking responsibility for their roles and for the goals of the project, as opposed to telling their colleagues what to do. This helps a team focus on the vision and mission of a project; and
- Management means coordinating a team's efforts to stay on time and on budget. This helps a team complete a project.

You'll notice we didn't say they need a boss to tell them what to do. Instead, creative teams need the support to develop positive communication systems that focus on the project goals and collaborative process.

Creative Chaos

Creative chaos is a term we use to encapsulate the creative production process, which is often full of ambiguous ideas about what a team is trying to make. It's a process that can, and needs to be, taught in order to best navigate the chaos.

One major challenge is clearly defining the goals of a project. I like to stress for student teams that if they're approaching a project and know exactly what they're going to do at the beginning, they're no longer doing anything creative. George Saunders notes that having a plan and simply implementing it does not make for good art.

Considering the chaos, Gordon Torr explores how creativity is always about changing the status quo, pushing beyond what we know. And Patrick Dawson and Costa Andriopoulos highlight how change is a ubiquitous part of the process, requiring both planning and flexibility. In order to create something innovative, a team has to take the risk of exploring new ideas and doing things that they haven't done before. And they must do this while also being aware that the results of their work are invariably uncertain as a team can't know in advance that their ideas will actually meet the goals.

The creative process advances by allowing the time for the dynamic balance between deliberation and imagination to gestate ideas. Jenny Odell stresses the importance of taking the time to disengage from your work in order to re-engage anew. Gary Claxton conceptualizes this as engaging both the hare brain and the tortoise mind. The hare brain is logical, rational, and purposeful, while the tortoise mind is imaginative, contemplative, and ruminative. This lines up with Daniel Kahneman's notions of fast and slow thinking. Building on these ideas, John Cleese stresses the importance of playfully deferring decisions as long as possible so that there's ample time to mull over ideas more fruitfully.

Damian Newman illustrates the chaotic design process with a squiggle that shares a sense of the journey. Throughout this process, Seth Godin notes that our creative practice is the only thing we can really control. This is done using skills—such as rapid prototyping or iterative design—as a team works to discover what they need to make. This type of prototyping practice is an inherently flexible process through which a successful team needs to be comfortable taking risks and dealing with various unknowns as they iterate their way toward a good design that meets the goals of the project. Richard Lemarchand acknowledges that the creative process is chaotic, but emphasizes three concepts: respect, trust, and consent. These three ideas form the basis of a healthy and playful production practice through which teams share a respect for each other and trust that everyone is willing to collaborate together as a community.

The creative process is intrinsically chaotic: hence, creative chaos.

Making Stuff

The creative production process consists of making artifacts and developing intellectual property (IP). Our students tend to conflate their ideas with intellectual property. Developing ideas is often the easier part of the process, but those ideas by themselves aren't IP.

That step happens when the team transforms an idea into a functioning product. However, when you're making stuff with an interdisciplinary team, you're sharing the design and development as you create IP together. At the ETC, we stress that what makes a team successful is that they come together to do the work that meets the project needs, as opposed to doing only what each person wants. This cooperative collaboration is where a team can really make something truly innovative and worthwhile.

Making the Magic

Disney Imagineering's motto is "making the magic," which captures the creatively chaotic nature of actually making something innovative that really inspires and wows an audience. When doing creative work, teams need to consider what it means to be innovative. Innovation happens at the intersection of work that is new, useful, and of good quality.

Accomplishing one or two of the three isn't enough. True innovation requires all three. In order to make this magic, teams must follow a good design process, which involves both defining goals and iterating on solutions.

This applied research methodology enables teams to problem-solve their way toward the goals of a project. There are a plethora of methods to work through the design process so we're not even going to try and capture all of them. We do know that good design requires critical creation, or what Thomas Triumph refers to as purposeful practice, in which a team carefully considers what they're making, and why they're making it, throughout the development process.

On ETC Research

Research on Creative Chaos

One of the challenges researching the creative chaos process is defining a replicable framework that can be useful from one project to the next. Every project is unique so we searched for relevant elements across projects that have some connection. We focus on three questions:

- How can teams succeed at doing creative work?
- How can they do it across multiple projects and years?; and
- How can you teach people to improve at doing innovative work?

We partnered with Laurie Weingart and a group of doctoral researchers to study how ETC's semester-long interdisciplinary project teams manage to do innovative work.

CMU Tepper Study of ETC

In 2008, Laurie—along with two of her doctoral students, Gergana Todorova and Kenneth Goh —launched a four-year study exploring if—and how—*expertise diversity* translates into innovation. In other words:

- Do teams made up of people with a variety of disciplinary expertise create more innovative work than teams with more homogeneous expertise?

ETC Study Methods & Measures

They studied sixty ETC projects in those four years, surveying the project teams four times each semester (the beginning of the semester and the three presentation points called Quarters, Halves, and Finals), collecting general demographic data along with information on the design process. They supplemented these surveys with interviews and direct observations of team meetings. They also had the faculty provide independent ratings on quality and innovativeness of the final prototypes that the teams delivered, as well as how useful, usable, and desirable each project was.

After collecting all of the data, Laurie Weingart and her doctoral students examined communication and conflict within the design process of projects. Additionally, they examined how leadership and

management coordination arose through the process, while also taking into account the faculty ratings on the quality and innovation of the final project deliverables.

The datasets were too small to develop broad generalizable guidelines that would apply for project teams anywhere, but the preliminary data provided two important pieces of information:

- The early data suggested that, at least within the ETC project teams, diversity of expertise introduced a variety of conflict, which, when managed on an interpersonal level, helped lead to the creation of more innovative products; and
- That same data provided a framework for further studies that examined the role of gender, background, and other data points that might further explain how to best manage the creative chaos of project teams outside the ETC.

The researchers found that expertise diversity leads to better quality outcomes. The reason: debate and disagreement related to tasks (i.e. the team's list of what needed to be accomplished) brought up a variety of perspectives *early* in the project development process. When supported and managed, these debates allow for a more productive development cycle. However, those same conflicts can damage a team and their progress if they move from task-focused discussions to interpersonal relationship-focused discussions.

As discussed in the previous section On Creativity, the creative chaos process needs support to ensure yields positive results. Leaders and managers should mediate disagreements and debates so they are aware of the types of conflict developing on their teams and can help keep them constructively focused.

Expertise Diversity & Managing Conflict

In 2014, another of Laurie Weingart's doctoral students, Anna Mayo joined the Tepper School of Business research team and together with them began further analyzing the data to examine the effects of other variables in the creative design and development process. Early indicators suggest both that diversity matters on teams and that it's imperative to consider why diversity matters. Both questions must be addressed in order to develop inclusive and diverse teams where each member is able to work in an environment that is aware of, and works to address, any visible and invisible social biases.

More generally, analyses found that previous work experience (even just an internship) can affect outcomes, lead to better innovation, and more learning. While this suggests more work experience is always beneficial, the research also shows that experience working with one another is not always productive. Teams that have some familiarity with each other seem to work well, yet too much familiarity

can be detrimental with more group think and less discussion and debate. Other research on this topic suggests that newcomers and new collaborations can offer new and fresh ideas that facilitate creativity. Every team and every project is different, so leaders and managers need to consider how they are supporting their team and individual team members.

So, what did the preliminary Creative Chaos study suggest about expert diversity and ETC project teams?

Teams with more expertise diversity had more conflict—debates and disagreements about the tasks that needed to be done. Counter-intuitively, those disagreements and debates led to final deliverables that were rated to be more innovative, useful, usable, and desirable, as determined by the faculty and project partners. The reason for those more desirable deliverables:

- Teams with diverse expertise can have constructive conflict in the form of debates around specific tasks the team needs to do as opposed to personal arguments.

In other words, diversity of perspectives can enable constructive conflict that often leads to better innovation outcomes overall.

Interestingly, neither the type of ETC student team project (client, research or pitch), the size of the team, nor the instructor had an impact on the expertise diversity findings. However, leadership did have an impact on that expertise diversity. Leaders who were both supportive of, and considerate to, teammates seemed to fare better than those who focused on initiating structure by assigning members to particular tasks and defining standards of performance.

Overall, the data suggest expertise diversity is important. Constructive conflict and the exchange of ideas emerge as the key reasons why some teams were more innovative than others. The question: Why did that happen? The answers, while still based upon preliminary and early-stage research data, suggest there may be some guidelines that can help manage these types of teams.

Teams made up of members with different expertise will look at the same problem from very different points of view. That diversity can cause conflict as the team begins working on a project. It's important that teams have a framework for managing that conflict, and the research shows that there are two types of team interactions that need to be managed:

- Affective integration: which is how each person feels about each team member. This includes elements like trust and respect; and
- Cognitive integration: which is how much a person can understand what another team member is trying to communicate.

Each of these interactions and integrations—which are both interpersonal and team-based—are important. While teams are building interpersonal relationships and developing their communication strategies, three types of conflicts can arise with their processes. Those processes are:

- Tasks: The development of the team's co-created To-Do list;
- Processes: The development of the team's co-created timeline and process guide; and
- Relationships: The interpersonal relationship amongst the team and its stakeholders.

The preliminary findings found that teams that managed to focus its conflict mediation around tasks tended to create more innovative, useful, usable, and desirable products.

The question the researchers wondered was: Why?

There were three preliminary *correlated* findings that came from the early research, which point towards new questions that should be studied, but give some basic understanding of what *might* be happening:

- The first is the idea of *transactive memory,* which basically means that in a group with expertise diversity, the group collectively understands what each individual knows and it knows how to access the knowledge when needed; and
- The second is that the team leaders who managed the task and relationship conflicts best were those who used a more holistic approach to conflict management. They were less likely to impose rigid project management structures because of the expertise diversity. Instead, those teams tended to discuss and co-create their team's framework for the project; and
- The third is that there were more task and relationship conflicts on teams that external reviewers found to design and develop products that were more innovative, useful, usable, and desirable.

While it's easy to want to extrapolate team management heuristics from these findings, it's again important to note there were other dimensions that could explain some of the success. For instance, project team leaders already had a sixteen-week, imposed development schedule, which alleviated the necessity for the leader to create a schedule. Instead, those teams could focus on task-oriented development.

But there were some correlated findings that suggest areas for further study. The one most germane the ETC:

- Productive task conflict on ETC project teams led to design and development of more innovative products.

This isn't always the case. Other Carnegie Mellon University studies found that nearly fifty percent of student project teams have a negative response to task conflict. Instead, it seems that ETC project teams' performance is generally positive because of the relationships amongst task conflict, collaborative problem-solving and relationship-oriented leadership as well as the supportive framework that the ETC curriculum provides.

ETC Study Takeaways

That's a lot of information to sift through, and leaders and managers might have a difficult time parsing out what they should consider when managing their teams. While this research is preliminary and has led to further studies, here are some concepts and ideas that came from that early Creative Chaos research at the ETC.

Team leaders should consider both the team's *performance* (how they work together) and the *outcome* (what they create). Generally speaking, *performance* is impacted by all three team processes (tasks, processes, and relationships), while *outcomes* are impacted by expert diversity. However, expert diversity only manifests through two of those team processes: task development and relationship management.

The impact of that expert diversity—which is correlated to the types of *things* created by a team—bubbles up through the conflict caused during the development of tasks and the management of those interpersonal relationships on a team. So, we can generally say that:

- Team leaders who are able to successfully navigate interpersonal conflicts to focus on task development in a positive way tend to create better outcomes.

The Tepper research group led by Laurie Weingart has continued to parse through the data collected, working together and with other colleagues, to better understand the creative collaborative processes. It's important to keep in mind that researchers are still studying how diversity and performance are related, which means that there are very likely other dimensions at play in team environments that produce innovative outcomes.

Further Creative Chaos Study

Following the initial studies with CMU Tepper, Dulce Pacheho, an ETC visiting scholar (who is now at Madeira Interactive Technologies Institute), and ETC Teaching Professor, Scott Stevens, worked with Laurie Weingart's team to mount a one semester follow up study in 2017.

Dulce and Scott surveyed the teams that semester with a primary focus on the cultural intelligence of leadership and how this can improve communications and performance on culturally diverse teams. These findings resonated with the initial study, showing how inclusive diversity can lead to innovation as long as teams build communication early in their process and develop support mechanisms through the design and development process.

In parallel to Laurie's study, the ETC faculty also engaged in a semester-long study examining the effectiveness of the assessment and evaluation of these graduate project teams with the support of the CMU Eberly Center's Director Marsha Lovett, Senior Teaching Consultant Emily Weiss, and Associate Director Chad Hershock.

They observed the faculty evaluation activities for projects, teams, and students throughout the semester. They determined that teams appreciated verbal feedback since it was direct, efficient, and provided more shared meaning to help the team improve. At the same time, teams found that written feedback was helpful as it can be specific and easily referenced later to help move forward.

As the ETC faculty have worked to determine how best to support projects teams, this research found that feedback that was constructive, prioritized, and specific was most effective in helping teams improve. This has helped the faculty adjust how we deliver assessment and evaluation for project teams.

Since 2015, ETC faculty and staff have been collaborating with CMU's Institutional Research and Analysis to do entrance and exit surveys of ETC students to measure learning outcomes of the graduate program. During this time, Laura Velasco, Sarah Hailey and Shannon Foster, Research Designers and Analysts, have helped conduct surveys as students enter the program, matriculate, and graduate with their master's degree.

Students report that they improve their skills with collaboration, communication, creative design, and problem-solving, which lead to an overall improvement in professional development. Students point to the real-world experience of the semester-long projects along with the interactions with all of the diverse faculty and peers as important in this process.

We've worked to develop and teach these creative chaos processes. We've done this quite successfully, so much so that we noticed an issue we didn't know we had in our program

* * *

In 2018, the ETC had a program review with Estefania Harbuck, Jenny Kim, Doreen Lorenzo, Jane Pinckard, Rade Stojsavljevic, and Lance Weiler serving as the review committee. The committee reported that the ETC was an excellent example of the innovator's dilemma. The MET program has a successful curriculum that includes our creative

immersive semester and our project teams. This makes it challenging for us to institute changes to help evolve and improve the ETC without losing what makes it work so well in the first place.

The insights across all of these studies and reflections have affirmed for us that in order to do innovative work, orchestrating support for interdisciplinary teams is important. This support starts with striking an interdisciplinary balance as we recruit each incoming class to include people from varied backgrounds.

This balance leads into a first semester of study where we emphasize the value of diverse ideas and perspectives as students collaborate with all of their new colleagues and also take improvisational acting together. Improv is one of the best ways we have found for people to learn how to creatively collaborate with each other. Throughout the two year program the faculty and staff model supportive leadership. With this in mind, we work to continually improve the design of our curriculum. Our goal is to help teams be able to constructively collaborate and communicate through the creative design and development process.

On Creativity Research

Granted

The initial study and subsequent work on the ETC was focused on CMU graduate students so people might question if the results are applicable in other situations. We believe some lessons we've learned could be helpful for a variety of groups who are doing collaborative work together.

Resonant Research

There is ample related research that resonates with the results of the studies on the ETC, but there are far too many studies to reference all of them in this book. We will try to highlight some of the most relevant to what we've learned.

Scott Page's research explores how diverse perspectives and tools enable people to find more and better solutions and to contribute overall productivity. He notes how diverse, predictive models enable people to predict values accurately and how diverse, fundamental preferences frustrate the process of making choices even as they lead to better overall outcomes. Page notes diversity also has direct benefits on producing better creative ideas through our differences in how we interpret, reason, and solve problems, though it requires practice to improve and support productive inclusion.

Similarly, Josh Bersin's recent work highlights the positive business performance impact of successful diversity, equity, and inclusion (DEI) initiatives.

Along the same lines, two meta-studies clearly distill related findings.

- A report by the Association of Computing Machinery (ACM) found that diverse teams have a greater potential for innovation. The caveat was that the effectiveness of diverse teams depended upon having a trusting and supportive culture. While there are challenges to developing trust, the collected studies reference known methods that can help address this effectively.
- A *Scientific American* report reviews decades of research that show socially diverse groups are more innovative. The reviewed research also shows that just interacting with people who are different from us makes us more creative, more diligent and harder-working, enabling group members to prepare better, to anticipate alternative viewpoints and to understand that reaching consensus takes effort.

Both of these meta-studies illustrate the valuable effect inclusive diversity can have, and highlight the challenges and support needed to make it a positive impact.

Collective Intelligence

Anita Woolley, an Associate Professor of Organizational Behavior and Theory in the Tepper School of Business at CMU who also studies teamwork, has been researching how groups most effectively tap into their collective intelligence in order to do better work as a team. Her studies have shown that groups are able to work better if all the members of the team make equal contributions to discussions and decisions. This dynamic is more likely to happen when the team members are able to empathize with each other and to have an emotional intelligence to infer what their colleagues are thinking and feeling.

Interestingly, her studies have shown that teams that have more women on them tend to exhibit these traits more and are better able to tap into the collective intelligence of the group. While this is a good example of the benefits of diversity in a group, it's important to recognize the societal conditions within which women more often have to develop social-emotional expertise and shouldn't be expected to be the only ones to listen and empathize with colleagues as it should be the responsibility of everyone. As Oliver Zara notes, collective intelligence is a co-constructed process amongst everyone in the group together.

On ETC Curriculum

Creative Chaos Orchestration

What's readily apparent is that the creative process is truly a chaotic experience and that more inclusive diversity—while adding challenges—helps create better results.

To get these positive results, people need to feel truly included. As Matthew Cronin and Jeffrey Loewenstein note, creativity occurs within a social context and merits social support to help that process thrive. And Edward Clapp notes that creativity is a participatory and distributed process. This is collaborative innovation in practice and process.

The ETC faculty are well aware that failures and conflict will most likely occur during a project, so we work to provide teams with support to best orchestrate how they learn, work, and play together.

Master of Entertainment Technology (MET)

The structure of the curriculum provides the context within which the faculty orchestrates our support for students learning the creative process.

The ETC is a two-year professional degree, and students graduate with a Master of Entertainment Technology (MET). A MET is a unique degree that helps us articulate what we're not as much as what we are. For instance, if students are interested in just taking standard technical courses, they'd be better off pursuing a master of science (MS) degree. If they're interested in working on their individual art projects and portfolio, they should pursue a master of fine arts degree (MFA). If they're more interested in writing papers than hands-on projects, they could consider a master of arts (MA). And, if they're more interested in business they should look to a master of business administration (MBA).

The MET is similar to a MBA degree in that there is a strong professional focus; however, an MBA concentrates on finances and administration, while the MET is focused on creative design and development.

The ETC accepts between seventy-five and eighty students per year, which means our student body is around one-hundred-and-fifty and one-hundred-and-sixty students. To strike the necessary interdisciplinary balance, we work to recruit:

- forty percent of the incoming students out of technical backgrounds (e.g. computer science and engineering);
- forty percent out artistic backgrounds (e.g. 2D/3D, graphics, UX/UI, visual effects); and
- twenty percent coming from a variety of areas (e.g. theatre, creative writing, industrial design, business, audio, music, communications, etc.).

This mix of students ensures that they can be on interdisciplinary teams throughout their studies.

To support the students, we also need to have a diverse faculty and staff with a variety of backgrounds and experiences. This helps all the teams and students have faculty and staff available to support their educational needs and goals. We have students with various interests ranging from technical, artistic, design, audio and production. We also have students interested in industry jobs, or entrepreneurial opportunities, or in furthering their education.

Students engage in our project-based curriculum in which they own their intellectual property as they get real-world hands-on experience in design and development. Faculty and staff advise students on both their educational goals and professional aspirations. Within this curricular context, we have found that space is extremely important to the success of projects. Each team shares a large office room where they sit together through their project work. We are also technologically agnostic, in that we do not work to teach specific tools. Instead, we focus on teaching the concepts and processes so that students can adapt and learn to whatever tools they need to use for the project on which they're working.

Research & Design

The breadth of our interests is one of the strongest components that makes the ETC experience so unique, but this also makes it challenging for us to explain exactly what types of research and projects we work on. We've articulated an applied research and development agenda to focus on projects that best innovate across the range of our expertise. And maybe as importantly, this helps students, clients, and recruiters better understand the type of creative design and development work done at the ETC.

Considering the interdisciplinary nature of the ETC's mission, the goal of our project-based curriculum is to provide a context within which students can develop into creative professionals through the process of collaborating on teams working on projects where they have to make things together.

Having worked on these projects, ETC students graduate with two invaluable traits:

- They are fearless about doing something they've never done before. They know they can problem solve together to figure things out; and

- They become leaders and creative professionals who are comfortable in stepping up collaboratively and taking responsibility for their role on a team as well as pushing the envelope on the work being done in the field at large.

ETC project teams work in one of three areas:

- **Transformational Games:** including educational games, games for health, games for change, simulations, meaningful gameplay, and in-game assessments, humanities and civics
    - to continue iterative rapid-prototyping of transformational games to develop the most effective and impactful games
- **Innovation by Design:** including next-gen interfaces, experimental prototyping, entertainment, creative development best practices, and iterative experience design
    - to innovate through development processes and apply the latest technologies to create engaging experiences
- **Interactive Storytelling:** including location-based experiences, mobile, transmedia, augmented reality, and live interactive performance
    - to design the most engaging narrative experiences that incorporate multiple media and audience engagement

ETC project teams can focus their overarching goals in one of two ways Delivery or discovery. Regardless of the focus, the teams must design and develop a final deliverable.

- Delivery projects must have a solid, working prototype finished by semester's end.
- Constraints become very important on these projects. A large portion of the evaluation is based upon the quality of the final product in relation to those constraints.

Discovery projects are more open-ended and focus on rigorously exploring ideas through playable proofs-of-concept. A large portion of the evaluation is based upon the creative research as it is illustrated through these conceptual proofs.

We are interested in how engagement occurs with different topics, media, groups, and contexts regardless of which three areas (Game, Design, Story) and which goal (delivery, discovery) the projects are focused on. We encourage the teams to focus on designing the best experience that the user, player, guest can have.

ETC Projects

The studies discussed above all primarily focused on ETC projects, which are the central part of the ETC curriculum. In the ETC project course, students are in small, interdisciplinary teams, creating artifacts under faculty supervision. Artifacts may be software, hardware, illustrated design documents, multiple proofs of concept, or a number of these or other things. Artifacts are intended to be prototypes, not production models. Each project team must design what they are going to create, the mechanisms by which they will create it, and then actually create it.

John R. Mergendoller notes how project-based learning is a great way to provide learning opportunities for students. To increase the quality of learning projects should include:

- intellectual challenge and accomplishment;
- authentic experience;
- public display of the work;
- collaboration with students and faculty, project management processes; and
- the chance to reflect on their work.

Our projects include these characteristics; however, after our program review, we're working to provide project teams and individual moments to better reflect upon the creative chaos process.

ETC Projects are developed in 3 ways:

- **Client Sponsored:** in which an external group supports a project on which an ETC team will work. In the past we have worked with companies like: Electronic Arts, Microsoft, Sony, Lockheed Martin, General Motors, Amazon, Bayer, ILM, Intel, Viacom, Legendary, Disney, etc. And we've partnered with non-profit organizations like: Games for Change, Children's Museum of Pittsburgh, Sesame Workshop, Fred Rogers Center, Give Kids the World, Field Museum, Franklin Institute, etc.
- **ETC Research:** in which a faculty member has a research interest on which an ETC team can work. We have had research projects supported by funds from: MacArthur Foundation, Grable Foundation, Benedum Foundation, DARPA, Heinz Endowments, NSF, etc.
- **Student Pitch:** in which a group of students get their pitched project approved by the faculty. Students have pitched projects that have gone on to be fully developed into a product and serve as the basis of founding a company, like: Experimental Gameplay, World of Goo and 2D Boy, Peacemaker and Impact Games, Digital Dream Labs and Puzzlets, Quasi and Interbots, etc.

All ETC projects must balance two critical issues:

- The creation of an environment where all students can receive individual guidance and feedback on how they are doing, in the context of a group project where the group succeeding is a paramount value.
- The focus on process (learning how to work effectively), product (successfully creating an artifact/prototype), and production (the team deliverables throughout the semester).

All ETC projects engage in applied design-based research and development where teams apply methodological techniques (rapid-prototyping, iterative design, agile development) to discover fundamental principles (gameplay mechanics, indirect control, interest curves, improvisational storytelling) of how to best design effective interactive experiences.

ETC Core Courses

Students start the ETC with a first semester of study that we call the immersion semester, as its goal is to prepare students for the upcoming semester-long projects mentioned above. During this semester, they take all four courses together: Fundamentals of the ETC, Building Virtual Worlds (BVW), Visual Story, and Improvisational Acting. This first semester is important in getting them ready to most effectively collaborate on their upcoming projects.

The Fundamentals of the ETC provides an overview of the field, with two threads of focus for the course: creative development and professional development. Together, these threads combine to help students start becoming creative professionals who excel in diverse interdisciplinary groups through inclusive teamwork and innovative problem-solving. There are a variety of workshops and seminars throughout the semester, with an overall emphasis on communication and collaboration, challenging students to learn about leadership, teamwork, innovation and positive social impact.

BVW is a rapid-prototyping course where students learn collaborative creative problem- solving. They are placed onto interdisciplinary teams of five, and then they have two weeks to make a virtual reality experience. Then shuffle the teams, two weeks, and make something all over again, and then repeat, for five rounds working with new teams throughout the semester. This course embodies research that suggests that constraints are important. But the structure also highlights two ideas: that expertise diversity is important and that teams need to include new voices. BVW implicitly illustrates to our students the importance of constraints and continued attention to inclusive diversity development. The tight timeframes and new teammates each round force students to problem-solve quickly as they work together toward the goals of the rounds.

The students also take Visual Story, a filmmaking course for non-filmmakers that focuses on how the language of cinema, visuals, and audio can be used to help make experiences more engaging for audiences. In particular, students are learning how to tell stories through visual media. They're also on teams in this course, but they stay on the same team all semester long so they face different time and team management challenges across the Visual Story and BVW courses.

Finally, students take Improvisational Acting, not so that they can become funnier or better actors, but so that they can learn how to share: ideas, space, credit, and more. This course helps students develop strategies for creating trust, which research suggests is vital to any diverse interdisciplinary team. Inclusive diversity doesn't occur without trust. Once again, the coursework is designed to teach these ideas implicitly, giving students a toolbox for building successful teams. Additionally, improv is a great paradigm for storytelling and collaborative brainstorming with a focus on the importance of the work you're trying to accomplish together. The tenets of improv can helpfully translate to the design and development process, which makes it one of the most important classes for our students.

Learn, Work, Play

Throughout, the ETC balances educational goals, professional development and engaging experiences; or learn, work, and play. We emphasize leadership, innovation, and communication by creating challenging experiences through which students learn how to collaborate, experiment and iterate solutions. We challenge and encourage our students to design experiences that educate, engage and inspire.

On ETC Updates

Since the publication of the first edition of *Creative Chaos* in 2016, we continue to study and explore how we can best orchestrate support for interdisciplinary teams through their creative collaborations together. What follows are the updates we've made to our program as we work to improve how we teach students and teams to thrive throughout the creative chaos process.

ETC Projects

Within the MET, we plan to build on the success of our applied, practical approach with a continued emphasis on the importance of the semester-long project course. In general, we work with CMU's Eberly Center to explore ways to improve how we deliver projects for the students and teams with a focus on life-long learning and collaborative creative problem-solving. We offer faculty-run workshops and roundtables focused on design and development processes, and additional work on communication to help with team collaboration. Concurrently, we provide more direct support for the various roles and skills of team members (technical, artistic, design, production, etc.) while also improving the feedback, specifically as it relates to assessment and grading. We want to incorporate workshops on philosophical underpinnings (ethics, aesthetics, responsibilities, etc.) in terms of the work our students are making and will make throughout their professional careers.

Immersion Semester

To best prepare students for the project course, we are improving support during the first semester of our immersion courses to help the students navigate the intensity of the four core courses. ETC alumni consistently note the value they found in this intensity so we want to keep it challenging while also formalizing support and guidance around time and stress management as well as communication strategies with their colleagues and teams. All of these curricular updates are meant to help students and teams get the best educational experience and professional development during their studies.

Student Journey

Along with these curricular adjustments, we continually work to improve the overall student journey through the ETC: from admission, through matriculation, to graduation, and beyond. With

admissions, each year we strategically recruit a diversity of students from a variety of schools to get a solid interdisciplinary mix. We are also exploring avenues to help provide more scholarship and fellowship options to support students' studies. Once students are here, we mentor students through their education and their career development. Looking toward graduation, we build on our successful industry outreach and placement opportunities. Post-graduation, we actively engage alumni, both inviting them to participate with the program and keeping the ETC community growing and involved.

Other Academics

Beyond the MET, we have been rolling out new academic initiatives. Our game design minor has grown into the largest of the CMU's IDeATe undergraduate minors. We help support the animation minor. And we are proposing two new minors: Immersive & Spatial Media and Themed Entertainment. We also support playtest evenings open to all CMU students.

We are also providing Executive Education offerings to help further share the creative chaos lessons to help improve inclusive diversity in the creative industries. This is something we firmly believe we can do together and change the world.

Creative Causes

The ETC provides students with experiences so they can learn to become comfortable doing things they've never done before. When they graduate, they go out into the world ready to take the lead regardless of the challenges they may face.

Since the founding of the program, we have been refining our experience around creative causes in two ways. First, as covered in this book, we continually explore what helps creative collaborations to be successful even though it is an inherently chaotic process that interdisciplinary groups must work through together. Second, we believe you can, and should, apply creativity to good causes. We work to design transformational experiences that can have a positive impact in our society.

Doing creative work with others requires adaptability and resilience, and a comfort in embracing uncertainty as you design and develop. We describe it as "creative chaos" as it's a process within which you never really have complete control. The research we've done around creative chaos has shown that while more diverse teams have unique challenges, they also do more innovative and higher quality work. To get these positive results, diverse team members need to feel a sense of belonging and of comfort with the potential of failing as they iterate toward the best solutions. Our students develop these life-long skills that serve them well throughout their careers as creative professionals.

In general, creative collaborative work is challenging. And starting in 2020 with the extraordinary worldwide disruptions the pandemic caused in our societies and cultures, the challenges of doing good work, or simply just living a good life, could seem overwhelming. It has not been unusual to hear people wish for things to get back to "normal," but we're not sure going back is the best option as the pandemic clearly showed the structural inequities and systemic racism in our society. Instead, we're looking forward and striving to work together to shape something better than before.

To create this new reality, we need to change and adapt. This is true of the ETC, CMU, the creative industries, and the world at large. During the pandemic, CMU, like many universities as well as companies, adopted a hybrid approach that incorporated both in-person and remote experiences. The ETC has always embraced hybrid learning through a combination of design, art, and technology. So while these hybrid semesters haven't been like "normal", they have been amazing life-long learning opportunities. We are fortunate to be able to provide our students and teams with all the technology and equipment they need, which makes this even possible.

Our projects and courses were successfully adapted to remote delivery, and we noticed that the quality of student project work remained high. While not having in-person events made it harder to have serendipitous moments together, opening up events to remote participation enabled more people access to engage. Of course this required a device with an internet connection, which underscored some of the inequities in our society that the pandemic highlighted.

In-person or remote, our curriculum is a great way to learn how to be well prepared to flourish in our ever-evolving world. We believe the future of work will be more flexible with a hybrid mix and balance of remote and in-person collaborations around the globe. The ETC is taking our existing expertise in teaching collaborative skills and reimagining them for a hybrid future.

We can meet and exceed these current challenges by practicing what we teach and excelling through our expertise with creative causes. The ETC thrives through adaptability and resilience, and we believe that it's imperative that we use the lessons we've been learning through the pandemic to do this even better together. Our heart is in the work we do as we challenge and encourage each other to design experiences that educate, engage and inspire.

Learning Lessons

On Inclusion

On Collegiality

On Development

On Context

On Support

On Challenge

In Conclusion

On Inclusion

Valuing Inclusive Diversity

The ETC is committed to inclusive diversity. But, we recognize that it's one thing to say you are committed to that ideal and quite another to act on that ideal. Certainly we have—and will likely again—fall short at reaching our goals, but we are committed to being transparent about what we mean when we say we value inclusive diversity, and about the steps we are taking as we move forward.

Let's begin with what we mean by inclusive diversity at the ETC. We continually work to understand how the intersection of gender, ethnicity, sexual orientation, socio-economic status, culture, religion, age, disability, expertise, and work experience apply to people, and we are cultivating an awareness and understanding of how each of these impact both individual and group experiences.

Often inclusive diversity is encapsulated as diversity, equity and inclusion (DEI). Minal Bopaiah champions the concept of DEI while also incorporating the consideration of accessibility (IDEA). This is challenging work; however, it's part of the creative chaos magic. Inclusive diversity matters, which means we devote time and energy to this ideal in our processes.

As mentioned in the earlier section "On Creativity," providing support to teams is one of the actions that leads to the best results from creative teams. One of the best ways to show that the ETC values inclusive diversity is through continually being supportive so that everyone involved (students, faculty, staff, partners) feels that they are part of, and belong in, the group. This support must come in the form of both words *and* actions. Saying you value inclusive diversity is not enough. You must follow through on how you actually work together so that everyone on the team feels included.

We firmly believe that being open to inclusive diversity enables us to go through the creative process together, which translates into being able to design and develop a greater diversity of products. Noting that this is an ongoing process is important so that we can discuss it together and address it when needed.

Actions and words are how we shape our culture, one in which a community grows together. We work to accept that we're all different and that we all can make a difference. This work is a process, and while

we've come a long way, we still have a long way to go. Valuing inclusive diversity is a challenge we must face together.

Both CMU and the ETC are taking concrete actions to better value and support diversity, equity and inclusion. CMU has a Vice-Provost to lead this initiative across the campus for faculty, staff, and students. And the ETC continues to actively recruit and support under-represented and under-served student populations. We offer merit-based scholarships and support GEM fellowships. We have an Electronic Arts ETC Fellowship and a recently established ETC Fellowship started with funding from Schell Games to help provide financial support for students.

To encourage students to consider creative causes and positive social impact opportunities, the ETC has a Creative Good Fund, which enables students to gain experience with real-world, non-profit projects at museums, libraries, zoos, arts, and human service organizations. We also strive to have semester-long projects with a focus on diversity, equity and inclusion and work on community and educational outreach with Pittsburgh's Remake Learning Network. We're also the academic home for Randy Paush's Alice Project, which teaches programming skills for kids and students around the world. Through the fund and projects, our students are challenged to create work that has a positive impact in the world.

Inclusion, Fit, & Diversity

Another way to think about inclusive diversity is through a concept of fit, which doesn't mean an individual must fit in with a larger structure. Instead, we mean *both* how a person feels that they belong within a group, *and* how the group feels a person fits within the group.

Before we dive into this idea, it's important to note that the idea of "fit" has been used as a way to exclude people who aren't like the predominant group in a company or field under the guise of ideas like "corporate culture" or "getting along." This is a poor way to build a team on a human level. But, there's another reason why this exclusion of diversity doesn't make any sense. As Kat Holmes notes, inclusion drives innovation and excluding others is a choice, which means that the smartest, most innovative companies and teams should choose to include people.

We believe that like inclusive diversity, fit is an important concept to consider. Here are some high-level ways to think about the notion of fit. There is:

- the general culture of the company or group,
- how a community for the field at large exists (or not); and
- the lifestyle associated with working in that field; and
- the landscape of opportunity in a given field.

Individuals can see how inclusive and diverse the field is. They can see what opportunities they might— or might not— have.

Other variables to consider:

- how comfortable you are with the location;
- where the company is located in the world; and
- whether the setting is urban, suburban, or rural.

Finally, you have the company and the team you would interact with daily, and the job's shared sense of the role and responsibilities.

All of the above plays a part in how individuals can get a sense of whether they fit within a group and community. But, as we've stressed, people won't necessarily feel included in a group or see how they fit within a community without attention being given on how to enable this to happen.

This is particularly true when trying to increase the diversity within a group. Leaders and managers must make proactive support part of the creative chaos process. Olga Khazan says that differences can boost creativity and decision-making, but it needs support so groups feel comfortable and aware of the differences. And Erin McLaughlin stresses the importance of supporting viewpoint diversity so that we can best value a variety of perspectives. Lastly, David Epstein discusses the importance of embracing diverse experiences and perspectives.

Improvisational Acting

We often describe improvisational acting (improv), taught by ETC Teaching Professor Brenda Bakker Harger, as the special sauce in our student's graduate studies. We believe improv is one of the most important ingredients that help create an inclusive atmosphere because the "yes, and" nature of supportive sharing encourages participants to play well together. Improv won't magically solve all your inclusive diversity issues. However, it's an extremely effective way to set the stage for groups to start working well together as a team focused on shared goals.

Paul Torrance discusses how it takes courage to be creative, while Vera John-Steiner adds that successful improv collaboration requires the ability to be mutually vulnerable. Improv helps teams feel more comfortable being vulnerable together as they work through the chaos of a creative project. Building on that idea, Abigail Stewart and Virginia Valian note that the success of diverse teams rests on mutual appreciation, an openness to others' views, and an atmosphere where people feel free to express their opinions. "Yes, and" means that you accept the ideas your fellow participants offer and expand on them, adding new ideas that relate to the experience you're creating together.

This “yes, and” philosophy can be expressed in the three fundamental rules of improvisation that help create a paradigm that all participants need to follow if they are going to work together.

- The first rule: Be fun to play with. This is different from being someone who has fun playing. Being fun to play with means having a generous attitude and willingness to share with others and not be too precious with yourself and your ideas. You need to be open and able to listen and incorporate other people’s ideas.
- The second rule: Serve the story. In improv, the story is often a scene unfolding in time and space, and participants are encouraged to use a Ken Adams’ concept of a story spine (Once upon a time - Every day - But, one day - Because of that - Until, finally - And, ever since then) as well as CROW (character, relationship, objective, and where) to help in this regard. Serving the story can also apply to anything that a group is working on together. Your focus should always be on the story, or the experience you’re trying to create together, rather than your own ideas or agenda.
- The third rule: Make your partner look good. You should focus on helping the people you are working with perform as best they can by supporting them. If your group can all agree to try and enact these rules, you can start to develop trust and respect working with each other. Keith Sawyer says diversity and collaboration drive innovation as it helps teams avoid groupthink and too much conformity. He adds that organizing through improvisation can help collaborative creative sparks fly. Improv helps participants become more comfortable brainstorming new ideas together, as they work to shape experiences, creating something novel from nothing but their own collaborative creativity.

On Collegiality

People (Can) Suck

No matter how hard you work to create an inclusive, collaborative group, you should keep in mind this simple truism: people (can) suck. The suck can range from someone having a bad day, being in a sour mood, or generally being unpleasant, all the way to various levels of sexism, racism, and other misanthropic tendencies (passive, aggressive or both). There will likely be times when your supervisor, the client, or some of your colleagues will suck. Bureaucracy seems to ensure that people can suck. And if you've ever been online, you're aware that the public at large can suck. Most importantly, you need to realize that sometimes you can be the one who sucks. Realizing this helps you be able to proactively deal with situations in which people may be sucking.

Responsibility

One of the best ways to deal with these potential issues is to take responsibility for things that you can control and effect which can help alleviate stressful situations (both for yourself and for your teammates).

In the earlier section On Creativity, the importance of leadership is discussed as "taking responsibility for your role and for the goals of the project, as opposed to wanting to be the boss of your colleagues." When people suck, you can't necessarily control how they behave; however, a leader should own up to the things they can do. As Anese Cavanaugh reminds us, you should be aware that your energy and presence is contagious as it impacts your colleagues.

You should take responsibility for the work you do as well as for how you deal with your colleagues. You can take responsibility for the mistakes you make, the failures that happen, and the regrets you may have. You should definitely take responsibility for being honest about what you don't know and being open to learning more. All of the above helps you take responsibility for being your best more often than not.

Comfortability

Comfortability is a term we coined that goes along with responsibility. Comfortability is a confidence grounded in an open, accommodating ability and

ease of associating with others while being your best because you feel comfortable with being responsible for yourself and your actions.

This means that you need to get comfortable with the unknown, comfortable with yourself, and comfortable with the small (and sometimes large) failures that happen in any creative field. As Joe Moran notes, failure is more plentiful than success in a creative life, and you need to live with yourself through both. And Karen Rinaldi notes how important this comfort is as we all continue doing new things across our careers.

As you learn to take responsibility for your actions and grow comfortable with failure and the unknown, you will start to thrive in creative, collaborative environments because you will be open to the risks and rewards of exploring new ideas together with a group. This is how you do work that is innovative.

Reputation

You will develop a reputation with your colleagues as you work on creative teams. You want to become known as a good team member with a positive attitude. You should remember that your reputation is based neither upon how smart or talented you are, nor if you are (or think you are) better than your teammates. Working to develop trust and respect with each other is a continual process.

A simple way to do this is to just be polite and have good manners. The bar is so low you can stand out by just being considerate and courteous with others. Students tend to laugh at this, assuming that being polite is easy. Yet, it's remarkable how few people actually do this regularly. Shereen Chaudhry and George Loewenstein discuss how studies show general appreciation and apologies, such as saying, "please," "thank you," and "I'm sorry," have valuable social impact. If you follow through with your actions as well as your words, you are on the path to developing a good reputation.

Also, remember the first rule of improv: Be fun to play with. You don't need to be the smartest person in the room. You're going to have lots of ideas that aren't perfect. You are going to need your team so that everyone can work together to improve them. And people won't want to work with you if you've developed a bad reputation.

Neil Gaiman says professionals can develop their reputation by being good, pleasant, and on time. But, also that being two of the three can work. If you're good and pleasant, people will forgive you if you're late. If you're pleasant and always on time, people will be okay that your work isn't the best. And if you're good and on time, they'll deal with the fact that you're not that pleasant. But, to be safe, you should strive for all three.

You can also think about developing your reputation by what you bring to the job: awful, average, and awesome. If all you ever do is complain and kvetch, and bring awful to your colleagues, that's what they'll remember. Almost as bad is if you're just regularly average, never really standing out for much of anything one way or the other. Ideally, you bring awesome to the table, where your colleagues have a positive sense of having you as part of the group.

Collaboration

Collaboration means more than just working well with, and within, your team. ETC faculty, staff, and students often work with external funders and partners on projects that have an educational focus.

The process can involve a lot of people and still not be that collaborative. For instance, when trying to make an educational video game, a fairly standard model of this process tends to start with the funders supporting academics with grants, who then reach out to designers and developers to help make the game, looking to educators as subject-matter experts. Then, there are the students who will be playing the game, getting drenched by all of the good intentions flowing down the steps of this waterfall-like process, which is not the best way to really collaborate around a topic and project together.

A better model of collaboration is to include all of the stakeholders (funders, researchers, developers, educators, and learners) throughout the whole process, which helps instill trust and respect with all involved. This model means you have a much more diverse group of participants throughout the process so there's going to be more challenges and conflicts, but that dynamic also brings the potential for doing more innovative work together.

Laurie Weingart and Matthew Cronin have explored the importance of groups having mutual trust and respect, where trust is where people believe in each other's honesty and respect is their regard for each other's values. Trust enables people to rely on each other and respect helps them to value each other. Together, this helps people feel more included in a diverse group and collaborate together. This model is a co-creative process where the community of people is involved and invested in the work.

On Development

Less Talk, More Rock

We teach students about rapid prototyping to help them develop creative problem-solving skills starting with the BVW course. One way to describe this is that we encourage less talk, more rock, an idea from Craig Adams, aka Superbrothers.

He discusses how Jordan Mechner says the classic design process with teams begins:

- with an inspiration or idea;
- then follows where the group talks about the idea; and
- finally the team starts making it.

Mechner noticed that teams often get bogged down in the talking step. He recommends they go from the first step directly to the third step, prototyping those ideas before they discuss them too much. Adams conceptualizes this as less talk (Mechner's second step) and more rock (the third step). In this model, teams should start prototyping in order to get their ideas into action where they can see what does or doesn't work.

Less talk, more rock.

Collaborative Jams

A helpful way to challenge teams to practice rapid prototyping as they design experiences is to host and encourage participation in game jams and hackathons. Jams and Hackathons are short-term events—usually around forty-eight hours although they can run more slowly over a month—where teams are assembled quickly and given a short time to prototype a game, gadget, or idea.

The ETC hosted a "Now I Get It!" transformational 'game' jam in the spring of 2015. This jam was inspired by the "explorable explanations" work Nicky Case and Bret Victor have done that focuses on creating interactive learning experiences and the 2014 White House Education Game Jam that had teams of jammers as well as educational subject-matter experts. The "Now I Get It!" jam paired development teams with subject-matter experts to collaborate on creating interactive explanations of complex social and educational issues. Similarly, we've partnered with Games for Change to host XR Brain Jams for several years, connecting designers and developers with scientists and researchers to brainstorm prototypes to help explore scientific concepts.

While a jam involves rapid prototyping, the short timeframe limits what can be accomplished. The ETC is currently exploring a creative chaos process that starts with a jam and then blends into a longer timeframe like our semester-long projects. The goal would be to cycle through more ideas early so that project teams have longer to build more fully developed prototypes by the end of the semester. If done well, those teams would have more time to finalize and test their finished prototypes.

Playtesting Workshops

Playtesting is an important part of the semester-long development process. Teams are required to do it because it helps them iterate and polish their designs. To support teams in this regard, we partner with CMU's Human-Computer Interaction Institute (HCII) to offer a series of playtesting workshops. There are various ways to test (e.g. usability testing, focus testing and quality assurance), but playtesting focuses primarily on determining if your prototypes are creating the experience that you're trying to design. These workshops cover three stages of playtesting.

- Explore: where playtesting helps to explore a design space.
- Refine: where playtesting helps to iterate and refine designs.
- Persuade: where playtesting helps to provide evidence of how the design is working.

The playtesting workshops are meant to help teams make the most of their playtesting and improve their work.

Experience

The goal of your design is whatever experience you want the user, player or guest to have when they engage with what you've created. Focusing on this experience ensures that the team is considering the most important part of their design.

Around the ETC there are several concepts that we think help teams focus on the experience that they're working to design.

- Jesse Schell, ETC Distinguished Professor of the Practice and CEO of Schell Games, discusses how an interest curve of experience is a graphical representation of a player's interest level in a game or experience over the time of their engagement. Teams should consider the interest curve of the experience in order to work on the pacing and to create activities that escalate toward the goals at the end of the experience.
- Mihaly Csikszentmihalyi's notion of flow, in which a person achieves an optimal experience with a high degree of focus and enjoyment, is another useful way for a team to consider how they're designing the experience.

- Ian Bogost and Michael Mateas have done work on procedurality, a computational method to express ideas through interactive and emergent experience design.
- And Drew Davidson has written about three experiential stages or interactivity: involvement, immersion, and investment, that participants go through as they get more engaged in a game or experience.

The above are just some of the ways to help a team focus on improving the experience they're designing.

Transformational Experiences

We explore all forms of entertainment technologies at the ETC, and we're interested in how all of these could be used for various fields, such as: education and learning, health and medical, civic engagement, and more. We believe you can use your creativity for good, and work to design transformational experiences that can have a positive impact in our daily lives. We've focused exploring those experiences in three ways:

- Our graduate student project teams are continually creating experiences. We challenge them to create transformational experiences in which they work to design experiences that will have a positive social impact; and
- CMU and ETC alum Sabrina Culyba wrote *The Transformational Framework: A Process Tool for the Development of Tranformational Games*, a field guide of best design practices for making transformational games that provides an overview for creating experiences with impact in mind; and
- We have the Creative Good Fund that helps support students and connects them to nonprofits to create work that has a positive impact in the world.

On Context

Constraints

Creativity needs constraints as a context for a team to do good work. Teams need to focus on the experience they are designing so they can be more aware of the constraints within which they're working. The classic project management triangle of *fast, cheap and good*—where trade offs often mean you can only accomplish two of those three goals—helps illustrate the constraints every project faces.

- If you want something fast and cheap, it's not going to be good;
- If you want something fast and good, it's not going to be cheap; and
- If you want something cheap and good, it's not going to be fast.

These universal constraints aren't the only ones. Each project has unique constraints based on its own goals. Sometimes you have to say no to an idea that the team loves. This can create a tension between improvisation's rule of "yes, and" with the necessity to define a team's constraints. It's within these various constraints that teams must navigate the complexity of tasks, processes, and relationships, as discussed in the "Expertise Diversity & Managing Conflict" in the third section.

In some ways, navigating these ideas is at the core of the creative chaos process. If a team can successfully define the project constraints, they can focus on the project goals and polish their designs. Another project aphorism that describes that is this: perfect is the enemy of good. In other words, a team needs to design and polish within their constraints in order to finish their project on time and on budget.

Failure

A reality of the iterative rapid prototyping design process is that a team will rarely have the right idea immediately so they need to become comfortable with testing their ideas, failing, learning from their mistakes, and trying again. Failure is the fuel of iterative creative practice, as John Sharp and Colleen Macklin note. In order to test their design ideas, teams should playtest their designs with their demographic audience, which will help them determine what is or isn't working. Early rapid prototyping helps a team fail faster as they experiment, explore ideas, problem-solve, and iterate toward solutions that meet their project goals.

Ed Catmull often discusses the importance of helping teams at Pixar overcome their fear of failure so that they feel encouraged to push themselves and try new ideas. Similarly, Matt Ridley notes that innovation works best when teams feel the freedom to share, experiment, imagine, and fail on their way to success.

One way the ETC supports failure in pursuit of creativity is through the First Penguin Award for the Building Virtual Worlds course. This award is bestowed to the team that had the most spectacular failure, shooting for the stars but falling short and burning up on reentry. The award's name comes from the idea that some penguin has to be the first to go into the water, and they may get the reward of all the fish or the risk of being eaten by a predator. We encourage teams to really push themselves, and that helps us provide a context for discussing this positive type of failure as opposed to a failure due to a lack of effort.

Doubt

One of the most important aspects of creative teams is the ability to keep an open mind. Teams need to pay attention to what is working and what isn't while they iterate design ideas. It's helpful for teams to try and be doubtful of any certainties they may initially have by questioning and challenging themselves. Julia Galef describes this as the scout mindset, in which you work to recognize that you might be wrong, ask questions, and challenge assumptions to help work through the design process to understand what they need to do. However, one side effect of this "scouting" is that it might lead to uncertainty on the team.

Kathryn Schulz explores how we inherently enjoy feeling that we are right, which can lead us to getting entrenched in our understanding of a situation. We want to believe we are right because uncertainty leads to feelings of fear and doubt. Exploring what we don't know is how teams can best do innovative work, according to Jonathan Field. And Jennifer Mueller believes we have to be open to the inevitable uncertainty in the creative process in order to best determine if the product you're making actually meets the goals you're trying to address.

One way to alleviate the problem with uncertainty: thinking in bets. Annie Duke maintains that you should frame decisions in terms of making bets, which is merely making a decision about an uncertain future with incomplete information that depends on the quality of our decisions and luck. She also explores the idea of diversity when making bets. Diversity in perspective enables a group to improve its decision-making outcomes as it has more heterogeneous information. The variety of information might appear to increase the uncertainty in a decision, but teams should embrace this uncertainty by holding themselves accountable for the decisions they make together.

Curiosity

Being curious is a great way to remain open to iterating and improving ideas. Ian Leslie says that curiosity is a fundamental drive to explore and understand, which helps us to ask open-ended questions as we analyze ideas. You should continually ask questions and engage with what you don't know or understand. Figuring out how stuff works and solving problems leads to lifelong learning as you discover new ideas, explore new topics, and find new areas of interest. In her review of the cultural history of curiosity, Barbara Benedict notes that curiosity was once considered a vice as it was believed there were things people weren't supposed to know. That changed thanks to advances in scientific thinking. Curiosity became seen as a virtue as people began asking questions of the world around us. Along with doubt, curiosity is helpful for teams to do new, innovative work.

Michael Roberto encourages the cultivation of curiosity as it's a powerful, intrinsic motivation. He encourages introducing novelty to the process by asking questions, letting teams answer them together, sharing failure stories while also celebrating mistakes to help empathize genuinely and believe in each other. Dawna Markova and Angie McArthur also note that genuine curiosity is a basic requirement for insightful inquiry.

Interestingly, considering games and learning, curiosity can lead to playing in ways that could seem to be cheating as you push at, and sometimes past, the boundaries or constraints within which you're working through your playful inquiry as you bend the rules. In terms of design and development, you can't readily create magically innovative work without being curious enough to keep pushing and exploring possibilities. And Bernie DeKoven extols the value of this kind of cheating, or creative bending of rules, that enables us to continue playing together in new ways.

Curiosity—expressed through storytelling, model making, and game playing—helps us make sense of what we're doing, whether it's in a creative project or in our lives in general.

On Support

Difficulty by Design

The creative process is chaotic and challenging. Design is difficult, which means supporting your team and teammates is important. An effective way to do this is to apply design thinking to how you lead and manage a group.

Design thinking as a concept was coined by Herbert Simon to define the process through which designers problem-solve and iterate toward solutions. Tom Kelley and Tim Brown took this notion and applied it at IDEO throughout every level of the business, not just the creative teams. The people that make up any team tend to know when they're engaged in an experience so they can build on that, but you should ask them questions to push them to understand that engagement. In the end, you need to let them try design thinking on their own so they can develop the confidence together.

You can provide a team context by shaping their challenges and showing them connections with related work relevant to their project. This support helps teams develop a mastery of their skills as they develop a literacy of expertise in what they're doing when they collaborate through the design process.

Creative Teams

Project teams are made up of a diverse group of creative professionals with a variety of skills and expertise. Ahmir Khalib (Questlove) Thompson notes that collaborations work best when there's a mutual desire to see what others add to the process, which is another way to express the "yes, and" paradigm.

There's a dance between leadership and management when working with creative teams, as discussed in "Creative Production" in the second section. While working through the creative process, teams need support to make sure their collective individual efforts are helping their team to achieve their overall project goals.

Chris Bilton discusses the inter-related nature of the management of creative teams and creative approaches for management to help understand how best to support the creative work a group does. The goal is to become adaptable and flexible throughout the design and development process. And Dutch MacDonald and Mickey McManus outline some best practices for forming high-performance creative teams. They focus on the importance of collaboration, trust, and environment as key components for developing innovative teams.

To help lead and manage this social creative process, you should also encourage active life-long learning skills through feedback, critique, and training so that teams grow and improve together.

Feedback

Sharing feedback in a constructive manner helps people to improve both individually and together as a group. Randy Pausch said, "When you're screwing up, and nobody is saying anything to you anymore, that means they gave up." Giving and receiving feedback is a way to show you're committed to your colleagues and their success.

Randy would also say that we try to give students ten years' worth of feedback during their two years of study at the ETC. Student project teams get feedback and critique in a variety of ways. Meetings are a prime place for this feedback. Kevin Hoffman discusses the importance of designing for productive meetings, and ETC faculty work with teams throughout the semester:

- We start with kickoff meetings to introduce project goals and brainstorm ideas;
- We hold progress meetings throughout the semester to iterate ideas; and
- We conduct post-mortems to reflect on the overall experience.

Beyond meetings, feedback occurs throughout the semester with each group receiving evaluations from the entire faculty on the actual product that they're creating along with how clearly they present this information in written materials and public presentations. These full evaluations occur roughly a month into the semester (1/4s), halfway through the semester (1/2s), about two weeks before the end of the semester (softs), and at the end of the semester (finals). Following these group evaluations, students have meetings with their project instructors that focus on their individual performance on the team. These meetings help give them a sense of how both they and the group are doing.

Along with this project evaluation, the faculty gathers twice per semester to evaluate the academic performance of each group and its group members. If more than one-half the faculty have a concern about an individual student's performance, that feedback is given directly to the student in order to help them best succeed. At the end of the semester, there are public presentations and events where guests are invited to see the student work, which also provides an opportunity to garner even more feedback. Throughout the semester, teams are encouraged to playtest each other's projects to help share feedback as well.

Our overall feedback process lines up with Annie Murphy Paul's work on how we can socially extend how we think through relationships with others.

She examines how relationships with experts, peers and groups can all help us improve how we think. Throughout our semester projects, students and teams are getting feedback from a variety of perspectives: ETC and CMU faculty, their peers, alumni, and academic guests.

Constructive Criticism & Conflict

Giving feedback ideally entails some constructive criticism. We work to help prepare students both to receive and to give critique of their work. Considering the "yes, and" improv paradigm can help teams be open to discussion. After all, you want individuals and teams to listen to the critique, to be open to what is being said, and to ask questions that clarify meaning if the feedback is mixed or unclear. What you don't want is a team that is immediately defensive and worried about being right. Think of criticism as an opportunity to improve the work, which is something to appreciate.

However, leaders should deliver criticism and feedback in a way that enables teams to hear it. Thinking of yourself as someone who wants to like the work can make the feedback seem constructive. It helps if you focus on:

- what works well;
- what you don't understand; and
- what you think could make it better.

Also, you should make sure to consider the time and place for feedback. For instance: Should it be public or private? Should it be written or oral? No matter the delivery method, you should keep it short, to the point, and focused on the work.

Similar to receiving criticism, you should also be open to questions and show appreciation. Douglas Stone and Sheila Heen stress that it's important to look for the truth in feedback, while also being aware of the relationship between the people giving and receiving it, which can help groups better appreciate and attend to the comments that are shared.

From a team or individual perspective, it's important to remember that asking for feedback from others is one of the best ways to get some critical input on your performance that you otherwise might not receive. When asking for feedback, you should be clear that you are looking for honest input, and you should be open to hearing what gets shared. You can help focus the feedback by asking for input on three things:

- what your colleagues appreciate about what you are doing;
- what they would like you to start doing; and
- what they would like you to stop doing.

This can help lead to a fruitful discussion on what you're doing well and how you can improve.

Of course, you should remember that sometimes the good intentions of sharing feedback can go astray and lead to conflict. David Burkus explores how critique can often cause conflict while also helping teams strengthen their ideas. To help this be a constructive discussion, as opposed to a disruptive argument, colleagues should step back and take some time. Then you should focus on making a resolution together, as opposed to hanging onto your perspective being right and them being wrong, so that you can move forward.

There's a flip side to constructive criticism. Too often leaders and managers focus on the "criticism" and forget the "constructive." Sharing praise is equally important. As with criticism, when you share praise you should focus on the work and what you appreciate. And when you receive praise you should be thankful and share it around (and don't expect praise for just showing up).

With both criticism and praise, you're sharing feedback to help improve the work. Feedback can happen both informally and formally, but it's ideal to provide some structure to help deliver feedback.

ETC/HCII Associate Professor Jessica Hammer has developed the EOTA process for sharing feedback:

- the guests describe their experiences (E);
- they also describe all the things they observed (O) while engaging;
- they then work to develop theories (T) on their engagement; and
- they share advice (A) through feedback.

The above are just some of the many ways you can work to ensure that criticism can be supportive and disagreements can be constructive, both of which helps a team develop trust and respect and the ability to collaborate well as a team.

Workshops, Seminars, & Concentrations

Along with the feedback we work to share at the ETC, we also offer multiple extracurricular workshops and seminars to help students develop skills individually and as teams. Providing these opportunities can be an effective way to support the group as a whole by offering a range of topics across a variety of applicable areas. We are continually working to make sure the topics offered are relevant and helpful.

They are loosely organized into two groups with one focusing on *creative development* (Aesthetics, Design, Skills, Process, Playtesting, Critique, Analysis, Project Management, Agile Development, Producing, Storytelling, Life-Long Learning, etc.) and the other focusing on *professional development* (Strengths, Intellectual Property, Branding, Entrepreneurialism,

Conflict Management, Public Speaking, Pitching, Interviews, Professional Communication, Portfolios, Resumes, Personal Health, Field Overview, Professional Development, etc.).

These workshops and seminars are meant to complement and support their projects and full courses to help them learn how to become creative professionals. On top of this, we also offer concentrations of elective courses in game design, themed entertainment, interactive storytelling, and leadership & innovation, which enable students to focus their studies. These courses are analogous to more focused creative training and professional certification. We offer these in order to further support students in developing their skills and expertise.

Lifelong Skills

If you are leading creative teams, you should want to support everyone to develop life-long skills that enhance their abilities as creative professionals. As Patrick Griffin notes, problem-solving, teamwork, and communication are the skills that remain in demand professionally. And Marc Zao-Sanders stresses how life-long learning skills are one of the most important factors to consider in the hiring process.

The ETC faculty and staff believe these skills will serve professionals well in almost every group, team or job in any field. Components of each of these skills includes:

- collaboration and cooperation;
- communication and attitude;
- problem-solving and adaptability to change; and
- leadership and management.

No matter the skill, both creativity and curiosity are important components of these skills. Matthew Daniel makes an interesting distinction about how these skills shouldn't be thought of as "hard" or "soft," but should be considered as "perishable" and "durable." Hard skills are perishable in that they have a half-life as tools and technologies advance and change. Soft skills are durable as they last across your career and can transfer across fields and roles. These durable, life-long skills help professionals and teams succeed as they work to design and develop engaging experiences.

On Challenge

Hard Fun

Seymour Papert and Alan Kay both used the term "hard fun" to describe activities that are challenging and enjoyable. Similar to the notion of "flow," hard fun is an apt way to consider the collaborative creative design process as well. Ideally, you'd like teams to find the process to be enjoyably challenging as they're working on interesting design problems that keep them engaged with their collaborative tasks. The difficulty of the process can lead to more mastery in working together. When team members have the agency to make choices and decisions together, they will become literate in the design process together.

Patrick Bateson and Paul Martin explore the importance of openness and playfulness in creativity and the development of innovative ideas, balancing the playful fun with the focused work. And Shelley Carson notes that this openness needs to be both deliberative and spontaneous. You should plan to do it while also being open to receiving it when it occurs. This transformational process happens with a project as it starts with a diverse group of people who across their time collaborating together form a sense of an inclusive community and culture as they play, learn, and create together.

Pleasantly Frustrating

James Paul Gee coined the term "pleasantly frustrating" when discussing games that are well designed so that the challenges are balanced across the game to be on a level of difficulty achievable by the player while also ramping up the challenges to meet their abilities as they learn how to play the game better as they progress through it.

Jerome Bruner's concept of "instruction scaffolding" in which students are provided with support to help them develop into autonomous learners across time is a related idea. You can work to help ensure that development challenges fall into the realm of a pleasantly frustrating flow, in which teams aren't faced with tasks that are too simple where they would then start to become bored with the process, nor too hard where they'd get overly stressed by the process. With pleasantly frustrating challenges, people and teams feel capable of learning what they need to do in order to succeed.

Of course, in the development process it can sometimes be difficult to ensure that challenges are pleasantly frustrating, but considering them from this perspective can help you support and encourage a team to learn how to solve the challenges together.

Challenge is Good

Developing a creative, collaborative group culture is not just about having fun together. Fun has a quick half-life and wears off as a primary part of engagement. Raph Koster talks about fun as a reward to encourage us to learn and explore the possibility space of a game. The experience becomes less fun as we more fully discover all the possibilities of the space. Similarly, Chris Crawford discusses how fun game experiences have smooth learning curves in which a player is enabled to advance through the game as they improve. In both cases, fun comes through being challenged and learning how to do better.

Considering creative design, the difficulty of the challenges that teams have to address helps them learn to become better at solving problems together as a collaborative group.

Challenge is Engaging

Challenges can be engaging when striking a balance where teams are able to tackle tasks of increasing difficulty as their experience and expertise develops.

Greg Costikyan discusses how game experiences inherently involve sets of challenges that keep the player engaged. Experiences that have challenges that meet teams at their level of mastery are powerfully engaging. Daniel Pink includes mastery as one of the three elements— along with autonomy and purpose— that motivate people and teams. Mastery is the sense that you are getting better at what you do. Autonomy is when you have some control over your work and how you do it. And purpose comes through feeling connected to a cause larger than yourself.

The ETC engages our students by challenging them to create transformational experiences, providing a structure that gives them a strong sense of agency to tackle challenges and exceed expectations while having a positive social impact.

Curiosity Literary

Another important factor in helping teams stay motivated across time is helping the members to develop a curiosity literacy. By this, we mean that team members should work to understand how they learn. They should be encouraged to grow as creative professionals and to begin addressing their own challenges.

Paul Paulus and Bernard Nijstad explore how innovation occurs through collaboration by supporting groups that are doing creative work. Along these lines, Sina Najafi highlights curiosity as an ethical imperative to engage with our world and imagine how things might be better. Curiosity helps teams iterate ideas through the design process. And two effective ways to express curiosity is through telling stories and thinking in models and systems. Roger

Schank notes how sharing stories is how we make meaning of our collective experiences together. And Donella Meadows shows how thinking in systems is an effective way to better solve problems together.

A curiosity literacy entails an active stance that helps people and teams address the life-long challenges of improving what they do while questioning why they do it.

In Conclusion

Orchestrating Creativity

While the creative process is chaotic, the ETC continually works to help orchestrate the creativity of collaborative teams so that they can regularly do more innovative work. Chris Risdon and Patrick Quattlebaum describe this type of orchestration as a system of moments and a process of collaboration. And Dorothy Miell and Karen Littleton note that there's no simple formula to enable and support collaborative creativity, you always need to reflect on the requirements and preferences of each particular group and community as it's necessarily a social process.

Through our project-based curriculum and modeling of supportive leadership, we strive to inspire our students and alums to value and embrace inclusive diversity where people feel a part of a group of creative problem solvers, who are open to improve themselves and their teams, and who are comfortable collaborating together doing things they've never done before.

More Inclusive Diversity, Please

In closing, we'd like to put out a call for more inclusive diversity please. Not only in the creative fields and entertainment industries, but also across all areas of work and culture. We strongly believe that education leads people to value and embrace inclusive diversity. And we believe that more diversity on teams leads to more diversity in the products they make and to more creativity in the work they do together. Inclusive diversity is important and valuable, and we have to do it together as we work to make more magic and change the world for the better.

Creative Chaos

Creative Chaos denotes how the design process is inherently challenging, how having more diverse teams adds to the challenge, and how that challenge can also spark more creative work if it's managed well. Inclusion leads to innovation as teams learn to collaborate with each other, but the creative design process requires supportive orchestration in order for teams to regularly make the magic.

Learning Lessons

Since the ETC's founding, we have been sharing the lessons we've learned about creative chaos, inclusion, and innovation. We view the experience and expertise we've been developing as "learning lessons" instead of "lessons learned" because this is a continual, on-going process in which we always work to make changes both to discover our best practices and to break our bad habits. And we plan to keep studying our process to continually explore these ideas. We look forward to sharing the lessons we're learning, and in our executive education initiative will build on, and contribute to, our creative chaos work.

This is the ETC's overarching "yes, and" approach to learning how we can best teach creativity through an inclusive, collaborative design and development process and culture. This open approach is how we balance educational goals, professional development, and engaging experiences as our student teams learn, work, and play together. It is why we believe the ETC is different and why we are successful in how we educate, engage and inspire.

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About the Authors

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Drew Davidson. http://waxebb.com/

Laurie Weingart. https://www.cmu.edu/tepper/faculty-and-research/faculty-by-area/profiles/weingart-laurie.html

Kenneth Goh. https://www.smu.edu.sg/faculty/profile/149921

Gergana Todorova. https://business.fullerton.edu/department/management/managementfacultyinfo?user=gtodorova@fullerton.edu

Anna Mayo. https://carey.jhu.edu/faculty/faculty-directory/anna-mayo-phd-1

Dulce Pacheco. https://www.linkedin.com/in/dulcepacheco/

Marsha Lovett. https://www.cmu.edu/teaching/aboutus/lovett.html

Chad Hershock. https://www.cmu.edu/teaching/aboutus/hershock.html

Emily Weiss. https://www.cmu.edu/teaching/aboutus/weiss.html

Laura Velasco. https://www.cmu.edu/ira/

Sarah Hailey. https://www.cmu.edu/ira/

Shannon Foster. https://www.cmu.edu/ira/

Anita Woolley. http://anitawoolley.com/

Jodi Forlizzi. http://jodiforlizzi.com/

Brad King. http://www.thebradking.com/

Mary Flanagan. http://maryflanagan.com/

Estefania Harbuck. https://www.linkedin.com/in/estefania-harbuck/

Jenny Kim. https://www.linkedin.com/in/jenny-kim-19b36454/

Doreen Lorenzo. https://www.linkedin.com/in/doreenlorenzo/

Jane Pinckard. https://www.linkedin.com/in/janepinckard/

Rade Stojsavljevic. https://www.linkedin.com/in/rade-stojsavljevic-0a9196/

Lance Weiler. https://www.linkedin.com/in/lanceweiler/

Daniel Abeshouse. https://www.etc.cmu.edu/blog/author/dabeshou/

Amanda Anderson. https://www.etc.cmu.edu/blog/author/amandaan/

Steve Audia. http://www.etc.cmu.edu/blog/author/saudia/

Brenda Bakker Harger. http://www.etc.cmu.edu/blog/author/bharger/

John Balash. http://www.etc.cmu.edu/blog/author/jbalash/

Mike Christel. http://www.etc.cmu.edu/blog/author/christel/

Ruth Comley. http://www.etc.cmu.edu/blog/author/rcomley/

Tom Corbett. http://www.etc.cmu.edu/blog/author/tcorbett/

Dave Culyba. http://www.etc.cmu.edu/blog/author/dculyba/

John Dessler. http://www.etc.cmu.edu/blog/author/jdessler/

MaryCatherine Dieterle.
http://www.etc.cmu.edu/blog/author/mb8f2/

Jessica Hammer.
http://www.etc.cmu.edu/blog/author/jessicahammer/

Chuck Hoover.
http://www.etc.cmu.edu/blog/author/choover/

Heather Kelley.
http://www.etc.cmu.edu/blog/author/heatherkelley/

Brad King. https://www.etc.cmu.edu/blog/author/bradking/

Chris Klug. http://www.etc.cmu.edu/blog/author/gcklug/

Melanie Lam. https://www.etc.cmu.edu/blog/author/mjyee/

Michael Lee. https://www.etc.cmu.edu/blog/author/ml42/

Stone Librande.
http://www.etc.cmu.edu/blog/author/stonelibrande/

Rebecca Lombardi.
http://www.etc.cmu.edu/blog/author/rl3j/

Bryan Maher. http://www.etc.cmu.edu/blog/author/bm3n2/

Mo Mahler.
https://www.etc.cmu.edu/blog/author/mmahler/

Cari Marty. http://www.etc.cmu.edu/blog/author/cmarty/

Janice Metz. http://www.etc.cmu.edu/blog/author/jmetz/

Vicki Poklemba. http://www.etc.cmu.edu/blog/author/vp01/

Dave Purta. http://www.etc.cmu.edu/blog/author/dp1m/

Carl Rosendahl.
http://www.etc.cmu.edu/blog/author/carlrosendahl/

Shirley Saldamarco.
http://www.etc.cmu.edu/blog/author/shirley/

Jesse Schell. http://www.etc.cmu.edu/blog/author/jschell/

Scott Stevens. http://www.etc.cmu.edu/blog/author/ss8s/

Jon Underwood.
http://www.etc.cmu.edu/blog/author/junderwo/

Ralph Vituccio. http://www.etc.cmu.edu/blog/author/rv0a/

Ricardo Washington.
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Shirley Yee. http://www.etc.cmu.edu/blog/author/syee/

Caitlin Zunic. http://www.etc.cmu.edu/blog/author/caz/

ETC Alumni. http://www.etc.cmu.edu/learn/alumni/

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