9 CONSTRUCTING MODERN KNOWLEDGE: CRAFTING THE NEXT GENERATION OF CONSTRUCTIONISTS

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During the late 1990s, Seymour Papert and I engaged in many conversations about why, when our allies in the progressive education community were asked about "technology" in schools, their responses were often naive, reactionary, or dystopian. This may have reflected misplaced nostalgia for a bygone era but was more likely a rejection of the dominant instructionist paradigm of technology use in schools, such as computer-based testing and drill-and-practice software.

At the same time, it was becoming clear that the mainstream educational technology field was giving too little thought to learning and ignorant of the contributions of progressive educators. An event was needed to build a bridge between both communities. Our hope was that progressive educators would learn the potential of constructive computing, while technology-focused educators would come in contact with powerful ideas about learning, teaching, and school reform. Since Papert was not able to create such a summit, I decided that it was my responsibility to do so.

In 2008 without grant funding, institutional support, or corporate sponsorship, I created the Constructing Modern Knowledge (CMK) Institute. For the past twelve years, educators from around the world have assembled in Manchester, New Hampshire, for a four-day learning adventure unlike any other. CMK is uncompromising in its commitment to constructionism and the competence of learners, with the overt goal of crafting the next generation of constructionist educators.

THE FORMAT

The format of CMK has remained unchanged since its inception. The model has proven successful even when the number of participants went from 25 to 250 while absorbing the advances in computational technology of the past decade. It is based on lessons I learned from Dan and Molly

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Watt in the 1980s, my work with Papert in creating an alternative learning environment inside a troubled prison for teens (Cavallo, Papert, & Stager, 2004; Stager, 2006), the subtle complexity of the Reggio Emilia approach (Edwards, Gandini, & Forman, 2011), and the primacy of the project as an educator's smallest unit of concern. While some may see CMK as educators just "playing around," CMK's seeming lack of structure has been carefully designed.

CMK begins by asking participants to take off their teacher hat and put on their learner hat. Papert favored that plea as a way to suggest that educators be selfish with the experience in order to enjoy maximum benefit. The project planning ritual begins with the question, "What do you want to make?" This minimizes skill-based ideas such as, "I want to learn to use Photoshop."

No idea is too crazy and no idea is rejected. Some projects are incredibly practical, others whimsical, like an Internet for chickens, and many are beautiful, like a robotics installation called "The Poetry of Wind." Members of our faculty write each idea on large Post-it Notes surrounding our meeting space.

After all of the ideas are shared, participants write their names under all project ideas in which they are interested. Next, those who are determined to begin a particular project are asked to stand in a common area as a beacon (not a leader), where others who share their desire can join them. This seemingly casual act shows that the groups are not made of leaders and followers, but of equal collaborators. Once most people "bunch up," groups begin to work on their projects, uninterrupted for the next four days.

Before the planning ritual, I prepare CMK participants for a predictable emotional arc. By the end of the first day, they will be exhausted and might even feel frustrated or worse. If they are patient and trust the process, on the afternoon of the second day everything clicks and they speed toward the finish line. The third night, the learning space is open until after midnight for groups anxious to put finishing touches on their masterpieces. That late-night session has a lovely celebratory feeling, leading into the last day's pride in their accomplishments. Year after year, educators confirm that is exactly what happens. Projects proceed from impossible to demonstrable in just four days. Participants often comment that this causes them to think deeply about the emotional arc of the students in their classrooms.

On the final afternoon, projects are exhibited informally. While the resulting projects are often extraordinary, there is no need for formal presentations. Participants have been looking around and collaborating for days. Project development is the most nutritious part of CMK.

In addition to a few planned social events and guest speakers, each day ends with reflection circles led by faculty members. Faculty members rotate through the reflection circle locations so that participants benefit from interacting with different leaders without having to stray far from their projects. These circles offer a form of pastoral care and encouragement to participants while focusing on learning, not teaching.

NOT A CONFERENCE

Although featuring remarkable speakers, CMK is not a conference. There are a few guest speakers at each year's institute spread out across four days so as to distract as little as possible from project development. We invite speakers to spend as much time as possible at CMK interacting informally with participants, in addition to their presentations.

Our speakers fall into three essential categories: visionary educators, technological innovators, and experts in fields your guidance counselor never imagined. We have featured National Endowment for the Arts Jazz Masters, treehouse designers, scientists, historians, inventors, and accomplished teens. The CMK guest speakers are carefully chosen in an attempt to acquaint educators with what greatness sounds, feels, and tastes like across an unexpected spectrum. This expands their community of practice, expands vistas, and elevates their self-concept.

As hoped, CMK impacts our guest speakers as well. Alfie Kohn took his kids to a Scratch workshop. Deborah Meier remarked that she never thought before of using computers in a way consistent with her progressive ideals. Reggio Emilia educators cherished the beauty of the projects and recognized "the miracle." CMK aspires to be the "samba school" Papert describes in *Mindstorms*, where everyone dances together. Constructionist learning is reciprocal among all members of a community (figure 9.1).

NOT A WORKSHOP

Several years ago, a faculty member was frustrated by the wide variety of microcontrollers available at CMK and asked, "Why can't we just standardize on one model of Arduino?" My response was, "Then this would be an Arduino workshop." CMK is focused on the unique centrality of each learner and epistemological pluralism (Turkle & Papert, 1992). Each year, we purchase all sorts of new technology that might be useful, even if none of us knows a thing about it. Every year a teacher or group of educators, regardless of their prior knowledge, uses that "bleeding edge" item to propel a successful project.

FIGURE 9.1
The project, speakers, and structure of CMK.

Workshops are intended to teach you something discrete to perform your job better. Some educators have attended CMK as many as six times. Educators who attend multiple times are not coming to learn a tool or skill, but as a gift to themselves and a commitment to personal growth.

COERCION–FREE

CMK offers multiple reminders that coercion is the enemy of learning. Nothing is mandatory and time is flexible. One of the benefits of the setting is that there are dozens of restaurants within walking distance of the institute. This not only reduces catering costs but also invites participants to make friends and break bread together. Early morning or late-night diner runs, meals with guest speakers, illicit coffee expeditions, and lunches of indeterminate length are a tacit, yet powerful model of a noncoercive learning

environment. The free choice of projects, collaborators, materials, processes, and even where you eat embodies the commitment to noncoercion.

THE ENVIRONMENT

One participant remarked that, overnight, CMK turns an empty hotel ballroom into a utopian school. None of the artifice of classroom instruction is found; there are no rules, plans, flowcharts, or rubrics. There are wacky signs, snacks, an inflatable moose, and a presentation screen made of Post-it Notes. This denotes a different sort of learning environment with an emphasis on self-reliance, whimsy, and ingenuity.

STUFF

CMK stretches the idea of objects-to-think-with to the maximum. It is our goal to have anything a learner might need or be inspired by within arm's reach. CMK requires sixty cases of materials, including toys, tools, microcontrollers, fabric, Raspberry Pis, a sewing machine, 3D printers, art supplies, green screens, cameras, MIDI keyboards, electronics, and a library of five hundred books. A plastic chicken that poops gumballs inspired countless projects. A stuffed Eeyore toy traveled to CMK for several years, largely ignored. Then one year, pieces of Eeyore found their way into three different projects and were then lovingly stitched back together for many more years of service. CMK shares Thomas Edison's goal of a storeroom that includes "everything from an elephant hide to the eyeball of a United States senator."

AN ABSENCE OF INSTRUCTION

With the exception of brief impromptu tutorials and on-demand project assistance, CMK is accomplished without instruction. Faculty share expertise, assist in thinking through a challenge, or help with debugging when called upon to do so. CMK embraces Mitra's concept of minimally invasive education (Mitra, 2000) and Papert's adage, "Every time you teach something you deprive a child of the pleasure and benefit of discovery" (1996).

CMK PROJECTS

Across twelve years, CMK projects show evidence of how educators develop when they are treated as creative, competent learners. While hundreds of projects have been developed at CMK, one example may serve to

demonstrate how cutting-edge technology, timeless craft traditions, programming, and whimsy combine to demonstrate the powerful ideas of constructionism and progressive education.

CMK 2018 generated a project idea to build a "living" Marie Antoinette wig. The idea sprung from a participant attending for the third time who understood that great projects need not be practical. Lo and behold, she and a group of new colleagues created a giant wearable paper wig, complete with birds that circled above, bees that shot out of flowers, and other behaviors instigated by a microcontroller-based accelerometer. The animation was accompanied by a monochromatic garden of meticulous paper curls. The STEM skills demonstrated in this project are only rivaled by its creativity, beauty, and whimsy.

Consistent with CMK's emphasis on self-reliance and learner agency, projects—both processes and artifacts—are memorialized via social media, blogs, and a shared Vimeo account. No elaborate system or teacher labor is required. Readers may explore project videos and participant reflections at constructingmodernknowledge.com/?p=2382.

UNCOMPROMISING CONSTRUCTIONISM

CMK is uncompromising in its adherence to the constructionist principles outlined in Papert's Eight Big Ideas (Martinez & Stager, 2017) while reanimating progressive education for a new generation of educators. As a learning theory, constructionism needs the productive context of progressive education to ensure that educators realize the possible. CMK values the competence of educators at a time when curricula is made "teacher-proof" and professional development offerings are too often limited to Google training.

One hopes that educators reacquainted with their own power as learners use the experience of a noncoercive constructionist setting as a catalyst for constructing similar experiences for the students they serve. Through the experience of personal invention, educators reinvent themselves, and only then can they invent the future of education.

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