Cultivating Constructive Mindset in World Museum, collaboration across cultures and generations

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Abstract

In World Museum, connecting universities/schools in many countries for creative collaboration across cultures and ages to create Scratch (Resnick, et al, 2009) animations. We propose a framework that addresses learning as embedded in a complex system of social relations, based on "constructive mindset", a generalization of "growth mindset" (Dweck 2007), as one's belief that one can construct the social/technological systems in which one is involved. Based on the framework, we analyze several cases of collaboration projects in World Museum. We found that the students' passions (the extent of systems for which one has constructive mindset) expanded from products to relations with people, to meaning of the products, and to learning environments. Based on these results, we identify some design principles for guiding the development of constructive mindset through cross-cultural and cross-generational collaboration.

Keywords

Collaboration; Constructive Mindset; Cross-cultural; Scratch

Constructionism and the need for global visions and passions

It is often when a system breaks down that we can learn much about designing the system. On March 11th, 2011, a huge earthquake and tsunami hit the northeastern coast of Japan, claiming tens of thousands of lives, and leaving hundreds of thousands without home, work, family, or friends. As the tragedy continued, many people who had interests only in things around them seem to have expanded their visions and began to pay attention to what's happening in the affected areas. Many people who had regarded social activities as someone else's business are now expressing their passions to get involved in activities to help the struggling people. Many people have designed creative ways to coordinate the efforts of these people trying to find ways to send necessary resources, like food, energy, and other necessities to the areas in need, or to help people rebuild their homes and jobs.

In the process of these efforts to support ourselves, when we could no longer rely on many of the social and technological systems that seemed to work well in stable situations, we have realized that we have to listen more carefully to each other, watch more carefully what's happening, and, most importantly, trust each other and support each other, more than we used to. We are realizing that the systems that we had relied on were designed so that we did not need to listen

and watch so carefully, and did not need to trust and support each other so often. In other words, these systems have broadened the extent to which we rely on, but at the same time narrowed our visions compared to the extent to which we rely on.

We have also begun to understand the danger of usable and reliable systems, which we have been trying to design since the publication of "User Centered System Design" (Norman & Draper, 1986). Those working at the Fukushima nuclear power plant at the time of the breakdown caused by the tsunami had difficulties in understanding and handling the situations. They had never experienced major failure of the system; the enormously complex system had kept functioning for decades. The users of reliable systems tend to have narrower vision than the designers. As the users of the system, the operators did not need the designers' visions, until the breakdown.

These are just a few examples of many opportunities we have found in post-earthquake Japan, to learn by constructing systems. As Dower (2000) pointed out in his examination of post-war Japan, in the face of unexpected difficulties, there emerges a space in which we can re-think everything in new ways. These experiences illustrate the importance of constructionistic learning in which people learn as builders of systems, not just as users (Papert, 1993). This applies not only to constructing technological and knowledge systems, which were the main focus of Papert, but also to constructing social systems. As Norman (2010) argues, design education must incorporate complex social systems.

As a culture matures and its social systems become stable, it seems inevitable that people will start relying more on the systems than themselves. As Turkle (2011) points out, even today's social media can leave us less connected than before. The question is how we can turn users to builders/designers, not only of artifacts but also of social systems. Do we need such a tragedy to be able to learn creatively? Fortunately, in today's world, meeting people from different cultures or generations might provide us with opportunities to re-think what we have taken for granted.

In this paper, we will describe some projects we have coordinated in which students collaborated across cultural and generational boundaries, and discuss how we could cultivate constructive mind of the students by expanding our visions and passions, without facing a tragedy.

. A theoretical framework: mindset, vision and passion

In order to address the question of how we can cultivate constructive mind, we first propose a theoretical framework to guide our design of the collaborative activities. Dweck (2007) introduced the concept of "Fixed vs. Growth Mindsets". With a fixed mindset, one believes that one's intelligence is fixed and cannot be changed by efforts, whereas with a growth mindset, one sees the intelligence as malleable, something that can be developed by efforts. We would like to generalize the concept of mindset to the systems that we construct or use:

- **Fixed mindset**: one can have a fixed mindset about a (social, economical, or technological) system and believe that the system is fixed and cannot be changed by one's own actions.
- **Constructive mindset**: one can have a constructive (growth) mindset and believe that the system is malleable and can be modified, re-designed, or even created by one's own actions.

This is a generalization of Dweck's theory dealing with intelligence because we can regard intelligence as part of the complex social systems.

We are usually aware of only a fragment of the enormously complex social, economic and technological system that we depend on, and we can usually imagine being able to change only some part of the system. In other words, we have constructive mindset about some part of the system, and fixed mindset about other parts.

Let us introduce two concepts, vision and passion to distinguish those things that we have fixed mindset about and those things that we have design mindset about.

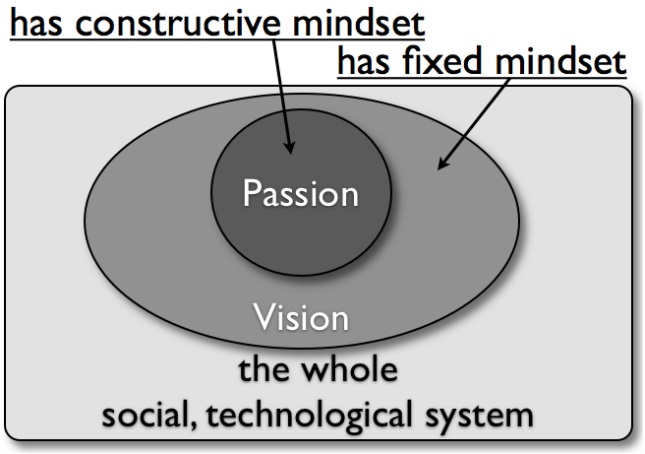

Figure 1. Mindset, Vision and Passion

- **Vision**: Vision means the extent of the system which one is aware of and interested in knowing or understanding, regardless of whether one has a fixed or constructive mindset about it.
- **Passion**: Passion means the extent of the system which one has constructive mindset about. In other words, passion means the things that one is interested in creating or influencing by one's own actions.

J. F. Kennedy's "ask not what your country can do for you - ask what you can do for your country" is an expression trying to expand people's passion, rather than their vision, by encouraging constructive mindsets.

One usually has a wider vision than passion. For example, one might be interested in knowing about the functionality of software that one uses, but might never imagine that s/he can create or modify the software. One may love listening to music but may never imagine one can compose or play music. (Figure 1)

Having vision would seem to be a necessary condition to have passion, because one can be interested in creating things only if one is interested in those things in the first place. ("Think globally, act locally" is an expression to encourage wider passion by having wider vision.) Therefore, we have designed the collaborative activities so that the expansion of students' vision guides expansion of their passion. (Figure 2)

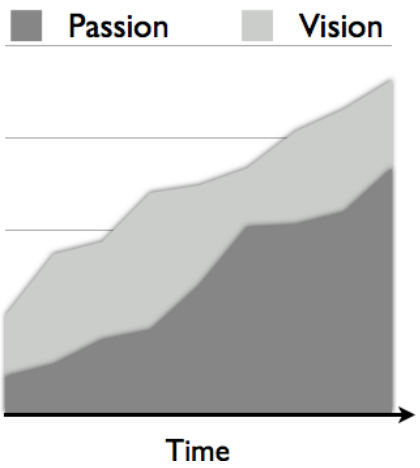

Figure 2 Expansion of Visions guiding Passion

Learning through Collaborative Construction

We have designed and coordinated collaborative acitivities for learning to cultivate constructive mindset and expand passion in students. In several cross-cultural and cross-generational inter-school collaborative projects, in which collaborating with people of different cultures or generations has been useful for broadening students' perspective and creativity in the design process (Miyata et al., 2010, 2009).

We designed activities in which students constructed some artifacts. Constructing an artifact is

embedded in a social process of constructing relations among the people who create, view, use, or work upon it. Furthermore, we designed collaborative activities because collaboratively constructing an artifact is a learning process in which the members try to communicate ideas through the artifact to discover new relations and meanings. We can expect that in collaborating across cultural differences, one can expand one's visions in trying to understand each other, and expand one's passion in trying to develop the ideas together. In this sense, the collaborative designer is not just constructing an artifact, but also constructing the learning of the people involved. In collaborating across generational differences, older or more experienced members can construct a learning environment for younger or less experienced partners. In this sense, the collaborative designer can also be an education designer.

Tools for Collaborative and Constructive Learning

Scratch as the tool for expression: We used Scratch (Resnick et al. 2010) as the tool to express and communicate ideas across cultural and generational boundaries. Scratch (Figure 3) is suited for this purpose because it is:

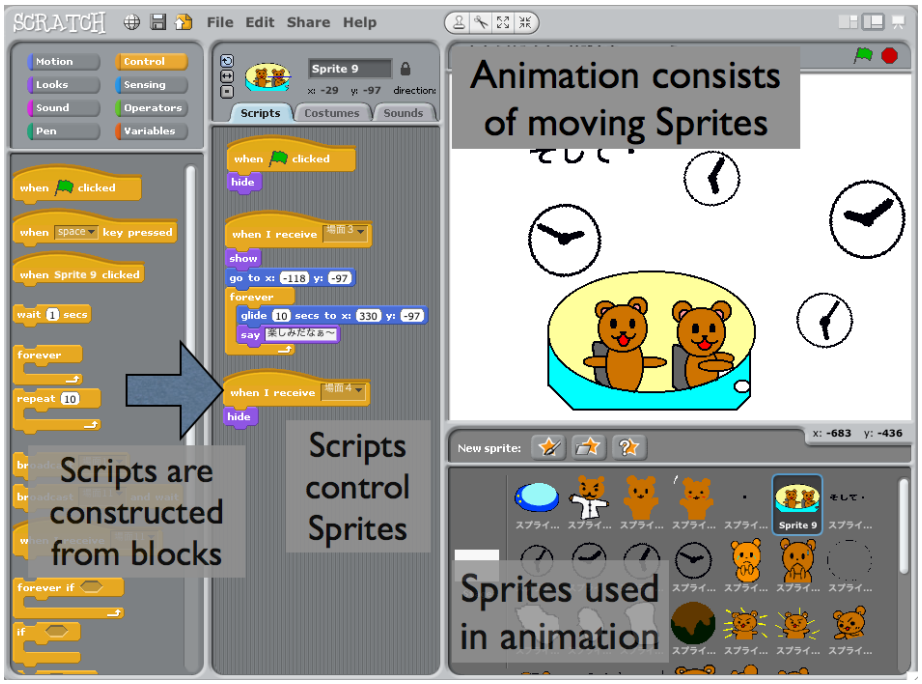

Figure 3 Scratch Interface

- **tangible**: with its block-based interface for programming, which avoids syntax error, Scratch is easy for beginners and children.
- **meaningful**: with its well-designed blocks as well as ability to design visual and sound objects, Scratch allows many different kinds of expression for different interests and backgrounds that the user may have.
- **social**: with its multi-language interface allowing over 50 different languages, and its social network site with hundreds of thousands of users uploading over two millions of projects and communicating as well as collaborating with each other, we can have interaction with multi-cultural audience.

Social network for sharing reflection: In order for students with different cultural and generational backgrounds can collaborate with trust, each member should be able to share ideas and feelings often. For this purpose we used a Social Networking System as well as video chat system (like Skype) and streaming service (like Ustream) to ensure communication among the members as well as the audience from outside.

World Museum Project

The first collaboration using Scratch started when a group of university students collaborated with a group of students in an elementary school in Massachusetts, as a part of Scratch Day in May, 2010. Since then, this small collaboration project has grown to involve students from at least five universities and ten elementary schools in different countries, and other children and adults from local community as well as from different areas. These projects are now collectively called "World Museum Project" to signify its global vision and passion. In the following sections, we will take a closer look at what happened in some of these collaboration projects, in terms of the framework outlined above.

Case study A: Animating Cartoons

In 2010, group of college freshmen and a group of 5th graders collaborated. The 5th graders designed animations about environmental issues expressed as hand-drawn cartoons (Figure 4). The college freshmen turned the cartoons into Scratch animations (Figure 3).

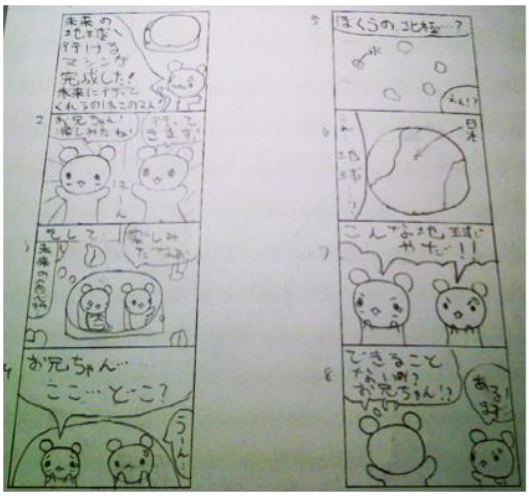

Figure 5 Cartoon describing an animation

Analysis: We compared two groups of freshmen and found that animations based on the children's cartoons were more sophisticated than works by another group who created Scratch projects freely without collaboration. The works of collaboration used 8 times more scripts and 4 times more sprites than the non-collaborative works (Figure 5). Also, they used more blocks in the "control" category used to construct loops and conditional branches. (Figure 6) Clearly, the students who collaborated with the children learned more about programming in Scratch (both in breadth and depth).

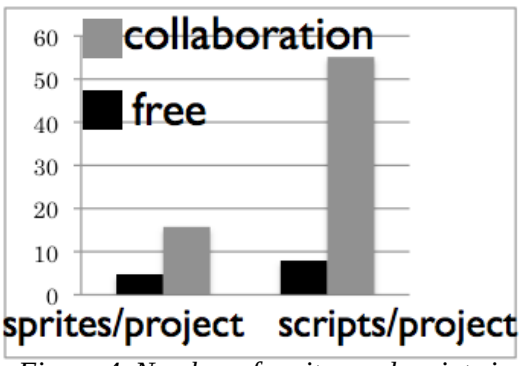

Figure 4. Number of sprites and scripts in collaborative and free projects

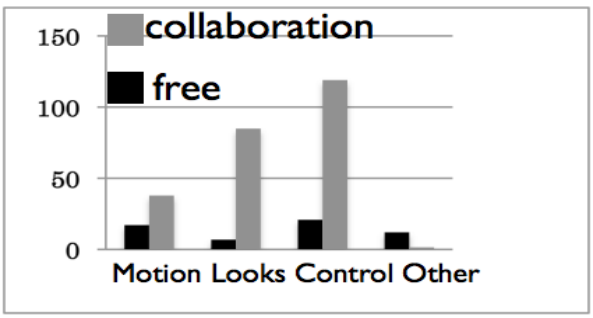

Figure 6. Number of blocks of different types used in collaborative and free projects

An analysis of their comments in the SNS in which they reflected on the experiences indicated that the passion of the college students expanded during the course of collaboration. In the following, we try to characterize their mindsets in terms of the changes in their passions.

Four levels of constructive mindset

The changes in the passions described in Case Study A above can be generalized as going through the following four levels.

- **Product-oriented mindset**: At the beginning, their comments in the SNS were concerned mainly with making the animations themselves. Their mindset was focused on constructing an artifact.
- **People-oriented mindset**: After they communicated online (video/voice chat) with the children and realized their expectations, they started to work very hard to make the children happy, as reflected in their comments in the SNS such as "I will work hard to fulfill their expectations" or "It was fun to create the animation just like they illustrated". Their mindset was focused on constructing relation with the audience through constructing the artifact.
- **Meaning-oriented mindset**: Their comments also mentioned communication with the children about the meaning of the animations that they were working on, such as "I was impressed with the child's thinking", "talking with the children gave me some new ideas". Their mindset was focused on constructing the meaning of the artifact.
- **Learning-oriented mindset**: Interestingly, there were many comments from the children mentioning that they were interested in creating animations themselves. Some of more experienced students responded by trying to design their animation scripts so that the children can understand the process of how the animations worked, in order to inspire the constructive mind in the children. Their constructive mindset was focused on facilitating learning in the design process

In the following sections, we will describe more cases in our collaborative activities and analyze some of the collaboration projects in which the students' constructive mindset developed.

Case study B: Inter-disciplinary Collaboration

Inter-college student teams from four universities collaborated in 2010. The students were from C. University (computer engineering major), S. University (culture and information), T. College (education), and C. Institute (information design). The goal of the project was to create educational materials for primary school students.

Figure 7. Collaborative Scratch Project

The project started in October, 2010, by each university group creating Scratch projects to introduce themselves and their campuses to each other [**People-oriented**]. In November, a number of project themes were proposed from the students, and three inter-college teams were formed each of which worked on a theme. They collaborated through December and finished their projects in January, 2011. The four groups had weekly classes on different days, so the communication was done mostly on an SNS. At the end of each class, each team uploaded their Scratch projects created so far on the Scratch website, which were then embedded in a blog entry explaining what they had done. Members of the other universities read the blog and wrote

comments or questions.

Analysis: In one project, it was difficult during the first two weeks for team members from two universities to understand what each other was trying to do. So they decided to communicate via Skype [**People-oriented**]. They later commented that they reached a mutual agreement about the goal of the project in this Skype session [**Meaning-oriented**].

In many of the projects, it was observed that the students tried to coordinate the team projects so that the specialty areas of different members can contribute effectively to the projects **[Meaning-oriented**], such as a language student who turned a project multi-lingual, or a computer engineering student who added explanations so that the children could learn how to make them [**Learning-oriented**]. As a result, the design students learned to view their role in a wider social context, while the other students learned to view their own areas in the designer's perspective.

Case study C: World Studio Spring

During the year of 2011, we had two series of workshops in which children from different geographical areas collaborated. During the first series of four sessions "World Studio 2011 Spring", held in June and July, we had children mainly from the local community of Toyota.

Analysis: After the first session had ended, a family who participated from Osaka (150km away from Toyota) started to organize their own weekly workshops in Osaka. [**Learning-oriented**]:

Case study D: World Studio Autumn

For the second series of four sessions, held in October and November, we designed the activity so that each participant could first work on a separate piece of work, but all the pieces were then integrated into a larger work of art, in this case an animation with a large screen size (1600 pixels wide compared to 480 pixels of the standard Scratch screen). The group in Toyota and the group in Osaka collaborated with each other communicating through Skype and through uploading their works to the Scratch site. They also communicated with children in Massachusetts by sending photos and uploading their works. The animation was based on a large (8m wide) mural created

Figure 8. US and Japanese children collaboratively animated "Kids Guernica" mural

jointly by children in Nagasaki, Japan, and children in Florida, USA, in the 'Kids Guernica' project (Figure 9). Each participant chose a few of the objects (people, animals, birds, etc.) drawn in the original mural and created an animation by giving movements and/or visual/sound

effects to each object.

Analysis: When all the objects were put back onto the original background, they realized that they needed to negotiate with others about the movements and visual/sound effects that they had designed. For example, many children put sound to their objects but mixing all the sounds together sounded like a chaotic noise, so they started to discuss how to coordinate the different sounds. While they put the sounds that they liked when they designed the animations of single objects [**Product-oriented**], when they tried to mix them, they had to think about the meaning of putting the sounds in the final animation. [**Meaning-oriented**]

Case study E: World Family Studio

After the second session had ended, the parent group in Aichi started organizing regular monthly workshops called "World Family Studio", so that their children could continue the activity. For the December studio, the parents chose animated Christmas tree, which allowed the children to create animated ornaments based on individual interests, and then put all the ornaments onto a tree (Figure 10).

Analysis: Initially, the Japanese and the American children focused on creating their own trees. **[Product-oriented]** When they saw what each other was created, they were excited and started to work hard. **[People-oriented]** Next, they wanted to integrate their works. As they exchanged ideas for how to integrate, they came up with many interesting ideas, such as making a forest, and in the process they mentioned about the similarities and differences in their creations and their meanings. [**Meaning-oriented**]

Figure 9. Christmas Tree by US and Japanese children

Case study F: High School Students and College Students

In July 2003, a group of high school students participated in a workshop organized by a group of college students as a part of an international event called "World Youth Meeting" (Kageto et al., 2003). The high school students and college students kept communicating online using a chat system and a BBS (bulletin board system) after the workshop. After communicating online for four months, which resulted in over 6,000 chat lines, the high school students designed and organized their own workshop in their school in November, so that their schoolmates could have the same experience they had had in the workshop that the college students designed for them.

Analysis: An analysis of the chat lines revealed that college students tried to facilitate communication of the others more often than the high school students, indicating that they had wider passions. It also indicated that the visions (the extent of relationships to which they mention in the chat) of both the high school students and college students expanded during the four months period (Miyata et al., 2009). These results can be interpreted in the new framework that the college students facilitated the passions of the high school students, which , as a result, expanded to facilitation of the learning of their schoolmates **[Learning-oriented]**.

Discussion

In many of these cases, the students seemed to have product-oriented mindset at the beginning, but as they communicated with their partners, their mindset changed to people-oriented, seeing the partners as user/audience of their products. In Animating cartoons (case A), the college freshmen's writings in the blog changed from comments about the products to comments reflecting their wish to fulfill the children's expectations after they talked with the children about their products. In "World Family Studio" (case E), the Japanese children were observed to start working very hard after they saw what the American children created. Their parents and the student staffs agreed afterwards that the children's attitude changed when they became aware that the American children will be looking at their works.

Design Principle (A): Create then Connect

These two cases suggest a design principle "Create then Connect": When two groups of students collaborate, their visions and passions will not be oriented toward (not interested in) collaborating with the partners initially, so they will be more interested in creating something they like. After both groups have created some products with enough passions, they will be interested in what the partners will comment about them (they will have people-oriented mindset), and will be more ready to appreciate what the partners have created. If you connect the passions of two groups by letting them share their works with each other, they are likely to keep interacting because they are now interested in each other. In some cases in which only one group created products, sharing it with another group did not lead to any collaborative activities.

When we succeeded in connecting the passions of multiple groups, they tended to continue their interaction. However, they soon discovered that their passions were not exactly the same. In the case of the Inter-disciplinary Collaboration (case B), the team of students from two universities who felt lost as to what they should be doing, a video chat with Skype helped them to discover a difference in what they were trying to do and led to a mutual agreement of the goal of their project. In this case, the difference in their passions led them to have meaning-oriented mindset (focus on shared meaning) and, as a result, expanded their vision, and then passion. In the other team of students who had to figure out the roles of students from different areas, they could appreciate what they had learned in their respective areas in a broader vision of the project, and, as a result, expanded their passion by contributing.

Design Principle (B): Keep Visions Open

The most exciting moments in these collaborative activities are when the participants acquire learning-oriented mindset, that is when they start to construct learning environments on their own. The high school students designed a workshop for their schoolmates (case F). The parents designed World Family Studio for their children (case C). These cases are important because it means that they have acquired constructive mindsets for social systems, not just inside their classrooms or workshops which someone constructed for them. They now believe that they can construct some part of the world where they belong.

This suggests another design principle "Keep Visions Open". As the designers of the collaborative activities, we should have visions of not just within the activities (classes or workshops) that we design, but also of outside the activities so that the participants can extend their mindset, vision, and passion to the daily lives of themselves, such as the families, schools, and communities that they come from. In our workshops, we encourage the participants to bring in their social contexts into the workshops, and try to facilitate them to connect what they experience in the workshops to their other activities in life.

Summary and Conclusion

We started out by a proposal of a framework of fixed vs. constructive mindsets, generalized from Dweck's mindset concept. Then we described some case studies of collaborative cross-cultural or cross-generational projects designed based on the framework. In analyzing how visions and passions of the participating students expanded in the collaborative activities, we could characterize the students' constructive mindsets as expanding through four levels: (1) product-oriented, focusing on designing artifacts, (2) people-oriented, focusing on the relation with the user/audience of the artifacts, (3) meaning-oriented, focusing on the meaning of the artifacts in the social context, and (4) learning-oriented, focusing on facilitating learning of themselves and others. Finally, we identified two design principles that can be useful in designing the flow of collaborative activities. (A) Create then Conenct, and (B) Keep Visions Open.

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