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Produced by Twin Cities Public Television, St. Paul, MN, *SciGirls* is a multimedia project for upper grade-school and middle-school tweens. Weekly half-hour animated and live action episodes are accompanied by web and outreach activities in the fields of science, technology and engineering (STEM).

Supported by an NSF grant (#1323713), Multimedia Research, an independent evaluation group, implemented a formative evaluation of a web game concept in paper form.

**METHOD**

**Sample**

Focus groups of four 5th grade girlfriends or acquaintances were recruited around four national sites: Miami, FL; Boston, MA; Austin, TX; and St. Louis, MO. Half (56%) of the sample of 16 girls were of minority backgrounds including 25% black, 25% Hispanic, and 6% Asian. Four (16%) girls had previously seen *SciGirls* programming on PBS and had visited the *SciGirls* website.

**Science interest.** The participants were interested in science, either “a lot” (25%), “some” (25%) or “a little” (19%). Seven of ten (69%) girls reported having completed a science fair project in the previous school year.

**Gaming activity.** The girls were familiar with online and app games, with 56% of the sample spending “a lot” of their time playing games (see pie chart).

When asked what online game or app game they liked best, some multi-game websites were noted: Coolmath-games, Friv, Miniclip, Poptropica and Yepi.

Girls mentioned virtual world sites, some of which support social interaction; for example:
- **Minecraft:** *Because it is adventurous and survival.*
- **Minecraft:** *In creative mode, you can build whatever you want, and in survival mode, you have to fight and survive.*

1 See http://pbskids.org/scigirls/
- Minecraft: I like to build and create with friends.
- Minecraft: I like to play with my friend. I like to build a lot of stuff with her.
- Minecraft: You can think whatever you want, and you can join in with your friends.
- Animal Jam: You get to socialize and make friends. I usually stick to people I know. A lot of girls love that game.
- Animal Jam: Because you can play with your friends and it’s really cool.
- Roblox: I like the game Roblox because it’s like your own little virtual world. You can build your house. [I like best] that you can have lots of parties, and my friend and I will connect on there, and we would play and team up and have a war against my brother.
- Virtual Families: When you first log into it, you just get it. It’s free. It tells you a story about what happened. You choose your person, your job, how much money they make and if you want kids or not... And then a little while later, you’ll get an email from someone who wants to get married...You can choose them and create a family from there, and you also can find little treasures in the ground and stuff like that.

Challenging and addictive action games were also described; for example:
- Meeblings: You start with this little tiny yellow dude, and you press him, and he flies away and you have to get him past every level. Sometimes there are more than one of him, and you have to go through obstacles. It’s pretty cool.
- Octagon: It’s very addictive. I’ve played every single day. Right now, it’s actually kind of hard but I really like it. You have to keep the ball from falling down on the floor.
- Piano Tiles: Don’t Tap the White Tile: Really fun because you don’t want to touch the white tiles. It’s hard because in faster mode, it keeps on going faster and faster, so it’s hard to go up to a higher level, because you almost always accidentally tap a white tile...it’s really fun to play because it’s challenging for me.
- Subway Surfers: It starts off with this one player and his name is Jake. And then you’re running from the police guard, and there are trains coming at you. [I like best] that you can unlock people by earning points while you’re running.
- Unknown name: There were little cubes and it’s like you are in a universe, and if you fall, then you are dead, and you have to redo it again.
- Unknown name: There’s this football game [on miniclip.com]. It’s like playing football basically, but it’s really fun. It’s fun to tackle people.

**Offline Activity Suggested by a Game or Website.** Half of the girls could recall activities that they had done in the real world that were suggested by a game or website:
- All the girls at one site reported doing projects with Rainbow Loom via YouTube.
- Two girls at one site carried out the Mentos and Coke experiment drawing from a science website.
- Two girls at one site reported making food using recipes suggested by a game (Design a Cake on friv.com; Papa Pizzeria on yepi.com.)

**Sharing a Creation on a Website.** One-quarter of the girls had previously posted or shared something that they created themselves, using Instagram or Youtube.
I made from another app - I forgot what it's called - I got a picture of my dog, and it would let you design and you could actually save a photo. I put glasses on my dog and a tongue, so he looked funny, and I posted it to Instagram.

Most recently I created a cake and posted it on Instagram. A real cake. Also I was bored and I got a lot of pastel crayons and heated them up in a pan. My dad was helping me and I created a crayon, and I posted that to Instagram, too.

There was this one time last year when I was in the "app club" [at school], and we made an app for blind people. [The other girls in the group said, oh yeah, that's true]. We did it together as a club. I did it with some kids at school. Once we finished it, we used a chip and then put it in our phones to install it to test it, and then like two months later we put it on the app store, with the help of a teacher. It's called "Blindfold Racer." It's free. I also posted pictures to Instagram.

I am not really allowed to post anything public. But I made a Youtube video. My dad made it, and I edited it some because I like doing that. It snowed that day, and it was basically me doing a happy dance. I had this picture of my brother. He was in a sombrero and I put that in it.

**Procedure**

Each research site ran one focus group of four girls for 90-130 minutes. Prior to seeing the game materials, girls viewed four minutes of a SciGirls Season Three episode about a team of SciGirls observing robins using a citizen science protocol.

Following the introduction to the television series, researchers walked through a paper version of the web game. Upon presentation of a draft home page, researchers gave an overview of the game:

*In the game that we are going to review today, you do activities off line in the real world, and then on the website you share the results of your activity and maybe your photos. Doing activities and sharing earns points for you and a nationwide team that you join. Over a period of time, like a month, you and your teammates from other places in the country complete activities and earn points. The home page content changes based on which team wins the game by completing the most activities. Today, I will be walking you through this game on paper and asking your opinions.*

In the process, participants “played along in the game” by completing a game profile on paper; making choices in response to game screens; reviewing and discussing different features of the game screens; and answering written survey questions about appeal and interest in game activities.
Participants were given a completed user profile page as a model (see left below) and a blank profile page that they each initially completed with their own choice of username, descriptive phrases and user icon (see right below). The researchers verbally described each of the features on the profile page. As the group progressed through phases of the game, the girls returned to their profile and added stickers and text to the lower sections of Who are you and Where ya been. These sections would be automatically updated by an operational online game.

Descriptive phrases

Users were given a list of 11 phrases to choose from to describe themselves. The order of the phrases in the list was different for each of the four groups. The girls chose 8 of the 11 different phrases to insert into their profile:

- 4 chose Leader
- 3 chose Idea girl
- 2 chose Comedian; Easy going girl; and Planner
- 1 chose Busy bee; Peace maker; and Problem solver
- 0 chose Deep thinker; Listener; Task master

RESULTS: USER PROFILE
The girls were also asked to create their own descriptive phrase (e.g., puppy lover in the right-hand illustration above).

- 4 suggested activities: Volleyball Player; Performer; Animator; Talent
- 3 referenced animals – Animal Lover; Puppy Lover; Ladybug Girl
- 2 chose Leader, again
- 2 wrote in Laugher
- 2 emphasized technology with Techmaster and Technogeek
- 2 phrases do not fit into the above categories: Breakfree; Camo lover

Appeal of Profile Features

The girls liked the range of features on the profile page, particularly making choices, telling about themselves and knowing their activity status. The girls assumed that profile pages would be for public viewing. For example:

- I like that you can create your own username.
- I like on this profile page that you get to make your own username and that you can give a hoot. I think that’s really cute.
- I like that it’s kind of open. I like that you can give a hoot to your friends.
- I like that you can pick your team and what position you are.
- I like that you can choose teams and stuff and the points.
- I like how you can pick a picture for you [referring to large icon sticker to left of username].
- I liked that you get to say what you did. I think the Who are You section is cool.
- I like how you can tell who you are like if you’re a comedian or a leader or a problem solver, things like that. And I like how they have certain stickers for what you did. It tells if you are a master chef or a builder, and it tells you how many points you have like times 1 or 4 or 8 or 5.
- I like that it states everything out, and it makes sure that it tells you so you don’t have to guess like how many [activities] you’ve done or points you have.
- I like how you can put photos of stuff, that is cool. And the points.
- I think the Who are You section is cool, so they can know who you are and what activities you have done. I like that you get to see what the people have done already, like the builder thing. I like the photos, so people can get to know you and what you like.

Half of the girls wanted more freedom and choices in how they presented themselves in the Who are You feature; for example:

- More choices for stickers in the Who are You section. More choices for the activity so I can pick my own sticker for the activity instead of have it assigned. It should have more information too, like stuff you like.
- I think that there should be more stickers, more choices, because some people might not like these stickers. I want to pick my own stickers. I think that you should write more and have more of a chance to fill in [the Who are you section] yourself.
- I would put a list of icons that you could choose. Instead of just having ‘idea girl’ or ‘busy bee’ choices, I would let people choose their own.
There should be more space for more activities to show and more options for stickers. We should definitely have more choices of what our favorite thing is instead of just one. It’s telling you who you are, but they could ask us questions about us, like our favorite color. I think it would be cool to give some things like your favorite color and stuff, but nothing really personal. We have been learning to be safe online.

You can’t make your own character for the icon [referring to the icon to left of username] to customize yourself. [Who are You section] could have characteristics about yourself. It can have this [pointing to Who are You section]. but it could have an arrow that would say “More about Me: and then it could have more about you.

A few girls were critical of the section headings, as follows:

Who are You is a confusing title but I like the labels.
It’s kind of confusing, the titles. Who are You, What you doin, Where you been are confusing. I can’t tell what goes where.
They shouldn’t use slang: Where ya and Whatcha doin.

Although participants had password accounts on sites, only 38% described profile pages on other websites or for games that were at all comparable to the SciGirls game profile. One group of four friends had profiles on Magic Piano, Vine, Instagram and Tumbler; e.g.,

Magic Piano. On Instagram you get to post your own photos. On Tumbler you get to post anything you want.
I do have Vine and Tumbler. I posted a picture of a pineapple on Tumbler.
Instagram, Magic Piano, Vine. Instagram is different because you have a picture of yourself and if you press edit, you can write about yourself.
I made a profile picture and bio on Instagram. I also have a profile for Vine.

Two girls in one group described profiles on virtual world gaming sites; e.g.,
There is this website, called Wee World. You choose how you look, like your whole person. Like your features, your hair, and your clothes. You have missions and you have to do stuff like buy new clothes or get a friend or something like that.
The website is Roblox and on the profile page, you have your own icon and then you have a friend. You have somewhere where you can put all your friends. And then on the side of it, it has like "where you been"- not in those exact words but it has all the different worlds you've been and the most recent ones. It takes photos of the game you're playing and posts it.

Although re-design was not a goal of the conversations, reflections on profiles and accounts elicited some design directions:
I think [Who are You] is really cool with the little icons they have in it and everything like that, but I think they should ask a little bit more questions about you first, and then see who you are, and then suggest some activities that you might be interested in, and then you can go on from there by yourself.
Maybe you could use your points to buy things for your profile page. You get points and then you use them to design an avatar.
I think you have to reach 1x techie to get an avatar. And you should stay on the leader board even if you spend your points.

RESULTS: CITIZEN SCIENCE ACTIVITIES

The game’s Citizen Science activities is represented in the paper version by the top of the right-hand screen. Upon presentation of this screen to the girls, the researchers briefly reviewed the screen’s available features and read aloud a draft script for the Robin video to introduce the citizen science challenge of Where are robins living this time of year across the United States?

Data entry questions

Asked to imagine that they have gone outside and looked for robins, the girls answered the questions presented in the paper screen below, which represents a proposed data entry process. Two-thirds of the girls imagined seeing a robin that was eating, nesting, flying or hopping.

19% didn’t look yet [in their imaginations]
19% looked but didn’t see a robin
63% saw a robin, and then answered the questions below about what the robin was doing:

0% resting
20% flying
30% eating
30% nesting
20% hopping
The girls responded positively to the questions about robin viewing, but a few were concerned about whether or not users would tell the truth; for example:

*It's good. It's cool.*

*I think it’s good. They would know what you did. Like if you didn't look. And you could know what it [the robin] was doing. I think it's interesting.*

*I like it because people hear about what you did and if they should do it.*

*I feel like an adventurer because you get to earn lots of badges for it so if I know I've done lots of these I feel I can help anybody else with them.*

*I would feel comfortable with it because I would feel like it would be something that you could do besides staying at home and being on the computer. And you can do random things, you can get out and be active and do some pretty cool things and stuff.*

*I feel like an adventurer because you get to earn lots of badges for it so if I know I've done lots of these I feel I can help anybody else with them.*

*Estimation of Activity Participation*

Each girl was asked how likely they would be to look for robins, if they had time and the weather was nice (see pie chart). **Two-thirds (63%) were very or somewhat likely to participate in the robin observation activity.**

When asked how many days they might spend looking for robins if they did the activity, responses ranged from 0 to 6 days, with an average period of 3 days. Those who were very or somewhat likely to look for robins suggested an average of 3.4 days compared with 2 days for those who felt that they were less likely to do the activity.

**Data Map Variations**

Researchers showed consecutively three variations of a robin data map. One girl in each group was asked to describe what each map tells about robins in a specific state, and the other girls were encouraged to respond if they disagreed with the interpretation given.
All of the girls understood the data presentation of the map below that presents comparative information about “amount” of robins in each state; for example: *It tells you how many robins are in each state. It tells you there are not a least or most - there's like a medium amount of robins in Missouri.*

![SciGirls Robin Map](image1)

The second map, shown below, adds robin icons to represent different activities of the majority of robins in that state. The girls understood the information added by the icons but most did not repeat the least/most information in their description; for example: *In Ohio, it's purple and they are mostly resting.* A few voiced confusions by what they interpreted as conflicting information between the color legend and the icon legend; e.g., *The bar chart [first map] was not accurate. It wasn't true, because it said Ohio had barely any Robins, but it said here [second map], they were all resting, so they couldn't see them.*

Before moving to the third map, researchers noted that in this map: *The color of the state of Ohio means that Ohio has the least number of robin sightings compared with the other states. The purple robin icon means that the majority of robins sighted were resting.*

![SciGirls Robin Map](image2)
As the third map, shown below, was presented, the researchers explained to the girls that *in this map version, as you roll over a state, a pie chart pops up for that state*. The girls understood that in Texas *there’s most robins and mostly resting*. A few girls noted the inconsistency with the previous icon map in which robins in Texas were *mostly nesting*.

![SciGirls Robin Map](image)

When asked which of the three maps they thought should be used in the website for the robin activity, two-thirds (63%) chose the second map with icons and the remainder (37%) chose the third map with pie charts.

Those choosing the second map felt the pie chart was perhaps too complicated and the icons were more interesting; for example:

*Icon map because it shows how many birds in a very specific way and it is very colorful. It's easier to read.*

*I think the icon map. Because probably people don't understand the pie chart, so they can have more of the idea of the birds. It think it's more funner, more interesting. It's easier to read and it's funner.*

*I think the second map might get more people's attention. If I saw the third one, I might be stuck for hours trying to figure it out. And the first one is too simple. And the third one - maybe they should explain it a little better.*

*I think they should use the icon map, because it shows you where the most Robins are and least Robins are and where they most rest and they nest, and they eat. It has more information. It shows everything.*

*I think that we should use the one with the roosters because it gives you more information and it's kind of a combination of the first one you gave us and it tells us how many robins that you can see and like for TN, CA, or ID, or you get what I mean? It tells you all that but then it also tells you, like in MO, you mostly see them eating but in ID you mostly see them resting. So it kind of lets you know what you'll be up for when you go walking and robin watching.*

*I like the second one, because it is not that much confusing. But I would put the birds here [pointing to the other side with more white space]. The third one is a little confusing.*
Those choosing the third map with pie charts recognized that it provided the most information; for example:

- Because it shows the most information.
- It tells you a lot of information.
- It tells you a lot.
- It has a lot of details, like how they are spending their time in Texas.
- I like the third one. I like what it looks like. But I really think it should be a little bigger, and maybe put numbers on the pie chart, like 10%...
- I like the third one, because it is more interesting with the graph. That is a cool way to do it and since you are asking the question of what was it doing when you saw it, it is kind of important to do that. That’s my opinion. Also why are there are some birds on some of the states but not all of them? That is really confusing.

Less than half (44%) of the girls felt that they were likely to look at the robin data maps online; 38% were on the fence; and 19% thought they were unlikely to look at the map (see chart). Those who had reported seeing the SciGirls series and/or website were significantly more likely to look at the robin maps online.

A majority of girls (63%) felt that they would check up on changes in the robin data maps two or three times. One-third (31%) thought they would check more than three times, and 6% responded with only one time.

The more likely that the girls felt they would go out to look for robins, the more likely they thought they were to look at the robin maps and the more frequently they felt they would check for changes. So those who felt that they would participate in the robin activity were also more interested in seeing the results.
Interest in Citizen Science Activities

Presented with written descriptions of six citizen science activities proposed for the SciGirls website, two-thirds (69%) of the girls were interested in one to three of them and one-third (31%) were interested in four to six activities. The top three activities in the chart below were chosen as interesting by half or more of the girls, with recording changes in water habitats appealing to 69% of the sample.

The girls were split on how long a citizen science activity should remain available on the website: 50% chose one month; 38% chose the length of a season; and 13% chose the shortest one week period.
The game’s STEM activity list is represented in the paper version by the bottom of the right-hand screen. Upon re-presentation of this screen to the girls, the researchers handed out two pages of activities that will appear in drop-down menus under What to Do. Participants were asked to place a check mark next to each activity that interests them and that they might be likely to do at home.

**Interest in STEM Activities**

The girls expressed interest in an average of 19 of the 32 activities. Girls check-marked a low of 7 to a high of all 32 activities. The table below shows the percentages of girls who chose each activity. Note that the bottom half of activities (right column) includes all those requiring an effort “outside” the house.

<table>
<thead>
<tr>
<th>STEM activity</th>
<th>%</th>
<th>STEM activity</th>
<th>%</th>
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<tbody>
<tr>
<td>Plan a picnic or party</td>
<td>94</td>
<td>Go star gazing</td>
<td>56</td>
</tr>
<tr>
<td>Make something out of duct tape</td>
<td>94</td>
<td>Plant a vegetable, grow it, eat it</td>
<td>56</td>
</tr>
<tr>
<td>Learn the words to a song you don’t know</td>
<td>88</td>
<td>Go geocaching</td>
<td>56</td>
</tr>
<tr>
<td>Design and build a fort</td>
<td>88</td>
<td>Invent an instrument</td>
<td>56</td>
</tr>
<tr>
<td>Invent a new popsicle flavor</td>
<td>81</td>
<td>Write a story about an animal and its home</td>
<td>50</td>
</tr>
<tr>
<td>Teach a grown up something new</td>
<td>75</td>
<td>Think about the pros and cons of different pets</td>
<td>50</td>
</tr>
<tr>
<td>Leave a nice surprise message somewhere</td>
<td>75</td>
<td>Design and build a puppet</td>
<td>50</td>
</tr>
<tr>
<td>Cook something from a different culture</td>
<td>75</td>
<td>Build a miniature of your room</td>
<td>50</td>
</tr>
<tr>
<td>Make business cards that advertise your skills</td>
<td>75</td>
<td>Go outside and look for animal tracks</td>
<td>44</td>
</tr>
<tr>
<td>Make a secret code</td>
<td>69</td>
<td>Create an inspirational cheer</td>
<td>44</td>
</tr>
<tr>
<td>Record video and edit it into a movie</td>
<td>69</td>
<td>Find your home, school, or neighborhood on a map</td>
<td>38</td>
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<tr>
<td>Be a reading buddy for a younger student</td>
<td>63</td>
<td>Learn how to fix your bike</td>
<td>38</td>
</tr>
<tr>
<td>Start a game club and invite people to join</td>
<td>63</td>
<td>Listen for frog calls near a body of water</td>
<td>31</td>
</tr>
<tr>
<td>Take a photo of the same place every day</td>
<td>63</td>
<td>Find an insect outside and learn about it</td>
<td>31</td>
</tr>
<tr>
<td>Rearrange or organize your room</td>
<td>63</td>
<td>Go looking for spider webs</td>
<td>19</td>
</tr>
<tr>
<td>Use recycled materials to create gift wrapping</td>
<td>63</td>
<td>Find a cool leaf and draw it</td>
<td>13</td>
</tr>
</tbody>
</table>
The 32 activities fall into eight *Who are You* categories of four activities each. The percent of girls check-marking activities in each category follows:

- 75% chose Master Chef activities
- 69% chose Communicator, Designer or Helper activities
- 57% chose Builder or Techie activities
- 38% chose Animal Guru activities
- 36% chose Nature Girl activities

The activities below are ones that the girls felt they were *most likely* to do at home as well as very likely to do. None of these activities were drawn from the Animal Guru or Nature Girl activities.

- 25% chose Plan a picnic or party
- 13% chose
  - Cook something from a different culture
  - Make something out of duct tape
  - Rearrange or organize your room
- 6% chose
  - Be a reading buddy for a younger student
  - Design and build a puppet
  - Invent a new popsicle flavor
  - Learn the words to a song you don’t know
  - Make a secret code
  - Record video and edit it into a movie

**Design and Build a Puppet Activity**

The girls were asked to pretend that they completed the activity of Design and Build a Puppet as listed in the For Now box of the game page (see p. 13). Shown the screen below, **56% of the girls preferred the multiple-choice question format whereas 31% preferred a blank box in which to describe the puppet in more detail.** Another 13% could not choose and wanted both options: Sometimes with multiple choice it’s easier to choose, but a blank box is good also cuz you can have more detail.

Researchers pointed out that a user can also upload a picture of your design which will appear on your profile page. Half (50%) of the girls had previously uploaded photos to a website. Some commented about their experience:

*On Minecraft, me and my brother uploaded a screenshot of a statue. I think they should not let you upload a picture of a face. I posted a picture of a pineapple on Tumbler.*
I posted a picture of my dog to Instagram.
On Instagram, you get to post your own photos.
I made a profile picture on Instagram.
I posted pictures of our app, Blindfold Racer, to Instagram.

RESULTS: GAME CONCLUSION

To bring the paper game to its conclusion, the researchers showed the Team Stats screen and explained that when users complete an activity like the Design of a Puppet or Look for Robins, they earn points for their team. The How We Doin? screen (left-hand below) shows that the girls’ green team has the most points at the end of a month. Their reward is the right-hand screen below, where the home page turns green and shows content related to nature in a video at the top, nature pictures in the middles boxes, and a nature poll question at the bottom.

Highlighting User Activities

The bottom of the left-hand screen under Super Sci-Girls presents users’ latest activities. To continue to involve our participants in the paper game process, the girls wrote in their favorite activity in the blank green space at the bottom and added the activity’s sticker.
The girls liked the feature of highlighting SciGirls’ activities for three reasons: (1) it rewards them personally to see their username; (2) it shows their accomplishments to others; and (3) it gives them ideas of activities that are popular that they could do too. For example:

In Think Through Math, you get to be first place for your state and for your school. I stayed up til about 12 o’clock to get to the top. I passed like seven pretests to get on the leader board. It stays up for 12 hours.

[Agreeing with comments about Think Through Math] It is super exciting to be the leader. I really like it because you get to see the most recent data of people on your team, what they have been doing, and you get to see if you’re in first or second place.

I think its actually kind of cool because people get to know you and stuff and also what you like.

I think it’s really cool so other people can see it as well.

I think it shows you who is working hard and who hasn’t been on this site for a year.

I think it’s good because other people can see what you’ve done and you can take their ideas and do it.

I think it’s good because other people might find it interesting that you might like it, if you are a builder and stuff, a fact they can get to know about you.

You can go to this page if you’re trying to decide which activity to do next. Like Ladybug did this and I want to.

I definitely like it. I was wondering: Do you get prizes?

Motivation to Invite a Friend

At this end point in the game, half (50%) of the girl participants reported that they were very interested in inviting a friend to be part of their team and half (50%) were somewhat interested. They liked the idea of including their friends: When you are playing with friends, it gets more exciting. Girls asked if their friends could all be on the same team.

RESULTS: GAME APPEAL

After walking through all the paper game screens, researchers asked the girls what they liked and did not like about the experience of making a profile and doing activities offline in the real world, then sharing online to earn points and stickers for yourself and your team.

The girls liked the features of stickers, points and a personal profile; for example:

I liked that we earned stickers and that people online really get to know you. I also liked that you can fill out your own information and earn points.

I think it would be really fun. While you are having fun, you are earning points, and if you win, you can get your color to be on the homepage.
I like the idea of making an avatar and stuff. It would be really fun. I like how you get the points. I like how they did the points and stuff.
I like it because I like making the profile because you can choose your own color. You can choose your own profile. You can make up your own name.

The girls liked the concept of the offline activities but had reservations about their available time and capability to do the activities; for example:

I think it’s cool because you get to do a lot of activities on this website, and a bunch of stickers, and that you can have your team show.
It’s fun because you’re not sitting inside watching TV all the time, and you can show people what you’ve done.
I think it is pretty cool, because some of these things you wouldn’t even think of doing, and then you just do them. But for some people, it might feel like once you chose a game [activity], you have to do it.
I like that you get to get out of the house for those days that you’re just doing nothing and you get to go out and explore your backyard or the park or something. Just get out and have fun, and then come back home and then you get back on the computer, but you’re learning something new and then you get points for learning something new and that makes you eager to do it again. Something I don’t like about the experience is I think that sometimes, if you really want to do something but then you can’t do it because of something that’s going on with your life or something, then it might be hard for you. But I think that they should add some different things besides a whole lot of nature - just go even farther with funness.
My dad and my mom work a lot. I just don’t think that many people would be able to go outside and look. Most of the time, people can’t do those things. You would have to be careful about what season you try to do outdoor things. Most of the time people have screen time [limits]. They don’t want to waste it. I think my parents would count it as screen time.
I usually play games in the morning only and that is it for the day. And hypothetically speaking, what if you do not have the materials or time or money to do one of the projects?

A few girls were concerned with the fairness of the reward system; for example:
How would they know that you are really doing it, if you are just answering questions. Some can say, “I did this” and go along with it when they didn’t earn it.
I like it in general but I think you should have to be able to say proof, like have a parent say you did it.
At the end of the sessions, the girls chose a game title and a set of team names from a multiple-choice list and also suggested their own title and team names. The top game title is *IRL (In Real Life)* and the top set of team names is the bird category.

**Game Title**

Participants were asked to choose a best game title from a list of six:
- 44% chose *IRL (In Real Life)*
- 19% liked *Wise Gals*
- 13% picked *SciGirls Field Guide*
- 13% chose *Listology*
- 6% liked *Hootenanny*
- 6% chose *Just Try It*

Game titles suggested by the girls appear below:

<table>
<thead>
<tr>
<th>Cute Girls</th>
<th>Pao Pao Players</th>
<th>Doodle and Draw</th>
<th>The Tree’s Life Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wise Gals</td>
<td>Guessing Game</td>
<td>Taste It</td>
<td>Looking for Robins</td>
</tr>
<tr>
<td>Fabulous SciGirls</td>
<td>Do It Yourself</td>
<td>Build an Eco Friendly House</td>
<td>Beautiful Robins</td>
</tr>
<tr>
<td>Bird Lovin’ Girls</td>
<td>Peanuts</td>
<td>Freeze for Bees!</td>
<td>Birds Every Wing</td>
</tr>
</tbody>
</table>

**Team Names**

Participants were asked to choose a best set of team names title from a list of four:
- 56% liked *Plucky Penguins, Cheeky Chickadees, Spunky Sparrows, Gusty Geese*
- 19% chose *Blues, Greens, Oranges, Reds*
- 13% picked *Nature Girls, builders, Designers, Sporty Girls*
- 13% chose *Planners, Innovators, Thinkers, Team Players*

One group chose to use their first name initials for a team name: *S.E.P.P.* More general team name suggestions are presented below:

- *Blue Berry Blue, Grassy Green, Cutie Oranges, Red Roses*
- *Blue Butterflies, Green snakes, Orange Bees, Red Robins*
- *Chubby Chipmunks, Cute Cats, Daring Dogs, Angry Leprechauns*
- *Pinky Penguins, Flowers, Butterflies*
- *Gibbons, Tigers, Pumas, Dragonflies*
- *Camo Crew, Tiny Tigers*
- *Spouting Flowers, Animal Lovers, Under-the-Sea Gals, Techno Thinkers*
- *Light Finders, Star Diamonds, Glass Flowers, Birdie Power*
Our 16 participating 5th grade girls were familiar with games, doing offline activities, and posting online; however, the specifics of their experiences do not overlap well with the design of the SciGirls “game.” The girls typically play addictive action games or visit sites that support social interaction with friends as well as gaming. The proposed SciGirls game does not match either of these genres. Half of the girls reported previously doing an offline activity suggested by a website; most were creative projects like making bracelets or cooking food rather than STEM-based activities. One-quarter of the girls had posted documentation with the help of adults of one of their creative endeavors on Instagram or Youtube; whereas others voiced concern about sharing with the public.

In response to the paper version of the SciGirls game, the girls were interested in the game features, particularly the ability to describe themselves and present their activity achievements. The social themes of showing who they are to others and playing with friends ran through all the conversations. Girls wanted to customize their profile, not so much with identifying information, but with self-chosen icons, stickers, descriptions and activities that represent their personality, interests, and portfolio of accomplishments.

The girls liked the reward system of points, highlighting who completed what activities, and finishing with a winning team. However, ‘team’ was interpreted to mean their group of friends rather than a distant national team effort. Consider capitalizing on girls’ interest in socializing and doing things together by structuring the game so that a group of friends could form their own team of two, three, four or infinity, with their own team name, team color, and their own team profile and team accomplishments. The same infrastructure should be able to support both an individual user who joins a team of unknowns as well as a group of friends who join as their own team. Winning teams could be highlighted more frequently to make the end reward appear more obtainable to users and to bestow the recognition more broadly.

The Citizen Science component elicited lower than desirable appeal results. Only one of the six briefly described CS activities was of interest to more than half of our girls. With respect to the specific CS task of robin observation, 13% felt they were very likely to participate with 50% somewhat likely; and less than half thought that they would look at the robin data maps online. As might be expected, those who felt they would participate in the robin activity were also more interested in seeing the results. Tightly tying the CS activity to the respective CS video
may increase motivation and interest as well as attaching higher point values to the CS tasks. And again, participation in the Citizen Science activities might be higher if girlfriends can go out to collect data and imitate the onscreen SciGirls and report back online as their own team.

The girls liked the idea of doing activities offline. A few described searching Youtube for things to do when they were bored, so this component fills that need at a minimum. The list of 32 activities included something to do for everyone, although the most appealing activities tended to be indoor rather than outdoor. Some girls were skeptical about their interest and ability to spend time doing activities, despite the rewards. The open-ended characteristic of most of the activities might be an issue. Consider drawing also upon non-school activities for this age group that require limited time and materials and have already been identified as fun and successful by the many STEM outreach projects. For example, a majority of the girls were intrigued by the Master Chef activities; Exploratorium has a set of tested Science of Cooking activities\(^2\) that could fit into the template of the Design and Build a Puppet Activity, and howtosmile.org lists 45 food activities that cost less than $5 and require less than 30 minutes.

\(^2\) http://www.exploratorium.edu/cooking/index.html