

What is Constructionism? Views from a Thai Perspective

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Abstract

This paper investigates the interpretation and implementation of constructionist principles in Thailand. Interviewing key founders of the movement as well as teachers, village leaders, business people, and others vested for many years in the constructionism movement in Thailand, we ask what constructionism means within the diverse Thai community where it has been applied.

Keywords

Constructionism; developing countries; educational reform; Thai perspective

Introduction

In a 1991 paper, Seymour Papert faced the difficult challenge of defining constructionism, an educational philosophy that prided itself in not telling people what things are—after all, he was a constructivist who advocated that knowledge should be constructed and not simply transmitted. At the same time, pressure was mounting on Papert and his collaborators to offer a better definition of constructionism, which, alongside the explosive growth of the Logo language, was become increasingly popular and influential. It was one thing to define constructionism within the confines of Seymour's weekly seminars at the Massachusetts Institute of Technology (the "Loud Thinking" meetings), but defining it for a broader audience, in an academic article, was an entirely different business. Papert's response was that,

"If one eschews pipeline models of transmitting knowledge in talking among ourselves as well as in theorizing about classrooms, then one must expect that I will not be able to tell you my idea of constructionism. Doing so is bound to trivialize it. Instead, I must confine myself to engage you in experiences (including verbal ones) liable to encourage your own personal construction of something in some sense like it." (p. 1).

If Papert succeeded in steering away from contradicting his own principles by offering a set-in-stone definition of constructionism, intentionally or not he opened up a wide and complex set of possibilities for implementing and thinking about constructionism. In traditional academic circles, whenever a new theory or methodology is created, the proponents spend the rest of their lives making sure that their ideas are not "distorted" or wrongfully appropriated. By allowing his readers to "personally construct" their own definitions, Papert was doing the opposite. It sounds like a good idea in principle, but what happens when people outside of Papert's close circle of students and colleagues try to implement constructionism? What happens when people have indeed the license to appropriate it in very personal and culturally-aware ways?

This paper investigates one such case: the interpretation and implementation of constructionist principles in Thailand. In 1996 a group of MIT graduates from Thailand started a foundation to support what they hoped would be a transformative initiative to reshape education in their country. They brought Papert and later many other researchers from MIT, including his then student Cavallo, to visit Thailand and begin a project to introduce constructionism to the country, starting first with teachers then reaching out through non-formal education to people in rural communities (e.g., Cavallo, 2000). After a few years, the collaboration with MIT phased out and the movement was left largely to its own devices, with relatively little contact with U.S. institutions or researchers. The foundation, led by a few visionary figures

and several educators and leaders, with some support from the ministry of education and various corporations, continued to figure out by on their own how to implement constructionism in Thailand. Intriguingly the Thai leadership and people who joined the constructionist community applied the philosophy not just in K-12 education but also in industry (from chemical companies to banks), remote farming villages, technical colleges, and non-formal education. Interviewing key founders of the movement as well as teachers, village leaders, business people, and others vested for many years in the constructionism movement in Thailand, we ask what constructionism means in Thailand within the diverse community in which it has been applied.

Background

In order to understand how constructionism has been framed and practiced in Thailand, we must situate those meanings against the background of how constructionism has been defined and applied in other areas, namely the developed countries in the West (in the context of this paper, we will refer to the West as mostly North America and Europe, from which most of the constructionist research originates, but we are aware that there are active communities in Latin Brazil, Mexico, Senegal, Australia, and many other countries.) Because of Papert's intention to not overly define constructionism and to convey what it is through stories and interventions, it can be difficult to pin down what it is and how it has been applied. Yet given the substantial literature on the topic, we certainly *can* frame some key foci of the movement. Perhaps the most common definition of constructionism comes from succinct statements, such as that the following one by Papert himself (Papert & Harel, 1991):

“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 a context where the learner is consciously engaged in constructing a public entity, whether it's a sand castle on the beach or a theory of the universe” (p. 3).

Later, Ackermann (2001) tried to clarify the definition in broader terms, saying that Papert's constructionism “focuses more on the art of learning, or 'learning to learn'.” She further emphasized Papert's interest in learners engaging in conversation with their and others' artifacts and “how these conversations boost self-directed learning, and ultimately facilitate the construction of new knowledge” (p. 1).

These two sets of statements embody several themes in constructionist literature, including the roles of creating things/artifacts, engaging with others about these public artifacts, learning in a self-directed way, and developing new knowledge. Ostensibly constructionism could be applied to any human being in any context creating anything of relevance to them and others. Yet within these very general themes the *application* of constructionism has tended to be far narrower. For instance, it has not often been used to study the construction of knowledge related to sand castles or cosmological theories. At the risk of grossly overgeneralizing a rich movement in just a few paragraphs, below we suggest four overarching ways to understand constructionism in the West. We consider the foci of people, institutions, activity, and mechanisms of building constructionism. Our goal is not to oversimplify a philosophy that has been explored in multiple books, but to situate the simultaneously familiar and unique 20-year implementation of constructionism in Thailand.

People Focus

Given its roots in developmental psychology, published literature of constructionism has focused almost exclusively on children. In the early years of constructionist research, in the 1980s and 1990s there was practically no work on adult education, higher education, or workforce development. Though constructionists worked considerably with teachers, they were seen as a vehicle to ultimately reach the children. There was a strong child-centered focus both in terms of research and implementation, but also in terms of the philosophy of the movement. On occasion, Papert would state that technology was giving children the opportunity to “learn on their own” or make some of the teaching redundant (for

example, in a video-debate between Papert and Freire recorded in the 1990s⁴³). In contrast, in Thailand the constructionist movement has been broadly applied to people of a wide age span: children, youth, young adults, adults, the elderly.

Institutional Focus

Deriving from the focus on children, educational institutions have been the main focus of constructionism in the West. In 1985, MIT started the well-known project in the Hennigan School in Boston which implemented Logo across the curricula (Tabor, 1990), and in the 1980s and early 1990s, schools in tens of countries started to incorporate Logo in their curricula. Much of the work was bottom-up with teachers bringing it on their own to schools, but given Papert's and MIT's centrality and international reputation, they were approached by many big school systems and ministries of education to implement constructionism in entire countries or cities (e.g., Costa Rica, Thailand, Senegal, etc.). Eventually, with the "Logo crisis," of the late 1990s, there was a bigger focus on out of school implementations: extracurricular time, summer programs, and after-school workshops. Over the past two decades, especially with the emergence of games-for-learning and FabLabs, libraries, community spaces, and museums have also begun to play a strong role in constructionist education for children. Still, all of these are generally *educational* institutions. In the Thailand constructionist movement, there has been a triple-focus on schools, businesses, and rural villages, laying the groundwork for some potentially unusual applications of constructionism.

Activity Focus

The initial Logo implementations focused considerably on project-based learning—students were writing computer programs based on personal interest. Papert defined the terms "project" and "problem" in very particular way: "projects are primary, problems come up in the course of projects" (Papert, 1996). "Projects" were larger-scale personal endeavors, and within them students would find "problems" to solve. This was a specific reaction to the "problem" based approach in traditional math instruction, in which students are given different math *problems* to solve without a connection to a broader project. The definition of these terms is relevant in our context because "problem" and "project" are used in Thailand in slightly different ways. This focus on making things has continued in recent years, visible in the number of titles in Constructionism conference proceedings that focus on learning programming, making games, creating animations, developing system models, and so forth.

Mechanisms of Dissemination

It is impossible to deny the role that digital tools have played in disseminating constructionism throughout the world. Since Papert introduced turtle geometry and Microworlds, there has been an almost inevitable focus on designing tools that children can use as much as designing the learning environments those tools are used in. Indeed there are many constructionist tools and "construction kits" since the early days, including Lego/Logo, NetLogo, StarLogo, Scratch, electronic textiles, FabLabs, and digital games. Even though many of those tools were not originally designed as stand-alone education materials, they have been undeniably a primary means of disseminating constructionism to educational settings. Programs, workshops, and curricula are built around the use of a tool, albeit with reflection, social expression, and sharing with a broader audience as familiar attributes of these learning environments. These are some of the primary (though certainly not the only) ways that constructionism has been disseminated, along with some academic artifacts such as books, publications, and conferences.

Methods

Context and Participants

This is part of a larger study to investigate the historical development of the constructionist movement in Thailand. Constructionism was formally introduced in Thailand in 1997 and has continued there

⁴³ <https://www.youtube.com/watch?v=FnVCyL9BwS8>

through the present time. What started as a small movement with a foundation established in 1996, some government and business sponsors, and initial training and workshops led by Seymour Papert and David Cavallo has grown substantially. It would take a full article or perhaps a book to wholly describe the breadth and history of that movement, but here we seek to provide a little context to provide a backdrop within which to situate what constructionism means in Thailand. The Thai community has three overlapping domains of implementing constructionism: education (K-16 schools and non-formal education), business (chemical, agricultural, tech-driven, and financial institutions), and rural villages. It has spread through both word of mouth (ground-up) and by top-down support from business, village, and school leaders.

Implementing constructionism has involved many types of activities for the different individuals and communities involved. Many teachers have sought to apply constructionism in their classrooms, often expanding to a school-wide approach if school leadership has been supportive. A number of large corporations in Thailand have used workshops to train employees and subsequently supported these workers in identifying and working through problems in manufacturing, human resources, or community outreach. Villages have identified problems such as water management, sustainable agriculture, managing finances, improving family education, and so forth as areas to work with constructionism. Some of these areas are described in more detail by the Thai community itself (e.g., Israsena et al., 2014). None of these areas are without contestation. When a principal at a school or the head of a business changes often constructionist efforts have been thoroughly disrupted or ended altogether. As we discuss below, it can take months, even years, for people to accept a constructionist mindset. Yet the community has persevered, largely isolated from out-of-country resources, for more than two decades, raising the opportunity to study what constructionism means in Thailand and how it has developed there.

Data and Participants

During a two-week visit to Thailand in December 2017 one of the co-authors (Fields), with a translator as needed, conducted 1-2-hour semi-structured interviews with 22 participants nominated by leaders of the community with the goal of sampling from people long- and/or heavily-involved in one or more of three main domains of constructionism in Thailand: education (9 participants), business (8), and villages (5). An interview protocol and a list of interviewees was developed by the authors with collaboration from some other researchers familiar with the history of Constructionism in Thailand. With a few exceptions, most participants had more than 10 years of experience working with constructionism, including some who were involved from the very early years of the project. A few people were relatively new to constructionism but were highly involved in growing the constructionism project over the past 2-3 years. Geography and time limited the number of people who could be interviewed during this first visit of the larger study. Interviews focused on participants' histories with constructionism, key characteristics they thought important to constructionism, and positive and negative examples of how they had seen constructionism in practice. All interviews were transcribed in the main language the interviewee used—English or Thai depending in participant preference. Thai interviews were then translated into English.

Analysis and Limitations

Multiple rounds of grounded, comparative analysis (see Charmaz, 2002) were conducted on the interviews with the focus of identifying key attributes of constructionism in Thailand. We initially developed 16 codes grounded in the participants' descriptions that were applied to the entirety of the data. In a second round we compared, condensed, and reorganized the codes to better reflect the dominant themes emerging from the analysis. We identified four overarching themes spoken of by almost everyone interviewed, with several subthemes that provided further clarification. We do not claim that any of these themes are universally shared by all members of the constructionist community in Thailand. Findings in this paper emerged from discussion with a particular subset of very experienced leaders in the community and are likely not reflective of the thousands of individuals who have experienced and applied constructionism overall. Further, we as authors recognize that we are foreign to the Thai context and though we have been involved in varying levels with the constructionism community in Thailand for several years (primarily during 1-2 week visits, often as workshop leaders or

observers), it has been largely as outsiders. Member checking with two leaders of the constructionist community at multiple stages of analysis and writing has helped us check our understanding against that of participants.

Findings

Given that the Thailand community applies constructionism across a wide range of contexts, from K-12 schools to non-formal education, and from rural villages to large industrial companies, it should not be surprising that there was a wide range in what people valued and prioritized in their explanations and descriptions of constructionism. Yet there were several core themes that emerged across people's accounts. Intriguingly, what might be considered one of the core aspects of constructionism in the West, the idea that learning happens when creating something was mentioned by only a few people, namely those with fluent English who had an advanced degree from a U.S. university, and had read Papert's original works. So if the idea of "learning by constructing and sharing objects" is not the core of Thai constructionism, what is?

Control over One's Own Learning

One thing that nearly all participants spoke about in regard to constructionism was that learners were *in control* of their own learning and that this was a transformative attitude compared to traditional Thai culture. Boonkong⁴⁴, a businessperson who had spent extensive time studying and observing constructionism in Thailand, described this as a powerful transformation in one village that took up constructionism across the past 18 years: "[M]ost of the villagers in Chuenchit, they control their lives. Before their life was controlled by someone else. Now they control their life. They say that everyday they wake up, they feel happy, not because they're rich, because they can control their life" (p. 4). Participants reported that without constructionism, when people in Thailand encounter a problem, they either wait to be told what to do or report a problem to higher authorities rather than trying to figure out what to do oneself, whether in a business or a village. Similarly, in schools, children are told what to do and are in continual search for what the "right" answer is, something that many participants said was still a tendency in their adulthood. In contrast, taking control over one's own learning meant having the power to deal with issues that came up in one's life and actively doing something about it.

Implied in the idea of being in control of one's own learning was the notion that learning should be *interest-driven*, which came with both a sense of freedom and responsibility. In other words, people should get to choose what to do, whether in class, at work, or in community life. For instance, Saijai, a leader in her village, described that constructionism is "the learning process, that the learner is the center of the learning" (p. 3). Or as Punya, a long-time teacher, explained, students should have the freedom to "do whatever they want to complete [their] project[s]" (p. 3). Learning should be driven by learners, not by others in authority. At the same time, there was an emphasis on responsibility, on doing things oneself rather than having others do a project or solve a problem for them, though support was always available in the form of mentorship. As an example, Saijai described how she and other members in her village helped others begin to apply constructionism: "We didn't do a project for them, they have to do it by themselves with our support" (p. 5). Thus applying constructionism meant taking responsibility and ownership over one's life, one's problems, one's projects.

This belief that people should have ownership of their own learning had empowering implications for how people thought of themselves and others. As Pinit, a business leader and constructionist facilitator, spelled out, "I've changed from a person who lacks confidence, afraid to try new things, to have more confidence. I now know the beauty of learning," (p. 2). Further, just as participants like Pinit took more empowered views of themselves, they took similar views of the students they worked with, whether those students were children in schools, family members, or colleagues in companies, or fellow members of a village. Many teachers described the transformation they experienced as they witnessed constructionism in practice with their students. Students became more engaged, happier, spoke up more, presented with confidence, and demonstrated changed mindsets even years later. Thus not only

⁴⁴ All names are pseudonyms. Quotes are cited by page number of the interview.

did participants describe greater confidence in themselves, they expressed similarly strong confidence in the capabilities of the students or learners that they worked with.

Notably participants described learning this attribute of Thai constructionism in *practice*, not by a definition read in a book or heard in a lecture. Most participants first encountered constructionism through a one-week workshop on Microworlds Logo. Designed to put learners in an unfamiliar situation, participants often felt very uncomfortable at the beginning because they were not told exactly what to make or how to make it. Yet through the weeklong experience they *learned how to learn* and grasped that learning could be driven by their interests and learned through practice not through lecturing or being told what the right answer was. Not only this, but as participants went on to apply constructionism in their own jobs and families (many expressed applying this with family members), the support they received further emphasized the interest-driven and learner-centered characteristics of constructionist learning. For instance, one teacher, Samorn, explained that when she and her fellow teachers tried to figure out how to implement constructionism at their own school, their director “didn’t try to control us ‘how’ to do it, we managed ourselves,” figuring out how to design constructionist learning environments in their classrooms and grade levels (p. 2). This was emphasized again and again in participants’ interviews; they were never told how to implement constructionism, something that was occasionally frustrating but overall fulfilling. Instead, it was up to them to try it out, learn through a process of trial, error, observation, and trying again.

Real-World-Problem-Focused and Process-Driven

In the Thailand constructionist community, solving real-world problems and the processes of solving them are at the center of doing constructionism⁴⁵. Whereas in the West the types of projects that are most common are related to personal interests of the individual child, in Thailand the context of constructionism involved working on a *real-world problem*, usually one of relevance to a local community. In businesses, employees need to be able to identify what a problem is when it arises and find a solution to solve the problem themselves. In villages, “Rural people need deep understanding on their own problem[s],” finding the root cause of an issue, collecting data and community knowledge about that, and solving the bigger, underlying issue (Worawech, p. 17). Finally in schools, students can identify problems in their class or in their community and try to work on a solution to that. In all of this, people work toward bettering their local community, be it a school, neighborhood, village, business, or Thailand itself. In other words, the interest-driven emphasis of constructionism in Thailand is based on broader collective interests rather than personal intellectual inclinations or hobbies.

Solving these problems involves applying a *process*. Almost everyone interviewed explicitly mentioned the word “process” in discussing constructionism, and those who did not mention the actual word described a type of process or set of steps that they used to solve problems in a constructionist manner. There was variation to the processes described, but in general it involved identifying a problem, doing something about it, reflecting on the result, and adapting to continue to fix the problem. One senior facilitator of constructionism, Boonmee, summarized one process as follows: “Think, make, reflect are the core principles... Then rethink, remake, and reflect.” (p. 2). Perhaps one reason why *process* is so important in Thai constructionism is that it is a set of abstracted principles that can be applied to a wide variety of situations. As village leader Pana Pong explained, “In the past, everything is scattered and unorganized, not systematic, but when we learn things we can get into clear processes” (pp. 1-2). Like Pana Pong, many participants emphasized that the process of doing constructionism gave them power to deal with problems, work through mistakes, and persevere when things did not work out the first time. Anurak explained that the idea of a process may work well with common cultural ways of thinking in Thailand: “If you look at all the different interpretations of the learning process in Thailand, all of it is a cycle. They might have five steps, six steps, seven steps, eight steps, but it’s all a cycle” (pp. 4-5). Internalizing a process of constructionism allowed people to use it again and again.

Although people had slightly different expressions of what a process of constructionism involved, several overarching themes emerged across the interviews. First, the process involved *community*.

⁴⁵ Note that many constructionists would consider the term “problems” as an equivalent to “textbooks problems,” so here we used “real-world problems” to differentiate.

Identifying, understanding, and working through a problem was best done with others. Manit described this insight as transformative. Instead of facing a problem by himself and when often he could not find a way to solve it, “by sharing information with the other people, other workers, there are many solutions to solve the problems” (p. 3). Many like Manit shared that constructionism brought people together, whether in a classroom, village, or workplace. Teachers intentionally supported peer pedagogy, villages thought about issues together in ways that built community, and workplaces experienced teamwork. Pinit shared that constructionism “made us understand or empathize with others’ perspectives and ideas” (p. 4). He explained that before technicians and engineers did not share their expertise in working through issues, but that constructionism helped them to listen to each other, share ideas, and work with “cross-disciplinary knowledge.” It would be all too easy to stereotype a community focus as relating to broad ideas about collectivist versus individualist cultures. But that idea does not explain why groups across the spectrum of Thai culture had previously failed to collaborate on solving problems before they were introduced to constructionism. Constructionism may have opened up deeper, more collaborative communities than were able to exist before.

About half of the participants mentioned managing *emotions*, often through *meditation*, in their descriptions of a constructionist process. They spoke about this as a means to concentrate, stay focused, understand oneself, and be receptive to constructive criticism. As Boonmee explained, “If you can’t control your mindfulness, you will get angry and you can’t think thoroughly about the cause of the problem you made” (p. 2). He shared that this was very personal to himself. Before constructionism he had a very short temper and was especially unreceptive when people criticized his teaching. But after learning to apply constructionism he was calmer and think about the other person’s perspective when they gave criticism. For many, managing their emotions, especially anger, allowed them to listen deeply to others and also helped them to be more humble. This all helped them to broaden their perspectives on the problem or project they were working on and to get help from others—to be more open to their community in productive ways.

Finally, about half of the participants also cited *reflection* as a core attribute of the constructionist process. This goes back to the “think, make reflect... rethink, remake, reflect” process that Boonmee described. It was important to take time to think about what one had done, evaluating what went well and what to change. Pimchan highlighted the importance of reflection in the changes her village experienced once they began to apply constructionism:

“Because normally, in the normal village, when they have activities or the things that they have to do, after those activities end, then it is finished. But our village has applied constructionism to the working process. And when we finish one activity, we have a reflection time asking whether or not this one is good? This one is bad? Are we going to continue doing this?” (pp. 6-7).

Like Pimchan, for those participants who mentioned it, reflection was tremendously powerful to their learning experiences. It gave them the ability to improve, to persevere through initial failures or imperfections, and to “crystallize” their knowledge. Those who were teachers saw a further value to reflection in that it enabled them to see their students’ thinking. Samorn, a retired teacher of 3rd graders explained that when she changed to constructionism, her students can “express into words so I know that they can think!” (p. 3). Reflection allowed students to externalize their thoughts so that they could be shared and seen by others.

Many of the characteristics shared here should be familiar to constructionist audiences, though some may be a surprise. It is not a far stretch to shift from a project focus (in the classical sense used in the West of personally-meaningful endeavors) to a problem focus (i.e., community problems in the real world,) especially since the types of problems solved in the Thai community often involve projects to fix them (e.g., water management projects, industrial design machines, agricultural plans). Further, in terms of an emphasis on process, the ideas that Thai leaders shared here are not far from processes such as “design thinking” that involve idea-generation, creation, testing, and evaluation common to many implementations of constructionism. Although reflection is far from a universal characteristic of constructionist literature, it has had an explicit part of some early constructionist work, such as the design notebooks that children in Harel’s software and game design environments used to keep track

of changes they made in their projects every day (Harel & Papert, 1990). In terms of community, Papert himself suggested some “social criteria” for the learning environments he promoted, drawing on the very social Samba School to compare it to the traditional “lonely, impersonal” mathematics environments. Managing emotions and using meditation may seem the most unusual characteristics of constructionism to western mindsets, but if we note that this is to facilitate focus and concentration in problem solving and to be more open to criticism on one’s work, then it may be something we can learn from.

Contested/Conflicting Roles of Digital Technology

While digital technology has played a key role in many, if not most, reports of constructionism in the west, it has a contested role in constructionism in Thailand. On the one hand, nearly all participants were first introduced to constructionism through a technology-centric, weeklong workshop on Microworlds, Gogo Boards, or photojournalism. This workshop structure was inherited from the initial work by Papert and Cavallo when they introduced constructionism in Thailand (see Cavallo, 2000). Since then local leaders started to create their own version of a trio of weeklong Microworlds, photojournalism, and Gogo Board workshops. The emphasis in these workshops was creating a situation where attendees could “learn how to learn” in a way they were unused to. These tech-driven workshops allowed participants to learn teamwork, meditation, reflection, the constructionist process. As the director of a technical school explained, “Tools are the first step—used to encourage learners so they can understand and see the process of learning” (p. 1). Then learners could figure out how to apply constructionism in their own locales. This training was common for people in all contexts - industry, villages, and education.

A few people continued to view technology as core to their implementation of constructionism and sometimes as essential to constructionism more broadly. One teacher who first experienced a Microworlds workshop 18 years ago immediately implemented it in her grade 6 classroom and continued to use technology as her primary way to share constructionism with her students, shifting to Scratch and Crickets (an early platform for robotics) as she learned of newer, more contemporary tools that worked with the computing systems available. A former teacher and now school leader, Nisa, prioritized introducing various digital technology in the school where she has worked for many years: starting with Microworlds and then shifting to Scratch, Gogo boards, and now FabLabs as ways to engage children. She spoke of a desire to emphasize the computational side of constructionism more in Thailand and her school. Another participant, Anurak, is a computer engineer and focuses most of his constructionist work on “building things to build other things with,” designing new technologies that are affordable for everyday Thai people to design and think with. However, outside of a few members like these, most participants did not necessarily focus on digital technology in how they put constructionism to practice.

Some participants, especially those in areas of industry and rural outreach, expressed concern that “digital technology is not essential for doing constructionism” (Worawech, p. 10) and that it could actually be a “block” to people in industry and rural areas if they became too focused on a particular technology (Boonkong, p. 7). After all, most people in workplaces do not use Microworlds or Gogo boards as professional tools. These participants hinted at a misunderstanding by workshop participants that constructionism was only relevant in the context of digital tools. Boonkong, an engineer at a technical firm sought deeper understanding of the key elements and outcomes of the now-traditional introductory constructionism workshops: “[W]hen we know those key elements, there’s no need of Microworlds, photojournalism, or Gogo Boards anymore. We can all create our own tools,” (p. 8). Similarly, one of the primary leaders of the introductory workshops thought that the community should not be stuck on particular technologies. Instead it might be better to shift to broader “project-based or work-place learning” (Boonmee, p. 5) so that participants could see the potential for using constructionism in their areas of employment or everyday life. The range of opinions and concerns about the role and importance of digital technology in constructionism raises it as an issue in the broader field worldwide. Constructionism was introduced in the context of digital tools, but Papert clearly drew insight from and saw applications in other areas, such as Samba Schools (Papert, 1980) and in sand castles (Papert, 1991). Yet in Thailand there is concern about over-associating constructionist with a particular tool. It raises the question of what *is* the role of digital technology in constructionism, historically and in contemporary times?

Constructionism as a Life-Altering and Lifelong Pursuit

One very striking element that participants spoke of was what they saw as the lifelong, transformative aspect of constructionism. Learning to think and act in a constructionist way involved taking up a new mindset that affected all aspects of life, both present and future. Teachers saw helping students (from elementary to vocational schools) to learn constructionism as valuable not just for particular academic-based thinking skills (e.g., computing) but as something that they would use for a lifetime. “The most important key of constructionism is to develop people with lifelong learning skills,” (Mana, p. 3). Taking on a constructionist mindset meant being able to learn and continue to improve for one’s entire life, regardless of problems one might need to face. Teachers reported that students came back years after their education was over to say how much they had learned from the experiences in the constructionist-based classes. That they had the ability to make decisions, to learn how to learn, to take an active approach to their own learning. Participants regarded training people in a constructionist manner as something that would enable them to improve their lives and contribute to their communities.

Participants saw a changed constructionist mindset and thus a trajectory of lifelong learning as key to transforming their local communities, workplaces, Thailand, and even the world and society as a whole. This is nowhere more evident than in the ways that people took constructionism from the contexts in which they first used it and applied it to broader areas, often in their volunteer time or in their retirement. Having received so much themselves from particular mentors over the years, many expressed the desire to give back, to help people have “a happy learning experience and hope they can do more for our nation in the future” (Pinit, p. 4). A transformed mindset ready to tackle problems through a thoughtful, iterative and reflective process within a shared community was important for the individual, community, society, Thailand, and the world.

At the same time participants spoke clearly about how difficult it was to help people develop such a changed mindset. “Constructionism is like growing a tree. It takes time,” (Mana, p. 4). Working for over a decade with students in a vocational school program, Mana explained that it took six months to two years for students to understand and adopt constructionism as a mindset with changed habits, and even then 10% of the students still did not change. It often took longer for some teachers at the school, but when they saw the evidence in the form of how students thought and acted (especially through a trial program where some students were taught in a constructionist program and others were not), they were willing to shift. Complicating this was that often results of constructionist projects were slow, especially if they dealt with challenging problems in a community. Anurak said that some projects in elementary schools he worked with took 1-3 years to finish. Pana Pong, familiar with nearly 18 years of educational, agricultural and financial changes in his village, spoke of a 4-5-year timespan to see the results of constructionism. Yet everyone thought the investment worthwhile. Constructionism took a “lifetime” of learning but was a “process that can pass on to different generations, young or elders or even kids” (Pana Pong, p. 4). In the Thailand constructionist community, this was about transforming their society over the course of individual lives and across generations within society.

Conclusion and Discussion

Papert taught the philosophy of constructionism in a way that prioritized people learning it in a constructionist manner themselves, through stories and personal experiences. One could argue that the Thailand constructionist community’s 20-year process of learning and growth well illustrates the affordances of this approach as they built their movement largely in isolation from the broader worldwide community. In doing so they extended constructionism to a number of settings that are not often considered in the literature of the broader constructionism community, namely businesses, non-formal education, and rural villages. The values and practices that they ascribe to constructionism show both cultural integration and transformation. They brought culturally relevant practices validating process, emotions, and community to their implementations in ways that, at least for them, transform how they think, live, and relate. The way they conceptualize constructionism also raises a number of important questions for us to consider as we explore what this means for the broader constructionist community.

One question this study raises is what the *starting point* for constructionism can be. There are many examples in constructionist literature of the starting point for an educational intervention being a

particular digital technology (or a set of technologies, i.e., in a makerspace), albeit one with openness for learners to design something of personal relevance to them. However, in Thailand the starting point is more often a problem of relevance to a local community, which might lead people to a range of different solutions which may or may not involve particular tools.

A related question is what the role of technology should be in constructionism. Despite Papert's insistence that constructionism can involve making sand castles or cosmological theories, using technology to do things that can't be done (at all or as effectively) with paper and pencil is one of the central foci of western constructionism (for a discussion see Kafai, 2006). One of the motivators for this may be a prioritization to introduce computational literacy, but it may be helpful to tease apart the more domain-centric drive to support computation and more broadly applicable philosophy of constructionism. Perhaps it is time to revisit epistemological considerations (e.g., syntonicity, epistemological pluralism, powerful ideas) or pedagogical strategies (e.g., audience collaboration, reflection) that have received far less attention in constructionist literature.

Constructionists have always had a strong identification with the work of Paulo Freire and other scholars in critical pedagogy, due to their agreement on issues of student-centeredness, real life relevance, and student empowerment. However, Freirean scholars had a much stronger stance on issues of power within the classroom ("dialogical education") and on the broader role of education in society (e.g., education as a way towards personal "emancipation"). In many school systems and countries we might anticipate that even though policy makers are enthusiastic about to constructionist principles, they might not have anticipated that, if fully implemented, those principles will upend some of the canons of traditional educational policy: being able to predict, test, and track students, the ability create environments that are predictable and stable, the respect for authority in classrooms or schools, and the lowering of cost. Some interviewees raised some of those questions, and we believe that, if constructionism keeps expanding in Thailand, at some point these larger societal issues will come to the fore of the discussion.

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