Peloton: A Teamwork Tool for the Classroom

Diego Salvatierra & Nina Slote

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ABSTRACT

Our Master's Project, Peloton, is a teamwork tool for the classroom. It takes the shape of a web application that can be integrated with Google Classroom. The specific learning problem Peloton addresses is that students with low status characteristics learn less in group projects because they do not participate as much and thus develop lower self-efficacy. This learning problem is important to mitigate the gap in learning outcomes between different groups of students that plagues classrooms. Our specific learner demographic is high school students in STEM classrooms. One unique challenge of designing for high school students is that they have had years to develop negative self-perceptions, and therefore require repeated mindset interventions to undo the way they view themselves as learners. Our general approach includes assigning competencies to students so they view themselves as experts, and relying on the protégé effect so that students build confidence and skills by teaching others. We are also focusing on social-emotional skills that are often not often captured by content-focused assessments in the classroom. User testing revealed that Peloton does indeed facilitate students in giving meaningful feedback to peers; further testing will examine the long-term effect of using the app with students.

Link to a shareable version of our final product here.

CHALLENGE

Peloton aims to teach high school students give feedback to peers on social-emotional skills, thus allowing them to learn from each other and gain self-efficacy and confidence through peer teaching.

There are two major learning challenges that Peloton seeks to address. For one, there is a lack of opportunity for students to engage in social and emotional learning (SEL) in traditional classrooms. Secondly, status differences amongst students working in a group affects learning outcomes.

Challenge One: Students Lack Opportunities to Develop Social and Emotional Skills

During user testing, a particular moment elucidated the need for students to learn and appreciate social and emotional skills. As a group of ninth-grade algebra students worked together on a problem involving rates of change, one young woman in the group struggled to understand how her peers came up with their answer. In defeat, she stated “I don’t get this - I’m stupid.” For the remainder of the time the group worked together, this student disengaged from the work and when asked how her group came to their answer, was not able to demonstrate her learning. This experience told us that her self-perception as a student was completely wrapped up in following the content of the group work rather than other skills such as organization or leadership that she brought to the team. Peloton aims to intervene in that way of thinking by offering regular feedback on and engagement with social-emotional learning. By integrating Peloton into the classroom, teachers can emphasize to students that SEL is as important as acquiring content knowledge.

Research shows that many of students lack social-emotional competencies. In a national sample of 148,189 sixth to twelfth graders, for example, only 29% to 45% of surveyed students reported that they had social competencies such as empathy, decision making, and conflict resolution skills (Durlak et al., 2011, p. 405). Social and emotional learning programs, however, have the capacity to improve students’ social and emotional skills, attitudes, behavior, and academic performance. In a meta-analysis of 213 SEL programs, students who participated reflected an 11-percentile-point gain in achievement in those categories (Durlak et al., 2011, p. 405).

Furthermore, research by Abner et al. (2011) suggests that effective SEL programs may be the key to effective low-income schools. Once there is trust between students and adults in the school building, then behavior can improve and learning can flourish.

Students in schools at the the Knowledge is Power Program (KIPP), for example, are taught SEL and show higher graduation rates and standardized test scores than students from similar backgrounds. Despite the promise of SEL to teach all students skills that will allow them to succeed in the modern economy, there continues to be an emphasis on teaching and testing for high-stakes standardized tests over “soft skills” that will benefit students in the long-run. As Abner et al. state:

> But despite their importance to education, employment, and family life, the major educational and school reforms of the K–12 system over the last few decades have not focused sufficiently on the socio-emotional factors that are crucial to learning. Though most teachers believe that schools have a fundamental responsibility to educate the whole child, education policy has focused disproportionately on high-stakes accountability strategies based on results from standardized academic achievement tests. We believe that the education gap can’t be closed unless and until schools commit to and become skilled at educating the whole child (2011).

Peloton therefore aims to fill the gap of social and emotional learning for high school students by easily integrating into existing classroom technology and practices.

Challenge Two: Status Differences Amongst Group Members Affects Learning Outcomes

Research shows that collaborative group work can provide a fertile environment for learning when certain conditions are met (Barron, 2003, p. 307). However, there is often a power imbalance observed in group dynamics that privileges certain voices more than others based on status characteristics such as language proficiency (Cohen et al., 1999, p. 80).

One of the authors saw this dynamic play out in her five years of teaching high school science in urban public schools with a significant English Language Learner population: when she assigned group work, native English speakers often dominated the dialogue, had more practice with academic language, and therefore gained greater understanding of material as compared to their peers with lower levels of English proficiency. This classroom dynamic contributes to a persistent achievement gap between English Language Learners and their native English-speaking peers, and furthermore, may affect their self-efficacy in the long-run (Cohen et al., 1999, p. 83).

Peloton is designed to level the playing field in group work by granting all students in a group work context an area of expertise.

LEARNING

Learning outcomes

We want students to learn to see themselves as contributors to a team. The post-intervention learner will be able to identify an area of confidence and help their team grow in that are by giving praise and useful feedback and listening to their peers' contributions. This learning outcome has been redefined over the course of the quarter. We shifted our student learning objectives from focusing on skills to students' attitudes, thinking about how might we help students recognize their abilities to participate even when they don't consider themselves content expert.

Approach to learning

As we iterated, improved, and added to our design this quarter, we identified several ideas rooted in educational research that proved valuable to grounding our approach. The main ones are as follows.

1. Assigning competence (Rachel Lotan)

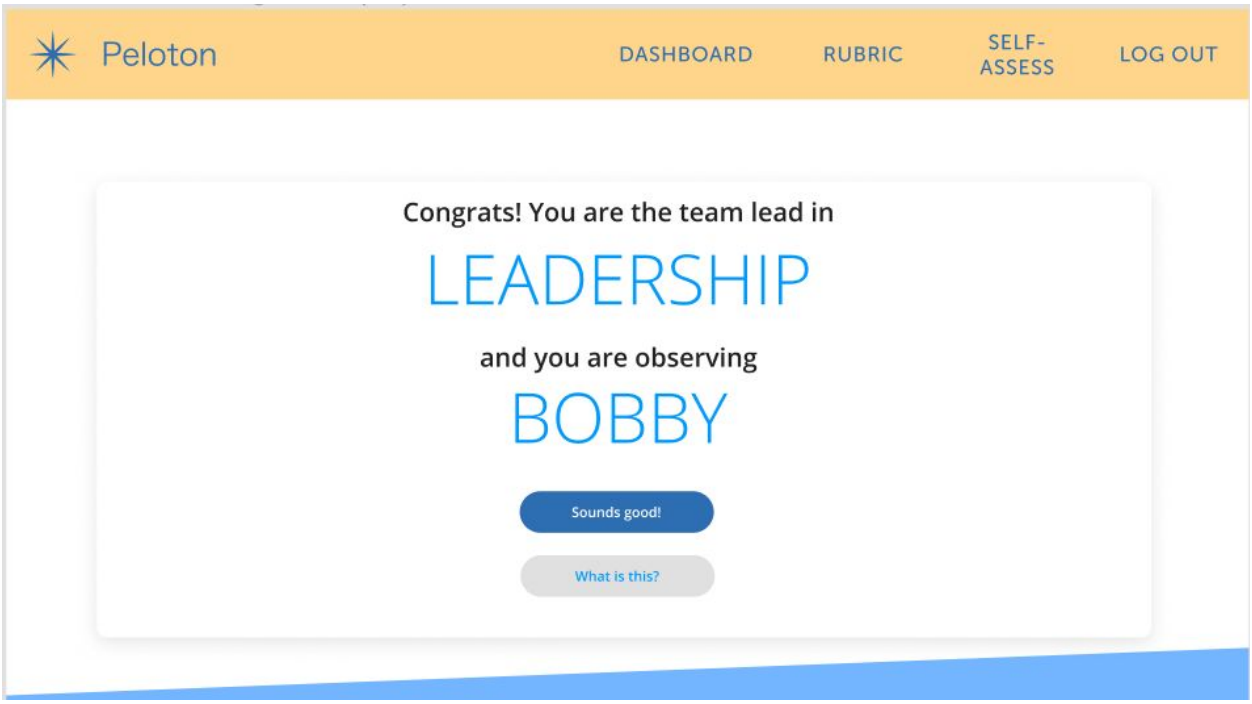
Our project focuses on learners in high school and middle school. We specifically want to help students from low-status demographic and socio-economic groups, or students who generally lack self-confidence and a sense of belonging in the classroom. This is why our project focuses on "**assigning competence,**" or giving students a role and authority in some specific skill area.

This idea of assigning competence has its root in the writings of Elizabeth Cohen and Rachel Lotan and others, who developed the theory of "complex instruction." Cohen and Lotan propose assigning competence as an intervention "to boost the participation of a low-status student" (Cohen & Lotan, 158). This works both through raising the students' confidence in his or herself as well as through raising the expectations others have of them. Cohen and Lotan have conducted research in classrooms in support of this idea (Cohen, 1988; Cohen & Lotan, 1995).

2. Elements of motivation (BJ Fogg)

Another learning principle relevant to Peloton is BJ Fogg's **elements of motivation** within the FBM (Fogg Behavior Model). In his article "A Behavior Model for Persuasive Design," Fogg lays out three major elements of motivation: pleasure/ pain, hope/ fear,

and social acceptance/ rejection (2009, p. 4). Our design works within the latter framework of motivation, as students showed that they were more motivated to work in groups with the use of Peloton because they knew they were being directly observed. As the screenshot below demonstrates, students are each assigned one particular student to observe. For this reason, students are more accountable for their actions because they are given feedback by a group member in front of the group. In one conversation during user testing with a 9th grade algebra student, for example, he told us that he was “less likely to slack off knowing that other students were paying attention to him”. This indicated to us that he was trying to avoid social rejection by being the student in the group not following along or contributing. As Fogg states, “It’s clear that people are motivated to do things that win them social acceptance. Perhaps even more dramatically, people are motivated to avoid being socially rejected” (2009, p. 4).

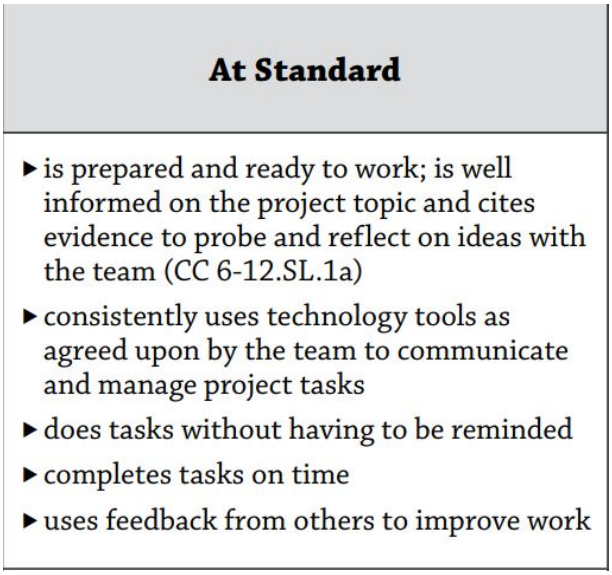


Students are assigned one specific student to observe. User testing revealed that this design choice motivated students to stay engaged in group projects because they were held accountable by a partner in their group.

3. Optimizing for ability (BJ Fogg)

The third learning principle that influenced our design, **optimizing for ability**, also comes from BJ Fogg’s FBM. To move users across the behavior activation threshold, Fogg suggests the following: “...to increase a user’s ability, designers of persuasive experiences must make the behavior easier to do. In other words, persuasive design

relies heavily on the power of simplicity" (2009, p. 5). This was an important principle for us to consider because Peloton is asking a lot of students: on top of completing an academic task, we are also asking them to assess and give feedback to a group member on their performance. To encourage students to utilize the app to its fullest potential and not cognitively overload, therefore, we designed for simplicity in several ways. For one, we aimed to always write student-friendly language that was accessible to most students regardless of English language proficiency. As shown in the screenshot below, the first iteration of our skills rubric was based on language from the Common Core State Standards. Students reported, however, that the text was too long and confusing to remember. In our second iteration of the rubric, therefore, we used lower-tier vocabulary, visuals, and shorter phrases in order to help students internalize the content more easily. This design change reduces the amount of time it takes students to read the rubric and how much hard thinking goes into that process, two elements of simplicity that Fogg advocates for in optimizing for ability.



At Standard

- is prepared and ready to work; is well informed on the project topic and cites evidence to probe and reflect on ideas with the team (CC 6-12.SL.1a)
- consistently uses technology tools as agreed upon by the team to communicate and manage project tasks
- does tasks without having to be reminded
- completes tasks on time
- uses feedback from others to improve work

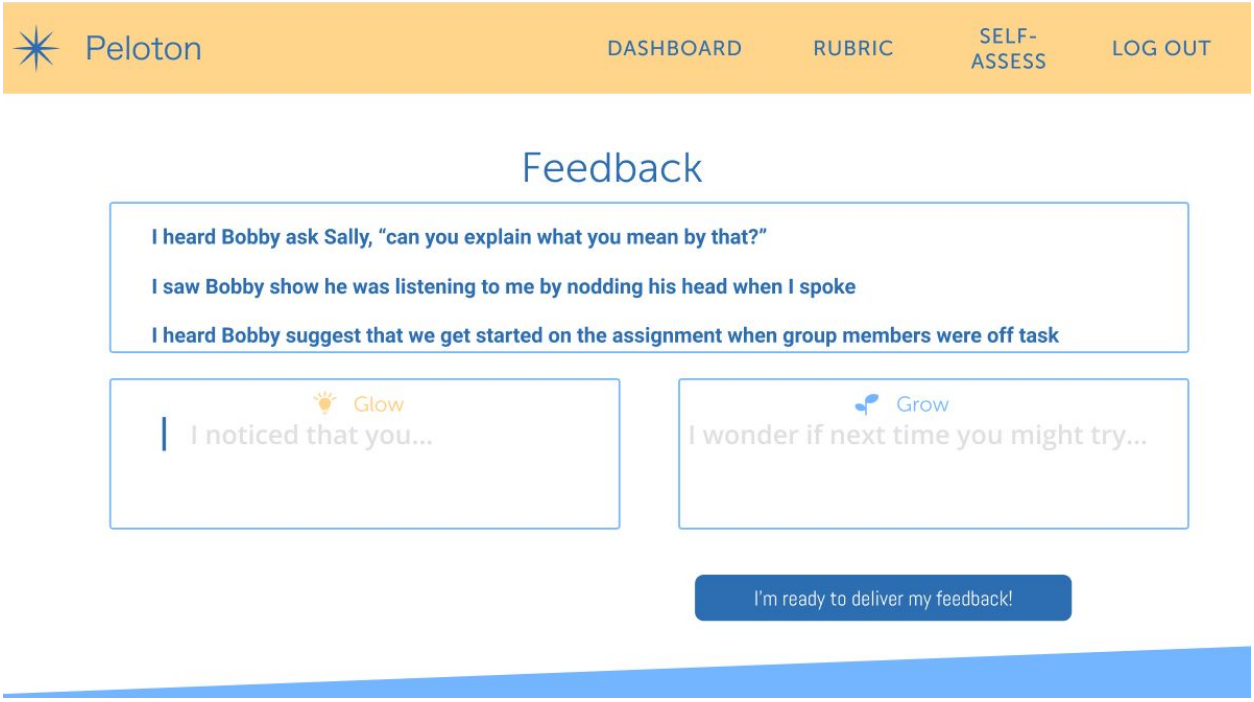
A first iteration of Peloton's skills rubric included text that students found too long and confusing. We observed many students skipping reading the rubric.

In our second iteration of the rubric, we used lower-tier vocabulary, visuals, and shorter phrases in order to help students internalize the content more easily.

4. Wise interventions (Cohen & Garcia)

The fourth principle of learning design that inspired our project is Cohen & Garcia's notion of **wise interventions**. Their 2014 article "Educational Theory, Practice, and Policy and the Wisdom of Social Psychology" builds on previous work around the power of perception in the classroom. If a student perceives his or her intelligence as malleable, for example, they are more likely to deal with mistakes constructively versus if they view their intelligence as fixed (Cohen & Garcia, 2014, p. 13). Of the interventions that the authors review, all of them involve changing how students view their environments. If students learn that setbacks are normal or that their intelligence is malleable, for example, they are more likely to change the process by which they learn. With that in mind, Peloton aims to intervene in student's learning and assessment experiences in several ways. For one, students are being assessed on social emotional skills that are not typically measured in typical summative assessments. This signals to them that these soft skills are as important to their overall learning as mastering content-based skills. In addition, students are framed as the experts in Peloton. They are the ones deemed an expert in some category, then have the responsibility of reporting feedback based on a rubric. This reverses the role of typical classroom assessments, in which the teacher is the sole expert offering feedback to students.

Lastly, most classroom assessments are given individually and quantitatively. Students view their test score as summative and a judgement of their ability. The aim of Peloton is to offer students a more reflective space to gather meaningful qualitative data and therefore suggest specific, descriptive ways that they can improve their work rather than a number that judges their performance.



The feedback that students get through Peloton differs from traditional classroom assessments in that it is qualitative, comes from peers, and assesses social-emotional learning. The aim of these design features is for students to alter the process by which they view assessments and the skills that are most valuable to possess.

5. Triangle of acceptable play (Brian Upton)

Lastly, our design was influenced by Brian Upton's **triangle of acceptable play experiences** (Upton, 2015, p. 69). According to this two-axis framework, there are two spectra to consider when designing games. One measures player boredom versus confusion, while the other measures frustration versus satisfaction. Upton posits that the ideal game experience for most players lies at the intersections of these spectrum. Peloton aims to lie at that intersection by offering students a choice in what feedback they offer to other students with an appropriate amount of constraint. As shown in the screenshot below, for example, students have a suggested sentence starter when giving feedback that they may choose to use and then are expected to develop the rest of the feedback using specific evidence from their work time. Regarding the frustration

versus satisfaction element, future user testing aims to determine how students react to their growth with Peloton over time.

Scaffolds such as sentence starters aim to offer both clarity around expectations and the freedom for students to come up with their own original feedback. This aligns with Upton's framework of aiming to design game experiences that neither overconstrain players nor leave them confused.

DESIGN OF THE LEARNING EXPERIENCE

Existing solutions

Existing Teamwork Tools

There are many solutions that have been developed to facilitate teamwork interactions, many of them in the project-based learning context. One such example is Project Pals, a platform where teachers can assign teams and tasks and visualize project teams' progress, and where students can publish and share the files their team is working on.

What we find lacking in initiatives like these are tools that actively push students to interact in a team, or that work to feel students valued within a team.

One of the many features of Google Classroom allows students to share and comment on each other's work in a similar way to using Google Docs. This platform is a powerful way for students to connect as they work in real-time and point to specific areas in their peer's work where they would like to offer feedback. However, there is no way for students to track the feedback they receive over time or scaffolds for students to offer feedback. Peloton builds upon Google Classroom's feedback feature by offering an accessible rubric and structure for writing feedback. In addition, Peloton offers students a way to deliver feedback to peers through both writing and speaking, thus creating opportunity for dialogue and practice giving feedback orally.

Existing Social and Emotional Learning Tools

ClassDojo's popularity makes it one of the most impactful classroom tools available to help students engage in social and emotional learning: according to their website, ClassDojo is used in 90% of K-8 classrooms in the US. With the ClassDojo app, teachers select positive class values such as perseverance or teamwork, and award students 'Dojo Points' when they exhibit behavior that reflects those values. Teachers also connect with students' families to share updates and create classroom communities, and assign avatars to students called 'Dojo monsters' that show students where they have gained and lost points. One pain point of ClassDojo for teachers is how time-intensive it can be to enter and track students' behavioral data. By relying on peer feedback, Peloton takes the burden off the teacher to be tracking every students' behavior. In addition, Peloton is designed for high school students who might find monster avatars infantilizing.

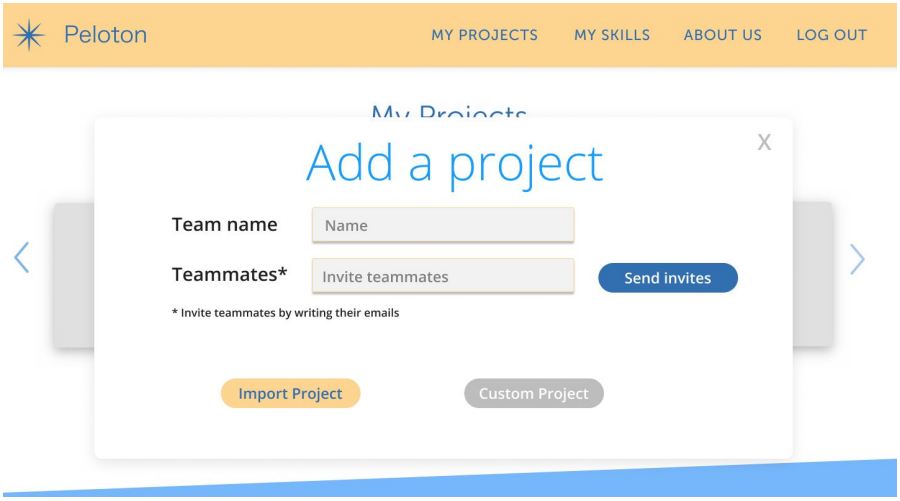
Augmented reality (AR) and virtual reality (VR) also offer social and emotional learning to learners of all ages. Emoti, a VR mindfulness exercise, exemplified one such tool. Students wearing a VR headset gain instruction in mindfulness techniques. As they engage in various simulations, biometrics offer feedback based on a student's stress level. Tools such as Emoti have great potential to influence student behavior and SEL in the classroom and take the burden off of teachers to provide feedback to each individual student. AR and VR, however, are still both in their infancy and require expensive technology that is not realistic to have in many classrooms. According to Fast Company, for example, one Oculus Rift headset costs $600 and a computer to run it costs between $1000 and $2000 (Montgomery, 2016). In addition to being an app that is compatible with technology already present in many schools, Peloton is also a joint engagement technology that fosters human connection between students rather than isolation from student's surroundings.

Each of these tools inspires and their success offers proof of concept for Peloton. Peloton stands out by offering learners both the structure for collaborative learning and social-emotional learning in one platform.

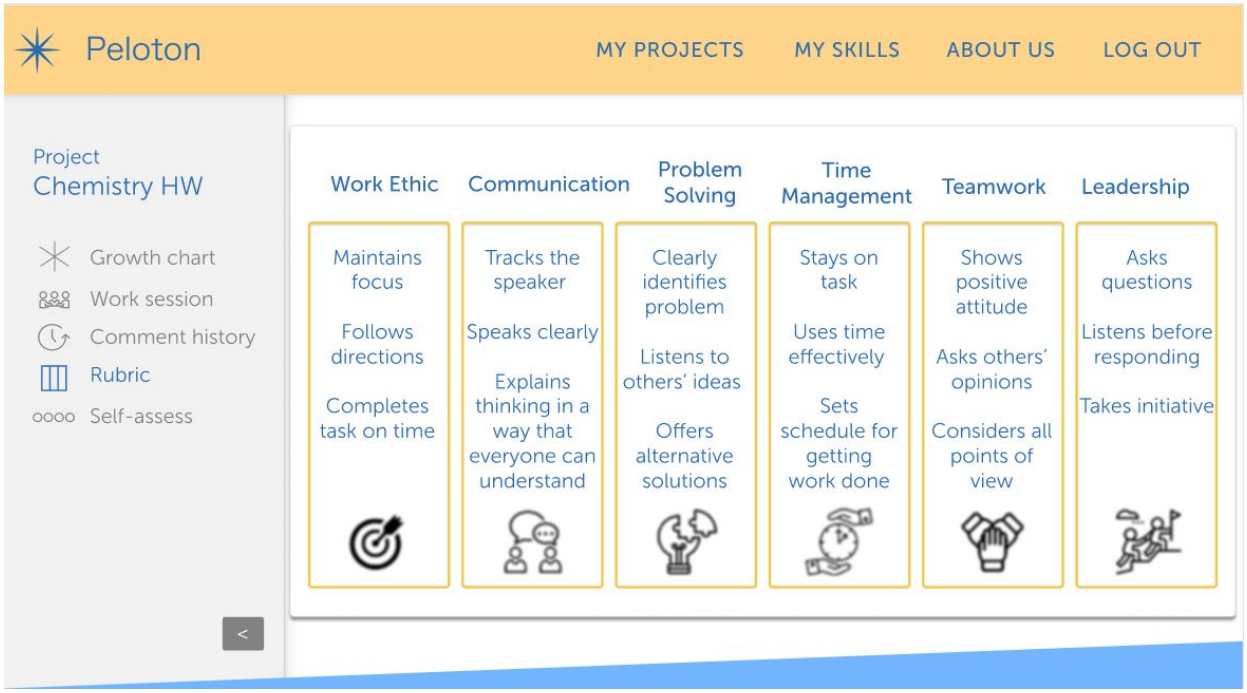
Key features & design walkthrough

Our instructional strategy is for students to learn to see themselves as a valuable part of a team. We do this by teaching them to give feedback to other students in their team on a soft skill or teamwork skill in which they feel relatively confident in. This is achieved through the following sequence of activities:

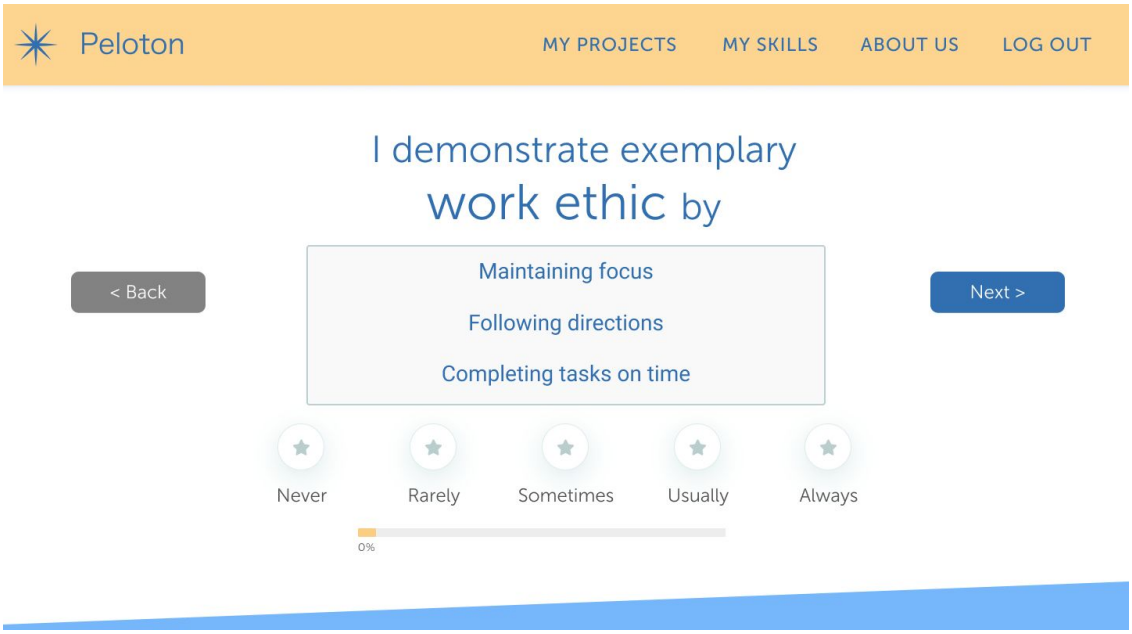
1. Students sign up on the app with their team, loading a set of soft skills and teamwork skills determined by their teacher



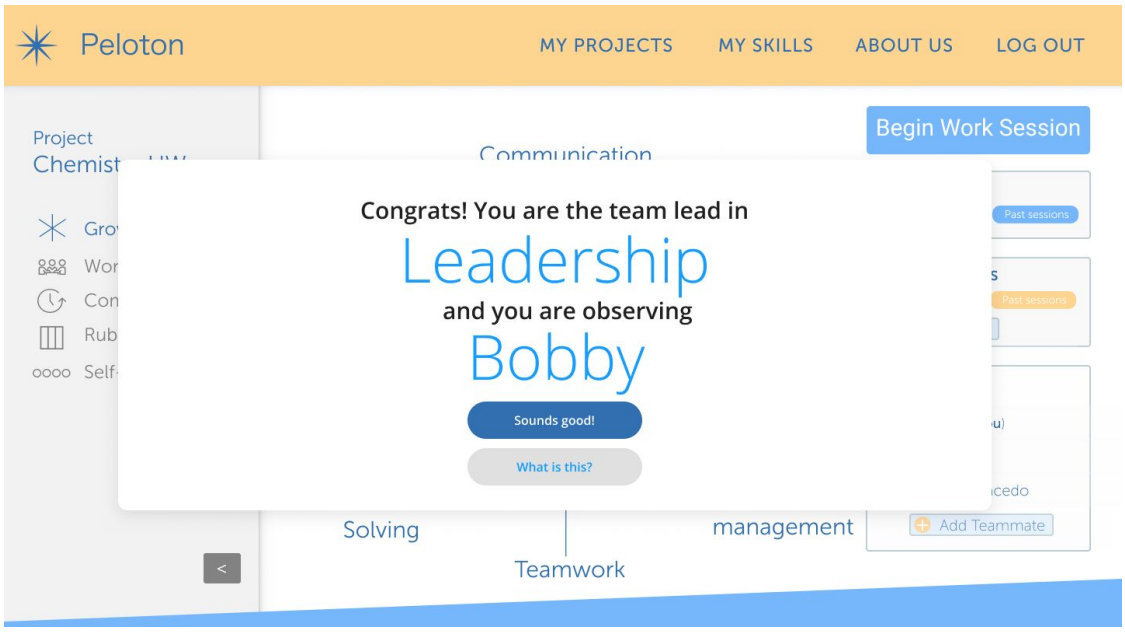
2. Once the project is launched, students have a chance to review the rubric for the set of skills selected by their teacher.



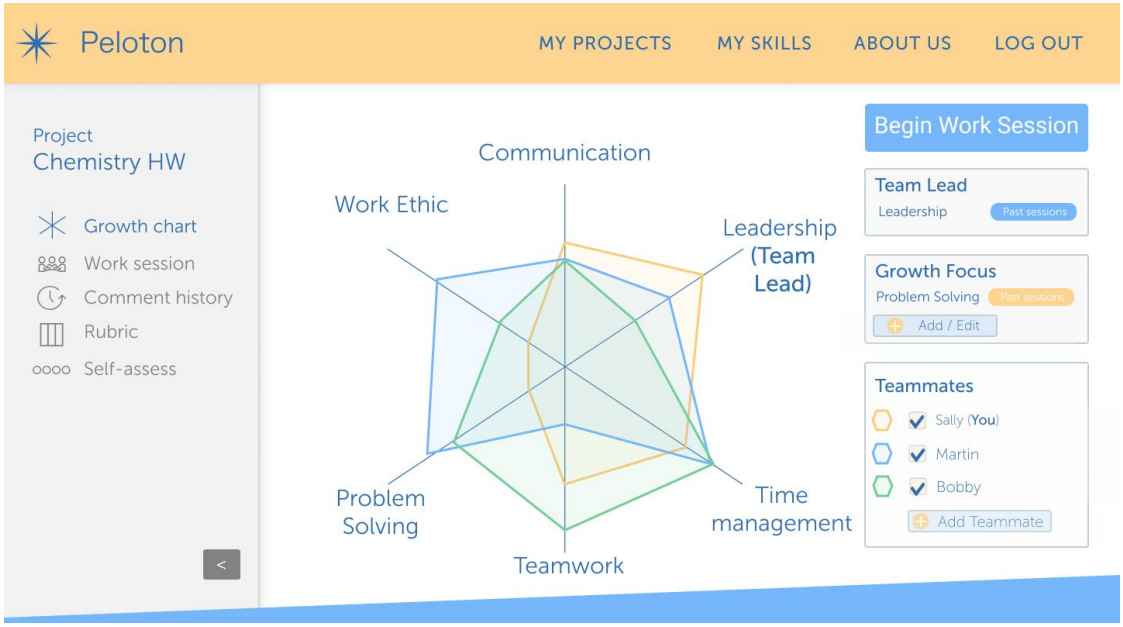
3. Students self-assess themselves on this set of soft skills and teamwork skills.



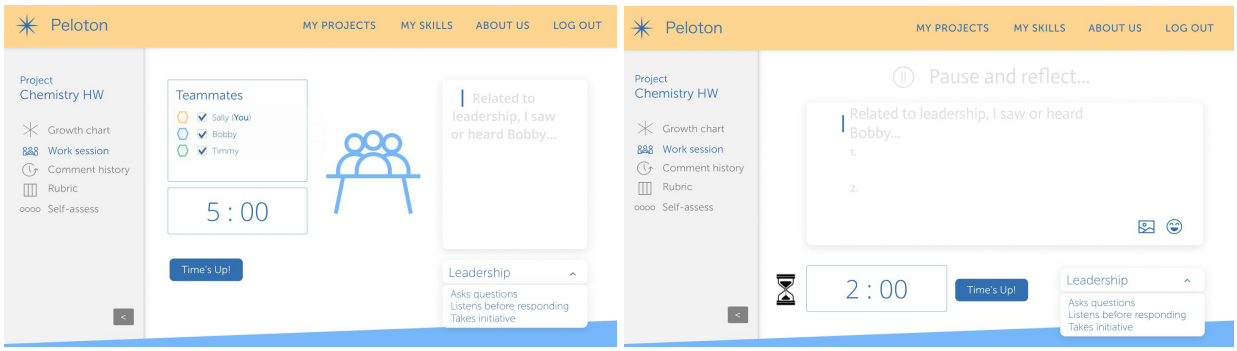
4. Based on this self-assessment, students are assigned to be the team lead in a specific skill, and are also assigned a teammate to observe and give feedback on that skill:



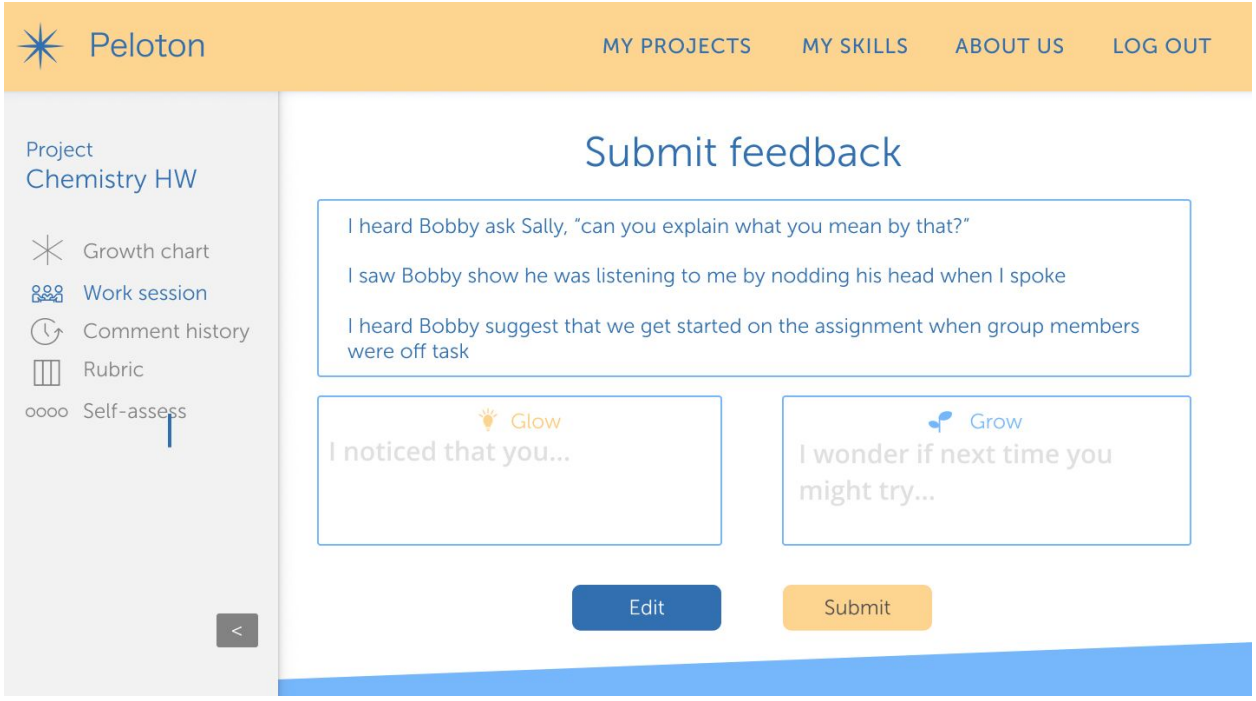
5. After this, students go to the project homepage, where they can see a chart graphing the relative confidence levels of their teammates and launch a “work session.”



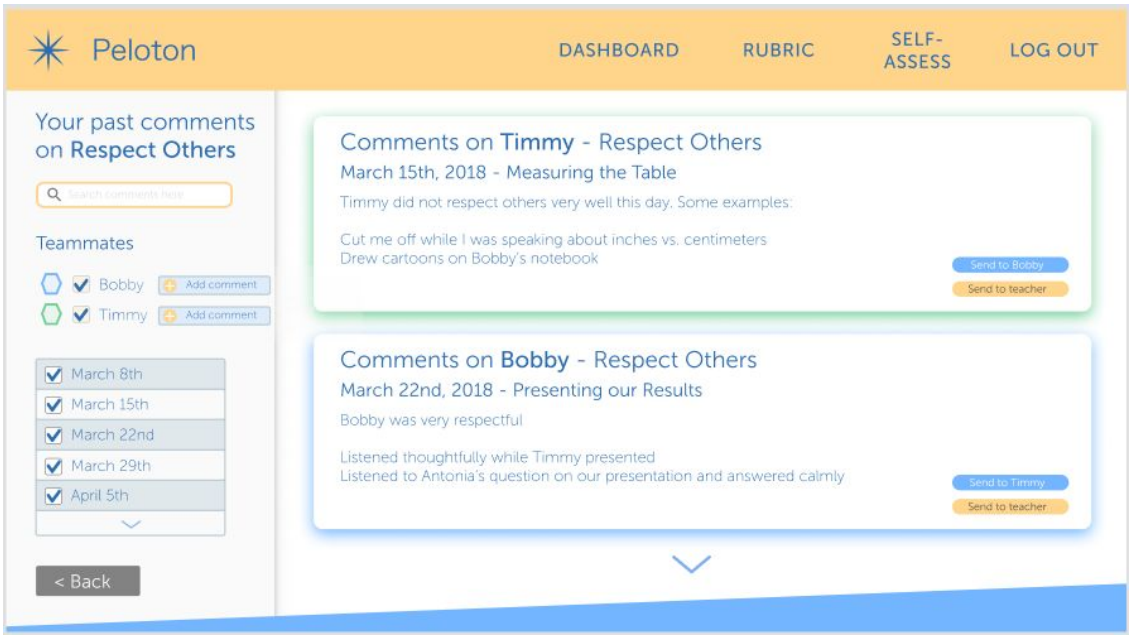
6. When students launch a work session, they are given a set amount of time, set by the teacher, to work on a class project. Once this time is up, they pause to write down notes on the teammate they will be giving feedback to.



7. After several cycles of work and note-taking (defined by the teacher), students have a chance to review their notes and summarize it into a feedback message to be sent to their teammate and teacher.



8. To promote reflection, students can also review the history of past comments they have sent and received



EVIDENCE OF SUCCESS

User testing up to this point has focused on usability for our target learners. Below is a description of our user testing and key insights.

We carried out user testing at several schools in the Bay Area. On May 17th we visited a school in San Francisco belonging to the KIPP network of charter schools. We were in a high school chemistry class, where students were working in teams. One team of students used our Figma prototype, complemented by worksheets that simulated the app's functionality. The three students went through the soft skills self-evaluation in our app, and then had a work session in which they worked on their regular classwork, while writing down feedback to give each other.

After they gave each other their feedback and finished the app's cycle, we had a follow-up interview with the students to get their opinion on what could be improved and what worked well. From the students' feedback and our observation, we made the following major changes:

1. Added prompts to guide students on how much feedback to give.
2. Added sentence-starters to help students give more concrete feedback with examples.
3. Simplified the language in the skills rubric
4. Improved the UI for self-assessing skills: changed the position of explanatory box that reminds students of the description of each skill
5. Created a "past comments" page

There were also two major changes that we considered but have not implemented yet, as we have doubts about them and they will depend on further testing:

1. Add the ability to send separate feedback to peer and to teacher
2. Change self-assessment from multiple-choice Likert scale to draggable scroll bar

We are considering doing some A-B testing with online self-assessment surveys to decide on the second point.

We then carried out another session of user testing on May 23rd, at the same high school in Daly City where we had ran our pre-learning-objectives session. The testing session was similar, with some changes incorporated, at a

mathematics class. This led us to consider the following changes:

1. Keep the feedback sent to peers and teachers the same, as students said this would avoid bullying.
2. Give more instructions on feedback timing, or give instructions when students finish, as some students finished writing earlier than others.
3. Add more guidance and instructions in general, perhaps a few introductory screens.

There were some differences between students who wanted more detail in the rubric versus students who wanted a simpler one. This is something we still have to define.

CONCLUSIONS AND NEXT STEPS

Next design steps

Based on our user testing, we are currently working on adding the following changes and re-designs:

1. Improve the flow in the early pages/sign-in section/launch project section
    a. This could be achieved with additional explanation screens, and/or by changing the flow of registration activities
    b. Several people specifically highlighted the need for an additional screen after project launch and before the rubric, giving an overview of the skills and the process to come.
    c. Add a better landing page that explains the app.

2. Add more friendly and celebratory components in certain parts of the project.
    a. For example, when competence is assigned (i.e. when students are assigned to be team leads on a skill and observe another student), there could be confetti images.
    b. Make the insertion of emojis and other friendly items easier in feedback.

3. Think about how students will stay motivated throughout the use of the application. Ask teachers how they would frame the task of using Peloton.
    a. Carry out more user research with teachers over the summer.

Next development steps

Over the past month, we have also started working with a programmer to begin building a working prototype of our application. Muhammad Althaf, whom we hired via UpWork, is a web developer based in India who is very well evaluated and passionate about contributing to a project with an education focus. He was selected out of 23 applicants for our job-posting, based on his knowledge of web application frameworks and the genuine interest he showed in the project in a cover letter we requested. Muhammad is currently working on developing the backend data models for the application, and he will then develop the front-end based on our Figma design. We are in constant communication with him and will be able to keep track of his progress via Github.

We hope to have a functioning prototype by early July, which should give us one month to do some user testing and implement final changes before LDT Expo in early August.

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