Co-creation Process of Collaborative Work with Communication Robot

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Abstract. This paper reports on fieldwork concerning co-creation among primary school students. The students brainstormed ideas and made a play using a robot as a prop. We observed their group decisionmaking process in creating their performance, and concluded that setting up a environment with some “order” is necessary, but freedom must also be preserved for organic decisionmaking. Our results showed that the Japanese children are 1) collaborative decisionmakers (deciding not by majority or by a single leader), 2) avoid conflicts by relying on everyday experience to back their arguments, 3) require outside perspective of a facilitator, and 4) can have equal say if props are used.

Keywords: Robot, co-creation, collaboration, design, communication.

1 Introduction

This paper tries to overcome the traditional dichotomy between freedom and rules-finding an “order” that allows for spontaneous co-creation. By “rules” we refer to rigid laws, whereas “order” is a concept that is more about setting up boxes within which organic decisionmaking is possible. We define co-creation as collaborative work that some people generate ideas and put into practice together.

Often it is thought that the best human decisionmaking must occur through strict rules. Whether in society or politics, rigid rules govern human activity to prevent crime or extreme behavior. However, in our research, we find that children are able to come up with executable, creative ideas with minimum structure or rules.

Our fieldwork examines methods of co-creation among children during a workshop where the children create plays. It is difficult to understand the extent of freedom and order required for children to engage in a collaborative, creative project. We used some order- such as a facilitator, a prop (robot), project phases- and also allowed for freedom- allowing for organic decisionmaking processes, and equal say among children.

2 Research Approach

The workshop was conducted at an elementary school in Tokyo. We organized 2 groups (A, B) of elementary school students, each group consists of about 5 members. The experimental period was about 3 months with 2-hour workshops per months.

We utilized a communication robot called PaPeRo as a prop. The goal of the workshop was to make a short play with them and the robot PaPeRo as actors. The students of our lab Supported each groups as a workshop facilitator. Fieldwork was conducted to assess the activities of students as they gave ideas.

3 The Workshop Process

- (1) The elementary students brainstormed on Post-it notes about the theme of their skit. They drew sketches of the stage design.
- (2) The groups decide their subjects and plots. They write a script.
 - A. Group A decided that PaPeRo is a part-time worker at a convenience store. In the play, PaPeRo fends off a burglar.
 - B. Group B decided it would model its skit on “Shoten”, a Japanese comedy TV show in Japan. At Shoten, an MC gives a theme to which show guests must answer with a witty story. If the story is not funny, then the guest loses. In their play, PaPeRo acts as MC and the guest roles are performed by the students. What is interesting twist in this play is that the robot is asking questions to the students.
- (3) The students program and move the robot according to their script step by step. The facilitators taught the students how to program the robot.
- (4) They designed and made the stage using paper and cardboard boxes
- (5) On the last day of the workshop, the students presented their slots with PaPeRo in front of other students at the school assembly.

Fig. 1. Brainstorming

Fig. 2. Developing the scenario

Fig. 3. Programing PaPeRo

Fig. 4. Presenting their slots with PaPeRo

4 Communication Robot PaPeRo

We use PaPeRoch! with the workshop. PaPeRo is the communication robot developed by NEC. PaPeRo is 385mm height, 282mm depth, 251mm width, 6.5kg weight. PaPeRo have a function of voice recognition, voice synthesis, image recognition, touch sensor and can move with its own wheel.

We can control PaPeRo by “PaPeRoch!”. PaPeRoch! is control software for PaPeRo which based on Scratch. Scratch is developed by the Lifelong Kindergarten Group at the MIT Media Lab. PaPeRoch! is easy to use for elementary students. They can programmed by snap block as a part of function on screen easily.

Fig. 5. PaPeRo

Fig. 6. Interface of PaPeRoch!

5 Ingredients of Co-creation: Situational Idea Generation, Common Ground, Outside Perspective and Models

5.1 Situational Idea Generation: No Leader, No Voting, But Organic Spontaneous Decision Making

We found that the children generated their ideas spontaneously through a situational process involving a stacking of ideas. A situational process is where a group exchange ideas as they think of them, and the ideas accumulate into a final decision.

There are no predetermined rules. For example, in the following transcript, we see that their ideas eventually converged. Even a student that originally disagreed ended up agreeing. There is no clear logic, but there is some kind of organic synthesis of ideas. Thesis and antithesis are not articulated, allowing for a smoother process towards a conclusion. The children do not feel that one side “wins”, so the “losers” are more easily convinced. They can “lose” without feeling that they lost.

Example 1

Evidence of this can be seen below. Student D originally disagrees that PaPeRo (the robot) should not be a part-timer character. Later, however, the same student gives a constructive idea about PaPeRo as a part-timer. The student’s opinion is not only reversed, but he is giving a new idea, contributing to the idea he used to object to. In response, Student C encourages Student D, without making any comment about his stance being reversed. Thanks to the follow-up of Student D, Student C feels integrated back into the group. A decision is made without a single leader, without voting, and instead from situational idea creation.

Transcript

Student A: OK! Lets make it a comic skit of PaPeRo!

Student A: Decided!

Student B: Skit, make PaPeRo a part-timer.

Student A: Why do you want him as a part-timer?

Student B, Student C: Sounds good, part-timer!

Student D: Part-timer no! Change!

Student A: Where does PaPeRo work? FamilyMart?

Student C: No, Seven-Eleven is better!

Student A: PaPeRo is eating fried chicken in the shop. PaPeRo gets fired after stealing food.

Student C: So in the skit, PaPeRo becomes a part-timer. Next, we must decide the store, LAWSON or FamilyMart.

Student D: Maybe a customer tells PaPeRo “I want a salmon rice ball”, and PaPeRo says “Am I gonna be riceball?”

Student C: Good idea!

Facilitator A: Have you guys decided on the comic skit with PaPeRo?

Student A: OK! OK!

In the situation of fixing content of the play, Student B proposed PaPeRo as a part-timer. Student A and Student D questioned the act of PaPeRo. But they proposed new ideas through their context. Student C declared PaPeRo as a part-timer. Student D opposed the act of a part-timer at first. But he whistle a different tune and proposed “wrapped PaPeRo inside a salmon rice ball” In their discussion nobody only led them, nobody only decide by majority vote, too. They chose their ideas situationally.

Example 2: Stacking ideas

Transcript

Student C: OK, next, let’s decide on which convenience store.

All Students: Seven-Eleven.

Student A: Where should it be? Which branch?

Student C: Seven-Eleven’s Yokohama branch is good.

Facilitator A: You'd better tell Group B that you decided on this theme.

Student F: We don't have say it.

Student A: We could make a cash register from cardboard...

Facilitator B: Did you decide?

Students: We decided.

In their discussion, they generate ideas by stacking ideas on top of one another. From a general idea, details are stacked up based on other people's ideas. Student C said "convenience store", then all of them said "Seven-Eleven," then the branch and location were also stacked on top of that. From the simple idea of just "convenience store", all the details were provided situationally. A rule does not precede the suggestion, but the suggestion itself creates the rule. The children were never told "Decide on a convenience store, then decide location and branch."

5.2 Common Ground: Every-Day Life Experience

Usually, when workshops are conducted, people from different backgrounds are thrown together. However, in our situation, the workshop members knew each other since they go to the same school. We see that the members used this common ground to their advantage. They generate ideas from their shared everyday-life experience. They fixed cast of the play. Their transcript is as follows.

Transcript

Student E: Are you writing the script? (to Student B)

Student B: That story XXX is no good... (inaudible)

Student E: Not that one, First we have to decide if we "bad students" are gonna be in junior high or high school.

Student B: 9th grade.

Student E: The situation is that 9th graders sneak out of their math class...

Student B: OK.

Student E: Wait, put this down too.

Student E: So he's 9th grade and what does he say?

Student B: He complains at 10am that "the steamed dumpling (made in the convenience store) isn't properly cooked."

Student E: Why 10:00 a.m.?

Student B: Because the 9th graders snuck out of their math class...

Student E: It has to be AM?

Student B: It has to be AM. That's why they buy food and go to **Komae**.

They generated the idea of "9th grade students" "snuck out of ath class" and "Komae". No one objects to the idea of Komae because they all are familiar with it. By using a location or ideas they are familiar with, the workshop moves forward smoothly. Ideas generated from their common ground help facilitate a smooth decision making process.

6 Facilitation for Co-creation

The students did not co-create alone. The Facilitators played an important role for co-creation in the workshop. Their outside 3rd person perspective helped the children to reach a conclusion. Whenever the children would get stuck or not know how to

continue, the facilitators would step in. They would only step in, however, when they thought it was necessary. The children were given as much freedom as possible, provided that there was some creative activity occurring. A top-down approach was avoided.

Their parts are given as follows.

6.1 Providing an Additional Perspective

In the following transcript we see that while students initially resisted the suggestion of the facilitator to have PaPeRo (robot) play an instrument, after some additional comments, the children accepted the idea. (Student C) The facilitator helped the students recognize an additional function of the robot, but only gave the suggestion as an option, not as a command. Student C agreed without the Facilitator having to make their decision for them. Given a hint by the facilitator, the children are quick to react. They do not require rigid directions.

Transcript

Facilitator: Can PaPeRo play instrument ?

Student H: PaPeRo has no...(inaudible)... so he might be able to play percussion.

Student C: It can't play percussion instrument because has no hands.

Facilitator: So, if you install sound resources into PaPeRo, then you could make it seem like PaPeRo is playing.

Student H: We can't have PaPeRo have an instrument.

Facilitator: Hmm... yeah but you could...

Student C: Yeah, so you're saying we can have him pretend to play...

6.2 Models: Having Equal Say

Usually, when such workshops are conducted, the students who have the loudest voice or have power in the classroom make the remarks. They often end up making most of the decisions as well.

Fig. 7. Model of the stage

One way the facilitator made the process fairer was by introducing a model of the stage made out of paper and cubes of Styrofoam. The children could then discuss the model of the stage by physically moving the cubes around. The students formed a circle around the model and could focus on the stage layout itself, rather than each other. All students had a more equal opportunity since they could all access the model equally.

Again, the facilitator introduced the model, just the “box” or an element of “order”, without setting rigid rules that may stifle the students’ situational, spontaneous creativity.

7 Conclusion: Designing Environments for Co-creation

In short, the most interesting conclusion from our fieldwork was that there is a delicate balance of freedom and order needed to trigger the right kind of organic, situational decisionmaking process among elementary students.

For co-creation, it is necessary to design co-creative environments that allow for such discussion among the children. Resources for the environment include people, such as the facilitator, as well as props, such as the robot or models. The situation should have some kind of “order” and also should have a facilitator who encourages expansion of the discussion into actual ideas and their applications. Models also help to equalize opportunities for expressing opinions. Setting some kind of goal is important, but should not overbearing. People and props work together to spark motivation for creation.

Additionally, although it is strictly speaking beyond the scope of this research, an interesting observation was that the children treated the “robot” prop not as something strange or foreign, but gave the robot conventional roles, just like humans. Perhaps this suggests some kind of cultural characteristic among Japanese children where they can embed a “foreign” object into daily life situations without feeling it is an alien object. Judging from the ways robots are treated in films in the U.S., for instance, robots are more often considered “foreign” or “unusual”. Contrastingly, the Japanese children had no problem giving the robot “human” roles like “part time convenient store worker”.

Perhaps the reason the children treat the robot in this way is similar to the reason the children do not divide themselves into clear positions of “for” and “against”. The group can include children with different opinions, or even a “robot”, into their spontaneous, organic creation. It may be because of the mode of communication which does not clearly set a thesis and antithesis. This finding may be applicable in other situations where situational creation is desired.

Acknowledgments. We deeply appreciate NEC C & C Innovation Research Laboratories as co-researchers and Christopher Gibson as my collaborator.

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