

Online Collaborative Designing with Kids

by

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Abstract

Collaborative designing with kids is an evolving field and will only continue to grow. Exploring online approaches to collaborative designing has the potential to make this opportunity available to a broader demographic group of children. Therefore, this study explores an online approach to collaborative designing with kids, using an established framework and tools that will be easy for kids to use and navigate. With help from the Enoch Pratt Library of Baltimore, we were able to reach families on a big scale to recruit participants for defined dates and time for the design sessions. Then, we had access to a conferencing application tool, a drawing application tool, and question sets to collect qualitative and quantitative data from the sessions. The results support the idea that successful collaborative designing can be done online, but the research also identified considerations that should be noted about the age group.

Acknowledgments

Thank you to Everyone! And yes, I really do mean it!

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Chapter 1: Introduction

The field of participatory design is constantly evolving, driven by the urgency of designing technology with the technology's targeted user base. This urgency is especially strong when it comes to the population of children.

At the time when this study was performed, there was a global pandemic declared, and the internet and its tools were heavily used by everyone, in every country, to do things that might have been an in-person experience. There was a need to help define what the new normal of what Person to Person interaction could look like, online. This was important for children because they very much depended on the internet for school. At the same time, for everyone to be safe, we all had to be 6 feet apart so there were not a lot of in-person options. Fortunately, Aragon states the richness of face-to-face interactions is not always a requirement for communication and collaboration (2009) and this is true. There is a huge market for designing with children so to make it feasible as well as more inclusive we must find ways to do it, remotely.

The purpose of this study is to further the knowledge of designing with children by using the Kidsteam framework through online collaboration. Conducting sessions online makes it possible to include participants from an array of places, life experiences and ages. Also, there was a chance of exploring what it meant for children to co-design as an online partner with others and being able to expand on one another's designs if they chose too. The kids were interviewed to understand their personal insights about the experience. The results of this study will:

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- Add insight into the field of remote collaboration for kids between the ages of 7 - 11 years old
- Deepen understanding of dynamics between kids and kids and adults (this includes parents)
- Identify collaboration tools that should be considered and are needed
- Explore what understanding kids and their parents have about the purpose of the session.

To complete this purpose, there were sessions that happens in real time that will include a way for the participants to verbally communicate and design together with the use of a virtual whiteboard. Typically, the parents are not present when sessions occurred, but this was not enforced in the sessions.

There are several unknowns that could impact how well the sessions go. These include the number of participants, their age range and how comfortable they would be with interacting with potential strangers. Another unknown would be if the COVID-19 pandemic will be influential in the ideas and discussion that occurs.

Chapter Two: Literature Review

There has been a fair amount of research done around collaborative designing with specific audiences and its importance. What is missing in research is being able to conduct design sessions in an online environment and how effective it could be with children. The existing literature of Participatory Design, Cooperative Design, Cooperative Inquiry, Collaborative Inquiry and Online Collaboration is discussed in this chapter.

Participatory Design

Participatory design is an evolving field. Participatory design is the direct involvement of people in the co-design of tools, products, environments, businesses, and social institutions (Robertson & Simonsen 2012). Participatory design emerged about 25 years ago as a distinct set of design and research practices rooted in a Scandinavian approach to systems design, which emphasized designers and users actively working together in a process aimed at improving the quality of working life (Halskov & Hansen 2014). It is a type of designing that allows for a collaborative effort where the design process is spread among diverse participating stakeholders with diverse competences (Bjogvinsson 2012). It is a design method that started from the standpoint that those affected by a design should have a say in the design process (Bjogvinsson 2012). Participatory design has been recognized as an effective way to allow many different voices to be heard and considered. Participatory design involves different non-designers in various co-design activities throughout the design process. (Sanders 2008)

Participatory design practices question major assumptions about technologies in workplaces, communities, homes and social institutions (Mueller et al., 1993) and. Muller at al., (1993) offers figure 1 to help describe the different aspects of Participatory design that may be useful while demonstrating who participates in it and its place in the development cycle:

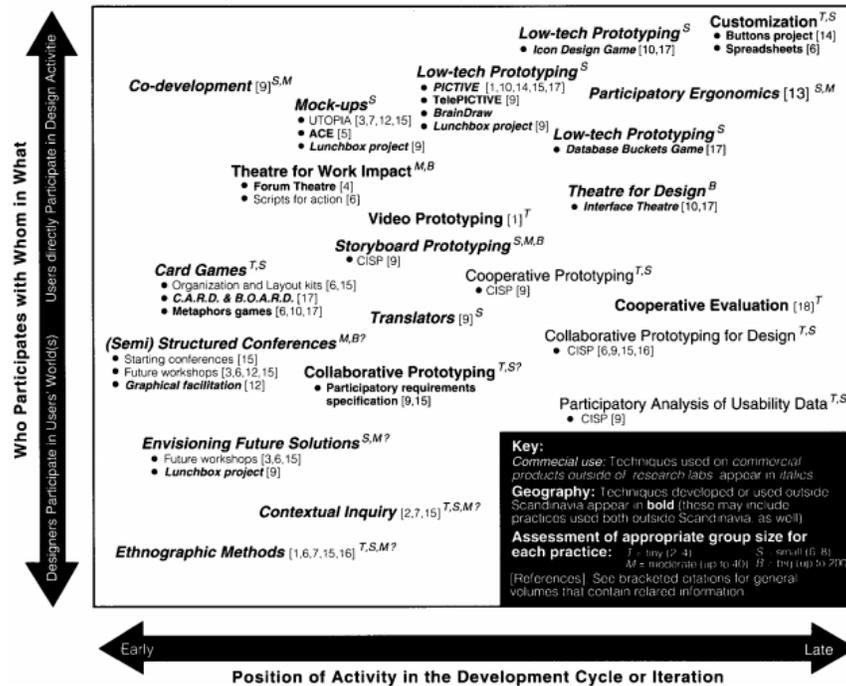


Figure 1. Participatory Design Development Cycle (Mueller et al., 1993)

(Frauenberger 2014). The democratic principle underpinning participatory design is demonstrated through the involvement of different users during design discussions and through their potential equal contribution to the design outcomes (Luck 2003).

User participation is central to the development of understandings and practices that are defining current trends in design thinking and user-driven innovation (Robertson & Simonsen 2012). Participatory design projects are always driven by ongoing and systematic reflection on how to involve users as full partners in design and on how this involvement can unfold throughout the design process (Robertson & Simonsen 2012).

Below is a great example from Sanders et al of Human Centered research/design's and its relation to Participatory Design's current state and help bring visibility to it.

Figure 2. Human Centered Research/Design

Co-Design (Cooperative Design)

Because participatory design has evolved over time, the vocabulary and set of practices used to define it have also evolved. One of these subtopics is co-design, also called cooperative design. Co-design can be defined as a collective creativity as it is applied across the whole span of a design process (Sanders & Stappers 2008). Sanders & Stappers 2008 indicates that co-design is often coupled with co-creation which is defined as any act of collective creativity, i.e. creativity that is shared by two or more people. For the purpose of this study, co-design is more applicable. In co-design, diverse experts come together, such as researchers, designers or developers, and (potential) customers and users—who are also experts, that is, “experts of their experiences” —to cooperate

creatively (Steen et al., 2011). Many diverse benefits are associated with co-design: from improving processes of idea generation and service or product development, to improving decision-making and promoting cooperation and creativity, to improving users' and customers' satisfaction and loyalty over the long-term (Steen 2013).

Only in the last 15 years have children become more involved and accepted into the co-design process, where they can offer their ideas through group discussions, sketching new ideas, or walking through various scenarios (Xie 2010). Children, along with older adults, are typically 'relevant but absent' social groups in the design and development of new technologies in the sense that, even though technology plays a role in their everyday lives, they are rarely asked to play a central role in the development process (Xie et. al, 2010). Because of this, children must be convinced that co-design is not just an exercise for a school grade but rather an activity that can have real and lasting impact (Xie et. al, 2010). Co-Design helps build a framework for design researchers to follow when eliciting feedback from children or when working with them as full partners and stakeholders (Walsh & Foss 2015). Traditionally, co-design sessions have been co-located, meaning all the team members are physically in the same place at the same time (Walsh & Foss 2015). However, this study focuses on what these sessions might look like when sessions are held online instead.

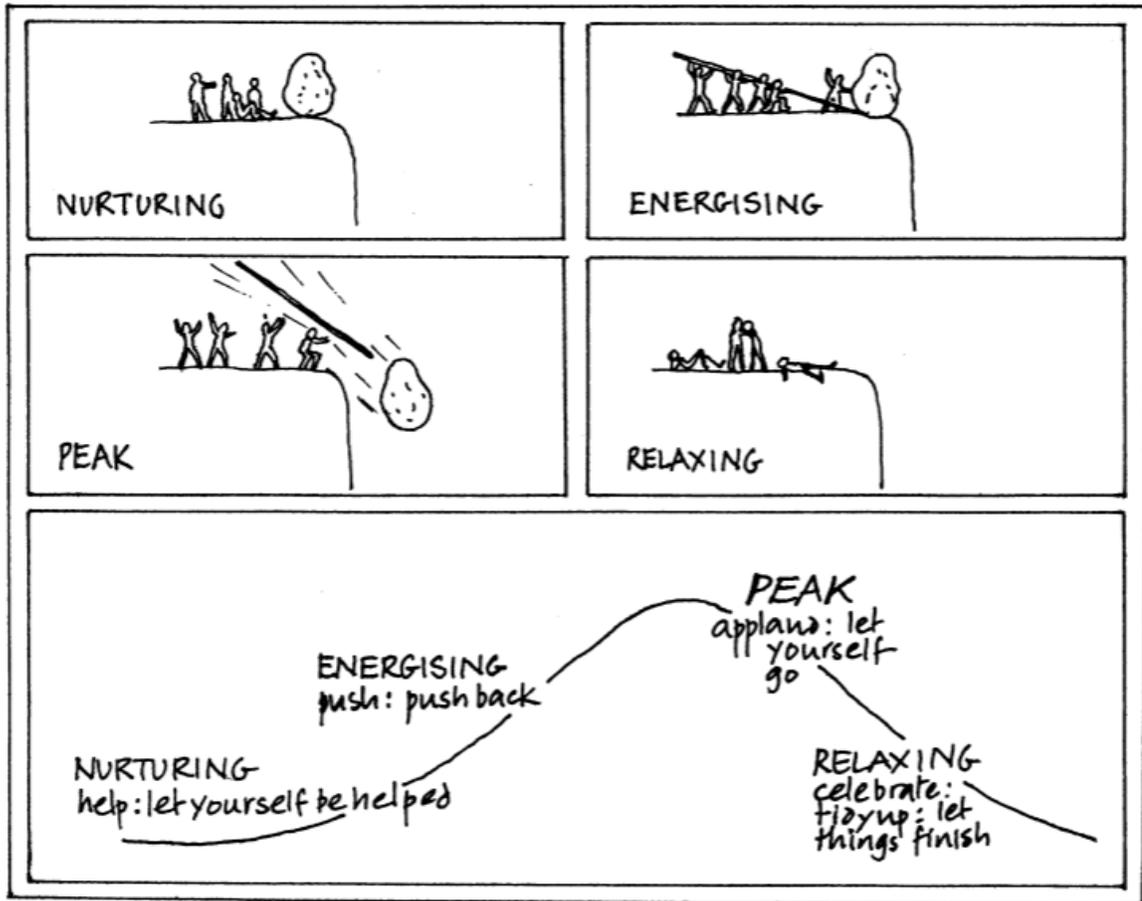
Cooperative Inquiry

Cooperative inquiry involves two or more people researching a topic through their own experience of it, using a series of cycles in which they move between this personal experience and the activity of reflecting on it together (Heron 1996). Each person is co-

subject in the experience phases and co-researcher in the reflection phases (Heron 1996).

The methodology of cooperative inquiry draws on a fourfold extended epistemology: experiential knowing is through direct face-to-face encounter with a person, place or thing - it is knowing through empathy and resonance, the kind of in-depth knowing which is almost impossible to put into words; presentational knowing grows out of experiential knowing, and provides the first form of expression through story, drawing, sculpture, movement and dance, drawing on aesthetic imagery; propositional knowing draws on concepts and ideas; and practical knowing consummates the other forms of knowing in the form of action in the world (Heron & Reason 2008).

When utilizing the cooperative inquiry methodology, the design group goes through a cycle of stages called a creative group. The following figure (Heron & Reason 2008) describes a creative group as a cycle of nurturing, energizing, a peak of accomplishment, followed by relaxing:



Cooperative inquiry can be used with any group of persons. For this study, the methodology will be used for sessions that have both adults and children.

Cooperative inquiry is a method of involving children in an intergenerational team throughout the design process of technology (Yip. Et. Al 2013). In cooperative inquiry, “design” includes all of the steps necessary to conceive, develop, and produce a technology- essentially all of the work from start to finish in the creation of technology, including brainstorming, coding, building, iterating, and testing (Guha et al. 2012). In most cases of cooperative inquiry, the ages of the children are defined as between 7 -11

years old (GUHA et al. 2012). With children of these ages, it is important to be prepared to modify the design process to meet evolving needs (Guha et al. 2012) and to be able to pivot design sessions when necessary.

For this study, the following features of cooperative inquiry (Heron 1996), will be observed:

- All the subjects are as fully involved as possible, serving as co-researchers in all research decisions - about both content and method – that are made during the reflection phases.
- There is intentional interplay between reflection and making sense on the one hand, and experience and action on the other.
- There is explicit attention through appropriate procedures to the validity of the inquiry and its findings.
- There is a radical epistemology for a wide-ranging inquiry method that can be both informative about and transformative of any aspect of the human condition accessible to a transparent body-mind, that is, one that has an open, unbound awareness.
- There are, as well as validity procedures, a range of special skills suited to such all-purpose experiential inquiry.
- The full range of human sensibilities is available as an instrument of inquiry.

Cooperative inquiry, which is a process that enables adults and children to share their ideas with each other yet minimize differences in age and communication styles

(Druin 2010). Kidsteam, a byproduct of cooperative inquiry, allows for children and

adults to collaboratively and iteratively build low tech prototypes at different points in a design's life cycle in order to elicit requirements and provide new directions for the designs to explore (Walsh 2013). A typical Kidsteam design session consists of four sub-sections: Snack Time, Circle Time, Design Time, and Big Ideas. An explanation of each section, according to Walsh, is as follows:

During Snack Time, children and adults share a small snack and are free to discuss whatever is on their minds. In Circle Time, the design group sits in a circle and answers a Question of the Day that pertains to the topic that the group will work on during that Design Time session. In Design Time, the team uses techniques, creative endeavors that are meant to communicate design ideas and system requirements to the larger group [19]. At the end of the session, the group gets together and discusses the Big Ideas, which become the design requirements for future iterations of the technology designed in that session (2013).

Collaborative Inquiry is a method that focuses on generating transferable knowledge claims from the shared, systematic exploration of one's own experience (Walther et. al, 2017). This is important to understand because it allows for the process of designing to occur with the self in mind. Collaborative inquiry is based on shared engagement and explorations whereby together, inquiries formulate a compelling question that they can answer by examining data from their personal experience (Walther et. al, 2017). This allows for more personalization of the design process and feelings of inclusivity for all potential participants. Cooperative inquiry is synonymous with collaborative inquiry and is used more widely.

Online Collaboration

Collaboration can be defined as the interdependence of the group participants as they share unique ideas and experiences (Hathorn and Ingram 2002). In this study, the goal was for everyone to collaborate as a group. The characteristics of a collaborative group, as defined by Hathorn and Ingram 2002, are:

- A group goal – a group can accomplish it better by working together than individuals can by working alone.
- Equal Participations – all members of the group need to do a similar amount of work
- Interaction – occurs when the topic of discussion is continued in a series of messages
- Interdependence – mutual value members of the group place on the work of others in their group
- Independence from teacher/boss – the group should be able to function independent of instructor or supervisor input
- Synthesis of information – the creation of new insights in the individuals of the group as a result of discussion of the ideas

The research goal of this study was to find out if these kinds of collaborative goals can be achieved while everyone is online.

According to Olson and Olson, the success of remote collaboration is based on four concepts which are

- a common ground (the knowledge that the participants have in common, and they are aware that they have it in common)
- coupling of work (the extent and kind of communication required)
- collaboration readiness
- collaboration technology readiness (2000).

Churchill and Bly (1999) stated that co-presence is operationalized in terms of the communicative cues that enable the establishment of common ground in face-to-face interactions. This drive to recreate face-to-face interactions has yielded a substantial body of work on the role of non-verbal cues in conversation in both virtual worlds and videoconferencing contexts. For example, in the context of video-mediated communication, Whittaker and O’Conaill (1997) offer an analysis of cues for process coordination (turn-taking cues and availability cues) and content coordination (reference, feedback, and interpersonal cues). Typically, such coordination comes from the ability to see another’s gestures, artifacts, emotional stance, and gaze. The challenge for technology is to support the timely transmission of these cues, through audio and video channels (Churchill & Bly 1999). This is an important point that is essential for this study and the reason why a videoconferencing tool will be needed. It will help put a name and face to all participants to and help create a virtual environment to help foster collaboration and comfort.

Chapter 3: Methods

This chapter provides an outline of the methods that was used for this study. The following methods of Participant Recruitment, Participants, Structure of Sessions, Tools used actively and post sessions, allow for discovery for online collaborative designing was possible.

Participant Recruitment

The Enoch Pratt Library of Baltimore promoted the online sessions on their website and their social media platforms. The promotion was geared towards children ages 7 and up and described that they will work together to design solutions. Participants were encouraged to register through the Enoch Pratt website. During the process of registration, a parental consent waiver was presented (as approved by the University of Baltimore Institutional Review Board). Once the registration was completed, a confirmation email was sent and included a Zoom link that was good for both sessions. The sessions were from 4- 5 pm, which is typical after school hours. Originally, there were supposed to be four sessions, but Enoch Pratt decided to limit the number of sessions to two.



Participants

There were 4 participants (3 females, 1 male) for the first session and 5 (4 females, 1 male) for the second session. For the first session, the age range of the participants were between 8 – 11 and for the second session, the age range was between 7 – 10. Three of the participants attended both sessions, one participant participated in the first session only, and two participants participated in the second session only.

Structure of Sessions

	October 14 th Session	October 28 th Session
Time Allotted	1 hour	1 hour
Participants	Kids and Leaders (adults)	Kids and Leaders (Adults)
Snack Time (Kidsteam)	Each participant stated their Name, Age, School that they attend, and an adjective that describes themselves	Each participant stated their Name, Age and their favorite store to go shop with their family
Circle Time (Kidsteam)	How to Make School Safe so kids and teachers don't get sick? (Question of the Day/Session)	How to have people be safe when shopping and for the people who work in the store?

		(Question of the Day/Session)
Design Time (Kidsteam)	DisCo was used by all participants to draw their idea about how to make School Safe	DisCo was used by all participants to draw their idea about how to make Shopping safe
Big Ideas (Kidsteam)	Sharing of Ideas from each participant and discussion of the iterative process	Sharing of Ideas from each participant and discussion of the iterative process

Table 1. Structure of Sessions

Tools Used for the Sessions

The purpose of this study was to examine online design collaboration with kids. A study like this is not new but the sessions took place while the COVID- 19 pandemic was occurring. The Kidsteam framework was used to conduct the sessions. Kidsteam is a framework that allows for children and adults to collaboratively build low-tech prototypes at different points in a design’s lifecycle in order to elicit requirements and provide new directions for the designs to explore (Walsh 2014). Kidsteam helps to achieve the following goals: eliminating traditional power dynamics, nurturing a safe space through social interaction, focusing the conversation, enabling creative expressions, capturing ideas, and facilitating creative discourse by segmenting the larger design session into smaller periods of time (Walsh 2013).

Kidsteam is typically an in-person experience that occurs at a physical location with the participants in person. For the purpose of this study, there was never a time when the participants and leaders could be in the same location, so it had to be virtual but was still able to meet in real time. The sessions were a collaboration with the Enoch Pratt Library of Baltimore. Previous sessions had taken place at one of Enoch Pratt’s library

locations. The participants of those sessions were kids that visited that specific library after school (based on proximity to their school and/or home). The previous sessions were personally advertised to these kids by the librarians. Because of this, there was a chance that the kids who participated would vary from session to session.

Because the session invitation was available online before and during the two sessions in this study, it was also possible for the participants to vary between the two sessions.

The central questions that were used for each session in this study were chosen deliberately due to the state of the world at the time.

The communication tool that was used to allow all participants to meet was Zoom Video Communications. This tool allowed for participants to be synchronously seen and heard, and it allowed for recording of the sessions. This tool is also in widespread use for online school instruction so many kids would be familiar with how to engage with it.

The primary design tool that was used for this study was DisCo [Distributed co-design] which is a computer-based design tool that enables intergenerational co-designers to collaborate online and synchronously or asynchronously while being geographically distributed (Walsh et. All 2012). DisCo allows users to design on the same virtual whiteboard, but each user will have their own distinct drawing color. During each session, a website link was posted in the Chat box feature and each participant was able to create a log in. It was stated that, even after the session, everyone will have access to the same whiteboard if they wanted to add anything. Besides being able to distinguish which participants drew what, the tool allowed for quantitative data about each user and

the time in which they were actively drawing on the whiteboard. DisCo was chosen because it allowed for us to keep track of how much or how little each participant engage in designing. The data that was collected was a downloadable file, and data visualizations of the results were created for each session. Using the datapoints from the file, unique usernames, and a unique URL for each session, DisCo allows for a reconstruction of the drawings, which is a form of version control. This tool does not allow for recording of a session, so recording was provided in Zoom.

Post Sessions Structure

After the second session, interviews were completed with each participant. The parents were contacted via email and asked for a good phone number to contact them and their children in order to interview them. Two sets of questions were asked. One set of questions was geared towards asking about the participants' overall experience of the sessions. The other set of questions was geared towards asking the participants about their co-design partners. Both sets of questions provided qualitative data that was used for further analysis of the sessions.

Chapter 4: Results

For the results section, each stage of the session will be discussed separately.

Within these sessions, the Kidsteam framework was used as a guide for conducting the design activities. Child participants will be referred to as P1, P2, P3, P4, P5, and P6.

Graphs only contain data from child participants.

10/14 Session

Snack Time

The first module in the Kidsteam framework is Snack time. There were 4 kids that participated in this first session. One of the questions that was asked during this time of the session was what school they attended and what grade that they were in. Two of the participants attended Baltimore City public school (P3, P4), one attended a charter (P1) school in Baltimore, and one (P2) is homeschooled. At the time of the study, all participants were experiencing virtual school due to schools being closed. This question was helpful because it helped set the tone of the session and gave everyone a chance to speak. Once everyone answered, the researcher shared the question of the day (QOTD) and that was **“How to make schools safe so kids and teachers don’t get sick?”**.

Circle Time

The second module in the Kidsteam framework is Circle time. When in person, this is time spent sitting in a circle for a group discussion. Because the session was online, the “Circle” time was instead replaced by instructions that ideas about this question should be drawn using the computer, and the logistics of getting all of the

participants connected to DisCo were sorted out. A link for DisCo was put into the chat box on Zoom and everyone was instructed to click on the link and complete the form in order for them to participate in this aspect. P1, P2, P3 were able to follow through with this stage with no help but P4 could not complete it without the assistance of an adult. Once everyone stated they were able to login, they were reminded of the question of the day and asked to illustrate how they could make school safe.

Design Time

The third module of the Kidsteam framework is Design time. This is when all participants are asked to use a tool to draw their ideas. The leader drew a small school.



Greg wrote "How can we make schools so kids and teachers don't get sick?"

Figure 5. School Drawing from Session 1

What was stated for the QOTD:

P3: This is glass, go inside and it protects you from being sick

P2: Only Take 5 kids in on one day and take 5 the next day

P4: A gate to separate the kids

P1: That's cool and what if the other kids are online like a big TV

Librarian: Everyone in a giant bubble.

Once initial answers were given, and after drawing, P2 asked "Would the teachers give homework?" and the leader stated, "easy homework".

What was drawn for the QOTD:

There was a lot of collaboration during this period between the kids and the leader. Before drawing their idea for the question, P2 drew a bigger school. During this first round of answers, there were some who were bouncing ideas from what others had stated, allowing for iteration of the initial designs. An example of this would be when P2 stated that “teachers would wear a double mask” in response to what P1 stated. Another example of this would be when P1 stated that it will be “cool to shrink or everyone can get big” in response to what the leader stated.



Figure 6. Collaborative Designing screenshot 1 from Session 1



Figure 7. Collaborative Designing screenshot 2 from Session 1

Engagement/Distractions during the QOTD:

P4 was not as engaged in the sessions as the other participants. Their video was off for a little while. When their video came back on, it looked as if they were more engaged with the whiteboard but not involved with the QOTD. They were the participant (referencing the picture above) that drew a black circle around the larger school, and the scribble in gold. P3 was engaged during most of the discussion of the QOTD but decided to draw a figure, on the left side of the picture, that was not related to the discussion.

Once P3 completed the figure, they were moving around and playing with the settings on Zoom.

The first iterative question to the QOTD was “What if school was on a boat, under the sea?”

What was said for this question:

When this question was asked, P1 and P2 had additional follow up questions. P1 then stated, “How about school on a field?” P2 asked “How about astronauts’ helmets on while on the field with a graduation hat?”

What was drawn for this question:

The leader, P1 and P2 drew pictures that illustrated their own question. The leader expanded on figures (drawn by P2) that were drawn during the QOTD.



Figure 8. Collaborative Designing screenshot 3 from Session 1

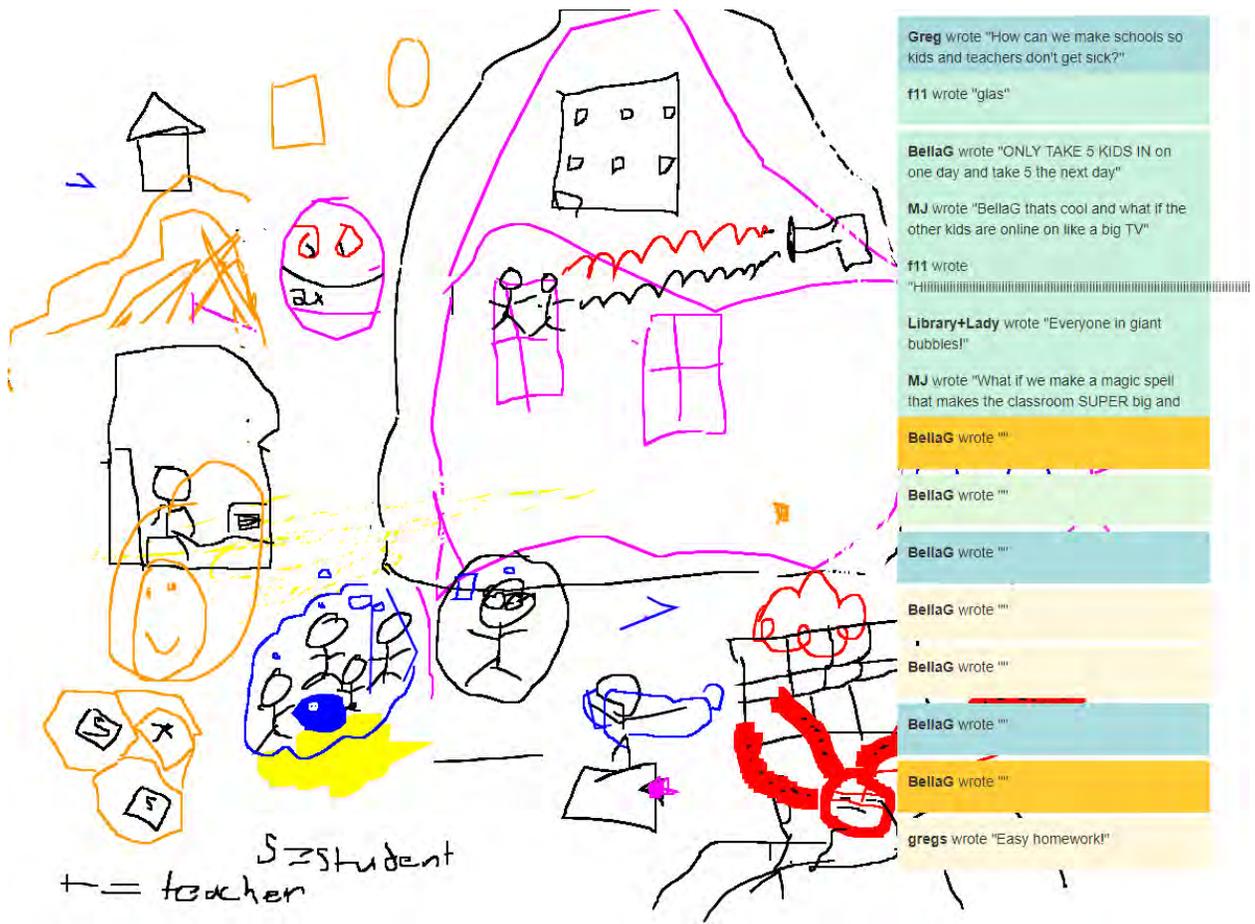


Figure 9. Collaborative Designing screenshot 4 from Session 1

Engagement/Distractions during this question:

P3 and P4 were not actively participating during this portion.

DisCo was the tool that was used to allow for drawing. As a tool, DisCo had some strengths and weaknesses. Two of its strengths were that it allowed everyone to see what each person was drawing on the whiteboard. A second strength from a research standpoint was that it kept data points of how frequently each person made a mark on the canvas and at what times. The following graph shows the sum count of marks by each participant when they interacted with the white board in relation to each other:

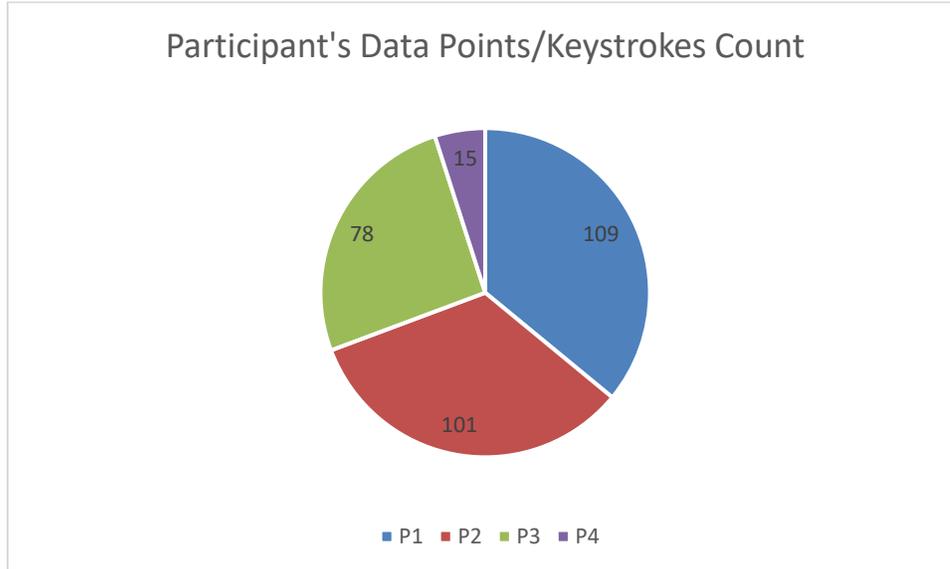


Figure 10. Participant's Data Points/Keystrokes Count from Session 1

For the purpose of this study, the graph only shows the number of marks from the kid participants and not the adults. As can be seen in Figure 10, the number of marks made by P1, P2, and P3 were comparable to each other in number, while P4 data points are drastically lower than the other participants. P4 actually logged out of the session, at some point between 4:37 pm and 4:51 pm. She came back online before 4:51 pm and had the last data point for that day even though the session was officially over. Prior to P4 logging out, the participant's camera showed that P4 was getting up from the computer.

P3 had the second lowest number of data points, and the data shows that their last point was made at 4:32 pm and they were actively drawing during the session prior to this time. However, P3's engagement was not steady throughout the session. At one point this participant walked away from his computer and was doing other things including interrupting P1, who was a sibling and was thus in the same physical location as P3. P3

was the youngest participant. P1 was not distracted by P3's efforts and P1 continued to participate throughout the session.

Towards the end of the session, P2 left the drawing session and re-logged in under a different username. P2 continued to draw once logged back in. Unfortunately, three days after the session, P2 still had the login link from the session and logged back in. At this later time, P2 used the white marker and painted nearly everything on the DisCo board white. It was not clear as to why P2 did this action but it did not appear that it was done out of spite. They were one of the participants that was engaged, one way or another, in both sessions and stated that they wanted to do more sessions.

The other type of data that was captured during the session were the times in which there was participant engagement. The following bar graph shows this:

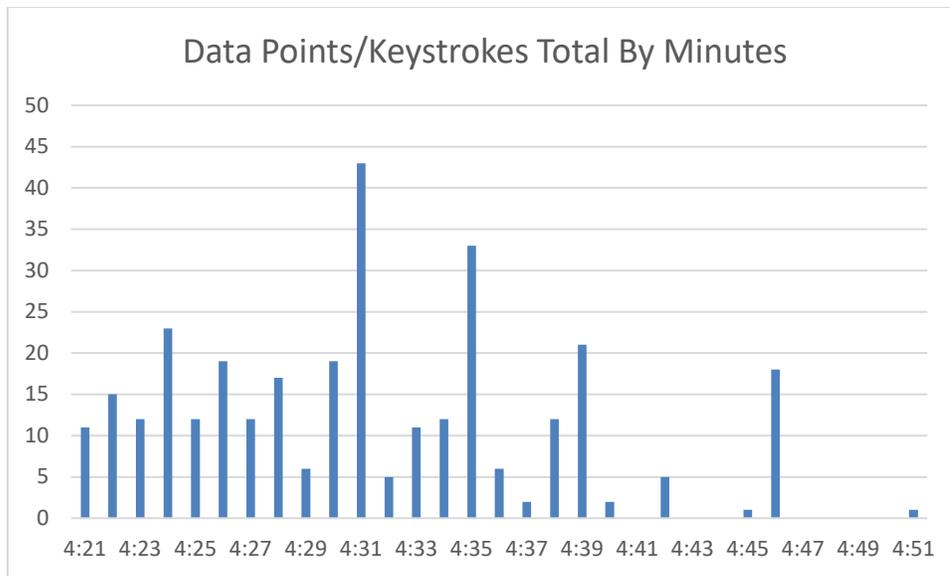


Figure 11. Data Points/Keystrokes Total by Minutes from Session 1

The QOTD was asked shortly before the first data point was made at 4:21 pm. This reflects the time when the first of the participants were able to log into the whiteboard

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and draw their first data point. Each high point in the number of data points is in direct correlation with when an iterative questions of the QOTD (stated above) was asked and time was given for the participants to give a response.

Below is the final white board drawing from the session:

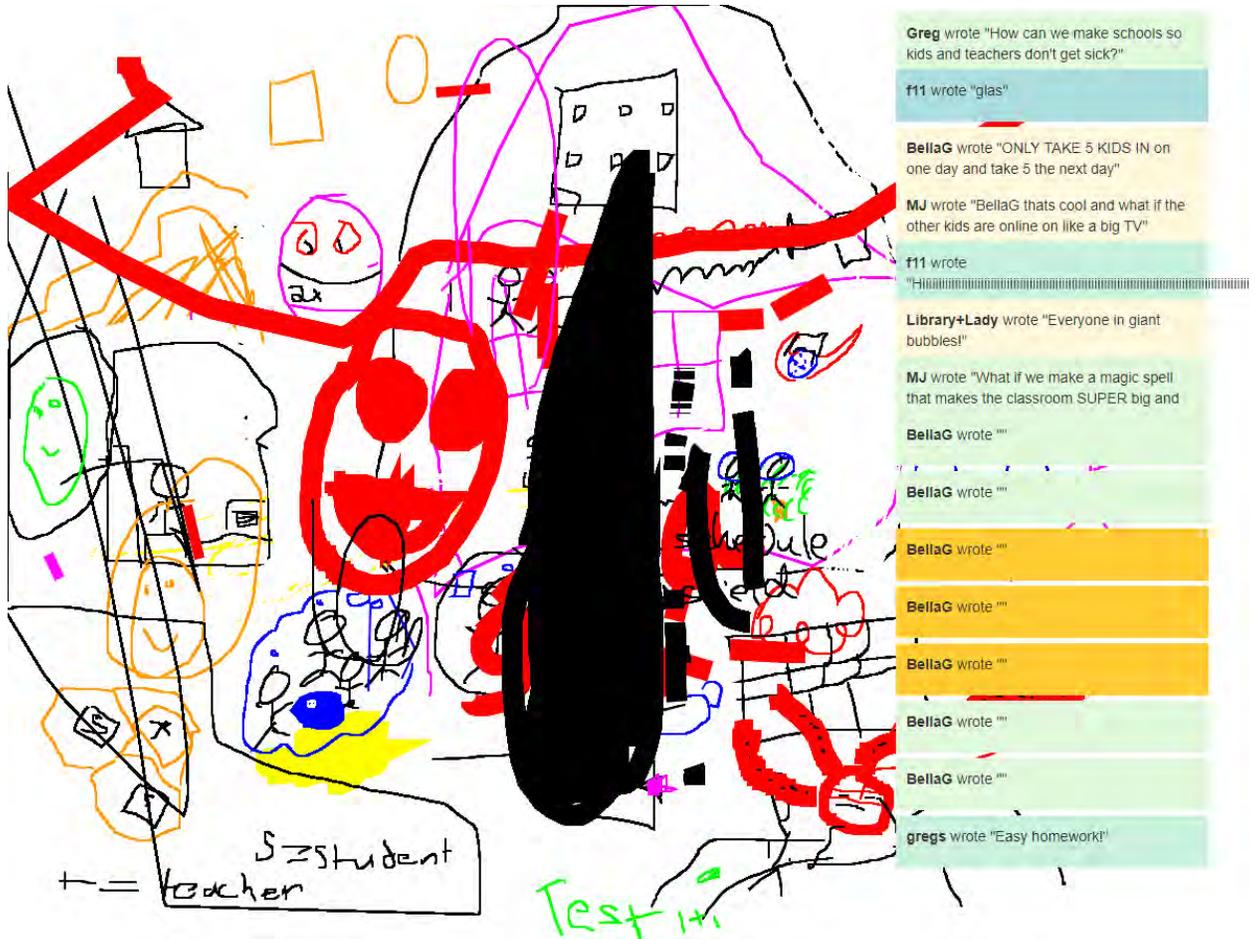


Figure 12. Collaborative Designing screenshot 5 from Session 1

Big Ideas

The last module in the Kidsteam framework is Big Ideas. At about the 4:40 pm mark, the session began to transition away from drawing on the DisCo board and towards a group discussion. The Big Ideas section is meant to identify and solidify the main ideas

that all participants could agree were important. The leader pulled the following ideas from the session (and the kid participants agreed):

- Suits
- Under water/Space Suits
- Field
- Farm
- Rotating schedule for the kids to go to school and shields for the teachers for the kids that were in school.

Towards the end of the session, P1 and P2 drew items that were not related to the topic. It is unclear as to why this was done by them but perhaps they were bored. At that point, there was more talking being done that did not require as much interaction by the participants. These two participants were actively engaged in this session and did most of the talking and drawing. What was drawn covered most of the whiteboard and the earlier illustrations cannot be recognized as clearly.

10/28 Session

Snack Time

For this session there were five kids that participated. In this first “getting to know you” section, each participant was asked to give their name, age and what was their favorite store to go shopping with their family. This question was related to the upcoming QOTD, which was **“How to have people stay safe when shopping and for the people who work in the store?”**.

Circle Time

Again, this section of the session was used for logistics, and to get participants started with DisCo, the tool that was used for drawing. A link was put into the Chat feature and instructions were given for how to log in. There were two new participants this time, P5 and P6. These two participants were sharing a computer and thus were only able to use one username for the session. There was a parent that was in the same room as they were who assisted with the login. The process of making sure every participant was logged in took 5 minutes. P2's parent could be seen to be in the same room as P2 but did not appear that to be assisting the participant. It took some time for P4 to log into the DisCo session, even though it was her second time. Also, this was the start of their video being off and on throughout the entirety of the session. There was encouragement for the participants to think big and crazy and that there are no wrong answers.

Design Time

What was stated for the QOTD:

In this session, participants' initial answers were stated or written in the chat feature:

Librarian: Robots grab groceries

P5/P6: Put a bottle of hand sanitizer at the end of the aisles

P3: Invisible bubbles to put around people

P2: Put glass in each aisle so people are 6 feet away so like a shield

P2 writes "send a drone" but did not draw it. P3 was asked to draw it and they did.

These ideas sparked some discussion. The leader asked two questions about the robot that was stated by librarian, should the robot have a mask on and what should its name be.

P4 (who had not been engaged in the conversation prior) is now engaged and answered that the robot's name should be "Maskito".

What was drawn for QOTD:

The leader drew what the Librarian stated (drawing is below)

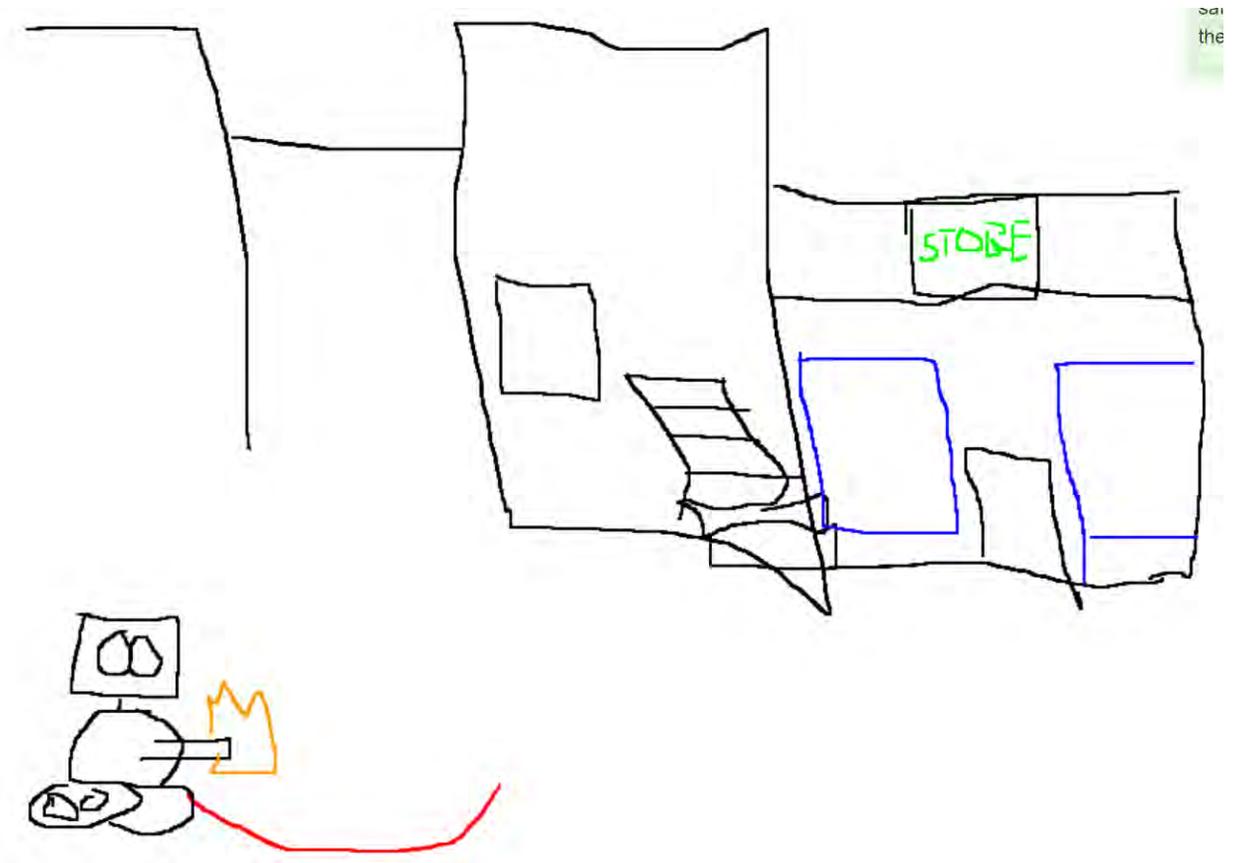


Figure 13. Collaborative Designing screenshot 1 from Session 2

P5/P6 did not draw their answer but did write it in the chat box. P6 stated that they did not want to draw so the leader decided to draw their answer. P5/P6 were the youngest participants in this session. That drawing is below.

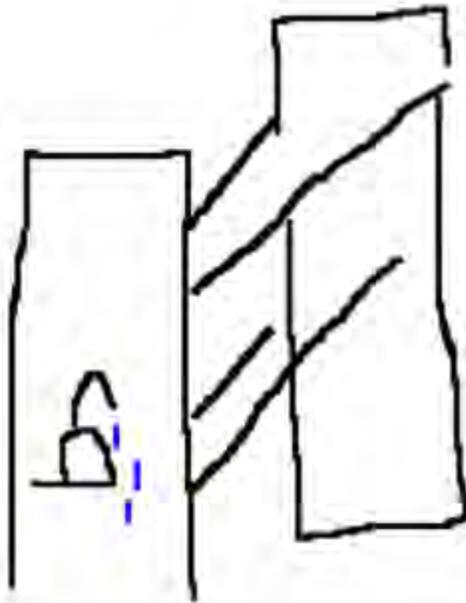


Figure 14. Collaborative Designing screenshot 2 from Session 2

P3 wrote their answer in the chat box as well. The leader drew the person and asked P3 to draw the bubble and they did not. This drawing is below:

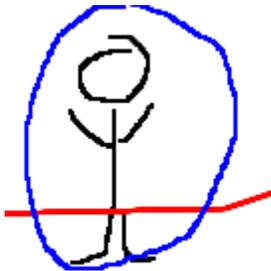


Figure 15. Collaborative Designing screenshot 3 from Session 2

P2 did draw their answer. The leader expands on P2's answer by stating the glass could be plastic instead, and could expand when others get too close.



Figure 16. Collaborative Designing screenshot 4 from Session 2

P2 also wrote “send a drone” in the chat but did not draw it. P3 was asked to draw P2’s drone, and they did, suggesting that P3 became more comfortable with drawing once another participant (other than the leader) had made a drawing. P3’s drawing about P2’s drone idea is below:



Figure 17. Collaborative Designing screenshot 5 from Session 2

Towards the end of the session, the participants circled back to the QOTD.

P2 drew and wrote in the chat “put blue dental plastic cover over the carts”. The leader draws the cart.



Figure 18. Collaborative Designing screenshot 6 from Session 2

It is observed that P5 is drawing on paper, stating that there would be a sign outside [the store] that says ‘Don’t touch anything’ unless you buy it.

P3 left the session and then re-appears on the leader’s screen (P3 and the leader were in the same location). The leader and P3 started talking to each other, suggesting using Transformers and you could tell them to get their groceries. P3 proceeded to draw using the leader’s computer.



Figure 19. Collaborative Designing screenshot 7 from Session 2

Right before transitioning to the last module, P3 retrieved an iPad and showed robots from its screen, stating that the robots can look like these.

Distractions observed during the QOTD:

P4 drew a continuous line on the white board that was not related to any questions that were asked. P4's video was off and then it came back on, showing that they are now in a different area in their house. P4 then wrote a note that says "Hi". This was unexpected.

After giving that answer of Maskito, P4 picks up their pet dog while looking at the camera and twirls in the chair. The leader notices someone drew a blue face with a red thing over it and asks who drew it and no one responded. There were several other drawings on the whiteboard that had nothing to do with the QOTD. One of the drawbacks of the DisCo tool is that here is no way to formally "erase" the board, and no way to "undo" the mistakes. P2 and P4 repeatedly covered parts of the board with "white" in order to make new drawings. Below is a picture of the whiteboard, right before the first follow up question was asked.



Figure 20. Collaborative Designing screenshot 8 from Session 2

The first iterative question of the QOTD was “How to make toys in the toys aisle safe so people won’t get sick”.

What was said for the this question:

P5: A robot that sprays them with something to make them clean; P6: spray them with Clorox

P2: Someone can spray you before you touch the toy

P5/P6 and P2 did not draw their answers. P2 P3 did not state anything, nor did they draw.

P4 could be seen running and chasing after their brother.

What was drawn for this question:

The leader did draw something that was a combination of what P5 and P2 stated. It was an expansion of the robot that was drawn before, Maskito. The drawing is below:



Figure 21. Collaborative Designing screenshot 9 from Session 2

Distractions during this part of the session:

When the first iterative question was asked, P3 did not state or draw anything. It is possible that that they were distracted with other things unrelated to the session. P4 was

seen running and chasing after their sibling so they were not engaging at that time. Also, there was frequent whiting out of the board during the Design Time. Below is a picture of the whiteboard:



Figure 22. Collaborative Designing screenshot 10 from Session 2

The second iterative question was “How to make Farmer’s markets safe”.

What was stated for this question:

P5/P6 stated that everyone would wear masks and gloves. Also, they stated that people can put the money in a jar and when it closes, the farmer gets the money. When P5 and P6 were giving their answers, they were pulling from their past experiences. They did not draw. No one else stated anything.

What was drawn for this question:

The leader drew a cart and a box to illustrate what P5/P6 stated. No one else drew anything.



Figure 23. Collaborative Designing screenshot 11 from Session 2

Distractions during this question:

There were no visible signs of distractions after the second iterative question was asked, but there was more whiting out of the white board by a couple of participants.

The third iterative question was “How would you give money to friends and be safe”.

What was stated for this question:

P6 stated to put the money in a containment (Ziploc bag) for a day and then give it to your friend the next day. P6 stated to put it in a box and handle it with gloves and use hand sanitizer.

What was drawn for this question:

The leader drew the box for P6. None of the other participants drew anything.



Figure 24. Collaborative Designing screenshot 12 from Session 2

Distractions during this question:

There was more whiting out of the whiteboard and miscellaneous drawing by P2.

That drawing is below:



Figure 25. Collaborative Designing screenshot 13 from Session 2

Because DisCo was used for this session as well, the same type of data about frequency and timing of drawing activities was able to be extracted as was seen in the discussion of session 1. The first graph shows the amount of data points each child participant had.

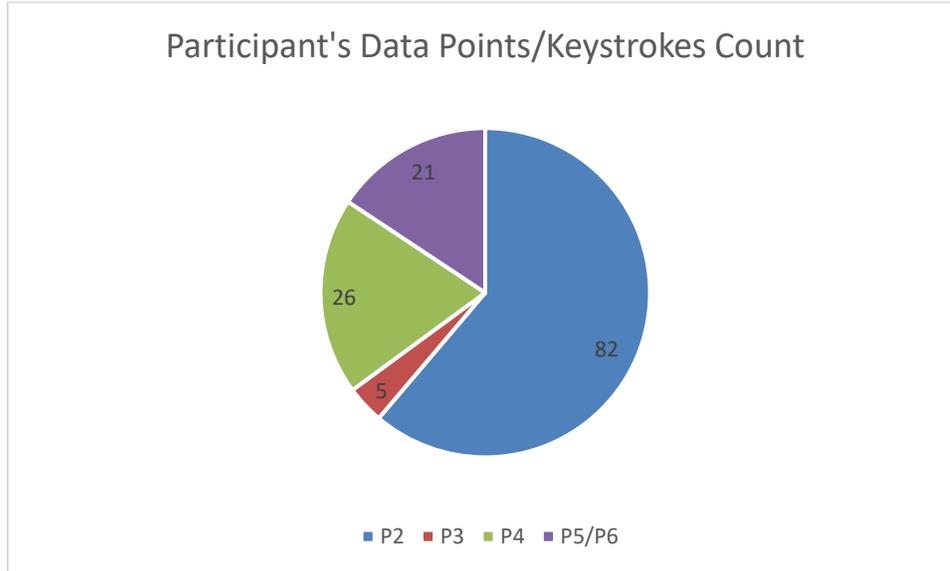


Figure 26. Participant's Data Points/Keystrokes Count from Session 2

For this session, there is a varied range of the counts. P2 had the highest count for this session. They were more actively drawing throughout the session but P2 did less interacting with the group. P4 had the second highest count but it's considerably less than P4. P4 was off and on video throughout the session and was constantly moving around. They were distracted by a family pet and a sibling. P5/6 has the third highest count. Their count was comparable to P4, but they were much more interactive verbally within the session. It did not appear that P5/6 were comfortable with drawing but they were the only participants who provided answers for all questions asked.

P3 had the fewest number of markings on the drawing board. They answered the QOTD but, when singled out during the session, their answer was often "I don't know". P3 did become more engaged once they appeared on the leader's screen which occurred right before the end of Design Time, and P3 did do some drawing from the leader's computer, which would not have been captured in the count shown in Figure 26.

The following graph shows the number of total points by minutes:

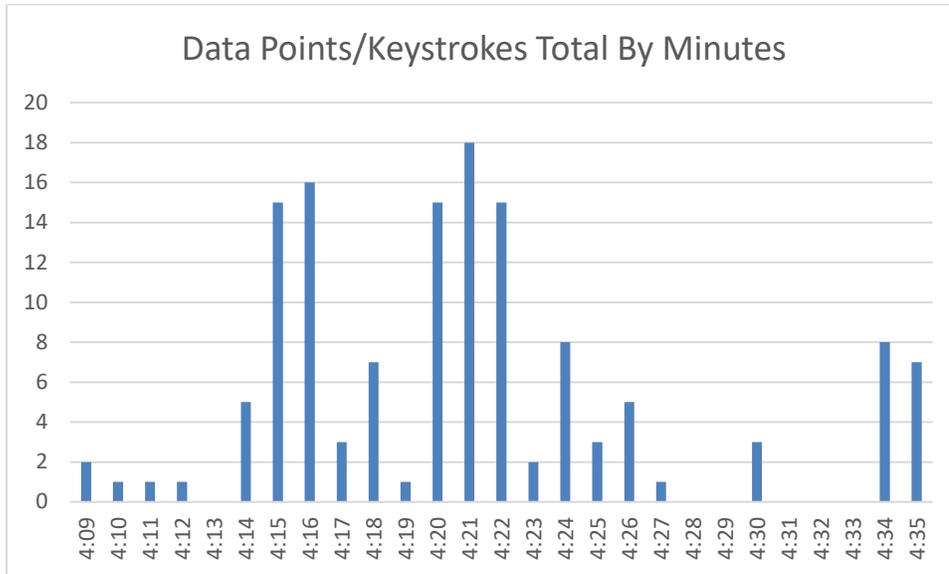


Figure 27. Data Points/Keystrokes Total by Minutes from Session 2

In general, the number of data points was lower than in the previous session. The highest numbers appear direct correlation to when the QOTD and the iterative questions were asked. Drawing points were mainly from P2, but P5/P6 spoke more. It was observed, throughout the session, that the leader was drawing more than the kid participants.

One day after the session, there was someone that was able to login and draw on the whiteboard, but it is unsure what they drew. Also, they left a note on the whiteboard. These points are not indicated on either graph because they did not occur during a session, and it is uncertain who it was.

Below is the final white board drawing from this session:



Figure 28. Collaborative Designing screenshot 14 from Session 2

Big Ideas

The following were the big ideas from the session:

- Robots get us things
- Ask other people to get us things
- Lots of hand sanitizer (end of aisles, spraying on toys)
- Shopping carts with shields (blue plastic or clear glass)
- Signs to not touch
- Space bubble around your head

- Boxes to put money in

In the first session, the leader had to pull out the big ideas. In this session, the participants contributed to the list of big ideas. While listing these ideas, after the second bullet, P5 references an experience with Target that they know of. They state that at Target, you can pick up items and use the app for an employee to bring stuff to your car and put it in your trunk. After the list was completed, the leader asked the participants if they would like to try again [another session] and they all stated yes. P4 motioned, during design time, that they wanted to show the group something. Another leader asks P4 if they would like to show what is in her notebook, they stated yes and proceeded to show an offline drawing of a smiley face.

Interview Questions

After each of the two sessions, the participants were asked two sets of questions. One set of questions was geared towards specific elements of the Kidsteam framework and the other was geared towards overall impressions of the sessions. The Circle Time module questions in the standard Kidsteam framework questions were not answered by anyone because these issues were covered in the Snack Time module questions and because Circle Time was essentially replaced by the logistics required to get all the participants logged into DisCo. The Kidsteam framework does not include any questions about the Big Ideas Time. Two participants (designated P5 and P6) either answered the questions together or only one of them answered. P1 was not asked these questions because they had done Kidsteam sessions in the past. Not everyone provided an answer for each question.

The interviews were not held at the same time as the sessions, and they were not held over Zoom. Instead, the parents were contacted, via email, to get a good contact number to talk to their children. Also, there were some parents that gave their thoughts about the sessions.

Kidsteam Questions:

What has been your favorite feature on Online Kidsteam?

- P2: Really liked the first part of it.... How do we protect teachers and students in Covid 19.; Why? Never thought what it would be like; (maybe the topic was more relatable); A store is not so relatable.
- P3: How creative it is. It was creative. The application that was used. All the ideas were really neat.
- P5/6: Drawing the stuff
- P4: Drawing

What has been your LEAST favorite feature on Online Kidsteam?

- P2: Second session. It was a little bit harder than the first session; The whiteboard was crowded so she couldn't see everything. Everything was so much fun.
- P3: It was short. And there weren't a lot of kids.
- P5/6: [They] were youngest one there
- P4: That it was on Zoom

Have you participated in the Snack Time section?

Each participant answered Yes to this question.

What did you like and not like about the Snack Time section?

- P2: Usually do not like it but liked it in both sessions.
- P3: Enjoyed it. We could share information about themselves
- P5: Enjoyed it. It was neat.
- P6: It was their first time. It was good.
- P4: Got to know everybody

Have you participated in the Circle Time section?

N/A

What did you like and not like about Circle Time?

N/A

Have you been able to draw in the Design Time section yet?

Each participant answered Yes to this question.

What could make Design Time better? Any design ideas?

- P2: Maybe put people in breakout rooms; Maybe have a button to clear the white board and have access to click people so there's drawing one at a time.
- P3: More activities like more drawing or a matching game/a game
- P5: It was okay; The app that was used didn't work all the time; Would have liked it was better.
- P6: I'll make it a little neater; Too much drawing on it
- P4: Everyone had turns and when it's their turn; only that person can draw, one person at a time so nothing gets messy

If you could have any design tools that you wanted in Design Time, what would they be?

- P2: Liked the whiteboard; the login information was pretty simple
- P4: A notebook; they like drawing in a notebook; prefers things on a computer because they have a phone (have been using them for 2 years)
- P3: A tool that allows for you to draw but ends up going away. It is an application.
- P5: A piece of paper, would've shown it to us through the screen
- P6: A notebook can be good so you can see what you did before

Anything else I should know?

- Parent of P4: States that they weren't "Wasn't distracted much"; They didn't understand the name for the robot; Doesn't know why they had so much trouble naming the robot because they like to name everything; all their toys get names

Parents' Overall Impressions

- Parent of P2: Just seeing Digital Whimsy [on the flyer] is not clear at all and most might not click the "More" to read more information. They are always looking for things because she homeschools.
- Parent of P5/P6: Didn't know exactly what they were signing up for; They do a lot of Enoch Pratt library programs so they signed up; their kids were the youngest; they really did like it and would do it again. Adult leader was really friendly, and kids reacted to it.

Overall Sessions Questions:**Please define “online co-design partner” for me.**

- P2: Fun and the mics are not muted and they can talk and they can share ideas; art drawing and would do it again. Usually do not work in groups but enjoyed; Like knowing to get to know people; no answer was a bad answer; everyone was heard.
- P4: It means that they can talk about stuff and doing fun activities
- P3: Asked “what does that mean?” After I explained it, they stated “Good”.
- P5: Someone you will have to work with on Zoom
- P6: Someone you do work with and chat with them in the chat box

What is the best part of being an online co-design partner so far?

- P2: Drawing
- P3: Hanging out with other kids
- P5: Something that was nice and something to do; You can tell other people your ideas
- P6: You can draw and see what everyone else is thinking.

What is the worst part of being an online co-design partner so far?

- P2: Didn't like that it wasn't longer
- P4: They all had good ideas but they made different things and different stuff. It was kind of tough to understand what was going on.

- P5: Nothing; So many things that people said to do/to draw; It wasn't enough space to put anything.
- P6: Once you make a drawing, someone might draw over it or erase it by accident

How did being an online co-design partner make you feel?

- P2: Both sessions were interactive and really liked talking to people about their ideas
- P4: It made you feel happy; that they were a part of it and that it gave them something to do.
- P3: It made them feel good; Made them feel like they weren't alone.
- P5: It was fine; like to see more positive things.
- P6: Normal because they do computer programs all the time. Just talking to people

Would you say that you are friends with any of the other online co-design partners?

Is your friendship with other kids in Kidsteam Online different than with your other friends?

- P2: Interacted as much as I could; On a scale, It would be an 8 or 9. Pretty comfortable as if they were with friends.
- P4: Kinda. Because they do not know a lot about them. Felt comfortable talking around them. Doesn't interact with friends on a computer; With their friends in real life, they play.
- P3: Knew only one person, their sister. The interaction with the others was good.

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- P5: No; only knew their sister
- P6: No; only knew their sister

Which adult online co-design members do you like to work with in Online

Kidsteam? Why?

- P2: Likes working with the both of us.
- P4: Greg; because he allowed them to draw pictures and he talked about ideas
- P3: Greg; because they know him the most.
- P5: The teacher; He was very friendly
- P6: The teacher; he was very kind and the only adult there

How is being an online design partner different from other things in your life, like going to school or other activities?

- P2: Attended the School of the Arts (Acting) program and took a computer class; this was fun and no one was there to interrupt them;
- P4: No Homework
- P3: It was different because of how everything is... it's more interactive.
- P5: There were a lot of people
- P6: It's hard to draw on the computer; never drew online before; School is stricter with communicating; This was less strict; You can do whatever you want.

What have you learned from being an online design partner?

- P2: I learned some cool ways to protect.... Learned how to interact more and step outside their comfort zone, liked the questions. They really liked that no one said that their answer was wrong.
- P4: Learned that you could learn something new
- P3: Sorta. They were confident during the sessions.
- P5: Not sure
- P6: Nothing much

Is there anything else you want to tell me about being an online design partner?

- P2: Really liked it but would like more sessions. It wasn't that many people (that's a good thing). Change the name of the program, because it's not clear what the program was about.
- P4: Wish that it was longer; more than the two sessions that was had.
- P3: It's fine the way it is. They would change stuff that you could do with the app that was used. It was really glitchy. They would do it again. Online. Both sessions felt the same.
- P5: Nope
- P6: Nope. Would like to do it again and was waiting for a long time to do it again

Chapter 4: Discussion

This chapter explains the results of the data collection for this study. It will cover the success and areas of improvement of participant engagement, involvement of parents, Kidsteam framework, drawing technology, question of the day and the name of the event.

Engagement

The collaboration between the participants in the different sessions was not the same. During the first session, there was a lot of discussion and drawing that was done between the participants and the leader. P1 and P2 were the most active of the participants and really kept the collaboration going with very little help from the leader. P1 was the only participant that had participated in sessions like this before, which could be the reason why they were able to help foster the engagement of the first session. P3 and P4 were somewhat engaged a little, but each one lost interest at some point. During the second session, there was little collaboration between the participants. P2's level of engagement was lower than it had been during the first session. However, P2 was drawing. P3 and P4's level of engagement was the same or even a little worse than it had been during the first session. P5 and P6's level of engagement was high, but their interactions were mainly with the leader. There could be a few reasons why the levels varied. Even though there were participants that attended both sessions, it is helpful to have someone who has more experience with these types of sessions. Because contact information was giving, there could be an effort to reach out to those participants that were involved in future sessions. Also, selecting a topic that is more relational could help

with engagement. The interaction that involved school discussion was great. More participants did stay on topic during the first session than they did during the second session.

Parents Involvement

There were several participants whose parents were involved in the sessions, and this involvement benefited the participants. The youngest participants were 7 years old (P5 and P6), and they received assistance when logging into the site to access the whiteboard. Their parent then sat next to them throughout the session. P4 (9 years old) received assistance from their parent when logging into the whiteboard but the parent did not assist after that. P3 (8 years old) and P1 (11 years old) did not need direct assistance from a parent. P2 did not need assistance but their parent was still in the same room during the second session. The parents being involved can be beneficial for some children and could be stressed, in future sessions, that their assistance might be needed. They can assist with administrative tasks and possibly, help their child be more comfortable in the sessions with engaging more with the group. Typically, parents are not involved with the face-to-face sessions, but the leaders (adults) are, and they help with the same tasks that parents would do.

Kidsteam Framework

There were several adjustments that needed to be made for the Kidsteam framework. Snack time and Circle time needed to take a different form in a remote setting, and they ended up not being very distinguishable from each other. These two modules need to be re-examined and then re-named. Food, which is a focal point for

Snack time, is not very practical in this environment. A variation of Circle time is possible by using ice breakers to allow each participant to get to know each other, even though the participants are not in a circle. For this study, Snack time became instead a minimal round of introductions. Also, there was a fair amount of time that was spent on set up for DisCo for the participants, which pre-empted most of the time allotted for Circle time. Snack time needs to be given a new name that allows for the participants to be aware of what is the purpose of that part of the session, even if they might not know its name. Circle time needs a new name as well, and strategies should be sought that will make this logistical step shorter and perhaps more enjoyable and purposeful for participants.

Drawing Technology

The DisCo technology was somewhat useful for the sessions, but there were some drawback which caused discomfort while using it. There were several participants that did not like the drawing tool. They stated that it was hard for them to use it, explain that speaking was therefore better for them. Several participants opted to draw on paper because it was easier and more familiar. Also, some participants stated that they would rather use a notebook/paper so they can see what they drew throughout the session. This preference for paper drawing reflects the fact that the whiteboard was “whited” out by other participants throughout the second session, whereas paper drawings stayed available.

Towards the end of the second session, a participant decided to show a drawing that they did on paper in relation to the QOTD. Even though most participants would

have preferred a tool like physical paper, it would be tough to make good use of physical drawings in the remote environment. Therefore, a different online collaboration tool might be needed that allows for easier drawing. For data collection, DisCo is a good tool to use, but it was lacking an undo to help recover from mistakes and it lacked the capacity for screen recording which would have helped with reconstruction after some participants deliberately whited out the group's work. Also, DisCo has a distinct web address but will always stay live. This is a good thing and a bad thing. It could be a plus for participants to be able to revisit the site and add more to the design if they would like. It also meant that two participants were able to return to the site for less productive purposes. The fact that the tool is always live also means that anyone who has access to the link can access to the drawing board as well. An online drawing tool, in general, could be hard for anyone to use and create frustration for them. The easier of use, the better and this is especially true for these types of sessions. A better tool could be one that has set (basic) shapes that will allow participants to click and drag. Also, access to touchscreen technology for the sessions could help. It was not mentioned that the typical computer hardware was mandatory but, in the future, other computer-type technology can be advertised for use.

Question of the Day

It is important to choose questions and topics that the participants could identify with. The first session was about schools and there was a lot of interaction between the kid participants compared to the second session. The pace of iteration was natural and did not need the adults (as much) to help move it forward. During the second session, iteration was slower and the leader did a lot of prompting to progress it. Towards the end

of the second session, there was regression and one of the participants drew an illustration that was related to the question that was asked in the first session. Both sessions involved safety considerations that everyone had to take due to the COVID-19 pandemic, even though the pandemic itself was not explicitly referenced.

There are other subjects that could have been better to use to help foster a discussion such as playing with friends or attend a camp. In the future, it could be beneficial to ask the participants, during the first session, what are their interests and the things that they do. With this information, this will form the QOTD and, potentially, the participants would be more invested in the sessions.

Event Name

Partnering with Enoch Pratt Library was a great idea and went well. It allowed the sessions to be advertised to a wide population base. Recruitment materials for co-design sessions like the ones in this study also need improvement. There were several participants and their parents who did not understand what the sessions were going to encompass. The description of the sessions in the flyer was not clear. This lack of clear messaging could be the reason why not many kids signed up to participate. Fortunately, those participants who did enroll enjoyed themselves and wanted to participate again.

Chapter 5: Conclusion

In conclusion, this study aimed to explore what collaborative designing with kids might look like in a synchronous online format. The widely known successful Kidsteam framework for in-person collaborative designing was used as a starting point in guiding the sessions and providing tools such as DisCo to ensure that the participants would be able to design. The primary success of this study lies in the fact that the participants enjoyed the sessions and expressed a desire to continue participating. The study also helped to identify areas for improvement in order to replicate the successful Kidsteam framework in an online setting. During the pandemic, co-design activities could only take place online. However, given the need to make co-design activities available to a broader range of children, it is imperative that researchers continue to explore ways to engage in collaborative design with children in an online environment.

Limitations

There were a couple of limitations of this study. One limitation is that we could only schedule two sessions. The second limitation was the number of participants. If there were more sessions and participants, trends and data could have been more defined. Another limitation was the loss of one of the session recordings. Both sessions were recorded but the video for one of the sessions did not save properly, forcing the analysis to depend on recorded notes. The last limitation was relatively minor, consisting of the lack of the snacks (food) component. Typically, in person, the informality and sensory enjoyment of snack time helps participants get to know each other more by disarming

them and allowing for small informal conversations among and between participants to occur. Future sessions need to explore potential alternatives to snack time that may serve the same purpose.

Next Steps

There should be more studies on this topic because it has become increasingly important for online collaboration to occur with children. Another collaboration, such as the one with Enoch Pratt, is essential because it could allow for a true random population. The framework implemented should continue to be used because it is excellent but must be adjusted to fit current needs and understanding to continue the growth of children collaboration.

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Appendices

Appendix A: Consent Form

Children's Design Team Consent Form

Dear Caregiver,

Your child is invited to work with a technology design team at a branch of the Enoch Pratt Free Library.

In this research project, children will work with other children, librarians, professors, and students. The team will design new technologies using the internet.

The design team will meet **online for 4 weeks**. You and your child can decide how long they want to participate. There will be a weekly meeting for **30-60 minutes**. Your child can participate in any of the meetings that he or she wants for as long or short.

The research that is developed by the design team may be published in books, journals, videos, or as conference papers. Your child will never be identified with his or her real name in publications. Your child's face will **never** be shown in publications. Your child will be recorded during the meetings and logs of their activities on **our site** will be kept. Someone outside of my University may listen to a recording of the session and type out the words being said by the group. Your child will not be seen by them but your child's name may be mentioned. Once we are done with the recordings, we will destroy them.

Your child may learn new technology skills by working with this design team. Your child may get better at working in teams or at solving problems. And your child will probably have a lot of fun. We also hope that this design team can help invent new things that will help other children learn and play.

If you have any questions about this research project, please call me, Dr. Greg Walsh, at 410-837-5473. You can also call the research office at the University of Baltimore at 410-837-6199, or irb@ubalt.edu.

I agree to have my child participate in this research.

Name of Child: _____

Name of Parent or Guardian: _____

Signature: _____

Children's Design Team Consent Form

Phone Number & E-mail Address: _____

Appendix B: Question Set 1

Online Co-Design Partner _____

Date _____

Time of Interview (EST) _____

Note: Can use “online co-design partner” and “Online Kidsteam member” interchangeably

Note: Questions are guidelines. If the conversation continues and needs more prompting from interviewer, this is fine.

1. Please define “online co-design partner” for me.
2. What is the best part of being an online co-design partner so far?
3. What is the worst part of being an online co-design partner so far?
4. How has being an online co-design partner make you feel?
5. Would you say that you are friends with any of the other online co-design partners? Is your friendship with other kids in Kidsteam Online different than with your other friends?
6. Which adult online co-design members do you like to work with in Online Kidsteam? Why?
7. How is being an online design partner different from other things in your life, like
8. going to school or other activities?
9. What have you learned from being an online design partner?
10. Is there anything else you want to tell me about being an online design partner?

Appendix C: Question Set 2

Bi-Weekly Tool Survey Example

This is a survey about the tools that we use and what we can do to make them better and more useful.

What has been your favorite feature on Online Kidsteam so far?: [text area]

What has been your LEAST favorite feature on Online Kidsteam so far?: [text area]

Have you participated in the Snack Time section?: Yes/No

What did you like and not like about the Snack Time section?: [text area]

Have you participated in the Circle Time section?: Yes/No

What did you like and not like about Circle Time?: [text area]

Have you been able to draw in the Design Time section yet?: yes/no

What could make Design Time better? Any design ideas?: [text area]

If you could have any design tools that you wanted in Design Time, what would they be?:

Anything else I should know?: [text area]