Redesigning planting science

The Role of User Experience Evaluation in Improving a HUBzero Gateway for Plant Science Mentoring

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Sue Gyoung Kim, Purva Sane (University of Michigan)

planting science

STUDENTS

IN THE CLASSROOM

projects last **2-8** weeks

- students work together in teams to plan and carry out investigations
- students and teachers correspond with scientists online and get to know the scientists as real people
- teachers cover other content alongside investigations

9 Plant Biology Themes

From seed germination to genetics to agronomy...basic materials provided

STUDENT TEAMS DOING

REAL SCIENCE

COLLABORATING ONLINE WITH

SCIENTIST MENTORS

FROM AROUND THE WORLD

Student projects

Each team of 3-5 students designs and carries out an investigation with online advice and support from a volunteer scientist

I liked that we didn't know what was going to happen before we did the experiment. Instead of being taught something and then just doing an experiment to prove it, we made an attempt to find out what would happen ourselves.

Scientists are:

- from 32+ countries
- from 18+ scientific societies
- excited to share their passion for plants and science with the next generation

AROUND THE WORLD

TEACHERS

Videoconferences with scientists are an option if classrooms have a high speed internet connection

teacher/mentor group

Teachers communicate online with their teams' scientist mentors about what is going on in the classroom and about student projects

SCIENTISTS

Selected early career scientists work closely with teachers and help keep conversations going strong

Investigation Themes

PlantingScience Plant Investigation Themes and Associated Resources

The Wonder of Seeds

Germination and Seedling Growth Investigation: Students explore scientific inquiry through germination experiments designed by the students themselves.

Grades 6-12

More Information

Agronomy Feeds the World

(Beta Testing in Spring 2017 for up to 5 teachers!) **Where does food come from?** This module is designed to encourage students to think about food production around the world.

Grades 6-12

More Information

Celery Challenge

Osmosis, Diffusion, and Transpiration Investigation: Students are challenged to cause and then explain the most extreme bending in celery petioles (stalks).

Grades 6-12

More Information

Corn Competition

Grow the Largest Corn Plants: This module helps students build skills in experimental design and empirically-based justification.

Grades 6-12

More Information

Where Does Pollen Come From?

Pollen and Pollination Investigation: Explore pollen and pollination through one or more projects in this module.

Grades 6-12

More Information

The Power of Sunlight

Photosynthesis and Respiration Investigation: Students learn critical concepts of photosynthesis through leaf disc assays.

Grades 9-12

More Information

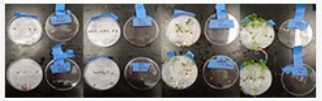
C-Fern in the Open

Sexual Reproduction, Alternation of Generations Investigation: This module is designed to expose students to the plant life cycle and the alternation of generations.

Grades 9-12

More Information

Foundation of Genetics



Traits, Variation, and Environment in Rapid Cycling Brassica: Students explore studies in genetics by growing a selected strain of *Brassica rapa* from seed to seed and examining plant traits during the life cycle.

Grades 9-12

More Information

Genetics in Inbred Arabidopsis

Investigation with a Model Species to Track Transmission of Traits: Students learn about genotypic variation in *Arabidopsis thaliana*.

Grades 9-12

More Information

Questions? Email PlantingScience staff: psteam@plantingscience.org

The Wonder of Seeds

Germination and Seedling Growth Investigation

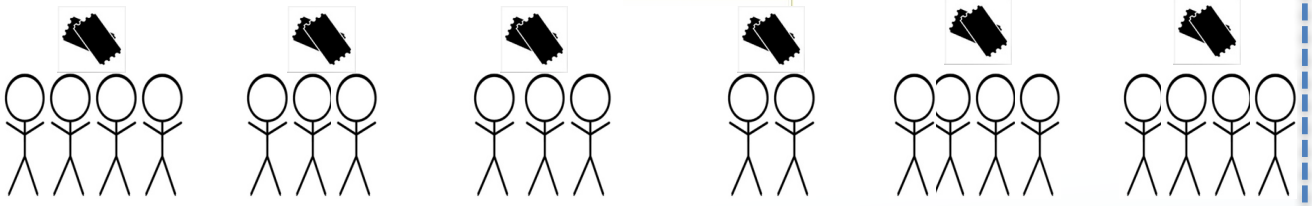
Grades 7-12

Mrs. Rebecca Buzzell

Nottingham Elementary

Nottingham, NH

Website



Plant Warriors

Nottingham Elementary
NE_F14_W01

Prediction:
What will happen if we put the buckwheat seeds under different wave length colors on the light spectrum such as red and violet? Will the

Cornicles of Science

Nottingham Elementary
NE_F14_W09

Prediction:
If we place our Buck Wheat seeds at different temperatures, then will it change the amount of

ABC Stalkers

Nottingham Elementary
NE_F14_W07

Prediction:
Will the radishes grow faster upside down or right side up?

KKS=Korny Korn Stalks

Nottingham Elementary
NE_F14_W08

Prediction:
Will Rye Grass grow faster and taller than Buckwheat under the same conditions? :D

Super Stimuli Discodancing Kernels- Sierra, Sam, Delaney, and Katy

Nottingham Elementary
NE_F14_W02

Prediction:
How will the plant react if it is put through 2 variables- various obstacles and gravity?

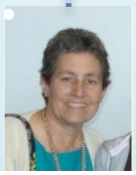
Vicious Violets

Nottingham Elementary
NE_F14_W03

Prediction:
Will plants grow taller when watered with water mixed with the inside of vitamin D3 1000 IU versus crushed up

Miss Rachel Hackett
Central Michigan University
Biology
Mt Pleasant, MI

Dr. Stephen Stern
Colorado Mesa University
Biology
Grand Junction, CO



Dr. Joan Hudson
Sam Houston State University
Biological Sciences
Huntsville, Texas

Janet Van Zoeren
University of Wisconsin-Madison

Madison, WI

Chris Loebach
Illinois State University

Normal, Illinois

Alona Banai

Oak Park, IL

planting science

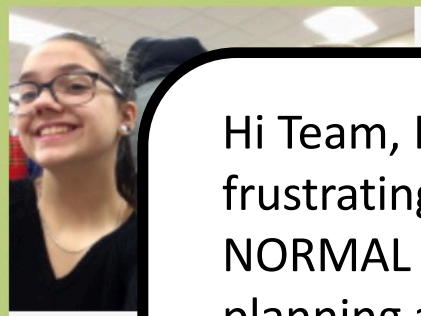
ABOUT PROJECTS TEACHERS SCIENTIST MENTORS STUDENTS DONATE

You are here: Home / Groups / MHS Schelling Spring 2017 / Projects / The Tree Musketeers

The Tree Musketeers

Project by group mhsschellingspring2017

Project reviewer



Hi Team, I'm sorry to hear your project is frustrating. Remember that this is VERY NORMAL in science. I've spent many projects planning and planning and getting everything in order, and things still go wrong! It is just a part of the game, and happens to scientist at ALL levels – so you are not alone at all! In terms of how to improve things…

so much for

d it showed :)

PlantingScience Staff May 3 at 04:46pm

said

Looks like you are in the final stages of your projects

It's great to see that teams from your school are wrapping up and posting conclusions. Enjoy the final stages of your project, and feel free to post any final comments or questions you have...

more

Jennifer Robison Apr 28 at 11:45am

said

Hi Muskateers!

Thanks for letting me accompany you on your science journey this semester it. I am glad you

Welcome to the teacher page for PlantingScience.

The teacher page contains all the information you need to register, monitor your students progress, and communicate with other educators and the scientist mentors.

(Edit menu #114)

My Students' Research

Team Code	Team Name	Last Project Update	Last Comment	By	Mentor

Other Projects I've commented on

Team Code	Team Name	Last Project Update	Last Comment	By	Mentor
SPH__W12	Fire & Ice	Feb 19, 5:55 pm	May 16, 2:30 pm	1NMiller2	Natali Ramirez-Bullon
GNA__W20	Team Puppies	Apr 29, 3:15 pm	May 12, 11:11 am	1SFong	Stephanie Fong
GNA__W16	ABC's	Apr 27, 1:54 pm	May 11, 11:57 am	1KChristie	Kyle Christie
KHSA_16S_C01		Feb 24, 2:28 pm	May 11, 8:47 am	zinx	Jeff Atkins
DMTI_16S_A01	Arabidopsis Growth	Mar 15, 4:04 pm	May 10, 10:42 pm	1RChauhan	Ravendra P. Chauhan
LSG_S16_W02	We Have	May 4, 6:15	May 10,	elling2003	Laura Super

(Edit menu #150)

Join as a Teacher

(Edit menu #107)

My Info

- Edit My Information
- Update My Name for "Comments" and timezone
- Update My Email Address
- Update My Password
- Add/Update My Image
- View My PlantingScience Profile

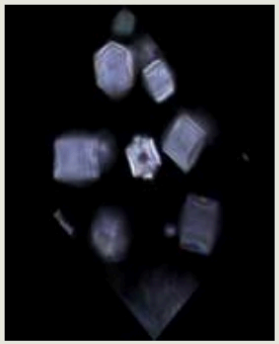
Apply for Next Sessions

- Application form for Spring 2016

My Students and Teams

- Team Setup Instructions (PDF)
- Registered Students

(Edit menu #73)



–

About 75% of flowering plants produce calcium oxalate crystals in some or all of their organs. Why must plants store crystals, oil bodies, and other products in their cells?

(Edit menu #74)

Meet our Scientists

Rebecca Povilus

Botanical Society Of America
leading scientists and educators since 1893

BSCS
A SCIENCE EDUCATION CURRICULUM STUDY

American Society of Plant Biologists

planting science

DIGGING DEEPER

An NSF-funded Collaborative Professional Development/ Impact Study

- Modernize UX
- Allow more community interaction between teachers and scientist mentors
- Provide more control to teachers/less responsibility for program administrators
- Be part of something larger – develop features for the larger HUBzero community

planting science

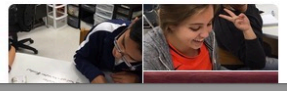
ABOUT PROJECTS TEACHERS SCIENTIST MENTORS STUDENTS DONATE

Tweets by @PlantingScience

PlantingScience Retweeted

RHS Science Dept.
@RHSScienceDept

AP Bio designed experiments to test how plants obtain & use energy to grow! Stay tuned! @PlantingScience



HELP US GROW!

Your contribution at any level will go directly toward increasing capacity to serve more teachers and students and it will help to sustain the program. Get a print copy of the book *Inquiring About Plants: A Practical Guide to Engaging Science Practices* by

SEEKING MENTORS

We are looking for new mentors for our Fall 2017 Session.

Volunteer as a scientist mentor

FEATURED TEAMS STAR TEAMS

Each week we feature some of the best projects of the current session here. Go to the Star Projects Gallery to see all the excellent work by star teams in past PlantingScience sessions.

Usability Services

Gateways help solve the mysteries of the universe. For example, Galaxy Zoo enlisted non-scientists to help categorize astronomical images, whereas LIGO (Laser Interferometer Gravitational-Wave Observatory) captures signals from distant universes. (Credit: NASA/JPL-Caltech)

Ask an Expert
Custom Development
Technology Advice
Business Planning
User Satisfaction
Usability Services
Campus Development Groups
How to Work with Us
Our Clients

Usability consulting services with our faculty-supervised interns can make your gateway satisfying for your users

Why might I want usability evaluation services from SGCI?

Usability (or User Experience) consultants make sure that everything is **easy to find, read, and use on your gateway.** The best gateways optimize their design and functionality based on the needs, requirements, and expectations of the gateway's community.

Getting a thorough usability evaluation of a gateway can be time-consuming and expensive, and doing this extensive research and testing takes skill and an outsider's perspective. **SGCI offers usability evaluations by master's student interns** from the University of Michigan School of Information and Purdue University, as well as high-level usability strategy advice.

Usability Services

Meeting to develop a plan for usability services and timeline

- Heuristic evaluation
- Workflow analysis
- Comparative Analysis

Revisions made/mockups generated

- Usability Testing

Additional revisions made

Heuristic Evaluation

What is it?

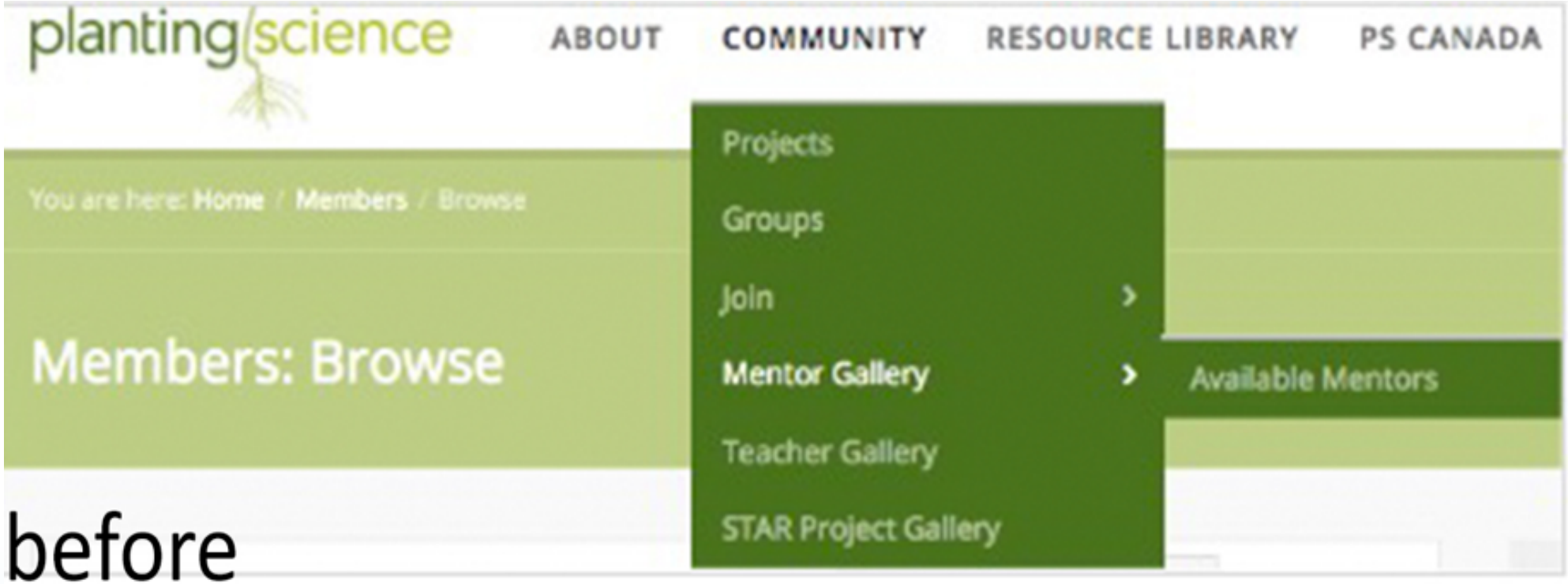
- Usability Engineering method to inspect usability problems based on usability principles
- Efficient way to find basic and critical usability violations

Key Findings:

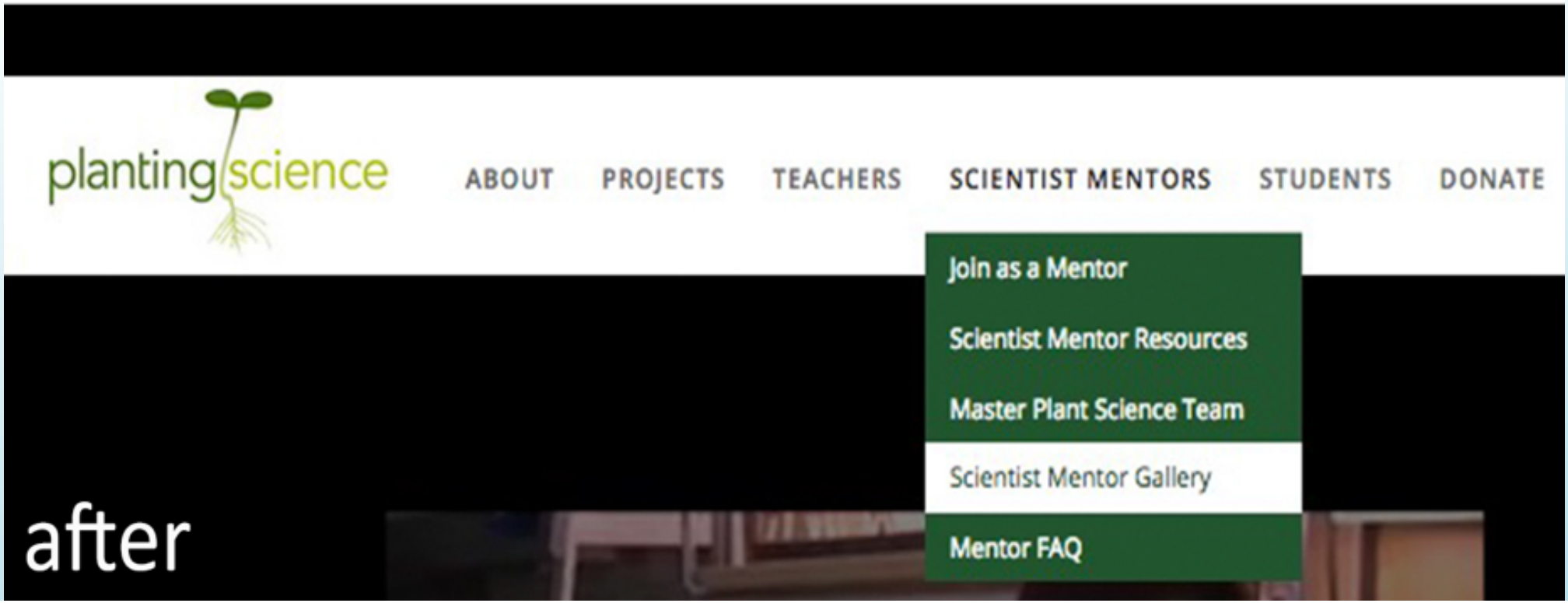
- Filters for finding mentors were difficult to use due to ambiguous labels and a complex design
- Navigation was confusing due to scattered menus and unlinked sub-pages
- The main navigation menu had low visibility due to the low-contrast color schemes between text color and background

Outcomes:

We redesigned menu organization and fine-tuned color scheme. We redesigned filters (including input from comparative analysis)



before



after

before

Filter results: Name

+ Add filter

Applied filters: × *Capacity is les*

- ✓ contains (LIKE)
- equals (=)
- doesn't equal (≠)
- is greater than (>)
- is less than (<)
- is greater than or equal to (>=)
- is less than or equal to (<=)

Filter results: Preferred Investig | is greater than (>)

- ✓ The Wonder of Seeds (seed germination and growth)
- The Power of Sunlight (photosynthesis and respiration)
- What about Pollen? (pollen and pollination)
- Celery Challenge (plant anatomy, osmosis and diffusion)
- Foundations of Genetics (traits, variation and environment in rapidly cycling Brassica)
- Genetics in Arabidopsis (investigation with a model species to track transmission of traits)
- C-Fern in the Open (sexual reproduction, alternation of generations)
- Agronomy Feeds the World (where does food come from?)

Applied filters: × *Capacity is less than*: 100 × *Role*

Sort results: Name | ASC

Members: Browse

Filter results: Name | contains (LIKE)

+ Add filter

s (LIKE) | Jason

Members: Browse

after

Narrow results

Search

Name or keyword...

Availability

- [x] Available
- [ ] Not Available

Class Level

- [ ] Middle School Students (Grades 6,7,8)
- [ ] High School Students (Grades 9,10,11,12)
- [ ] Undergraduate Students

Investigation Themes

- [ ] The Wonder of Seeds (seed germination and growth)
- [ ] The Power of Sunlight (photosynthesis and respiration)
- [ ] What about Pollen? (pollen and pollination)
- [ ] Celery Challenge (plant anatomy, osmosis and

Applied filters: *Availability*: Available ✕ *Role*: Scientist Mentor ✕

Vrentas, Catherine

18 Active projects
0 Invites
2 Possible

Role: Scientist Mentor

Zumwalde, Bethany

17 Active projects
0 Invites
2 Possible

Role: Scientist Mentor

Lynn, Austin Michael

15 Active projects
0 Invites
2 Possible

Role: Scientist Mentor

Clark, Katie

0 Active projects
3 Invites
4 Possible

Role: Scientist Mentor

Shukla, Devesh

0 Active projects
0 Invites

Suissa, Jacob S

0 Active projects
1 Invites

Workflow Analysis

What is it?

- Finds barriers and problems in processes
- We specifically examined the initial process for setting up student groups and preparing the online space for our participants

Key Findings:

- The lack of capability to manage documents for creating student accounts made the process complex and caused delays in creating groups
- The process for assigning mentors and students to groups was difficult, requiring labor and time due to the inconvenient interface

Outcomes:

We designed a new user interface for teachers to create and manage student accounts and project management

We streamlined the process of assigning mentors and students to groups

Comparative Analysis

What is it?

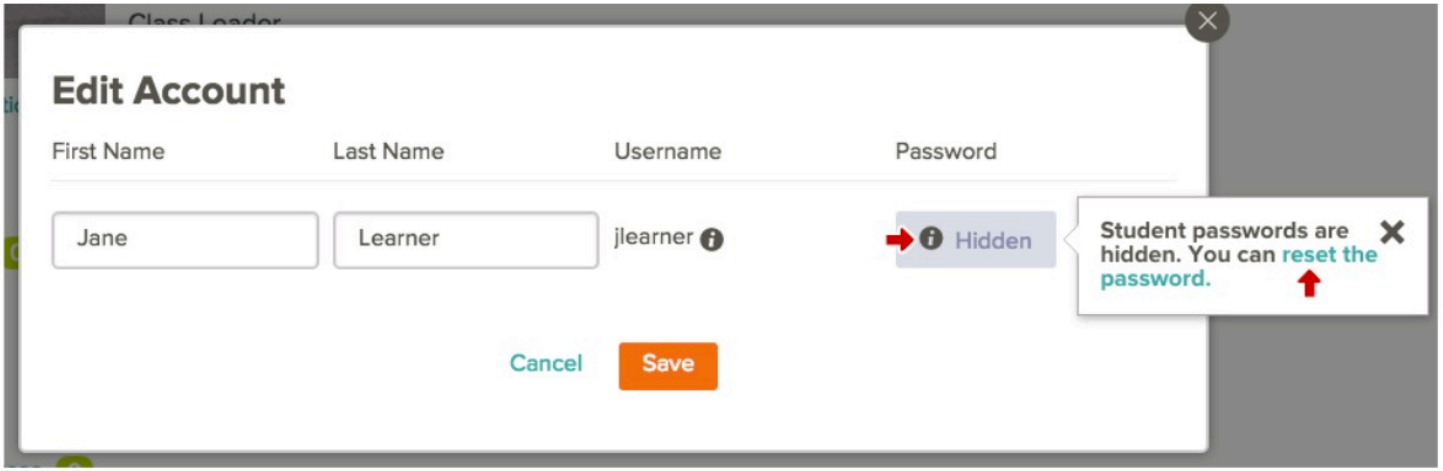
- A review of applications or websites similar to the website being evaluated
- Examine what competitors have done
- Allows to identify problems and establish benchmarks for comparison
- Understand industry standards or best practices

Key Findings:

- Websites like CK12.org have interfaces that allow teachers to create student accounts for their students, while Socrative.com and Powerschool.com allow teachers to import rosters
- Google Photos, Pandora.com, Canva.com, Flickr.com, CK12.org and stackexchange.com all present ways to assign items to different groups
- E-commerce sites provide examples of filtering and searching conventions

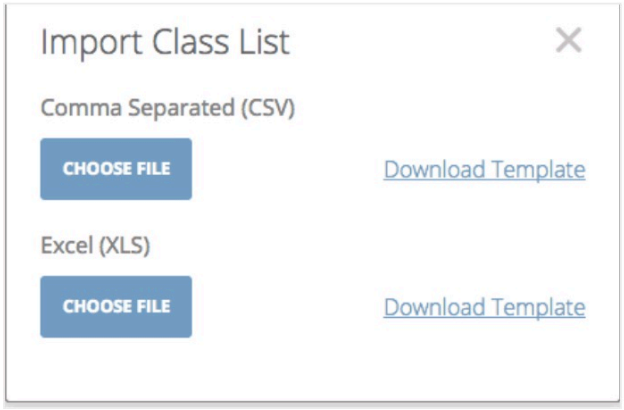
Outcomes:

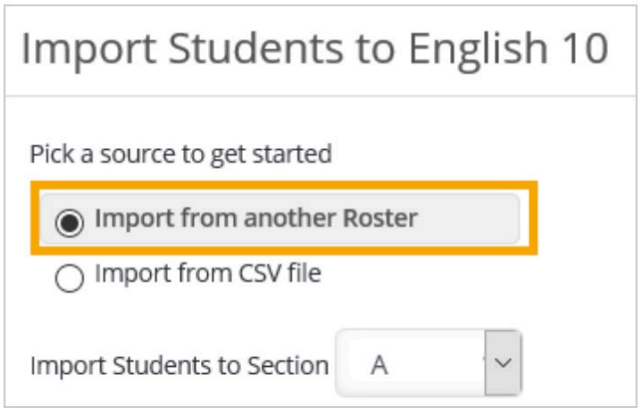
Comparison sites informed design of our filtering component and our new interface for adding student accounts



Reference 1: www.ck12.org/teacher/

CK12.org allows teachers to create student accounts by adding each student's information (name, username, and password) on the website. It also provides a feature to reset a specific student's password so that it reduces administrative effort.



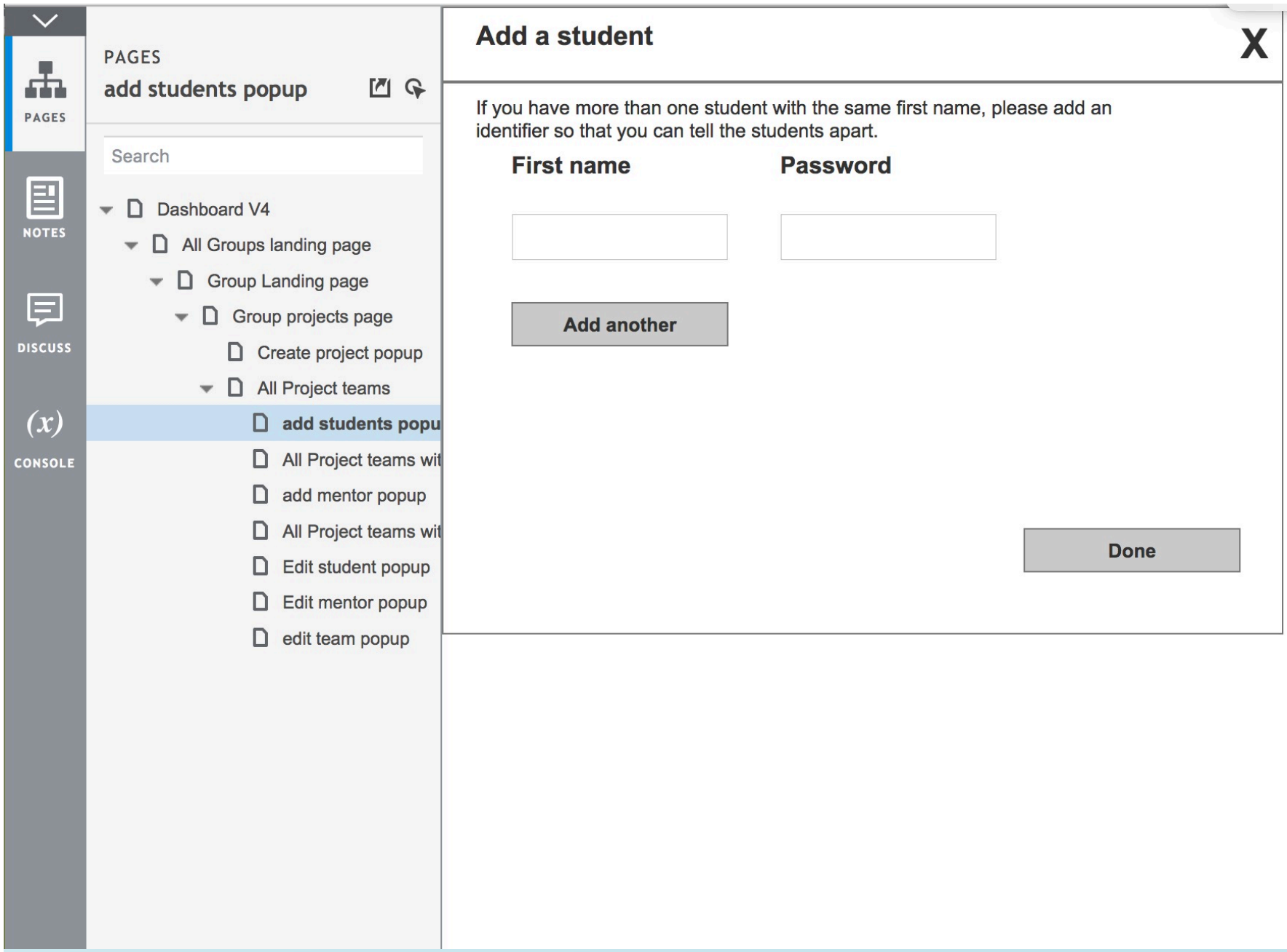


Reference 2: help.socrative.com

Reference 3: learning-support.powerschool.com

Socrative.com and Powerschool.com both allow teachers to import roster files to the website so that teachers do not have to add students one by one.

Mockups created using Axure



BEARS

Do plants
the dark ?
Light

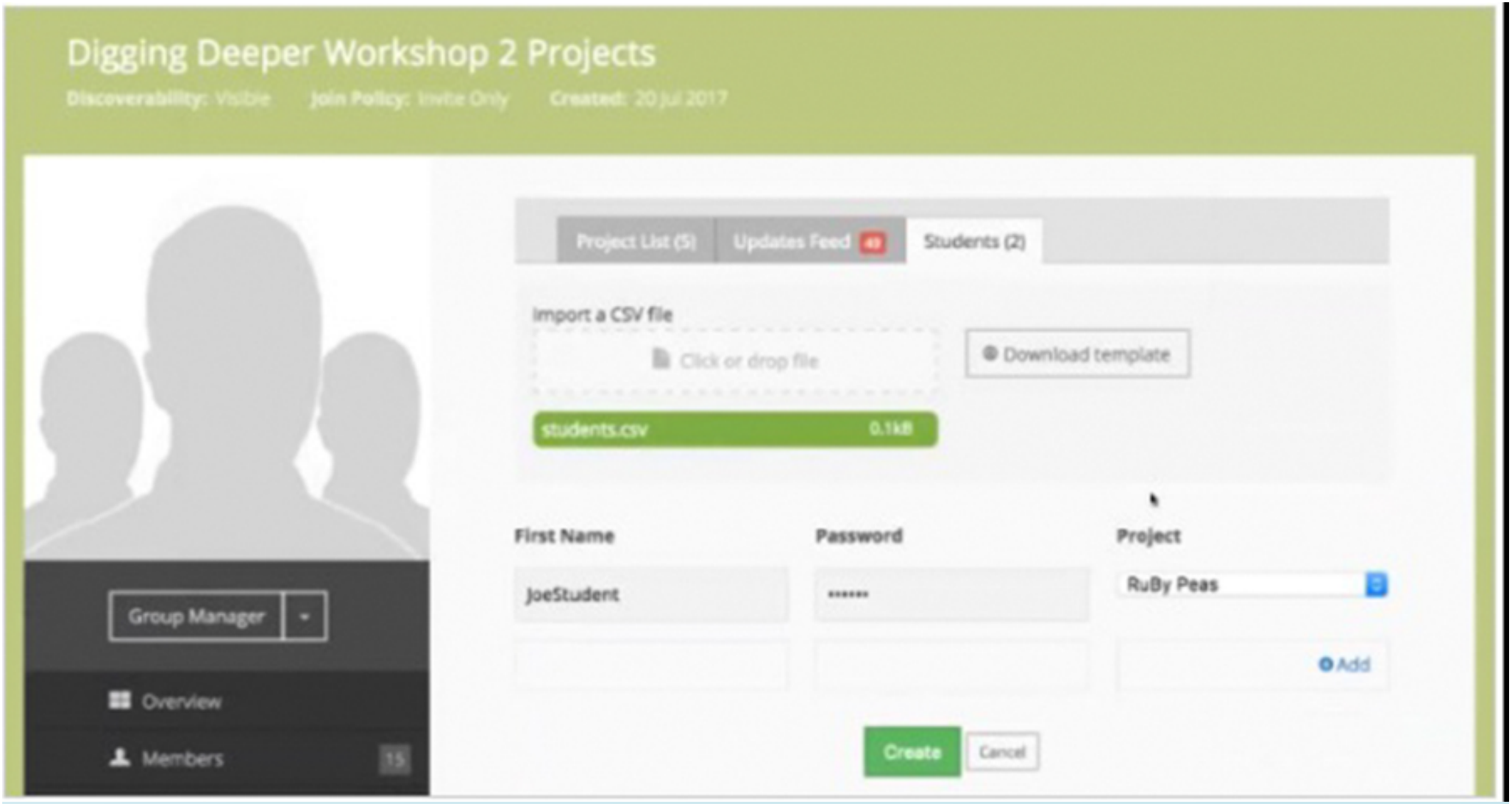
Usability Testing

5 teachers from workshop asked to:

1. Using wireframes, create team projects in AA High School group and add students and mentors to the project
2. Using wireframes, 1) change team name; 2) reset student password; 3) remove mentor from a team
3. Using mentor gallery, select 3 mentors for your student teams; include 1 mentor who works with middle school students and two mentors who are in the early stages of their career.

Findings from Usability Testing

- Participants were unsure of starting point for creating projects
- Participants wanted an easier way to add multiple students
- We learned a lot about where users expected to find different features and insights allowed us to streamline UX even further.


Digging Deeper Workshop 2 Projects
Discoverability: Visible
Join Policy: Invite Only
Created: 20 jul 2017
Project List (5)
Updates Feed 49
Students (2)
Import a CSV file
Click or drop file
Download template
students.csv
0.1kB
First Name
Password
Project
JoeStudent
RuBy Peas
Add
Group Manager
Overview
Members
35
Create
Cancel

Members: Browse

Narrow results

Search

Name or keyword...

Availability

- [x] Available
- [ ] Not Available

Class Level

- [ ] Middle School Students (Grades 6,7,8)
- [ ] High School Students (Grades 9,10,11,12)

Applied filters: *Availability*: Available ✕ *Role*: Scientist Mentor ✕

Brock, Kelsey

0 Active projects
1 Invites
2 Possible

Invite to Group

AHS Keymel Fall 2017
ALJHS Nagourney Fall 2017
AMHS Shepley Fall 2017

Brown, Kate

0 Active projects
0 Invites
5 Possible

Invite to Group

Role: Scientist Mentor

Lessons Learned

Continuous improvement is necessary for the growth and successful development of any project.

Take advantage of UX consultants!

Keep an eye to the future and plan for iterative changes so you can continually meet users' expectations and reduce administrative burdens.

Involve your users! They can provide insights that are hard to get elsewhere.

Allow time for UX evaluation

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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Science Gateways Community Institute

are you taking part in the evolution?

planting science

join us, make a difference