Creative Learning Challenge Brazil: A Constructionism approach to educational leadership development

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Resumo

O "Desafio de Aprendizagem Criativa Brasil" é um programa do grupo Lifelong Kindergarten do MIT Media Lab em parceria com a Fundação Lemann. Todo ano, o programa seleciona em torno de 10 educadores inovadores, os "fellows da aprendizagem criativa", dedicados a contribuir para uma educação brasileira mais mão na massa, relevante, prazerosa e colaborativa para todos. Baseado na documentação de práticas reflexivas, bem como em materiais produzidos pelo Desafio e seus participantes, este artigo analisa o processo de desenvolvimento dos fellows à luz teórica do Construcionismo de Seymour Papert. Evidenciam práticas baseadas no Construcionismo em vários níveis, desde o processo de seleção, o desenvolvimento dos projetos, até o próprio formato do programa, constituindo uma vivência de aprendizagem e formação de líderes robusta e imersiva.

Palavras-chave; Aprendizagem mão-na-massa, Criatividade, Formação profissional, Programas de Fellowship.

Abstract

The Creative Learning Challenge Brazil is a fellowship program of the Lifelong Kindergarten group of the MIT Media Lab in partnership with the Lemann Foundation. Each year the fellowship selects approximately 10 innovative educators, the "Creative Learning fellows", dedicated to making Brazilian education more hands-on, relevant, playful and collaborative for all. Based upon the documentation of reflective practices, as well as materials produced by the program and its participants, this paper analyzes the fellows' development through the lens of Constructionism theory of Seymour Papert. Constructionism based practices are revealed at multiple levels of the program, including the selection process, project development, and fellowship design, thereby providing a robust immersive learning and leadership development experience.

Keywords: Hands-on Learning, Creativity, Professional development, Fellowship Program.

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1. Introduction

The Creative Learning Challenge Brazil is a fellowship program of the Brazilian Creative Learning Network[3]. The Network is a rapidly expanding community of practice engaging over 3000 artists, designers, inventors, entrepreneurs, educators, researchers, and school leaders nationwide who are committed to making education more hands-on, relevant, playful, and collaborative for all. It is a response by individuals across Brazil who are dissatisfied with the persistence of traditional education and one-size-fits-all instructional models.

The Network was created in 2015 as an initiative of the Lemann Creative Learning Program of the MIT Media Lab's Lifelong Kindergarten group, with support from the Lemann Foundation, a Brazilian education foundation. The Lemann Creative Learning Program is based on three premises: 1) that there exists a wealth of initiatives in the spirit of Creative Learning throughout Brazil yet disconnected from one another; 2) that the adoption of new educational practices is more sustainable when building upon already existing organic transformational practices; and 3) that teachers learn better from one another than from external specialists. Therefore, the Program set out to identify initiatives and to connect them with one another, and with the Lifelong Kindergarten, in order to disseminate best practices and find solutions to common problems. In this way, the Lemann Creative Learning Program has promoted the Brazilian Creative Learning Network, enabling it to engage its members in a process of collective learning through events, meetups, discussions, networking, sharing of best practices, and resource development. The fellowship program, the Creative Learning Challenge Brazil, is one of these efforts.

The fellowship program is currently in its 4th edition. The first cohort was awarded in 2015, the same year as the formation of the Brazilian Creative Learning Network. The Fellowship is a strategy to give visibility to the creative efforts of a select group of Brazilian educators working in socio-economically vulnerable communities and to advance their experiences in Creative Learning. Simultaneously, the Fellowship aims to expand Creative Learning practice, to share this new knowledge with the network, and to inspire the development of new Creative Learning initiatives with different groups and regions of the country. Currently there are a total of 54 Fellows across Brazil, as seen in Figure 1.

[3] Rede Brasileira de Aprendizagem Criativa http://aprendizagemcriativa.org

Figure 1 – Location of the 42 projects awarded in the Fellowship Program since 2015


Source: Internal report.

These Fellows develop a wide range of projects in schools, community centers and afterschool/non-formal learning spaces, innovating new materials to use in hands-on learning experiences. For example: braving the school kitchen in which the curriculum subjects of chemistry, physics and math are reinterpreted through the implementation of student recipes; photography as a tool to build identity in remote communities founded by former runaway slaves; building low cost robotics toolkits for public schools, or exploring art and cognition through the development of creative computing projects with children with disabilities. Illustrative photos of each of these projects are presented in Figures 2 through 4.

Figure 2 – Braving the School Kitchen / Photography, Memory, and Identity
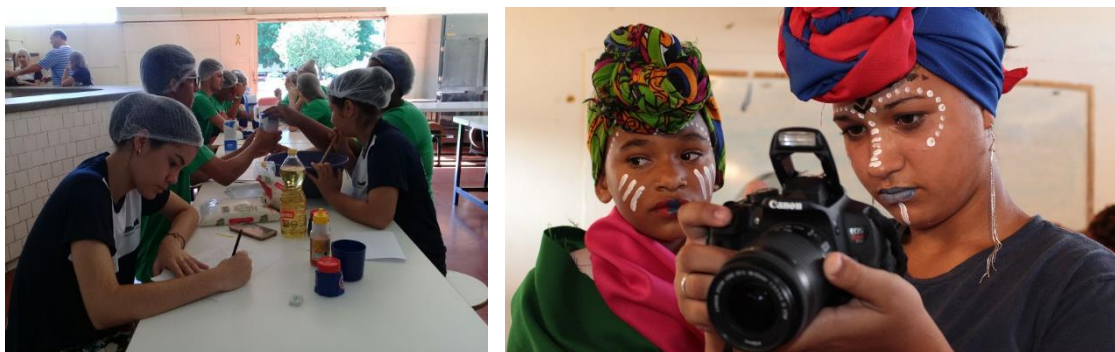
Source: Ellen Regina Romero Barbosa / Cecop collection

Figure 3 – Low-cost robotics kit
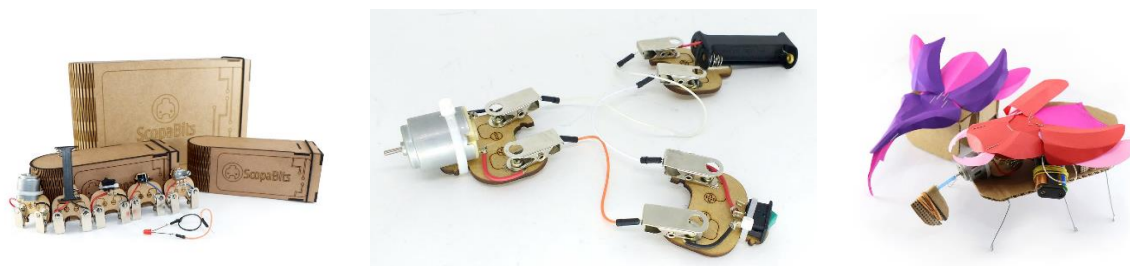
Source: Scopabits

Figure 4 – Develop creative computing with children with disabilities

Source: Eduardo Bento Pereira

A brief description of each of the projects awarded through the Creative Learning Challenge Brazil is available at the Lifelong Kindergarten group of the MIT Media Lab (Burd, 2019; Burd, 2018; Burd, 2017). A sample of the experiences of the 2018 cohort can be found at Creative Learning in Practice (Rede Brasileira de Aprendizagem Criativa, 2018). Creative Learning in Practice graphically expresses the diversity and creativity of each of the initiatives.

The Fellowship Challenge is a yearly competition. In the most recent 2019 edition, seven projects were selected from a pool of 326 applications. As projects may have up to two representatives, the 2019 cohort consists of 11 Fellows. The Fellows receive ongoing support from program staff and from each another, sharing practices, refining ideas, sparking alternative perspectives. The group is small, allowing for individual attention to each learning path. It is a level of exchange that would be impossible with a cohort of 100 fellows. Over the course of nine months the incoming Fellows participate in the following core activities:

- Program launch in March together with a major Creative Learning festival in São Paulo;
- A one-week seminar in May visiting the Lifelong Kindergarten and MIT Media Lab as well as several Boston-based formal and informal educational spaces dedicated to various innovative solutions in education;
- Participation in the Brazilian Creative Learning Conference in September at the host city in Brazil;
- Monthly online meetings on topics relevant to emerging interests and needs of the Fellows;
- On demand continuous support from the Program staff for development of the Fellows' projects;
- Final reflections meeting in November (virtual)

Projects also receive a US$3000 stipend to invest towards their implementation. Following the year of intense activities, Fellows continue as members of the Brazilian Creative Learning Network and many become agents fomenting local community groups of Creative Learning in their cities as well as nation-wide.

The objective of the current paper is to explore the ways in which the Creative Learning Challenge Brazil aligns with the theory of Constructionism and to show how Fellows experience first-hand the educational philosophy that they are attempting to put into practice in their own projects. Specifically, this paper starts out by defining Creative Learning in the context of Constructionism. It then goes on to explore the selection process, an example case, the fellowship program as a Creative Learning activity, the role of unexpected results. and, finally, concluding remarks. The methodology adopted to produce this paper is based on the documentation of various face-to-face and virtual reflective practices, as well as materials produced by the program and Fellows.

2. Creative Learning and Constructionism

The term, "Creative Learning" was coined by Mitchel Resnick and his colleagues at the Lifelong Kindergarten. It calls attention to the quality of learning experiences afforded by the Scratch programming language in tandem with the variety of devices, solutions and the online community designed to "help children learn to think creatively, reason systematically, and work collaboratively" (Resnick, 2012). These skills make up a (digital) fluency which is seen as essential for successful navigation in a constantly changing workplace and increasing complex society. Engine of Creative Learning is the "Creative Learning Spiral"

(Resnick, 2017) in which the learner, who could be a kindergartener but could also be a willing grownup, engages in a continuous process of imagining an idea, creating an instantiation of the idea, experimenting with the creation in a playful fashion, sharing the creation with other people, using this collective experience to reflect on the original idea, and then start all over again imagining the next iteration. The sequence, 'imagine - create - play - share - reflect - imagine again', is a spiral in the sense that each iteration is informed by, and elaborates on, the previous one (Figure 5).

Figure 5 – Creative Learning Spiral

Source: Resnick, 2017

The spiral encourages creative thinking in so much as the activities follow, to greater or lesser degree, four essentials principles - the 4P's. "In short, we believe the best way to cultivate creativity is to support people working on projects based on their passions, in collaboration with peers and in a playful spirit." (ibid, p. 16). The 4P's are central parameters for defining what we mean by Creative Learning activities in the Brazilian Creative Learning Network.

Creative Learning has its foundation in Constructionism as defined by Seymour Papert, which in turn has its roots in Piagetian Constructivism. Both Constructionism and Constructivism are defined by the self-organizing aspect of human intellectual development as the child constructs and modifies her mental schema through interaction and manipulation in the physical world. This notion is in stark contrast to instructional models of teaching based on information delivery (Papert, 1993). However, Constructionism diverges from Constructivism on several tenets, one of which is that Constructionism places particular importance on building things - the creation of objects through which budding knowledge can be expressed. "Constructionism - the N word as opposed to the V word - shares constructivism's connotation of learning as 'building knowledge structures' irrespective of the circumstances of the learning. It then adds the idea that this happens especially felicitously in

the context where the learner is consciously engaged in constructing a public entity, whether it's a sandcastle on the beach or a theory of the universe." (Harel; Papert, 1991, p.1).

Ackermann (2001) compares Constructivism and Constructionism taking into consideration the intellectual trajectory of each theorist, providing additional insight into the divergence between the two theories. Piaget, a geneticist, searched for the ways in which the child's mental structures evolve over time, and sought to clarify the mechanisms for this structural evolution. Papert, a mathematician in the artificial intelligence community, sought to illuminate the ways in which children learn to learn, and the specific role that making things can contribute to the process of self-directed learning. "To Papert, projecting out our inner feelings and ideas is a key to learning. Expressing ideas makes them tangible and shareable which, in turn, informs, i.e., shapes and sharpens these ideas, and helps us communicate with others through our expressions." (ibid., p.4).

The activity of programming the Logo Turtle, 'teaching' the turtle how to perform a particular task, is a clear instantiation of this idea. With this comes a new appreciation of the concrete, not as a stage to pass through on the way to abstract thinking, but as a way to explore and manipulate complex ideas in physical entities.

This notion that knowledge is constructed through the exploration of numerous concrete examples leads to a second divergence of Constructionism from Constructivism. In contrast to Piagetian stage theory, Papert asserts that learning is essentially nonlinear and context dependent - it is the connectedness and continuity of meaning that is embedded in a particular material or setting (Papert, 1993). Furthermore, he associates this nonlinearity with different learning approaches, from planning on the one hand to tinkering, or the "bricolage" on the other (idem). This focus on the individual learner and her idiosyncratic learning path raises the importance of building on one's own passions and interests. When the public entity that she constructs is personally significant, this influences the level of engagement, the understanding of the concepts, and the depth of learning.

Building on this intellectual tradition, Creative Learning goes on to expand significantly the notion of public entity, the wealth of concepts that can be manipulated, their shareabilitiy, the role of collaboration, and the building of communities. Creative Learning highlights the social dimension of Constructionism by emphasizing the role of collaboration and peer interaction in regard to personal engagement and understanding of new perspectives.

The Creative Learning Challenge Brazil embodies the Creative Learning and Constructionism educational philosophies on several levels. By design, the program team has consciously tried to formulate a fellowship model that would live up these educational

philosophies. Traditional international fellowships are usually limited to sending the awardees abroad and promoting a learning or writing experience. The Creative Learning Challenge Brazil has the double objective of contributing to individual learning while simultaneously fomenting the development of the broader network as a whole. First, each Fellow is deeply engaged in a project that is personally meaningful. This project becomes their public entity, their "object to think with". Second, the projects themselves promote Creative Learning practices with children in a variety of formal and informal learning settings. Therefore, the Fellows are providing opportunities for others to experience their own constructions. Third, based upon their practice with children, Fellows create, test and present their own novel Creative Learning activity to be included in the project gallery of the Brazilian Creative Learning Network. As designers of Creative Learning, the Fellows share their activity with the online community and become part of the learning spiral. Fourth, the Fellowship program itself is conducted in the spirit of Creative Learning. The mentorship and facilitation provided by the program constitutes an instantiation of Constructionism based pedagogy. Finally, the program is embedded in the Brazilian Creative Learning Network, an organization designed to champion for Creative Learning practices through a process of collective learning. The goal for the remainder of the paper is to exemplify how the design of these various components of the Fellowship are aligned with Constructionism and are instantiations of Creative Learning.

3. Expansion to find convergence - the Fellowship selection process

Papert goes to great lengths to define Constructionism through examples, explaining that the stories of concrete situations constitute the most (only) effective way to express meaning given that comprehension of any new concept is a personal construction. Furthermore, as more and more examples are shared, from very distinct domains of knowledge and experience, these instantiations will more likely than not converge on the essential nature of Constructionism.

> "I find an interesting toe-hold for the problem in which I called the playful facet--the element of tease inherent in the idea that it would be particularly oxymoronic to convey the idea of constructionism through a definition since, after all, constructionism boils down to demanding that everything be understood by being constructed. The joke is relevant to the problem, for the more we share the less improbable it is that our self- constructed constructions should converge." (Harel; Papert, 1991, p. 2).

Papert's joke is the basis for the selection criteria adopted in the Fellowship's selection process. The rubrics used by the evaluation committee to evaluate the project proposals address geographic diversity, relevance in terms of the degree of contribution to vulnerable populations, viability of the proposed project, degree of innovation and, most importantly, alignment with the principles of Creative Learning. The latter is defined by hands-on, significant to the target population, collaborative, and promoting playful experimentation. In this way, by concentrating on the quality of the learning experience as defined in the 4P's, the rubric allows for a tremendous amount of freedom in terms of the nature of the application. Indeed, many of the applicants have never heard of Creative Learning before the call for proposals. The fellowship itself helps them give a name to, and thereby reflect upon and express, many aspects of their practices. Building this identity is one of the outcomes of the fellowship.

The Fellowship program is a strategy to bring innovation into the Brazilian Creative Learning Network while strengthening its identity. Selection prioritizes untapped geographic regions, new content areas, and varying scopes of implementation. The idea is that through the accumulation, discussion, and reflection on a growing mass of examples that contemplate diversity in local cultures, thematic content, and implementation settings, "as bricoleurs we can come to agreement" (Harel; Papert, 1991. p. 2) in the sense of building personal meaning around Creative Learning.

The Fellowship application requires the submission of a project proposal which is evaluated according to the selection rubric described above. The form also requests evidence of practices with children in learning situations. These are analyzed with regard to the relative emphasis on promoting learning as opposed to direct teaching. In addition, the form includes several questions which seek to determine an intuitive mindset for Constructionism, for example: "Tell us about something you have learned, achieved or built in the last two years." or "What help do you need to develop your project?" In the end, the selection process aims to establish a cohort of individuals with very different backgrounds, working in diverse settings, but with an affinity of ideas regarding learning.

Once selected, the Fellows engage in the series of activities itemized above, not the least of which is the field trip to Boston. There, the Fellows have a chance to experience firsthand the way learning opportunities are designed at the Lifelong Kindergarten group of the MIT Media Laboratory. They visit schools that weave projects into their curriculum to varying degrees. They see children and youth engaged in informal learning settings, directing their own learning individually or in groups, and sometimes designing learning activities for their peers or children younger than themselves. They see public and private learning

spaces, from the elite to low-income based community centers. In this way, the Fellowship selects for an expansive range of projects and provides an even more diverse set of examples. How does a common understanding of Creative Learning emerge from these ingredients?

In thinking about how convergence may emerge from a diversity of interpretations, it is interesting to consider Peter Senge's notion of building a shared vision, one of the four disciplines that support the fifth, primary discipline of systems thinking in learning organizations (Senge, 1990). When Senge refers to schools as learning organizations, he explains that a vision isn't shared just because one person expounds on it. Individuals each have their own interpretation of that vision. In fact, Senge explains, without personal visions the shared vision is a facade. "If you go and ask everybody, what's the vision and everybody uses the exact same words…that is not a shared vision. People have memorized the correct words to talk about the vision." (Senge, 2017). Senge explains that the coherence only emerges through specific actions. People have different points of view, but it is through their practice that each person brings about some aspect of the whole.

When reflecting with the Fellows on the smorgasbord of innovative centers visited during the week in Boston, there is a wide range of reactions. Several common themes emerge but there are differences of opinion with regard to levels of freedom, organization, the relative importance of digital technology, curriculum content, accountability of learning objectives. These variations are apparent in their own projects as they develop over the course of the Fellowship and beyond. Yet each endeavor seeks to promote projects that are significant to the learners and shared with peers, through playful and creative exploration. For this reason, in order to find convergence, the vision has to be broad enough to allow for different perspectives and a variety of educational contexts. At the same time the principles of Creative Learning and Constructionism have to be clear enough so that they can be instantiated across domains. There have to be parameters, a lens through which the commonalities can emerge but, as Papert explains, the diversity of perspectives can substantiate the original idea and make it more easily understood. The Fellowship promotes learning through a process of expanding existing understandings by being exposed to new examples, realities and solutions. Convergence is achieved by having the opportunity to test the ideas, exchanging perspectives with their peers, and ongoing opportunities for collaborative reflection.

4. Understanding through examples – a project narrative

Imagine a small village called Pau D'Arco on the banks of a tributary of the Bay of Marajó in the Amazon. In the municipality of Santa Bárbara, Pau D'Arco is located 45 Km

from the Pará State capital city of Belém. Proximity to the metropolis brings high rates of violence and narcotics, while poor access leads to inadequate sanitation, lack of schools, and limited opportunities. Raimundo das Graças Lima Xavier was raised in Pau D'Arco and founded the organization Ação Parceiros[4] (Partners in Action) which for over 10 years has provided social and educational support for the children and their families in a community forgotten by the public and private sectors. Xavier and his colleague, Sebastião Borges Fonseca, submitted a proposal to bring Social Educational Robotics to Ação Parceiros, Figure 6.

Figure 6 – Ação Parceiros community center / Educational robotics materials

Source: Projeto Social Ação Parceiros

The project proposal described hands on activities in the subject areas of Reading, Math, Electronics, Programming, Robotics, English as a Second Language, and Civic values. The curriculum content would be developed through 'Creative Education' defined as creative activities and problem solving focused on solutions to the adverse situations encountered in the children's daily lives. For example, the proposed description of the course in Robotics would use materials from obsolete computers and electro domestics in conjunction with recycled materials. The description was very much in the spirit of Creative Learning. The 4P's were evident in the elaboration of projects that were personally significant and developed in teams in a playful spirit of re-inventing discarded objects. The project was selected for its intuitive alignment with the ideas of Creative Learning in the candidates' areas of expertise (electronics, programming and robotics) and for its potential to bring these ideas to such a vulnerable, remote community.

Nevertheless, in the same breath, the proposal also described the use of curricular booklets they had produced to navigate the content in each of the core curriculum subject areas. In the beginning of the Fellowship, the relationship between these artefacts wasn't

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[4] http://www.acaoparceiros.org/

clear nor how the divergent educational paradigms would be reconciled. Both existed harmoniously in the original project proposal.

The cognitive dissonance began to emerge at the first meeting in São Paulo and ruptured into despair during the week in Boston. Fellows Xavier e Fonseca returned to Ação Parceiros and proceeded to knock down the internal walls of their community center, literally breaking down the divisions between disciplines, unifying the methodology. It was through the renovation of the physical space that they aimed to express the integrated essence of learning through building external entities. Their rooms needed to be open with easily accessible materials in order to foment the autonomy and creativity they envisioned. Renovation of the outdoor area into an adventure playground provided learning experiences as important as building an electrical circuit (Figure 7).

Figure 7 – Integrated learning spaces

Source: Projeto Social Ação Parceiros

The challenges continue for Fellows Xavier e Fonseca as they struggle to guarantee the sustainability of Ação Parceiros. Workshops, courses, and speaking engagements are all part of the dissemination and fundraising process. With each event the materials become more ingenious as they invent new ways to embody the curriculum content in the physical constructions. Gradually the pedagogical methodology becomes increasingly adapted to the particular audience. Their learning spiral progresses.

5. Walk the talk - the Fellowship program as a Creative Learning activity

> [...] the goal is to teach in such a way as to produce the most learning for the least teaching." (Papert, 1993, p. 139).

In designing the Fellowship program, the question as proposed by the Lifelong Kindergarten group was, how can we structure opportunities for adults to learn in meaningful

and context-relevant ways that more closely resemble the exploratory, idiosyncratic explorations of young children? Paramount was to support this group of educators in their ongoing work and to help them reframe their experience through the collective input of a highly innovative and engaged group of professional colleagues.

The Brazilian Creative Learning Network workshops are a model for the kind of activities the Fellowship intends to afford. Currently there are several that have been formatted on topics including Creative Village (Rede Brasileira de Aprendizagem Criativa, 2019), Creative Learning Activity Design (Rodeghiero, 2019) as well as soon to be published topics on Scratch, and Micro:bit. Each follows a similar structure, always starting with an open-ended, hands-on activity that connects with the ideas that the learner brings to the topic and allows her to express these notions in a digital or physical artifact. If there is an introduction, it is minimal, just enough to set the stage. It is only after the participants have had a chance to build something and to share their creations with the group that participants and facilitators engage in a more conceptual discussion, reflecting on the experience and bringing these observations into a broader theoretical context.

Valente (2014) contrasts this kind of active methodology to that of traditional teaching units which start with a presentation of the concepts followed by some form of exercise, or in the worst case, mere regurgitation of the information on a test or quiz. When there is time, students get to do a project. Active methodologies can turn this sequence on its head, beginning the process with the student's action. Valente and Blikstein (2019) turn to makerspaces as a possible alternative to traditional teaching because of the essential role of hands-on activities in these spaces. In their analysis of knowledge construction in makerspaces, the authors highlight the multiple factors needed to make hands-on activities meaningful opportunities for learning. They show that the process of knowledge construction is much more complex than simply starting with student action. Specifically, they identify the various types of understanding from hands-on doing, to premature success, to comprehension, to conceptualization. They explain the critical role of the experienced mediator to ask the right questions and provide the right kind of information to promote reflection on the results from hands-on doing. Unfortunately, however, "…in general, the activities taking place in makerspaces within schools are becoming restricted to the action of creating an artifact, without there being an incentive for other activities to take place, such as reflection, comprehension, and conceptualization." (ibid, p. 260). The authors stress the importance of going beyond just making to promote knowledge construction.

The Creative Learning Challenge Brazil is a journey that begins with the work that the Fellows have been developing in their respective settings. Each Fellow understands her

reality better than any outsider and based on this understanding has submitted a project proposal. The project becomes her object to think with. It is the backdrop as the Fellows come in contact with the construct of Creative Learning in a wide variety of settings, both at the March Festival of Invention and Creativity in São Paulo, and the May visit to Boston. Also, Fellows participate in the Creative Village and Scratch workshops in which they experience first-hand the principles of Creative Learning. After participating in these activities, it is very common to hear Fellows say, "This is what I've been doing all along, but I didn't know it was called Creative Learning".

What each Fellow takes away from these experiences is highly individualized, and assimilation of the ideas will depend upon the person's current frame of mind. For example, some people focus on the technology, others want to reproduce the workshop dynamics, others are looking for how to connect with the classroom curriculum. As they test these new ideas in their projects there is a constant stream of sharing results online with the group, as well as regular planning meetings. This collaboration supplies new ideas to spark the imagination and to create new elements in their projects or to sculpt existing ones: play, test, and share again. The process mirrors that of the MIT Media Lab graduate students described by Resnick - rapid prototyping, play, share, reflect on learnings, imagine the next version (Resnick, 2017, p. 13).

The program includes two moments for more structured sharing with a larger audience - at the MIT Media Lab Lifelong Kindergarten and at the Brazilian Creative Learning Conference. Here, each Fellow sets up a table with artifacts from their project and a brief description of their journey - an exercise in synthesizing their identity and purpose. The audience circulates among the tables and the participants engage in conversations, as shown in Figure 8.

Figure 8 – Interactive project presentations

Source: Cecop collection

These interactions with a genuinely interested and supportive audience of experts are extremely rich opportunities for expanding perspectives on their own work while simultaneously legitimizing their accomplishments. They are essential moments that support learning and creativity. As Ackermann (2001) explains, communicating with others through our concrete expressions helps to shape and sharpen the ideas.

The Fellowship program is designed to be a microworld of Creative Learning, in the same vein as Papert (1993) defines learning French in France or learning math through playing with mathematical objects. The Fellowship can be thought of as an environment to be explored in order to understand its internal machinations – a safe place to build new practices. There is little information delivery, rather the program works with what the Fellows bring to the table. The "curricular agenda" is the process of the fellowship itself. There are no lectures, rather a plethora of optional resources. Over time, the intentionality of this kind of mediation becomes an object to think with. The Fellowship becomes a model that can be referenced when decisions are made for how to deal with situations that arise in their own practice.

6. When the result is not what you expected - reflecting on their projects

> Anything worth doing is worth doing badly. (Minsky, as cited by Abelson, 2019, p. 40.)

The spiral of learning adopted in the Fellowship program involves an iterative process of continuous refinement and expansion. Implicitly, this includes making mistakes and abandoning unsuccessful strategies along the way. Duckworth writes about the "productive wrong ideas" (Duckworth, 2006). She explains that right answers don't tell you anything and that most of schooling is designed to break down complex ideas into sequenced, easily assimilated steps so that students can avoid making mistakes. In fact, this can lead to all kinds of misconceptions and deprives the learner of the opportunity to experience the errors that show where your idea breaks down.

The tinkering community describes a process of getting stuck and unstuck and how, when this practice becomes internalized, it can lead to a sense of self and personal accomplishment. "The process of becoming 'stuck' and then 'unstuck' is the heart of tinkering. It is in this process that authorship, purpose, and deep understanding of the material and the phenomena are developed." (Petrich, 2013, p. 55). Ackermann (2014) reflects on tinkering, delving deeply into the relationship between the mind, the hand and the eye. She points out that when the learner pulls back to reflect upon the result of a particular

action, the way she perceives that result is informed by her expectations and ability to look at the phenomena from a different perspective. "When you think about tinkering, it all comes down to the ways in which you look at the discrepancies between what you got, what you thought you'd get, and what you read as having gotten…" Learning happens when you see features in the result that make you think in a different way. If you don't perceive in the result something that can change your perspective, then tinkering is just trial and error.

The disposition to become critically reflective of one's own assumptions is highly valued in the Fellowship program. Space for revisions in the original project proposal is built into the program. The ideas described in the original project proposals are just a starting point. Fellows are encouraged to experiment with new ideas and to remix practices that others have used. The program mediators are relentless in their targeted questioning of conventions and belief structures. Adapting or even letting go of certain ideas is part of the process. In fact, if the project doesn't suffer changes over the course of the year, it constitutes a missed opportunity for learning, both by the Fellow and the program.

Much of this reflection takes place around the monthly online meetings. Here, program mediators and Fellows have an opportunity to delve into each of the projects. These encounters are often accompanied by the analysis of internal planning documents or records of activities in a variety of media – photos, videos, timelines, audio, occasionally even written text. As a rule of thumb, the program mediators begin the meeting by asking the Fellows to explain what took place during the period, before they provide any feedback from the report materials. This is deliberate in that the Fellows are able to flesh out the narrative with contextual information. More importantly though, it provides a window into the Fellows' understanding of the learning experience they have provided for their target population, be it children, or teachers. If the Fellow speaks first the mediators can find out, in Ackermann's (2014) terms, what the Fellow "sees" in the result that she got. Sometimes the Fellow sees things that the mediators did not anticipate. Other times it is the Fellow who hasn't used the results to change her perspective. These are the strategic moments to pose pointed questions that can destabilize assumptions.

The mediators of the program are themselves involved in a learning process in how to make the monthly meetings a constructionist learning opportunity. On occasion, the mediators can foresee problems that may arise in the Fellow's current plan and suggest a particular strategy. Sometimes this works. Other times the suggestions are solutions to a problem that doesn't yet exist in the mind of the Fellows. The Fellow may adopt the strategy out of courtesy, but the implementation is usually not true to its original intent. For example, this issue has arisen when the Fellows engage in professional development of their

colleagues. The Fellowship program leaders have realized that a few days after a teacher workshop it is useful to reunite the teachers while they are trying out their new activity in the classroom to share and debug its implementation. This intermediate step, done before the new activity is fully implemented, allows for reflection based on partial results and new learnings for the teachers. However, sometimes the Fellows' frame of mind is that a dynamic hands-on workshop is enough and will provide teachers with the necessary elements to implement their activity in the classroom. In these situations, when the mediators recommended the intermediate step, the Fellows understood that they had to prepare another dynamic workshop to introduce another topic instead of using the meeting to give voice to the teachers. The Fellows saw their role as facilitator to provide innovative new resources. They hadn't yet perceived the need for the strategy suggested by the mediators. In this situation, the mediators needed to allow the Fellows to debug their notion of facilitation and then incorporate this new idea in the design of the next iteration of their workshop. Fellowship mediators are also continually learning from mistakes and debugging practice.

The frame of mind of some of the Fellows described above in part arises because when Fellows return to Brazil after the week at MIT, they have the feeling that they have witnessed 'the source' and want to share the 'power'. Many of the Fellows' projects include a professional development component, preparing teachers from their school, their school system or network of centers. In these cases, their project implementation depends on the collaboration and active engagement of these educators. Despite the fact that, on paper, their colleagues come from institutions with a common vision, their productions sometimes diverge from the essential principles of Creative Learning. The Fellows' success in these endeavors varies a lot.

In their final reflections at the end of the year, the Fellows from 2018 were asked to identify their "aha" moments. Low and behold they cited ideas that had been discussed throughout the previous 9 months, yet hadn't been fully assimilated, for example, the need to invest more time in aligning expectations. "Each professional has her own journey in her own time." "You have to understand people's context and practice." "You have to go with what the person brings to the situation." They talked about how this non-linearity demands a great deal of practical experience. "You have to have a set of experiences, plan B, C, and D to juggle your objectives with the emerging demands." These revelations did not come out of thin air. The Fellows had been immersed in the ideas and practices of Creative Learning, yet it was only through their own practice that they were able to make the shift in perspective, in Ackermann's terms, to "see" in the result of their actions the recursive nature of the Constructionism methodology.

One of the Fellows from 2018 talked about her change in perspective during the Fellowship. When Vaine (2018) first participated in the Learning Creative Learning online course and was asked which "P" she considered the most important, without hesitation she stated that the "P" for Passion was the most important because when working on projects that we like we invest time and effort and enter into the flow. However, after having been a Fellow for the past year she came to give increasing importance to the "P" for Play, one of the most difficult concepts to capture in a "P". "Starting with people's interest is great for developing projects, but awakening interest through a change in point of view is also marvelous."[5] She explained how through play and experimentation she came to enjoy areas that she previously thought were tedious or simply hadn't paid attention to. With her growing responsibilities within the institution, she found herself spending less time with children and more time with adults. This also made her re-visit Play:

> "Play brings everything that children lose as they become adults: not to be afraid of making a mistake, being willing to try, to test, to adapt, to re-adapt and start over, to dive right into the hands-on instead of go creating and killing the ideas before even putting them into practice, to be curious…"[6] (Vaine, 2018).

In this meta reflection where she is thinking about her own thinking about the 4P's, her perspective has shifted to one of greater mindfulness of the complex nature of play. The wonderful workshops she builds are playful not just because they are fun but because they make people think about the materials and ideas in a new way.

7. Concluding remarks

The Creative Learning Challenge Brazil is one of several programs of the Brazilian Creative Learning Network. The Challenge is designed to support a select group of Brazilian educators in their ongoing work to champion new solutions for socially vulnerable children across the country. These selected individuals embark upon an intensive 9-month fellowship program consisting of a series of national and international meetings and events as they develop their own respective projects. The Fellowship is an ongoing relationship with the Brazilian Creative Learning Network in which Fellows continue to shape and define Creative Learning as leaders in the community. Several have gone on to create local hubs of Creative Learning, engaging educators in their region through meetings and events designed to

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[5] Partir dos interesses é ótimo para desenvolver projetos, mas despertar o interesse a partir de uma mudança de olhar, também é maravilhoso.

[6] O Play traz tudo que as crianças vão perdendo à medida que se tornam adultos: não ter medo de errar, estar disposto a tentar, testar, adaptar, readaptar e recomeçar, colocar logo a mão na massa ao invés de ficar criando e matando as ideias antes mesmo de colocá-las em prática, ser curioso...

promote collaboration and to discuss hands on practices. In turn, the local hubs share their experiences and questions with the rest of the Network through regular online meetings and informal messaging groups. Numerous best practices have spread across the Network through the socialization between hubs.

The Fellowship program adopts Constructionism as its model for learning. Based upon the premise of knowledge construction as an iterative process of externalizing one's ideas as a public entity that can be shared, reflected upon, and refined, the Fellowship explores Creative Learning as defined by the MIT Lifelong Kindergarten. Fellows are chosen on the basis of project proposals that may or may not explicitly align with Creative Learning principles, but that embody the elements of promoting projects that are personally significant to the learner in a collaborative and playful environment. These essential principles allow for a wide range of themes in a variety of contexts. In this way, the notions of Constructionism and Creative Learning are instantiated through the examples.

This paper demonstrates various ways in which the Fellowship itself is an example of Creative Learning in the tradition of Constructionism. Fellows learn about these notions as they refine their practice with children and other educators. Simultaneously they themselves are involved in a process of Constructionism as they share, reflect upon and refine their own projects. As future leaders in the Creative Learning community it is essential that they construct their own meaning of Creative Learning in their context. The Fellowship itself is a process that is tied to its theoretical roots and becomes an object to thing with. In this way it offers the stability of a set of shared references. A transformative experience that strengthens the intellectual, social and affective affinities that define the community of practice.

Although the fellowship program has evolved tremendously since its inception 4 years ago, it is under constant refinement and still has important challenges to overcome. In particular, the organizing team grapples with scalability and sustainability issues associated with the Challenge. How to make the level of reflection and support provided to the current 7 projects available to the 300+ other projects that were not selected at the beginning of the year? How to support the current projects beyond the 1st year of the fellowship? One approach for the former question might involve the creation of a special web portal to facilitate ongoing peer-to-peer discussion about all the projects submitted. Another approach might involve narrowing the focus of the call for proposals to specific issues faced by the Creative Learning Network. One potential response for the latter question might involve the creation of a mini-grant program for which Fellows might be entitled to apply in order to take

their projects to the next level. These are some of the ideas currently under consideration for the 2020 version of the Challenge.

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