DESIGNING FOR **STUDENT PARTICIPATION**

creating an online tool for collaborative learning

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CREATING AN ONLINE TOOL FOR COLLABORATIVE LEARNING

Master thesis

by Aliénor de Haan

Master thesis
Designing for Student Participation: Creating an Online Tool for Collaborative Learning
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ILLUSTRATIONS

Icons made by PopcornArts and Bitmoji

PREFACE

A little over seven years ago I began studying Industrial Design Engineering in Delft. I always felt that good design has the power to help people, I'm especially interested in the possibilities digital innovations bring to do so. This is something I wanted my graduation project to reflect, and I'm happy to say it does.

I've enjoyed working on this exciting and challenging project. I've learned so much in the process, beyond all of the insights regarding this specific topic. I got the opportunity to see a young company grow, and witness the steps and dedication it takes from the entire team to do so. Being able to be a product manager within the company was also a great experience, managing the development of the product going through the whole design process from beginning to end.

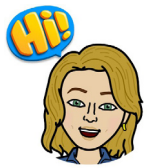
Before moving on to the rest of the report, I would like to thank my coaches from the TU Delft Quiel Beekman and Erik-Jan Hultink. Thank you for your advice, insights and positive encouragement. I'd also like to thank FeedbackFruits, and Ewoud de Kok, for all of the time and guidance; steering the process where needed, but also giving me the freedom to lead when possible.

And special thanks to all of my friends and family who have taken the time to help me with my project, whether volunteering to be interviewed, helping out with my video, or taking the time to give me feedback on my project.

I've really enjoyed this project, and am not afraid to say that I'm proud of the end result. I hope the report reflects that and inspires you in its own way.

I hope you enjoy reading this thesis!

-Aliénor de Haan



Hi there! Throughout the report you will see me in the margins, this might be for a witty remark or opinion from the author.

EXECUTIVE **SUMMARY**

As technology is entering the classrooms, online discussions are becoming a more integral part of modern education. However, within an online environment, it is more challenging for teachers to motivate students to be active participants in the discussions.

Cora Busstra, a professor at the University of Wageningen, developed a grading method for her online Master course as an answer to this problem. With this grading method, students are asked to reflect on what they think was their best contribution to the discussion. Applying this method results in more active online discussions where students are motivated to contribute.

FeedbackFruits is a company who develops software that aims to improve learning. They want to develop a new product that will implement the participation grading technique developed by Busstra.

The goal of this project is to deliver FeedbackFruits a design and working prototype of a concept that integrates a unique form of participation grading. This concept will be paired with an implementation strategy to effectively encourage teachers to apply this novel grading method.

Literature analysis supports that a tool that would implement the participation grading method, would be very effective in creating a successful online collaborative discussion among students. That is, if, the design meets several criteria. The design must grade students individually, require a minimum number of contributions per student, and apply the proper rubric.

Results from student and teacher interviews and a teacher survey indicate several concerns regarding the implementation of the participation grading method. The first is whether applying this method will cost both the instructor and students a lot of time. Secondly, it is challenging for teachers to visualize when and how they would implement this method to their classes. Third, will grading online discussions be the right kind of motivation for students, and how does the product ensure that the students do not feel overwhelmed by an additional tool that will ask students to self-reflect.

From these findings, a design brief was created. The design problem can be split into two parts, firstly, how to convince teachers to use this new method and secondly, to develop a concept to implement this approach. The created concept will need to be intuitive, easy to implement and provide teachers with information that will make them trust the new participation grading approach. The concept will need to be paired with a communication strategy to convince teachers to try this new method in their classroom.

An iterative design process was applied to design and develop the concept. The first step was to define a program of requirements and wishes for the concept, after which

the product was designed and prototyped, this prototype was then tested and evaluated. The evaluation step led to redefining the requirements again which signaled the beginning of a new iterative cycle. This cycle was repeated until the final concept was created.

The result of the design process is a concept called Collaborative Learning. Collaborative Learning is an online tool that encourages students to participate in online discussions by using fair online participation grading. Teachers can upload documents, videos, or audio, that they want the students to discuss. Students then participate in the discussion and are asked to select what they feel was their best contribution.

The concept is intended to be flexible enough to allow teachers to apply their personal preferences, yet still, steer the teacher to create the assignment for optimized student participation based on the findings from the literature study. Collaborative Learning is also designed to give students the freedom and flexibility to participate in the discussion in their way, as was shown to be a leading element to motivating students from the student interviews conducted about their motivation.

To successfully launch the product a marketing strategy was created. The marketing strategy of this product is centered around its website; this will function as the primary source of communication about the product to the consumers. Other marketing channels that will be applied in this strategy are; an email newsletter to the existing customer database, an active social media presence to create brand awareness, word of mouth mention to the existing network, and listing the product in various online educational app stores.

FeedbackFruits has voiced their enthusiasm for Collaborative learning and has reserved resources for developing the concept, the development of which is scheduled to begin in November 2017. Not only is the design going to be developed as a stand-alone product, but the participation grading element will also be implemented as an add-on to several of their existing products.

LIST **OF DEFINITIONS**

Some terms within this report are repeated throughout; definitions have been collected here to refer to during the report. These definitions have been gathered from the Oxford Dictionary (unless otherwise specified), with additional clarification from the author.

Collaborative Learning - An educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product. (Laal, 2012)

Concept - An abstract idea (Oxford Dictionary), in this case referring to a design concept which is the idea that is driving the design.

Contribution - A piece of writing submitted for publication (Oxford Dictionary). In this case referring to a piece of writing submitted online to the discussion.

Didactics - The science, art, or practice of teaching. (Oxford Dictionary)

Engagement - [mass noun] The action of engaging or being engaged. (Oxford Dictionary)

Feature - A distinctive attribute or aspect of something (Oxford Dictionary), in this case, often referring to distinctive attributes of the website.

Learning activity - Activity meaning; the condition in which things are happening or being done (Oxford Dictionary). In this case, the activity has the goal of learning. Learning meaning; the acquisition of knowledge or skills through study, experience, or being taught (Oxford Dictionary). Learning activity thereby means the condition in which things are happening to acquire knowledge or skills.

Participation - The action of taking part of something (Oxford Dictionary).

Platform - A raised level surface on which people or things can stand (Oxford Dictionary). The definition of a platform for this context has been abstracted to mean; An online website on which people or things can interact.

TABLE **OF CONTENT**

IMPLEMENTATION

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CHAPTER 1

THE PROJECT

The aim of this chapter is to give an overview of the important aspects of this project, including the relevance and aim of this project, as well as the approach applied.

1.1. THE **ASSIGNMENT**

For decades, higher education has relied on a traditional classroom model composed of long lectures and independent study. For nearly 40 years research has been challenging the effectiveness of traditional education to engage students, yet the education system remains virtually unchanged (Reschly & Christenson, 2012).

Student engagement as defined by Amy Reschly and Sandra Christenson (2013) refers to the extent of a student's active involvement in a learning activity. There are five factors of student engagement: level of academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, and a supportive learning environment.

This project will focus on one of these aspects of student engagement: active and collaborative learning. An important element of active and collaborative learning is student participation. One way to stimulate participation is by rewarding students who are active participants in group discussions or assignments. Cora Busstra developed a method to grade student participation at the University Wageningen: She asks the students to select their best contribution per course section, a contribution can be a question, original comment, or reply to a comment thread. According to Busstra, this approach gives the students room to explore and ask 'dumb' questions and encourages students to think critically about their best contributions. FeedbackFruits has created an online learning platform that aims to help increase student engagement in higher education. Their platform allows students and teachers to interact, share and discuss. This project focuses on creating a new concept for FeedbackFruits that incorporates the grading method that was developed in Wageningen to encourage collaborative learning.

1.1.1. FEEDBACKFRUITS

FeedbackFruits is a young start-up that develops software that aims to improve learning. To ensure that their product is future-proof, FeedbackFruits will need to create new design opportunities and solutions that they can integrate into their software to maintain a high level of student engagement. How can FeedbackFruits improve their product to increase their impact on student engagement, and ensure success in current and future markets?

FeedbackFruits will need to compel students to participate on the platform to secure their place in the market. The participation grading method developed by Busstra provides an exciting opportunity. Can FeedbackFruits use this method to increase participation and positively influence student engagement? Furthermore, how can this participation grading method be applied to different disciplines and student activities and how can FeedbackFruits best integrate this method into their current product portfolio? This project aims to find a solution to both of these questions.

1.1.2. THE PARTICIPATION GRADING METHOD

The participation grading technique that FeedbackFruits would like to implement is depicted in Figure 1. It was developed by Cora Busstra, a professor at the University of Wageningen. She developed it for her online master course, which has 10 to 15 students per year. Students from all over the world take part in this course. All of the lectures, discussions, and assignments take place online. The course has several discussion assignments, where students are asked to apply the knowledge they have learned from the online lectures to different situations and statements. Busstra wanted to develop a method where students have the room to make mistakes, yet still, be rewarded for their contributions to the discussions.

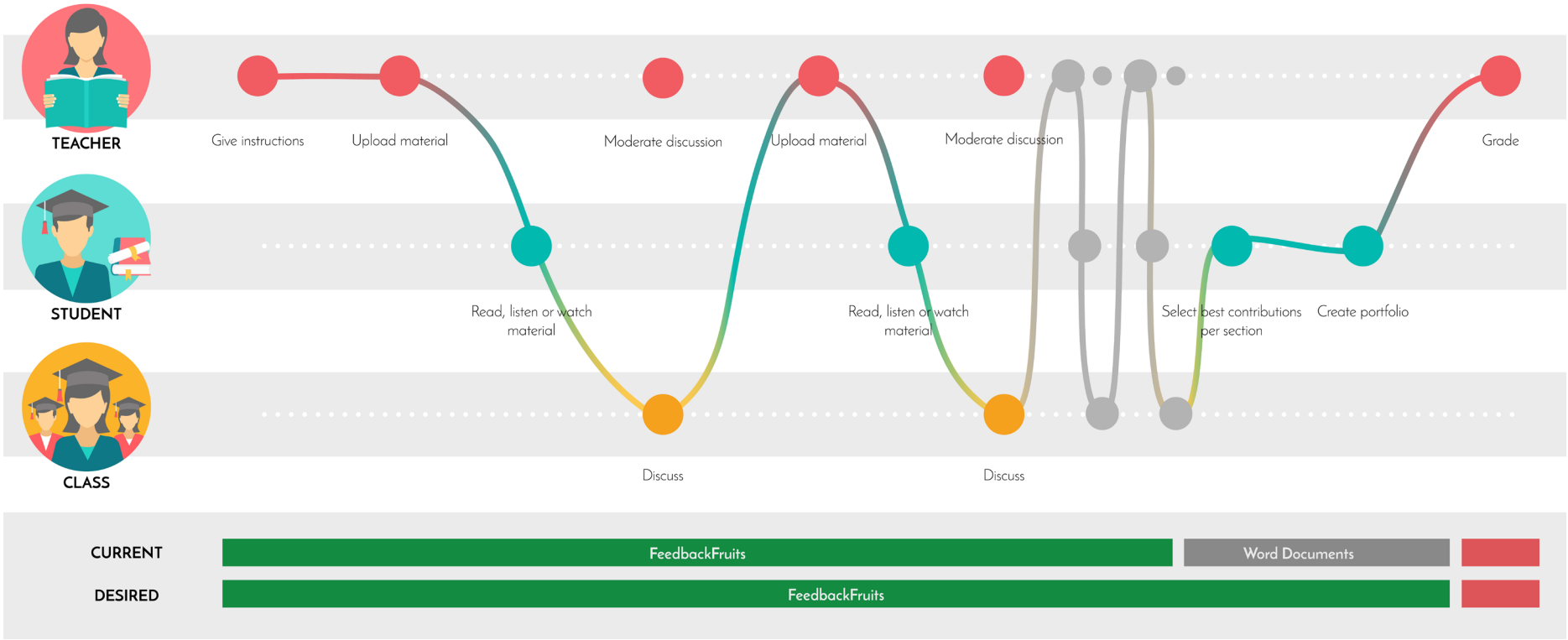


Figure 1. Reflective participatory grading method infographic

In Figure 1 the different steps of Busstra's method are shown. Keep in mind that this process runs parallel to the class lectures, which are not included in this diagram. As is shown in this image, students are asked to reflect on what they think was their best contribution to the discussion. Students will then collect all of their best contributions into a small portfolio, which will then be handed in and graded. By asking students to select their best contribution to the discussion, this method aims to increase critical thinking as well as participation.

As shown in Figure 1 Busstra currently uses FeedbackFruits for the discussions but students then have to copy and paste their best contributions into a Word document. Busstra would like to have the grading method integrated into the FeedbackFruits platform.

During an interview with Busstra, some of the issues of the current approach came to light. One of the biggest problems, when students copy and paste their contributions into the Word document is that there is no context of their contribution. Students also have a tough time selecting only one comment, and will often submit multiple contributions. Busstra also experienced that independent learners do not respond well to this method. She explained that, at first, most students do not understand why she uses this approach, but after about two weeks they see that this method elevates the class discussion.

Busstra indicated that the role of the teacher during class discussions is crucial. During the discussions, there are a lot of students who are unsure and feel that there is nothing left to say. In those moments the teacher will need to take the role of moderator; summarize what the students have said and ask more in-depth questions.

Busstra has asked FeedbackFruits if they can develop a feature that integrates this grading method into their platform, this is the beginning of this assignment.

1.1.3. AIM OF THE ASSIGNMENT

The goal of this project is to deliver FeedbackFruits a design and working prototype of a concept that integrates a unique form of participation grading. This concept will be paired with an implementation strategy to effectively encourage teachers to apply this novel grading method.

In the next section, the researcher explains which project approach has been used to achieve this goal.

1.2. THE **APPROACH**

To achieve the aim of this assignment, the project has been split into three different phases; analysis, design, and implementation. Figure 2 shows how the chapters correspond to the different phases of the project, these are also indicated throughout the report by the colored tabs.

The analysis phase consists of an internal and external analysis of FeedbackFruits and their context. Followed by a literature review regarding the effects of student engagement and participation, student assessment, and collaborative learning. Explorative interviews with students about what their key motivators are, can show how students can best be triggered to participate. Lastly, interviews with teachers and staff to evaluate the potential of the participation grading method. These findings were then translated into a design brief.

With the design brief the project could enter the design phase. In the design process an iterative approach was used, this process consisted of three major steps, designing, prototyping, and user testing. The user tests were conducted with the various stakeholders, including FeedbackFruits, Instructors, and Students. This process eventually led to a final concept: Collaborative Learning.

In the implementation phase, a positioning and launch strategy for FeedbackFruits regarding the implementation of the design was created to be able to make Collaborative Learning a success on the market.

These three steps are often used in the design process; they give the designer a structured way of continually converging and diverging towards an optimal solution.

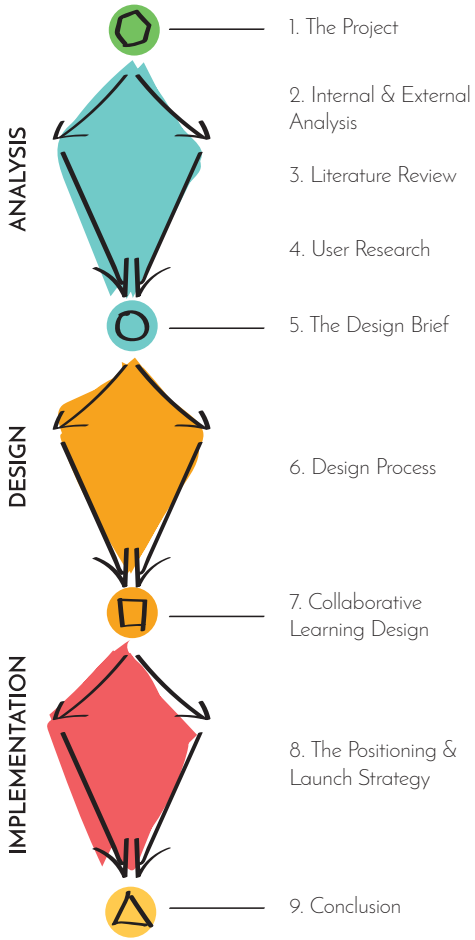


Figure 2. Approach of this project

Let's get started on finding that solution!

ANALYSIS

CHAPTER 2

INTERNAL & EXTERNAL ANALYSIS

When creating a product it is important to understand the context in which it will be designed. This includes looking at the organization that will be making and selling the product, as well as the current portfolio that the new product must fit. External factors will need to be taken into account such as FeedbackFruit's competitors, as well as the current trends that are going on in various other sectors: People, Education, Technology, and Global.

2.1. THE **COMPANY**

FeedbackFruits has been briefly introduced in the previous chapter. This section will provide more context regarding the company, their mission, and history, giving insights for whom this project will be completed.

FeedbackFruits is a young start-up that develops software that aims to improve learning. The company was founded in 2012 by students from the TU Delft; their office is located in the tech incubator Yes!Delft. FeedbackFruits currently has a team of around 20 employees, made up of interns and full-time employees. Their mission is to cultivate students' critical thinking worldwide; achieving this by facilitating instructors to shape learning activities that engage students and spark students' active thinking. The solution is to produce software that provides the teacher with new learning activities that stimulate students to think.

The software that they provide is in the form of an online website (often referred to as a platform), that allows students and teachers to interact, share, and discuss. The first version of their platform was launched in 2013 and was marketed to facilitate blended learning. Blended learning combines online and offline educational tools. In 2016 FeedbackFruits introduced their 2.0 version, this version uses similar tools to those in the 1.0 version, but is more modular and has an updated modern design.

FeedbackFruits has allowed their clients to still use their 1.0 platform, but is no longer developing new features for it. Only 2.0 will be analyzed during this project as the final design will be developed strictly for the 2.0 platform. The following pages show the product in greater detail.

Ten universities currently use FeedbackFruits, all of which are located in the Netherlands. Even though there is the new 2.0 version of the platform, some universities are still using the old 1.0 platform. FeedbackFruits has 50.000 users on the 1.0 and 2.0 platforms combined, with about 2.000 weekly users on their 2.0 platform.

The organization of FeedbackFruits is structured similarly to most start-ups. There is a very flat hierarchy, with several separate departments that work closely together. There is a lot of collaboration within the teams as well as between the various teams. The CEO plays an active role in each team. This structure works well within the current size of the organization, but might pose a problem in the future if the organization expands.

When looking for information online about FeedbackFruits it is difficult to find up to date information. The information about the company that is available is inconsistent and outdated; the company website still focuses on the first version of their platform. The site could benefit from an update to explain the 2.0 platform. This update would help to align and communicate a clear company vision and mission to people looking to use their products.

The timeline in Figure 3 shows that the company has been growing steadily over the past four years. Presently reaching five times the amount of users compared to 2014. The current trend seems to indicate a further increase in user numbers. With already having reached the majority of the Dutch market, it will be necessary to begin looking at potential international clients. This will require a cohesive brand story; establishing a clear mission and vision and communicating those through the website and the product portfolio.

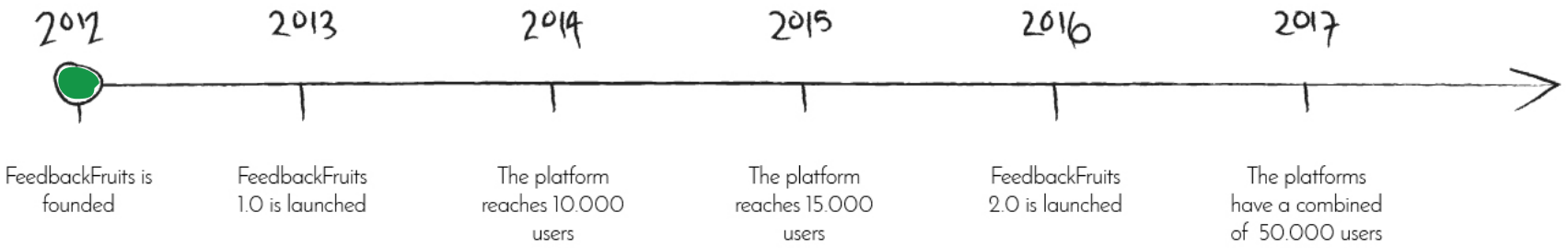


Figure 3. Timeline FeedbackFruits

2.2. PRODUCT **PORTFOLIO**

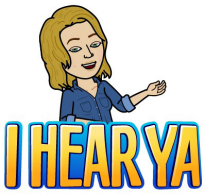
The product portfolio is analyzed in this section; this is done to create a sense of which products FeedbackFruits already has and where the new design will need to fit in. As mentioned previously the FeedbackFruits portfolio currently consists of two different versions of the platform. The 1.0 version is still being used by universities, but no new updates are being performed on the platform. FeedbackFruits 1.0 has three tools Live, Dialog and Share. The 2.0 version has evolved from these three principles but takes a more modular approach, in that users no longer have to purchase the entire platform, but can choose which specific features they would like to buy.

The product portfolio shown in Figure 4 is an overview of the 2.0 version, FeedbackFruits has divided this product into three categories; before class, during class, and after class. These categories refer to different steps of the blended learning didactic and refer to when instructors would implement the various learning activities. Figure 4 shows which tools belong to which category, and offers a short explanation of each feature. There are nine products in total, four of those are in the before class category, one in during class, four in after class. All of the products apply an interactive layer over online study activities.

The 2.0 platform structure and design are based on the guidelines that are set by "Material Design," which is an initiative by Google to create an open web design language that can be used by anyone. The Material Design guidelines cover everything from a color palette, to the way that web-elements should move, they can be found on the website www.material.io. Google uses it for all of their applications to provide their users a consistent experience. FeedbackFruits uses these guidelines to be able to also provide their users with a consistent and familiar user experience.

FeedbackFruits can be purchased in two different ways. Users can either buy access to all of the features that FeedbackFruits has developed as a single product or, alternatively, they can buy access to a single feature that FeedbackFruits has developed. The single features are marketed as plug-ins for Learning Management Systems, like BlackBoard. Each plug-in focuses on delivering users a single learning activity.

To illustrate what the platform looks like some of the main pages of the platform are shown in Figure 5 through Figure 8. Moving through the process from logging in, to creating an assignment. These screens show the design that has been applied to the product portfolio. All of the screens are very simple and clean. The homepage, Figure 5, gives an overview of the different courses the student and teacher is enrolled in, this view is the same for both students and teachers. When clicking from the homepage to the coursepage the student and teacher will see Figure 6, this view is similar for students and teachers but teachers have extra options like adding, editing, or deleting content.



Experiencing a website through a written description isn't ideal, to experience the website for yourself simply visit beta.feedbackfruits.com and log in with your university account.

All of the study material and assignments can be divided into different folders.

Both the homepage and coursepage provide access to features like the dashboard, support and notifications, search, and other online. Which the user can access on almost every page on the platform.

Figure 7 and Figure 8 show what happens when the teacher wants to add a content element to the course. They first receive an overview of all the different options (Figure 7). After choosing the 'assignment' option, they will move the page shown in Figure 8 where the teacher is able to add instructions and add other modules like a simple hand-in assignment or a peer review assignment.

The exact content of these pages shown in Figure 5 through Figure 8 will vary based on the content added by the teacher and the exact modules and assignment chosen, but all of these pages will always look similar by using the same design elements and placement of information. So, even though FeedbackFruits has nine different products the user will only need to learn the system once, and will then be immediately familiar with the whole platform.

Figure 4. Product Portfolio FeedbackFruits 2.0

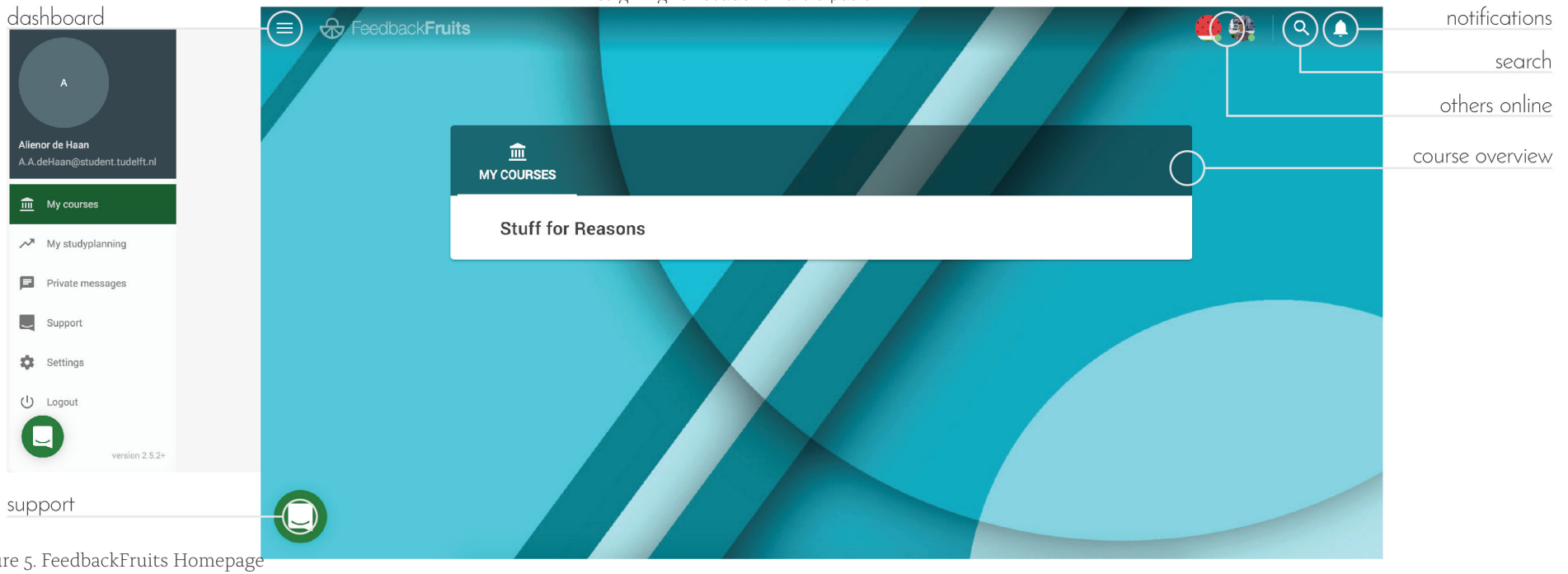


Figure 5. FeedbackFruits Homepage

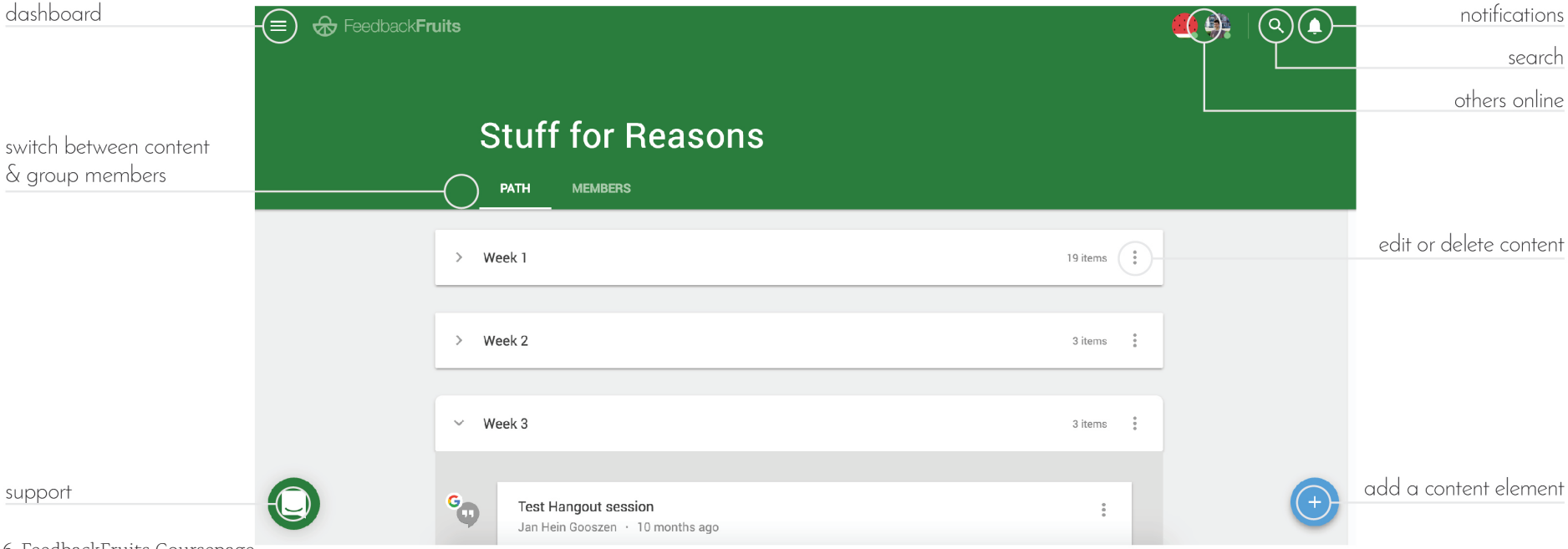


Figure 6. FeedbackFruits Coursepage

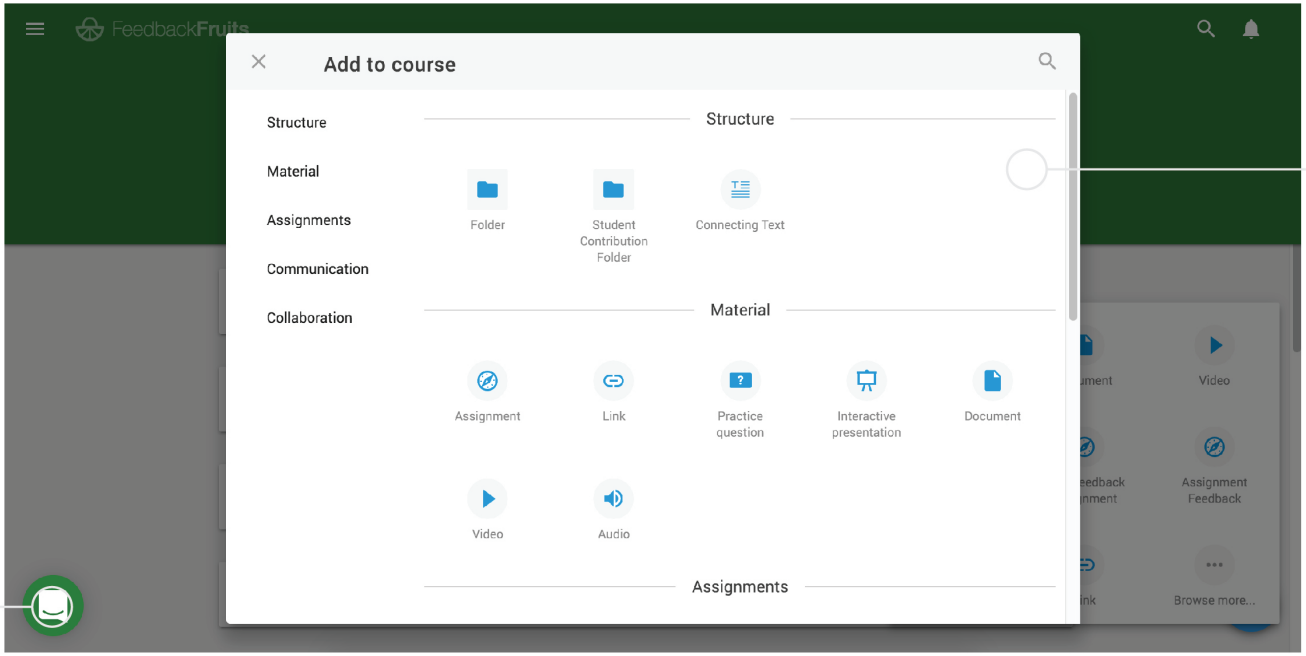


Figure 7. FeedbackFruits Add content page

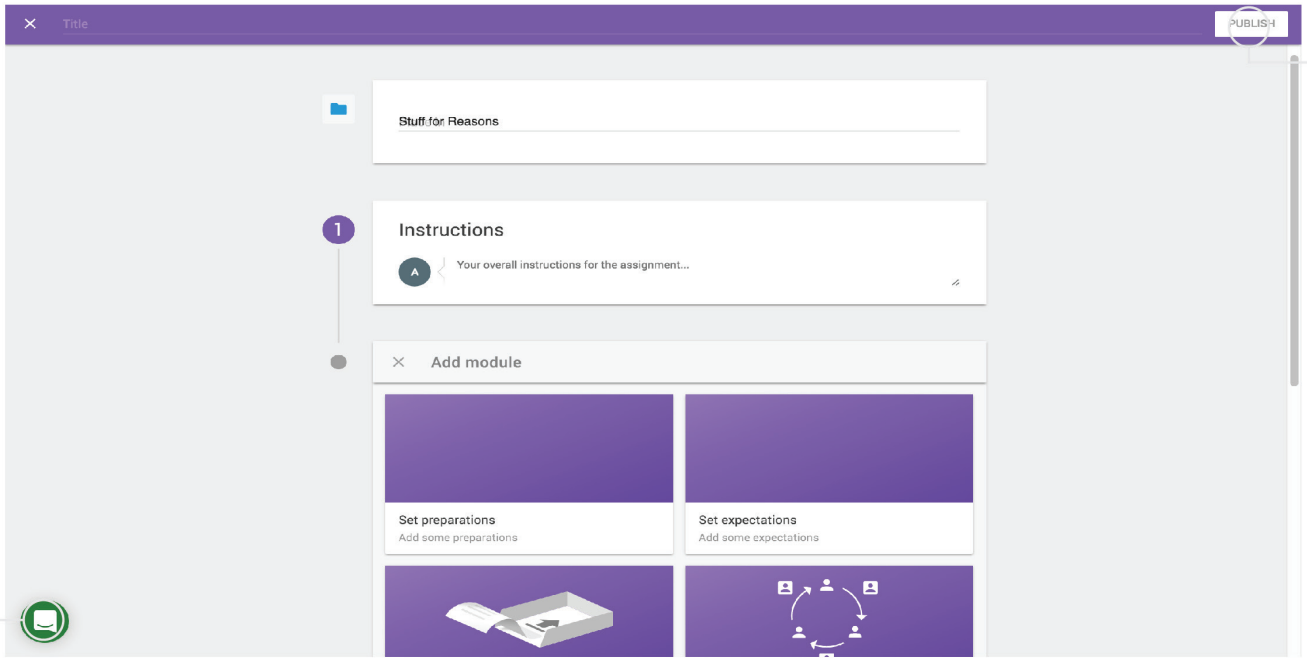


Figure 8. FeedbackFruits Create assignment

2.3. COMPETITOR **ANALYSIS**

The company overview in section 2.1. discussed the growth and success of FeedbackFruits within the Netherlands. To get a better understanding of the context within which they are operating and looking to grow, their competitors need to be analyzed. This analysis gives a better understanding in which ways they are similar or different from the competitors, which gives useful insights as to which direction they should be heading.

To structure the competitor analysis the competitors have been divided into different levels of competition. There are four different levels of competition; these are often defined as product form competition, product category competition, generic competition, and budget competition (Lehmann, 2009). This particular analysis will focus on the general competitors of the company.

2.3.1. PRODUCT FORM

Product form competition refers to any direct competitors; this means companies who are offering essentially the same products and targeting the same market. In the case of FeedbackFruits, this would be any business also offering online tools that are used to engage students with various learning activities. Two direct competitors of FeedbackFruits are Perusall and Turnitin. Perusall competes with FeedbackFruits on the comment and annotate features that FeedbackFruits offers (the 'before class' category in the product portfolio). Whereas, Turnitin competes with FeedbackFruits on the student work feedback features (the 'after class' category in the product portfolio).

Perusall (Figure 9) is an online tool that allows students to read and annotate pdfs, and respond to each other's comments. They have incorporated student analytics, it grades students' engagement, and sends reminders. Their analytics can generate a report of which areas were annotated the most within the required reading. Their tools can be integrated with different Learning Management Systems, like Blackboard.

The other competitor is Turnitin (Figure 10), which offers two main products. The first one is Revision Assistant, which is a smart online analytical tool that helps students to improve their writing assignment through feedback. Their second product is FeedbackStudio, this checks for plagiarism and then allows the teacher to review and place comments on the students' work.

What distinguishes FeedbackFruits from these two competitors is that FeedbackFruits offers a more varied product portfolio, suitable for every step of the blended learning cycle. Whereas Perusall and Turnitin both offer solutions for specific steps in this cycle. Such a high diversification of the FeedbackFruits product portfolio comes with the potential risk of having a lack of focus, but if done well could be a great advantage for FeedbackFruits over their competitors.

2.3.2. PRODUCT CATEGORY

Product category competition refers to any competition that is offering similar products; this is an added level of generalization compared to the product form category. In the case of FeedbackFruits, this refers to any company that offers online tools with the goal of engaging students. Within this category nearly all Learning Management Systems (LMS) can be placed, this refers to any software application that is used by educational organizations to manage, deliver and communicate with students. Blackboard is an example, as well as Moodle and Canvas.

Recent developments for these LMS platforms is that they are also building and integrating analytics into their platform, as well as finding new ways to increase and facilitate interaction between students and teachers. Canvas recently even launched a tool for collaborative video learning, similar to the video feature that FeedbackFruits already had on the market.

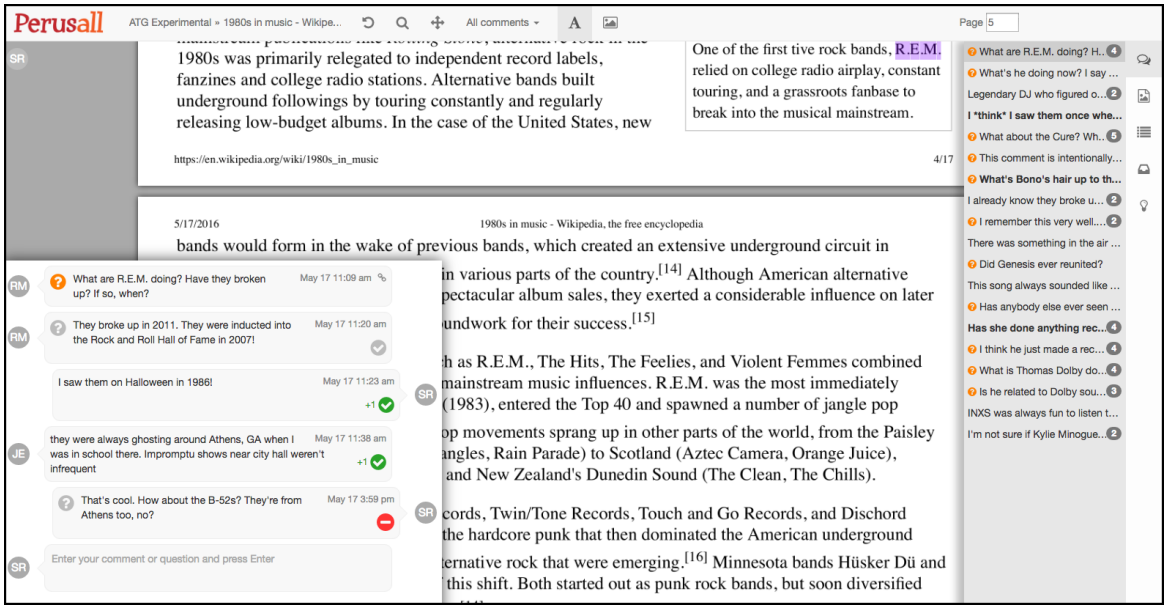


Figure 9. Example of Perusall functionality

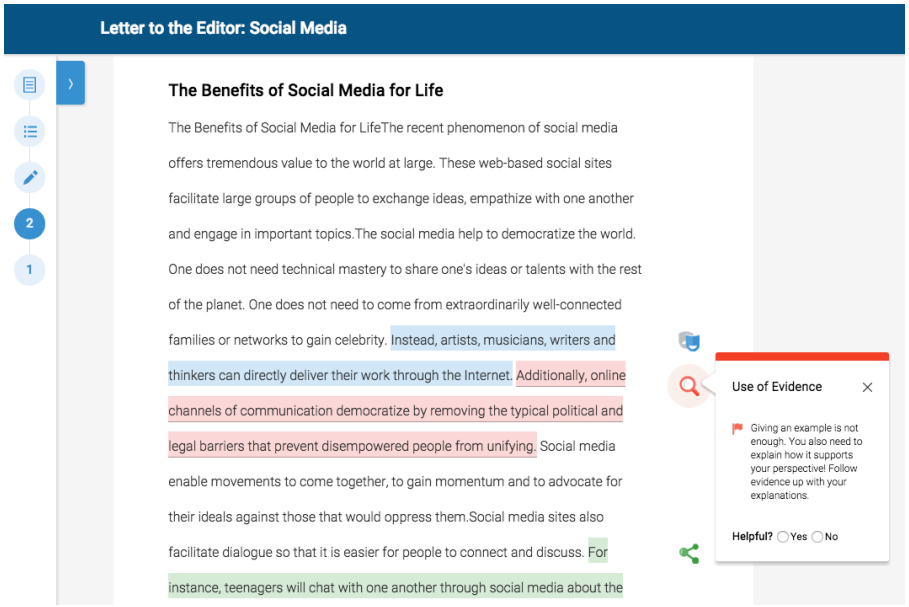


Figure 10. Example of Turnitin functionality

2.3.2. GENERIC & BUDGET CATEGORIES

Generic category competition refers to any competition that is fulfilling the same basic need. For FeedbackFruits this will be any product that lets students discuss and collaborate. This category can be divided into two groups, social media channels and in-person discussion opportunities. The social media channels that could be used for educational purposes to discuss (either written or spoken) material are: Slack, Facebook, Twitter, GoogleDocs, Skype, and Google Hangouts. Group projects and in-class discussions would be other options that teachers could apply in their classes to let students discuss and collaborate.

Budget category competition refers to any competition where the product is competing for the buyer's budget. For Feedbackfruits this is any product that competes with any of the FeedbackFruits products for the same university budget. Seeing as universities are the main buyers of this product, this category is focused on just a couple possibilities of what other things the university could possibly spend their budget on. This could include; investing in campus upgrades, hiring an extra part-time staff member, upgrading several computers on campus, or purchasing an extra software product license.

2.3.3. CONCLUSION

These are just a few competitors, but there are two very clear trends that can be inferred from this analysis. The first trend is the integration of smart online analytics to educational platforms. These analytical tools are able to provide feedback, either directly to the student or to the teacher. Secondly, there is a trend towards facilitating interaction between students and their peers, and between students and their teachers. FeedbackFruits will need to convince universities that their products are worth the investment and are then simply using existing social media. It is likely that this market will continue to slowly be saturated with new competitors, FeedbackFruits will need to differentiate itself in order to stay ahead of the competition.

2.4. TREND **ANALYSIS**

The previous sections discussed FeedbackFruits, their products, and their competitors. Zooming out further will offer an even greater context, a trend analysis was completed to create an understanding of the changes in the world, within FeedbackFruit's context. This was derived by collecting multiple trends, the information was gathered from various trend-watching websites. To structure this analysis the DEPEST-categorization was used as an initial framework to categorize the various trends. The categories in this framework are: Demographic, Economic, Political, Ecological, Social, and Technological.

These categories were adapted slightly to increase relevance for FeedbackFruits. Into the following four categories: People, Education, Technology, and Global. People combines the earlier mentioned categories Demographic, and Social. Global combines the earlier mentioned Political and Economic. Education is added as a separate category, seeing as this is the focus of FeedbackFruits. All of these trends are shown and explained in Figure 11.

2.4.1. IMPLICIT INTERPRETATIONS

Figure 11 shows specific trends within the four categories. When analyzing the trends the researcher, Alienor de Haan, found several recurring and overarching themes across all of these categories. She has combined these overarching themes into four categories: plugged in, search for purpose, learn if and when you want, and high adaptability.

PLUGGED IN

As has become apparent in recent years we are constantly "plugged in." Nearly our whole lives are online, and all of our information can be found and traced, from details about our personal health to almost the entire educational system. This trend has led to constant consumption and creation of content. For FeedbackFruits it might be interesting to look into creating a tool that can somehow navigate students through all of this available educational content.

SEARCH FOR PURPOSE

We are beginning to search for a purpose in our consumption of material objects, in consuming information, and in our time spent. Almost creating our own personal filter, in order to be able to process our fast-paced environment. This trend could be attributed to the oversaturation of certain channels, which is a result of the earlier mentioned trend "Plugged In." As a result of living in such a saturated digital and material world, we will become more selective in what we choose to consume and process. For FeedbackFruits it might become very important to stimulate the educational system to really communicate to students why they are learning certain material.

LEARN IF AND WHEN YOU WANT

Closely related to the "Search for Purpose" trend, there is a shift in education to focus more on intrinsic motivation

and formative assessment. This trend has been enabled by the increase of technology in education, where a student can now learn when and what they want. The notion that not everyone needs to go college is becoming more widely accepted. FeedbackFruits can act on this trend by offering tools that focus on these intrinsic motivators and formative assessment.

HIGH ADAPTABILITY

Across all categories there is a theme of rapid change, with globalization, for example, people are more likely to move and relocate. Technology is also changing rapidly. This trend will require people to keep up, and people will learn to adapt to all of these rapid changes. Continuous learning will, therefore, be required, people need to keep learning to adjust to the changing world. This might be interesting for FeedbackFruits if they decide to offer tools that really focus on teaching effective learning methods for example.

All four of these categories provide opportunities for FeedbackFruits. They are trends that will likely shape the next five to ten years. Awareness of these trends can help the company create new products for future success.

Figure 11. An overview of various trends in the categories people, education, technology, and global

CHAPTER 3

LITERATURE REVIEW

This chapter explores the literature regarding student engagement, student participation, online tools, and cognitive competencies. The key findings will be presented; these focus on how student engagement can be encouraged. A closer look will also be taken into the literature of learning taxonomies, to see how thinking skills and learning outcomes are categorized. Lastly, existing literature exploring the best practices of online discussions to enhance collaborative learning and participation will be discussed.

3.1. STUDENT **ENGAGEMENT**

The aim of the participation grading method that Busstra developed (section 1.1.2.) is to increase student participation and thereby increasing student engagement. Student engagement was the starting point for this literature research. The aim was to define what student engagement is, to find out why student engagement is important, how engagement and participation are linked, and what conditions influence student engagement. Quite a bit of literature has been written on this topic. For an overview of the relevant articles that were found, see Figure 12. This 'literature web' shows the relation between specific topics and articles. Student engagement is really at the heart of

Ever lost track of which paper said what? The literature web on this page is a method the author developed during her master's to better visualize how all of the literature is linked and which area's need further research.

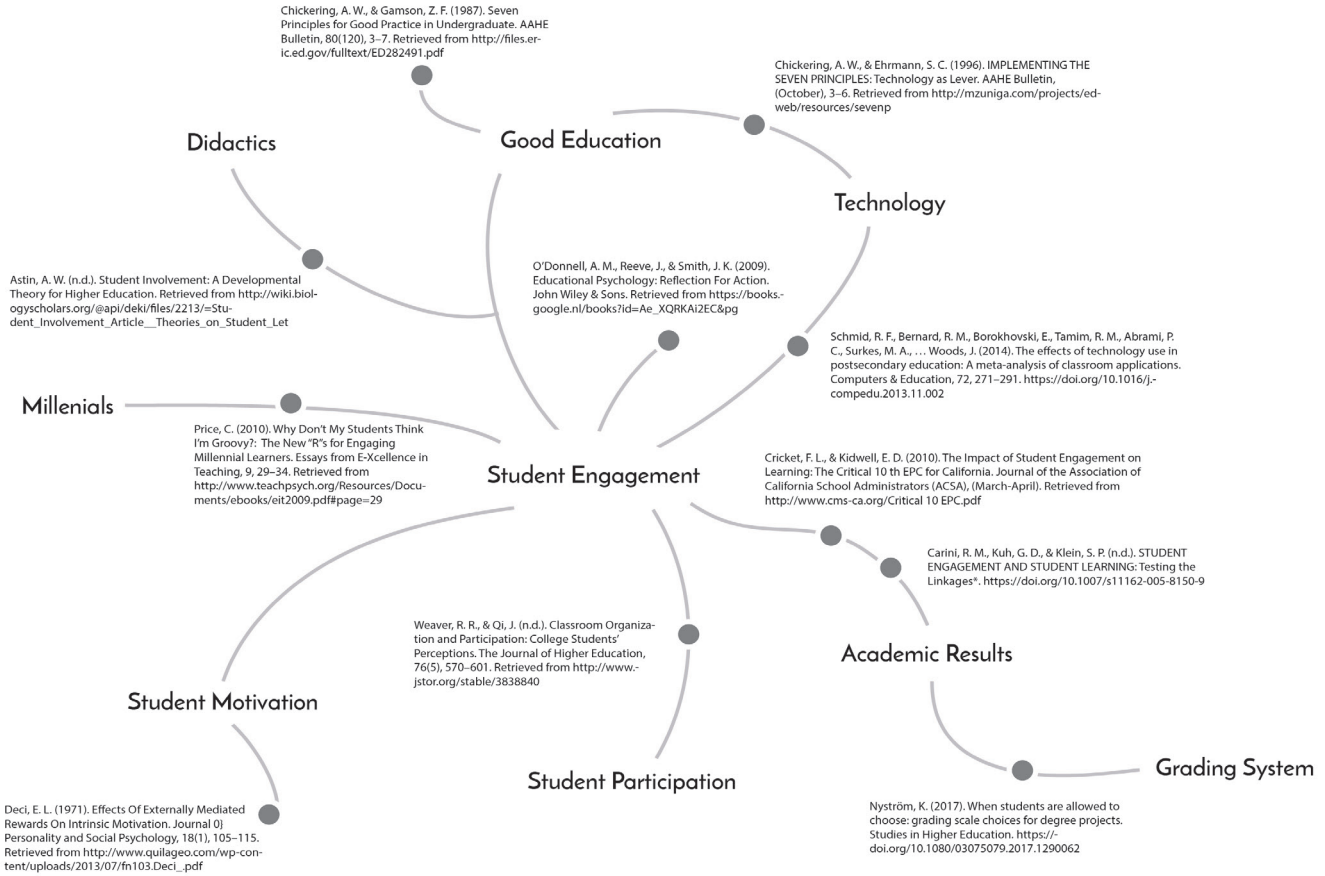


Figure 12. Student engagement literature web

How can you encourage student engagement?

WHAT IS STUDENT ENGAGEMENT?

The extent of a student's active involvement in a learning activity.[6]

5 factors of student engagement

1. Level of academic challenge
2. Active & collaborative learning
3. Student-faculty interaction
4. Enriching educational experiences
5. A supportive learning environment

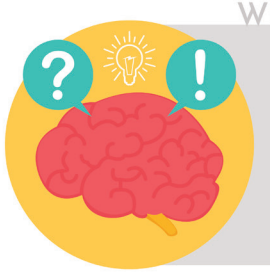
There is a significant correlation between student engagement and educational success.[2]

LINK BETWEEN ENGAGEMENT AND PARTICIPATION?

"Engaged students are more likely to attend class, pay attention to lectures, [and to] participate in discussion..." [3]

Learning will be greatest when the learning environment is structured to **encourage active participation** by the student,[1] and when the student is engaged in active, meaningful excercises via technological tools that provide **cognitive support.**[8]

WHAT ARE COGNITIVE SUPPORT TOOLS?



Cognitive support tools "encompasses various technologies that enable, facilitate, and support learning by providing cognitive tools (e.g. concept maps, simulations, wikis, different forms of elaborate feedback, spreadsheets, word processing.) These technological tools and applications are primarily for student use." [8]

Millenials prefer a variety of active learning methods, as opposed to a more traditional lecture- only format.[7]

"Faculty-student interaction **outside** of class [is] the most important variable affecting self-reported class participation. ... data suggest that students' view of faculty as the authority of knowledge reduces self-confidence, increases fears of criticisms, and hinders participation." [9]

"When ... an **external reward** [is used] for some acitivity, the subjects **lose** intrinsic motivation for the activity. On the other hand, ... when verbal reinforcement and **positive feedback** are used as the external rewards, the subjects' intrinsic motivation seems to **increase.**" [4]

[1] Astin, A. W. (n.d.). Student Involvement: A Developmental Theory for Higher Education.
[2] Carini, R. M., Kuh, G. D., & Klein, S. P. (n.d.). Student Engagement and Student Learning: Testing the Linkages. https://doi.org/10.1007/s11162-005-8150-9
[3] Case, K., & Hentges, B. (2010). Motivating Student Engagement with MySpace, Clickers, and Web-Enhanced Research Labs. Essays from E-xcellence in Teaching Volume IX, 17.
[4]Deci, E. L. (1971). Effects Of Externally Mediated Rewards On Intrinsic Motivation. Journal O} Personality and Social Psychology, 18(1), 105–115. Retrieved from http://www.quilageo.com/wp-content/uploads/2013/07/fn103.Deci_.pdf
[5]Laird, T. F. N., & Kuh, G. D. (2005). Student experiences with information technology and their relationship to other aspects of student engagement. Research in Higher education, 46(2), 211-233.
[6] O'Donnell, A. M., Reeve, J., & Smith, J. K. (2009). Educational Psychology: Reflection For Action. John Wiley & Sons.
[7] Price, C. (2010). Why Don't My Students Think I'm Groovy?: The New "R's for Engaging Millennial Learners. Essays from E-Xcellence in Teaching, 9, 29–34.
[8] Schmid, R. F., Bernard, R. M., Borokhovski, E., Tamim, R. M., Abrami, P. C., Surkes, M. A., ... Woods, J. (2014). The effects of technology use in postsecondary education: A meta-analysis of classroom applications. Computers & Education, 72, 271–291. https://doi.org/10.1016/j.compedu.2013.11.002
[9] Weaver, R. R., & Qi, J. (n.d.). Classroom Organization and Participation: College Students' Perceptions. The Journal of Higher Education, 76(5), 570–601.

Figure 13. Student engagement infographic

this network. From this visualization, it is easy to see that many factors can influence student engagement. The most significant findings have been compiled in the infographic in Figure 13.

There are several main takeaways from the findings. The importance of student engagement has been verified by the literature, demonstrating that higher engagement results in higher educational success (Carini, Kuh, & Klein, 2006). Engaged students are also more likely to participate in class (Case & Hentges, 2010), especially when learning is designed to encourage participation it will result in greater learning outcomes (Schmid et al., 2014). Analyzing these findings, it seems that these three variables, participation, engagement, and learning outcomes are positively correlated. Increasing one of these variables will most likely positively influence the others.

The infographic also shows how this can be achieved, showing that the younger generation prefers a variety of learning methods (Price, 2010). This preference for variety supports the shift to the blended learning approach in the educational system. The platforms for blended learning often offer students and teachers a platform outside of the classroom where they can interact and discuss. This could also greatly increase student participation as it can be a way to increase the amount of faculty-student interactions outside of class which is, according to one study, the most important variable in affecting class participation (Weaver & Qi, 2005).

If FeedbackFruits products are able to facilitate this interaction between students and faculty then it is likely that they will succeed in increasing overall student participation and thereby increase student engagement and overall educational success.

3.2. LEARNING **TAXONOMIES**

In the literature regarding student engagement, a link was made between engagement and educational success. But how can educational success be quantified? Several taxonomies, meaning schemes of classifications, have been made to categorize different learning outcomes and thinking skills. Understanding these taxonomies will help to understand what teachers and educators are aiming for in their classes when it comes to educational success, and to be able to design something that fits the mental model of teachers and educators.

3.2.1. BLOOM'S TAXONOMY

In 1956 Benjamin Bloom (Bloom, 1956) created a taxonomy for different levels of thinking skills. The aim was to get the educational system to challenge students beyond simply memorizing facts. In the 1990s a revised version of the taxonomy was created by Anderson and Krathwohl (Anderson & Krathwohl, 2001). They renamed the domains that had been named by Bloom and rearranged some of the categories to make the taxonomy more accurate and active.

The levels in the redefined version of Bloom's taxonomy are shown in Figure 14. Remembering refers to any activity that requires recalling learned information. The next level is understanding, which is about comprehending the information. Understanding is followed by applying which is when one is able to use information in a new situation. Analyzing is when one is able to troubleshoot, taking different ideas and using that to solve new problems. Evaluating is about being able to judge the value of new ideas. Lastly, creating is when one is able to take different parts together to create a new idea.

3.2.2. SOLO TAXONOMY

SOLO stands for Structure of Observed Learning Outcomes; it was developed by Biggs and Collis in 1982 (Biggs & Collis, 1982). This taxonomy focuses on learning outcomes. Five different levels have been defined, and each level reflects a certain degree of competence of the material. There's a certain progression in comprehension if the student is able to move through the five steps. The five steps are pre-structural, uni-structural, multi-structural, relational, and extended abstract. In Figure 14 an example of each different level is shown.

3.2.3. CONCLUSION

These two taxonomies test different things; one focuses on thinking skills and the other on learning outcomes. However, one does influence the other. Where if one is able to use their knowledge to "create" then they are probably also expressing their creation in the extended abstract.

There are always exceptions to these kinds of models, one thing to keep in mind when looking at these taxonomies, especially Bloom's, is that it assumes that the higher step cannot be reached if the lower step has not yet been fully

mastered. However, when thinking about learning a new mathematical method, for example, it may be the case that a student can apply and analyze the method before fully understanding it. The student is then able to apply the new method before knowing why they should.

Getting students to the highest level in both taxonomies should be the goal of higher education, but can only really be achieved when students are actively engaged in what they are learning and being challenged to think critically about concepts they are learning and discussing with their peers.

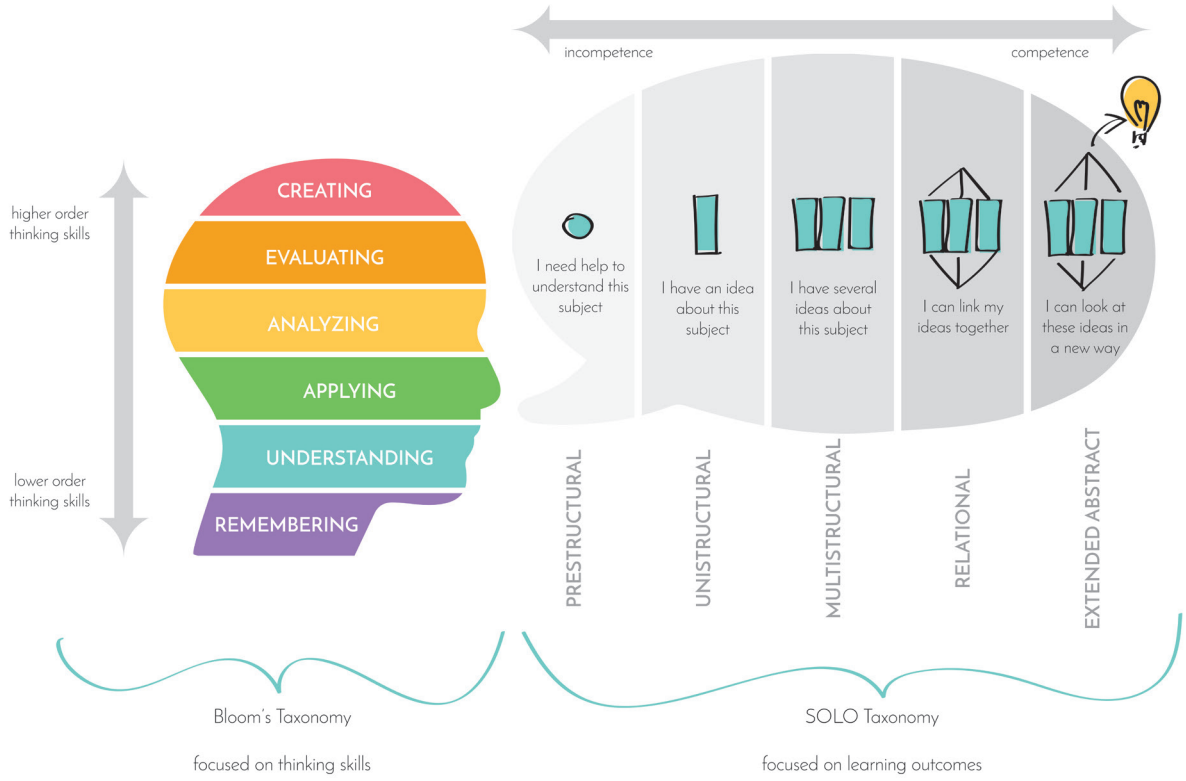


Figure 14. Learning taxonomies infographic

3.3. COLLABORATIVE **LEARNING**

In discussing the literature about student engagement and the learning taxonomies, the subject of collaborative learning was briefly touched upon. Collaborative learning is defined as: "an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product. (Laal, 2012)"

Discussions are a popular form of collaborative learning, as they allow learners to work together to think on a specific topic. Developments in technology have been able to move discussions online. Which is a didactic that the participation grading method is specifically created for, see section 1.1.2.

Teachers might recognize the difficulty in ensuring that all students participate in online discussions. Swan's (2006) study found the following:

> researchers have … found that successful online collaborative discussion is directly linked to its assessment. Simply put, this means that to encourage collaborative discussion one must grade it. Discussion participation must count for a significant portion of the course grade and individual discussion postings must be individually assessed. A requirement of a particular number of discussion postings per week or per course module will help ensure students participate in the discussion. (Swan, 2006)

These findings indicate that a tool that would implement the grading method, like the participation grading method, would be very effective in creating a successful online collaborative discussion. That is, if the design meets the following criteria: the contributions are assessed per individual and there is a minimum required number of contributions.

In the same article Swan (2006) also discusses the metrics that should be used to assess the contributions, discouraging assessment based on basic statistics like the length of the contribution or the frequency of participating. Creating a rubric to assess students is offered as a better alternative.

Ho and Swan (2007) developed and tested a rubric for online conversation in an asynchronous learning environment, or in other words an online discussion where the participants have a broad time-frame to discuss. This paper begins where the previous paper by Swan (2006) left off, it offers a specific rubric to assess students on the quality of their discussion.

The rubric that Ho and Swan developed applies Grice's cooperative principle theory. Paul Grice was a British philosopher who studied language and its meaning. Grice developed the cooperative principle theory to describe how effective communication is achieved, the basis for his theory is that the participants of the conversation must cooperate to sustain the dialogue (Grandy & Warner, 2005). Four conversational elements were defined that influence

The literature regarding the use of class discussions and collaborative learning does not address their potential ineffectiveness. They could be ineffective when learners are still trying to grasp completely new concepts, learners would then be at the lower end of Bloom's taxonomy, focussing on remembering and understanding the new concept. Once learners are more comfortable with the material they will be able to communicate their thoughts in a way that will be more fruitful for a discussion, linking different ideas together and creating new insights, as shown in the SOLO taxonomy. These didactic methods are therefore more suited for higher education environments, where students have developed a basic understanding of the subject matter.

effective communication: Quantity, Quality, Relevance, and Manner.

Ho and Swan developed a rubric for online discussions based on these principles; figuring that if they are measures of effective communication then they can also be a way of testing for effective online communication. The specific criteria they developed, based on Grice's theory, are:

> Quantity: The posting provides as much information/material, as is necessary, and no more.
> Quality: The posting is a new contribution, reflective of the student's belief and/or opinions, and is supported by sufficient evidence where necessary.
> Relevance: The posting is on the same topic, and follows a natural conversation from either the conference topic or previous posting, whichever is applicable.
> Manner: The posting is logically organized and clearly presented. (Ho & Swan, 2007)

To test the effectiveness of the rubric a case study was conducted by Ho and Swan (2007), during an English grammar course with 15 university students. The results show that there is a strong positive correlation between the application of the rubric and the collaboration and participation of students in online discussions (Ho & Swan, 2007). This will be a useful rubric to include in the design of the concept for this project as an example rubric for teachers to use, or to help teachers create their rubric. This rubric is shown in Figure 15, it shows the four different categories (Quantity, Quality, Relevance, and Manner) and the gradients in which those criteria can be present in discussion postings.

Collaborative Learning is an effective approach to teaching, and can be extended to online discussions when the right motivators are applied. This includes the rubric (Figure 15), assessing contributions per individual, and requiring a minimum number of contributions. This increases student participation in online discussions and, as discussed before, can thereby increase student engagement and educational success.

	Quantity	Quality	Relevance	Manner
3	The amount of information is sufficient to clearly establish the purpose of the posting.	The posting is a *new contribution* (e.g., novelty, originality), reflective of the student's opinions, ***and*** is supported by *accurate* evidence/examples.	The posting is on the same topic as both the conference ***and*** the previous posting.	The posting is logically organized and has no spelling, punctuation, or grammatical errors; meaning of the posting is clearly presented
2	There is *slightly* too much or too little information; however, the purpose of the posting is still reasonably clear.	(a) The posting is a *new contribution* that reflects the student's opinions; however, evidence/ examples are *not* provided to support claims. ***or*** (b) The posting reflects the student's opinions and *accurate* evidence/ examples are provided.	The posting is on the same topic as the conference, but *not* the previous posting.	The posting is adequately organized; if any errors are found, they are so minor that the meaning is still reasonably clear.
1	There is too much or too little information, such that the purpose of the posting is occasionally obscured.	(a) The posting is representative of the student's opinions, yet evidence/examples are *not* provided to support claims. ***or*** (b) The posting is largely a re-statement of prior postings *but* incorporates a *minor new contribution*.	The posting is on the same topic as any of the previous postings, but *not* the conference.	The technical aspect of the posting (e.g., organization, spelling, grammar) has several problems, such that the meaning is occasionally obscured.
0	There is so much or so little information that the purpose of the posting is not understood.	(a) The main idea in the posting is a re-statement of prior postings and *no new contribution* is present; ***or*** (b) *Inaccurate* evidence/examples are provided.	The posting is irrelevant to both the conference topic ***and*** previous postings.	The posting is poorly organized and/or it has serious errors in sentence structure or usage, thus the posting is hard to understand.

Figure 15. Grading rubric developed by Ho and Swan (2007) for online conversation in an asynchronous learning environment

CHAPTER 4

USER RESEARCH

This chapter includes research into motivations of students, and the response of teachers to the new grading method. The results of interviews with five students will be discussed and analyzed. Three main themes of motivators were identified, intrinsic motivation, extrinsic motivation, and extrinsic conditions. Followed by the results of a survey that was created to gain more insight into the opinions of teachers regarding the participation grading method, as well as the interview results with three teachers.

4.1. STUDENT **INTERVIEWS**

The literature review section about student engagement briefly addressed motivation. Understanding what motivates students is key when trying to increase their participation. These interviews focus on identifying key conditions that lead to optimal participation.

Six different students were interviewed, the interviews were all conducted in April 2017 in meeting rooms at the Yes!Delft building, where the FeedbackFruits office is also located. Unfortunately, there was an error with one of the audio recordings, which means only five interviews were analyzed. In Figure 16 there is an overview of the participants. All of the interviewed participants are male, to check for potential gender bias the results of the interviews were discussed with two female students who confirmed and agreed with the findings.

4.1.1. INTERVIEW METHOD

The interviews conducted were explorative, the participants filled in a booklet beforehand, which can be seen in Appendix A. Based on their answers in the booklet, questions were asked. All of the interviews averaged about one hour in length.

Rather than transcribing the entire interview, only the most relevant parts and statements were transcribed. The separate statements were then clustered into different groups; clustering was done based on the insight of the researcher. Based on these clusters three main themes emerged, these were intrinsic motivation, extrinsic motivation, and external conditions.

4.1.2. RESULTS

Every respondent is color-coded, and the frequency at which they mentioned specific topics is shown in Figure 17. For example, Student B, color red, mentioned confidence six times, this is far more compared to the other students. From this we can see that he is a student who relies heavily on his confidence in certain tasks as his intrinsic motivator. If he is good at a task, he likes doing that task: Which can also explain his aversion to a particular course where there was individual competition with other students. That course had been set up in a way where students had to provide feedback and improve another students' work. This did not sit well with this particular student because he felt others were only pointing out all of his mistakes to ensure themselves a better grade.

Another interesting observation is that the student who prefers to work independently, color blue, does not mention peer-pressure or discussing ideas with peers as extrinsic motivators. This student does not seem to be affected by a majority of extrinsic motivation.

There is only one student who said he seeks discussions with peers, while three students did mention being motivated by

peer-pressure. Concerning peer-pressure and competition, it seems that students who respond to peer-pressure also respond well to team competition, but may react negatively to individual competition.

From looking at the frequency of different topics mentioned by students, it seems that the 'external conditions' category has the strongest influence on motivation. Where the apparent relevance of the study material has the strongest influence. Mandatory attendance was experienced as demotivating by four of the students, and flexibility from the teacher and the course was highly valued and experienced as very motivating.

Figure 16. Participants of student motivation interviews

Figure 17. Results of the analysis of the student motivation interviews

4.1.3. KEY INSIGHTS

The quotes from the interviews allow the researcher to make some implicit interpretations. The students tell a jointly told tale, the analysis of which leads to a new insight. Which is often knowledge that all of the students are implying, but are not saying aloud.

Researcher: *Do you prefer having people around when you are studying?*

Student E: "I mean if I have any questions I'll text my peers, but I just make my assignments individually."

Student D: "I find it difficult to get myself to start working when I'm alone, especially when I'm just sitting at home. I'll usually go to the library and get someone to come with me. Or they ask me to come with them. It's a lot easier when I sit next to someone who is also working."

Student B: "It's like a nonverbal agreement, almost a contract that you sign together with all of the people you're sitting next to. That you're all agreeing to do your work."

Student A: "If there's a task that I need to do but am not looking forward to then I'll try and find some people to study with. That little bit of peer-pressure, really helps."

Implicit Interpretation: Simply being around others who are working helps the majority of students to also work. An important exception is students who prefer independent work.

Researcher: *Why did or didn't you like that particular course?*

Student C: "I've never been more annoyed with a course, they give you an abstract concept and just tell you to make some calculations! You're just solving problems, but you don't know what it means and why you're doing it."

Student D: "One of those memorizing courses, you know? Just learning and trying to memorize facts. I hated it, usually there's some kind of reason why you have to learn these things, but this just seemed pointless."

Student C: "For my minor in the first quarter we had a lot of courses learning the theories, and then in the second quarter we got to apply everything we had learned before. That was awesome."

Student A: "Communication, policy and strategy: that was a cool course, there were a lot of interesting lectures, good discussions, and relevant reading material. There was a very clear connection to the world around us, relevant examples were used and discussed. So I really went the extra mile for that course."

Student A: "Usually when you're assigned reading material as homework they'll build on that knowledge in the lectures. Yeah, and for example a different course where that wasn't the case. I decided that I would just skim the reading. Because reading every detail takes a lot of times, and I know where I can find the information if I need it, the discussions didn't go that in depth. So it was alright that way."

Implicit Interpretation: Providing context of study material and showing that the effort exerted is relevant to the course can greatly increase motivation.

Researcher: ***So you said you don't like mandatory attendance, can you give a reason why?***

Student C: "Just the way that they enforce it. If you decide you don't or can't go one time, then there's immediately a consequence. I'd much rather join the class 30 minutes later, or work on it in my own time, because then I'd probably learn a lot more from it."

Student D: "I mean I understand why they make it mandatory, I personally just appreciate flexibility. Nowadays I even attend the lectures that aren't mandatory. Because I want to pass those classes, and I know that it really helps to be present at the lectures and take notes."

Student A: "My least favorite course was a course with a lot of rules and bureaucracy in the organization of it. I knew the things I was learning were important, but was so distracted and demotivated by the rules. Like 'this report isn't allowed to be any longer than 10 pieces of paper'. I mean I understand they have to have some rules, but this just seemed over the top. There was no room to be able to give your own spin to the project, it was all so rigid."

Student D: "It's definitely difficult to have a lot of flexibility, but I've learned to be more disciplined, and I like my courses a lot more now."

Student A: "Ideally, I'd be able to work on courses as much as I feel is necessary, able to decide when I work on things, and being able to be flexible in scheduling the work. I think that would be the most motivating for me."

Implicit Interpretation: High course flexibility can greatly increase student motivation, whereas mandatory attendance can be very demotivating.

From this jointly told tale three implicit interpretations arise, these have been shown in the gray boxes. These are conditions that greatly influence student motivation, and are factors that the new product could influence to help get students excited about learning.

This method of deriving implicit interpretations was developed by Quiel Beekman, it offers the researcher a framework to tell the story of the people that were interviewed while giving the researcher the room to analyze the story that is being told.

4.2. TEACHER **SURVEY RESPONSES**

To explore the market potential of the participation grading, we first need to understand what teachers think about the participation grading method developed by Busstra. A survey was created to test what other teachers think about this method. The survey had two main objectives, to find out if teachers would use this method, and secondly, in what type of class or activity they would implement this method. The full list of questions can be found in Appendix B.

The survey was sent through several different channels, Facebook, LinkedIn, Quora, Reddit, SurveyCircle, Poll-Pool, and various groups within the TU Delft. Twenty-three respondents participated in the survey, from different European Universities and a variety of faculties. See all results in Appendix C.

In Figure 18 through Figure 22 results from the survey are shown. Figure 18 reveals that only a third of the respondents use an online platform where students can discuss course content, which suggests the product that will be designed in this project will be an entirely new learning activity for two-thirds of the respondents.

With that in mind, a majority of the respondents did indicate that they see possibilities with using this method (Figure 21). They were, however, a little bit more skeptical of applying the method to their classes (Figure 22). These statistics show that teachers still need to be convinced of the effectiveness of this approach, but they seem open to potentially using it. Replies of the respondents when asked whether they had any comments or concerns about the method, provide some additional insights:

> Respondent 16: "it seems like a great idea! looking forward to hearing more about it"
> Respondent 15: "I like the fact that they exercise a self-reflection or introspection about their own performance."
>
> Respondent 12: "In practice, there is a limit to the amount of reflection, portfolio products, peer review within discussion groups. It is extremely difficult to get high quality products here, and in many curricula we see overkill in the application of these kinds of methods. (in university progams)."
>
> Respondent 2: "This looks like it will be a lot of additional work for students with no educational benefit."
>
> Respondent 6: "I think it really depends on your learning objectives whether this is useful or not. Next, I cannot estimate for what kind of course this would be suitable, since I cannot think of examples of discussions. ... However, I can think of having online discussions for particular assignments, like explaining a novel technique from articles with a group. Students would have to read each other's contribution and ask questions. Both questions and answers could be rated by the students, I guess"

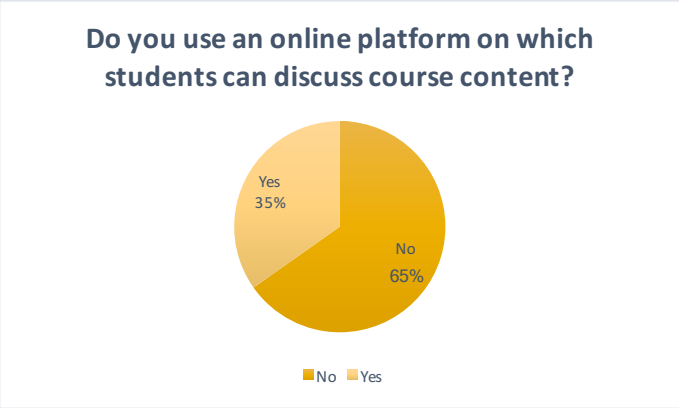


Figure 18. Survey results: Do you use an online platform?

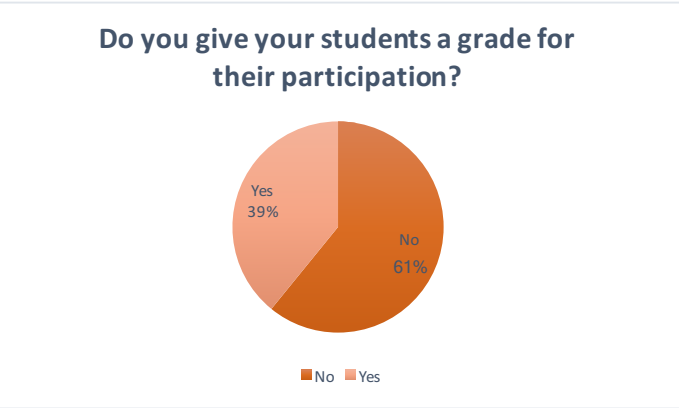


Figure 19. Survey results: Do you grade student participation?

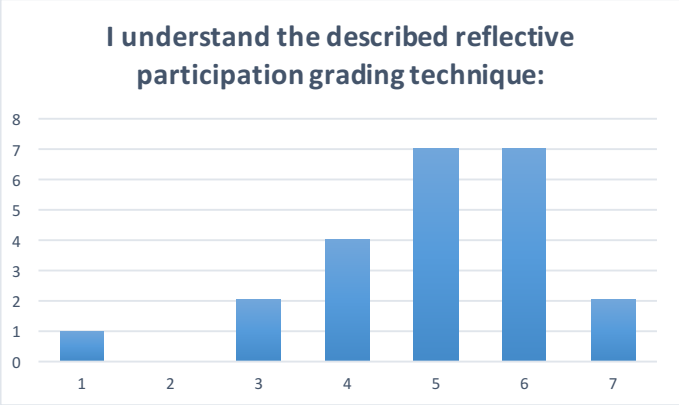


Figure 20. Survey results: Do you understand the method?

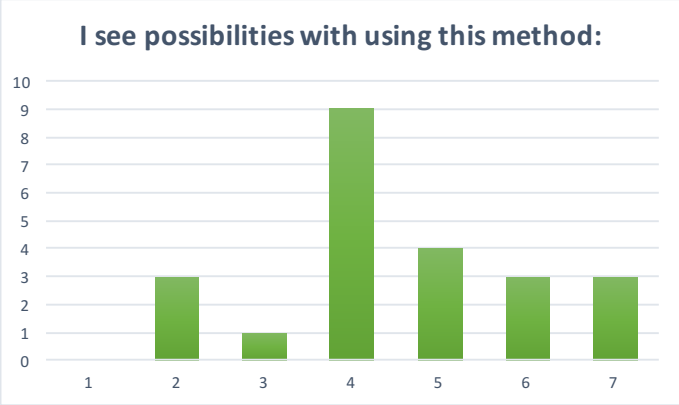


Figure 21. Survey results: Do you see possibilities with this method?

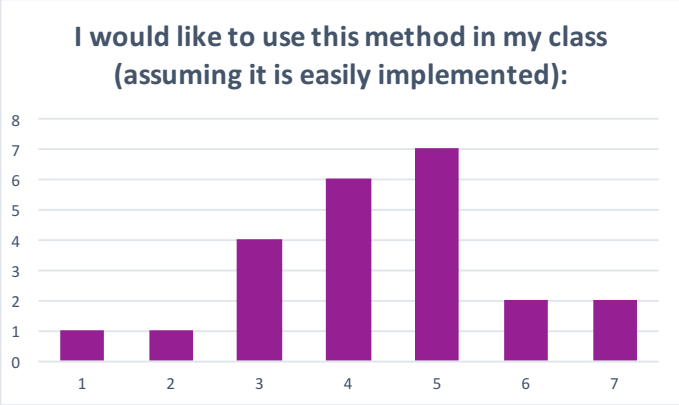


Figure 22. Survey results: Would you use this method?

> Respondent 20: "From my experience, and the students I have taught tend to be very much motivated by grades. Therefore, I can see that if they get a grade for participating in class, students will be more likely to participate."

These responses indicate a couple of the main concerns. The first is whether applying this method will cost both the instructor and students a lot of time. Secondly, it is difficult for the respondent to picture when and how they would apply this method to their classes. Third, students are motivated by grades, but will this be the right kind of motivation for students, and how does the product ensure that the students do not feel overwhelmed by an additional tool that will ask students to self-reflect.

These concerns need to be taken into account when designing the product, and will also be important when creating the marketing strategy, as these concerns will need to be addressed there.

4.3. TEACHER **INTERVIEWS ABOUT GRADING METHOD**

In addition to the survey three interviews with university staff and lecturers of the Delft University of Technology were conducted. The goal of the interviews is to gauge the potential of the participation grading method in being applied to online and offline discussions. All interviews were semi-structured, the interviewer began by explaining the participation grading method which resulted in a discussion about the method and possible applications thereof.

The first interview was with an assessment advisor at the Delft University of Technology. She has experience with creating and helping teachers to create their tests and apply different grading methods. She was interested in the method and suggested that this approach to grading could be best suited to those subjects that allow for a lot of discussions. An example of this could be an ethics course. She explained that during class discussion teachers are often left with the only option to simply tally how often students participate if they want to grade participation. This method could alleviate some of the work of the teacher during discussions, and move that to the students. The teacher could then focus on moderating the discussion, rather than spend their time tallying scores.

To explore the possible application of the participation grading method in in-class discussions; a professor of Ethics at the Delft University of Technology, was interviewed. In this interview, she stated that in her opinion it would be unnecessary to create an extra evaluation opportunity yet. She indicated that students already participate sufficiently. Therefore, she does not see the need for this method in in-class discussions. The possibility of this approach alleviating some of the work of the instructor during the discussion seemed to not be enough incentive to introduce the new method. Similar to the concerns raised in the survey, the professor voiced her concern regarding applying grades to discussions, as it increases extrinsic motivation it might thereby decrease intrinsic motivation. Even though she was fairly critical of the use of the method in-class, she did see a lot of potential for the method in online courses.

A third interview was conducted with a lecturer at the faculty Industrial Design Engineering at the Delft University of Technology. He voiced his interest in using the participation grading method in his class discussions. Possible ideas for this are to record (audio and video) the class discussion and using voice recognition algorithms to identify different students' contributions during the discussion. He stated that this could be particularly useful for the student presentations in his class, the class could then give each other feedback on certain parts of the presentation and identify the 'best' parts of their pitch.

All three interviewees were enthusiastic about the participation method when applied to online discussions. There were mixed reactions to applying this to in-class discussions, some seeing the added benefit and others doubting the need for this new method.

The first interview mentioned that the method would be best suited for subjects that allow for a lot of discussions. This raised the question of whether there are subject areas where there is no room for discussion. In subjects that are very exact, like Science, Technology, Engineering and Maths, class discussions will understandably be less common. In particular when compared to subject areas within the Liberal Arts which offer more discussion opportunities simply due to the nature of what is being studied being more open to interpretation. Although there are certainly subjects that are better suited for this didactic, there aren't any areas where there is no room for discussion.

CHAPTER 5

DESIGN BRIEF

This chapter addresses the design brief, this includes the objectives and goals of the project, the target audience, the scope, and the problem statement. The design brief signals the end of the analysis phase of this project and will be used to shape the rest of the design process.

5.1. THE **DESIGN BRIEF**

This design brief will act as summary of the important findings from the analysis phase, that together form the brief for the further design assignment of this project. The design brief has four elements, the project objectives and goals, the target audience, the problem statement, and the project scope.

5.1.1. OBJECTIVES AND GOALS

The goal of this project is to deliver FeedbackFruits a design and working prototype of a concept that integrates a unique form of participation grading. This concept will be paired with an implementation strategy to effectively encourage teachers to apply this novel grading method.

5.1.2. TARGET AUDIENCE

The target audience of the new product are students and teachers, as they will be the ones using the design. Based on the research and interviews conducted characters have been created to illustrate the different types of users that the feature will be designed for. The icons and description show the characteristics of the different characters that have been identified as a result of the research. This technique will help the designer during the design process to better design for the end users.

Three types of student characters were derived from the findings in the interviews, they are social, discusser and individual. Each of these types of students has their own factors that help motivate them. The design will need to be flexible enough to appeal to all three types of students.

There are two types of teacher characters that were derived from the survey and interviews, they are the active and the traditional teacher. FeedbackFruits usually only targets their products to the active teachers, but the traditional teacher could still be swayed to use the new didactic if they trust the new technique. The design will need to appeal to both types, and the marketing will need to focus on building that trust and showing the feature's effectiveness.

5.1.3. REDEFINING THE SCOPE

In the teacher survey and teacher interviews, different options for applying the participation grading method were explored. Based on this information and ideation from the researcher three possible use cases were established. These use cases are:

1. The application of the participation grading method in one single online discussion. (This is the use case shown in Figure 24)
2. The application of the participation grading method spanning across several online discussions.
3. The application of the participation grading method in offline (or in-class) discussions.

TRADITIONAL TEACHER

- is open to using new didactics if they have been shown to be effective
- teaches in an area where there is possibility for discussion
- might not be very tech-savvy

ACTIVE TEACHER

- is very open to using new didactics and techniques in their classes
- teaches in an area where there is possibility for discussion
- is reasonably tech-savvy

SOCIAL STUDENT

- needs incentive to get started on a task
- prefers working alongside several peers
- responds well to peer-pressure
- prefers group-work
- needs some structure to guide them on a task

DISCUSSER STUDENT

- seeks discussions with peers
- prefers working alongside one peer
- sets personal goals
- needs to know what the relevance and context is of material

INDIVIDUAL STUDENT

- largely unaffected by extrinsic motivators
- prefers working alone
- responds well to high flexibility in a course
- prefers individual work

Unfortunately designing for three use-cases is too broad for this project. In order to focus the scope of the project, the choice was made to create a design for the first use case: The application of the participation grading method in one single online discussion. This decision was made based on the responses from teachers and the product strategy of FeedbackFruits.

From the survey and interviews with teachers, it appears that using the grading method has the most appeal when applied to online discussions. Far less interest was shown in the other two use-cases, characterized by doubts regarding the effectiveness of the method. By first developing a concept for this use-case it will give users more time to gain confidence in the method, and can then later be applied to the other two use-cases.

The second reason for choosing the first use-case is that it is in line with the current product strategy for FeedbackFruits. FeedbackFruits is focusing their efforts on developing 'direct' features before they are implemented within the whole platform. A 'direct' feature refers to a FeedbackFruits product that focuses on one learning activity, like the single feature products shown in Figure 4. For example, Interactive Video is a product that targets only one learning activity; making videos more interactive. By first creating the feature in its 'direct' form, like use-case one, the design can then be optimized before it is implemented across the entire platform.

FeedbackFruits has expressed a desire to apply the participation grading method across the entire platform, by making it an extra add-on to other learning activities. One example of this could be peer review, where students review each other's work. The participation grading method could be added to a peer review assignment. Students would then simply select their best review contribution.

The implication that this has for this particular project is that the participation grading method will need to be developed in such a way that it is modular enough so that it can easily be 'added' to other study activities.

5.1.4. PROBLEM STATEMENT

The reflective participation grading technique provides an interesting opportunity to improve student participation and engagement. As the analysis has shown, these are all increasingly important aspects of modern education. Motivating students to participate in class discussions can be very challenging, the participation grading method offers an incentive for students to participate. The method can solve the current participation grading dilemma between providing enough incentive to students and giving them enough freedom within their discussions.

In implementing the grading method there are two main challenges, firstly, how to convince teachers to use this new method and secondly, finding an effective way to

implement this approach. A feature will need to be created that will be intuitive and easy to implement. The feature will need to be paired with a communication strategy to convince teachers to try this new method in their classroom and provide teachers with information that will make them trust the new feature.

This bipartite problem will be addressed in the next two phases of this report; first designing a product that implements the grading method, followed by a launch strategy that will make teachers want to implement the product in their classrooms.

It's time to design, let's get to work!

DESIGN

CHAPTER 6

DESIGN PROCESS

This chapter addresses the decision to follow an iterative design process rather than a parallel design process. Discusses the first concept for the design, and the steps that were taken to create the final concept.

6.1. ITERATIVE **& PARALLEL DESIGN PROCESS**

Now that the design brief is established the design process can begin, Figure 23 shows two different methods for the idea and concept development phase of the design process; the iterative process, and the parallel process.

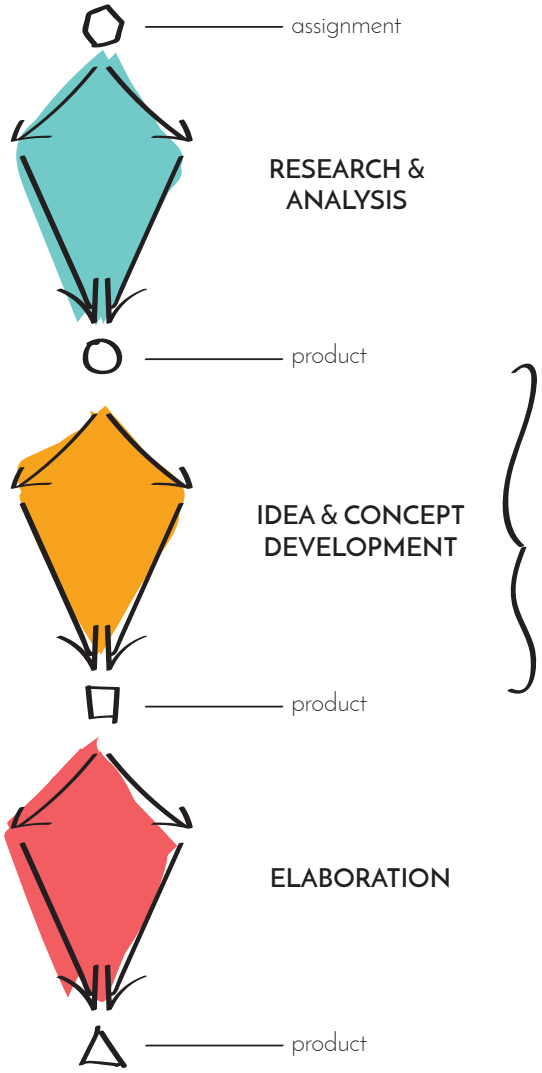
The parallel process will look familiar to most students and teachers at the faculty of Industrial Design Engineering of the TU Delft, as it illustrates the design process that is often taught there. This process was first visualized by the Verein Deutscher Inegenieure (VDI) and is based on the guideline for systematic design in Mechanical Engineering (Roozenburg & Eekels, 1998). The parallel design process is divided into four main phases; planning, conceptual design, embodiment design, and detail design. Within each step, several solutions, ideas, or concepts, are developed in parallel. At the end of each phase one solution, idea, or concept, is chosen to bring to the next stage of the process. This process ends when one concept is detailed enough to bring to production.

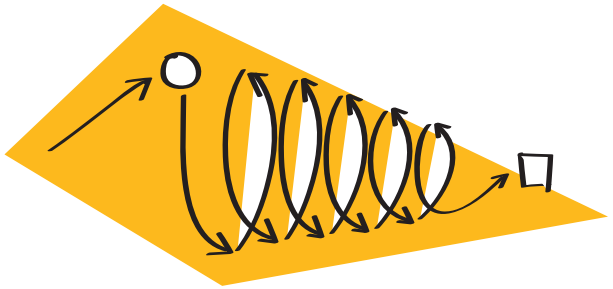
This type of design process lends itself well to the development of physical products that have a broad solution space, as it allows the designer to explore a large variety of solutions while keeping the costs relatively low. It can become costly to prototype various iterations of tangible products, pushing the detailing towards the end of the process reduces a risk of investment.

The parallel design process is the process that is favored at the faculty of Industrial Design Engineering, as the roots of this faculty lay within the development of tangible products. However, in recent years, Industrial Design Engineering has broadened its scope to also include digital products. With this shift towards digital products, there might also be a need to change the type of design process that is applied.

Within the field of digital products an iterative design process is more commonly applied. This approach was introduced to replace the waterfall method in the 1950s and has its roots in the software sector (Larman, 2003). The typical iterative design cycle begins with creating a planning, followed by setting requirements, which leads to analysis & design, this is then prototyped, tested, and evaluated. This cycle is repeated until a product is created that is ready for deployment, which is when there are no significant user issues found during testing. This design process can be easily applied to digital products because the cost of prototyping software is relatively low. Another important aspect of this approach is that it requires a large quantity of user feedback, which is very important because it is the only way to ensure that digital products meet the wishes of the users.

Considering the parameters of this project the decision was made to apply an iterative design process, rather than the parallel design process. The main factor that impacted this decision was that the possible solution space was limited to a digital product, this is because it had to fit within the FeedbackFruits product portfolio which is made up entirely of digital products (section 2.2.).



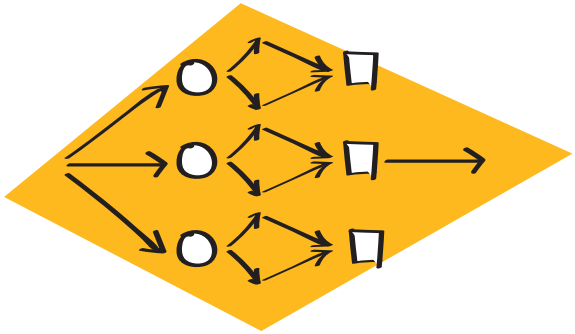


ITERATIVE PROCESS

Ideation leads to one idea for a product. This idea is developed into a concept, prototyped, tested, improved and redesigned. This cycle is repeated until no big iterations are required.

\+ FINAL CONCEPT IS ABLE TO REACH A HIGH LEVEL OF ELABORATION.

– THIS PROCESS WILL MOST LIKELY RESULT IN INCREMENTAL INNOVATIONS.



PARALLEL PROCESS

Ideation leads to 3 different ideas that are developed into concepts. These concepts are then prototyped, tested, and compared, one concepts is then chosen to develop further.

\+ DIFFERENT SOLUTIONS ARE EXPLORED MAKING RADICAL INNOVATION MORE LIKELY.

– FINAL CONCEPT WILL NEED MORE WORK IN THE NEXT PHASE: "ELABORATION".

Figure 23.Illustration of the design process and important differences between an iterative and parallel process

6.2. SCENARIO **CONCEPT COLLABORATIVE LEARNING**

The iterative process always begins with an initial concept, as discussed in section 6.1. The starting point for this design is the concept sketched in Figure 24. This concept was created based on taking the grading method from online classes to a more common use-case, where students will still have traditional lectures but also have online homework assignments.

It shows the scenario of a teacher who wants their students to have read an article before the next class. The student then goes home and can read and discuss the article on their own time. During the week the students discuss the article. All of the students actively participate in the discussion because they know that they will have to select their best contribution at the end of the assignment. During the week the teacher can monitor and guide the discussion where necessary. In the next class, the teacher is able to continue with the material, happy that all of the students are well prepared.

The concept will be named Collaborative Learning because this is the didactic that the feature will be based around. As stated earlier in the report, Collaborative learning is defined as: “an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product.” (Laal, 2012) Using this name for the feature will allow the feature to fit the existing mental model of the teachers.

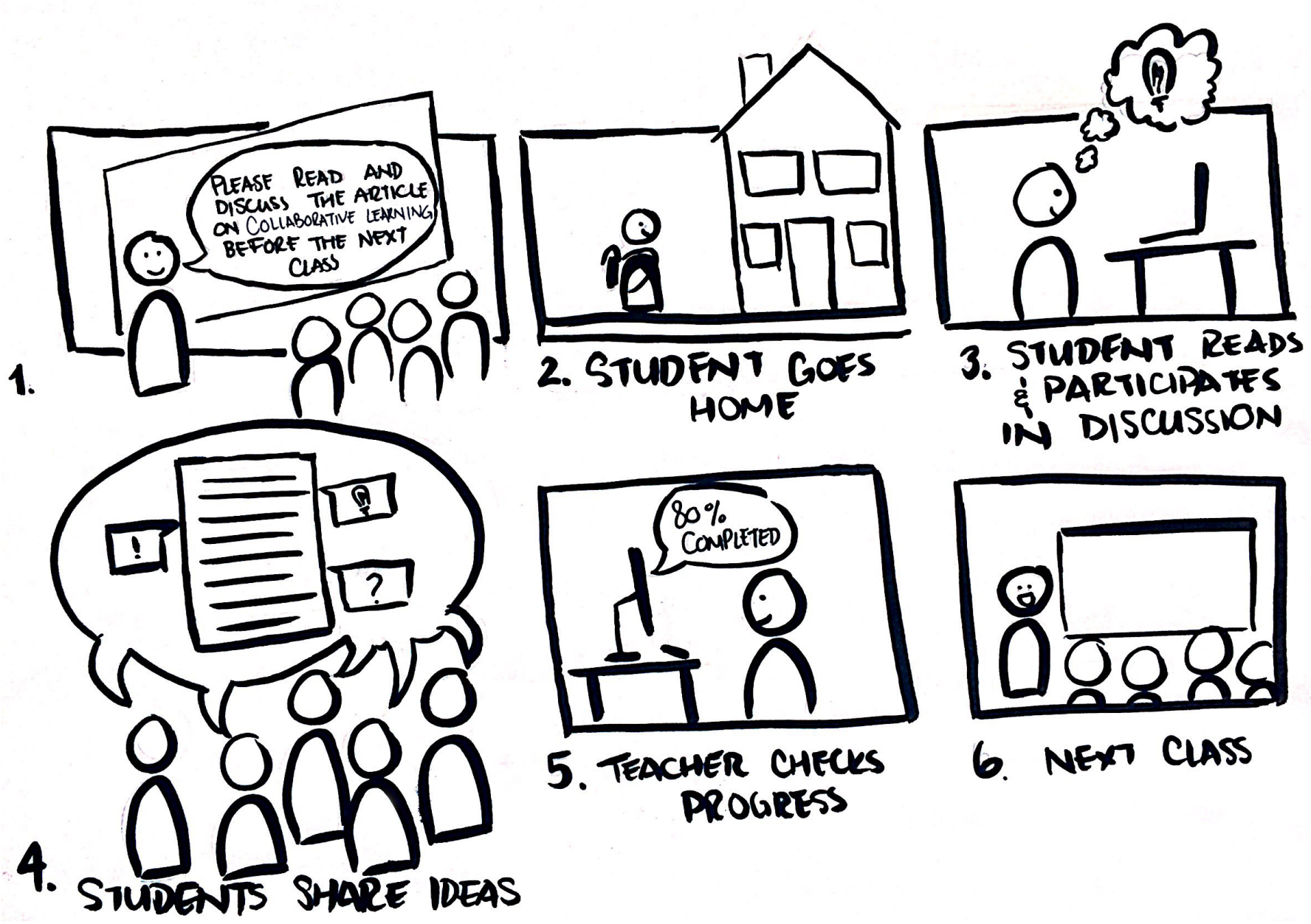


Figure 24. Scenario of concept for Collaborative Learning

6.3 THE **DESIGN PROCESS**

The previous section gave a general overview of the steps of the iterative design process, the exact steps that were taken in this process are shown in Figure 25. The input to this process is the design brief, from here the requirements are defined, after which the product can be designed and prototyped, this prototype is then tested, and evaluated. The evaluation leads to redefining the requirements, which is the beginning of a new iterative cycle.

Each step of the process will be described on the following pages, along with the most important design decisions that were made in those steps. After explaining the process, an example of how the process was applied to one of the features of the concept will be shown. The final result, which is the design of Collaborative Learning, will be shown in the next chapter.

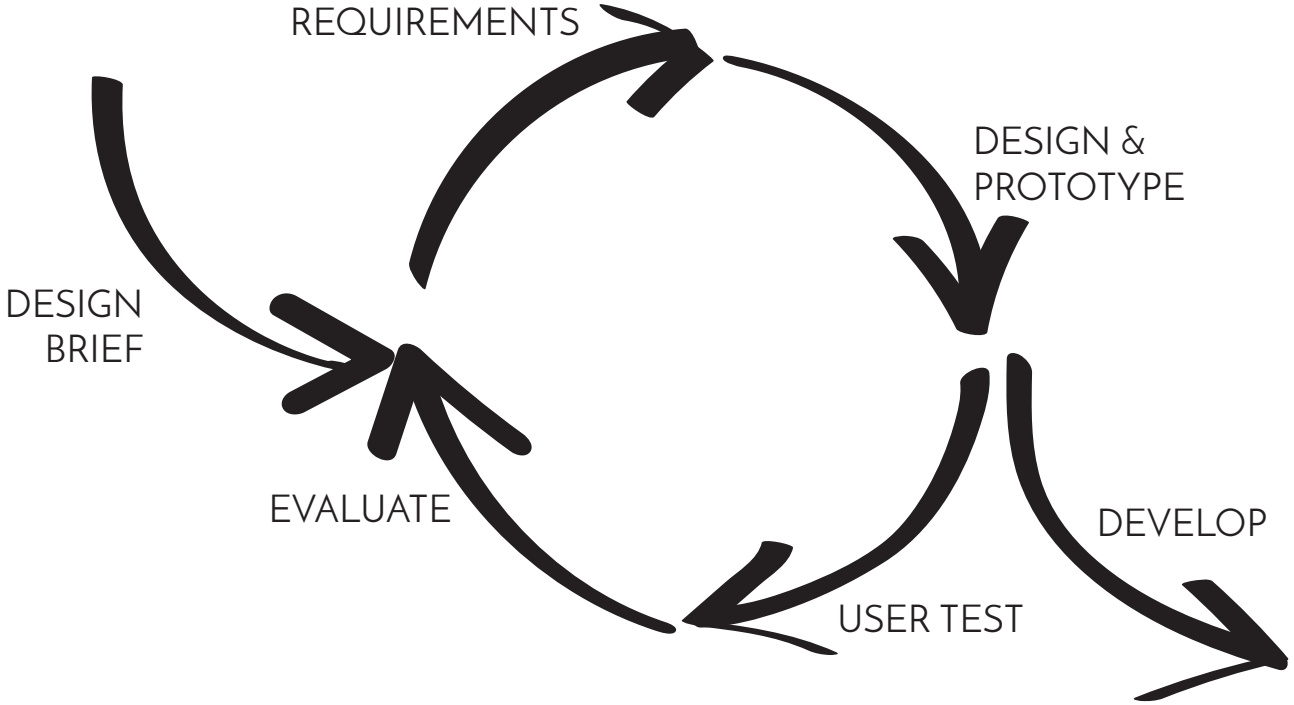


Figure 25. The steps taken in the iterative design process

6.3.2. PROGRAM OF REQUIREMENTS & WISHES

The first step in the iterative cycle, as shown in Figure 25, is developing a program of requirements. A program of requirements is a tool that allows the designer to set of specifications that the design must fulfill. The program of requirements is often accompanied by a list of wishes, these are conditions that would be nice if the product fulfilled, but are not make or break for the design.

Differing from a parallel design process, this program of requirements and wishes has been revised throughout the iterative cycle. The initial contents of this program of requirements and wishes is loosely based on the requirements checklist from Pugh (Roozenburg et al., 1998), but adapted to fit an intangible product. Throughout the design process the lists have been extended to include new findings that were a result of the user tests. The initial list is shown in regular text, the requirements that have been added throughout the iterative process are shown in italic.

6.3.2.1. REQUIREMENTS

1. The feature

1.1. Description of the feature

1.1.1. The feature should provide a solution for implementing the participation grading method in online assignments. (section: 1.1.3.)

1.1.2. The feature should focus on single document discussions. (section: 5.1)

1.2. Specific functions of the feature

1.2.1. The feature should provide the context of the best contribution that the student submitted, which should be visible for the teacher as well as the student. (section: 1.1.2)

1.2.2. The feature should ensure that it does not take students longer than 5 minutes to select their best contribution, as time was raised as a concern of this method. (section: 4.2)

1.2.3. The feature should allow the teacher to set a minimum number of contributions per students. (section: 3.3)

1.2.4. The feature should enable the teacher to upload either a pdf, audio, or video, as the discussion material. (user test)

1.2.5. The user should be able to edit the contributions they placed in the discussions. (user test)

1.3. Grading specifications

1.3.1. The teacher should be able to upload a rubric on which the students are going to be graded. (section: 3.3)

1.3.2. The feature should give the option of weighing different rubric criteria. (user test)

1.3.3. The grades should only be sent to the students once the teacher has graded all students, and confirmed that the grades should be sent. (user test)

2.Users
2.1. Teachers
2.1.1. The feature should be easily implemented in different teaching forms, teaching styles and learning activities. (section: 4.2)
2.2. Students
2.2.1. The feature should take the different types of learning styles into account, this includes the social learners and the individual learners. (section: 5.1)
2.2.3. The feature should clearly communicate to the students what their progress is on the assignment, and what is still expected of them. (user test)
3. FeedbackFruits
3.1. Strategy
3.1.1. The product should fit the company objectives of FeedbackFruits. (section: 2.1)
3.2. Style
3.2.1. The feature should follow the house style that is being used by FeedbackFruits. (section: 2.2)
3.2.2. The feature should follow the user flow that is being used by FeedbackFruits. (section: 2.2)
3.3. Platform integration
3.3.1. The feature should be able to function throughout the platform, as a module to other assignments. (section: 2.2)
3.3.2. The feature should be usable as a stand-alone function on the FeedbackFruits platform. (section: 2.2)

You've been reading this report for a while, maybe it's time for a coffee break?

6.3.2.2. WISHES

4.1 Wishes for functions of the concept
4.1.1. The feature should have an overview of all of the comments created by one student, which should be visible for both student and teacher. (section: 1.1.2)
4.1.2. The feature should provide the teacher with visible response to identify and communicate whether or not the feature is effective. (section: 4.2)
4.1.3. The feature should allow the teacher to set separate deadlines for when every student must have participated in the discussion, and from when the students are required to select their best contribution. (user test)
4.1.4. The teacher should have the option of using a different scale for the rubric, as for the final grade of the students. (user test)
4.1.5. The teacher should be able to view the rubric while grading student contributions. (user test)
4.1.6. The most commonly used grading scales in Europe, the United States, and Australia, should be integrated into the design. (user test)
4.1.7. The feature should indicate which posts are unread by the user. (user test)

These requirements and wishes helped to shape the design of Collaborative Learning. The iterative process allowed the users to test these requirements, that were then translated into specific design choices, and either validate them or they were adjusted to better fit the user want and needs.

6.3.3. DESIGN & PROTOTYPE

After defining the program of requirements and wishes, the next step in the process is to design and prototype. The scenario that was sketched in Figure 24 provided a starting point for the design of the concept. A flow of the interface was first created to begin to conceptualize the actual feature. This flow maps out which steps each user, the student, and the teacher, would possibly take when using this feature. This flow varies slightly from the flow illustrated earlier when describing the grading method (see Figure 1), the new variation is shown in Figure 27.

After creating the 'flow,' some preliminary sketches were made on paper, creating some basic wire-frames for the possible screens (see Figure 26).

FeedbackFruits uses a program called Sketch to design their interfaces; user interface designers widely use this program. Sketch was used to visualize the screens that had initially been drafted on paper. The screens were continually changed and improved as the iterative process continued.

Once the screens were created in Sketch, they were exported to Invision. Invision is a website that makes it possible to prototype static web page designs. The designer can create clickable areas on the web pages, that will then link to a new pre-designed page. Making it possible to create clickable prototypes for user testing.

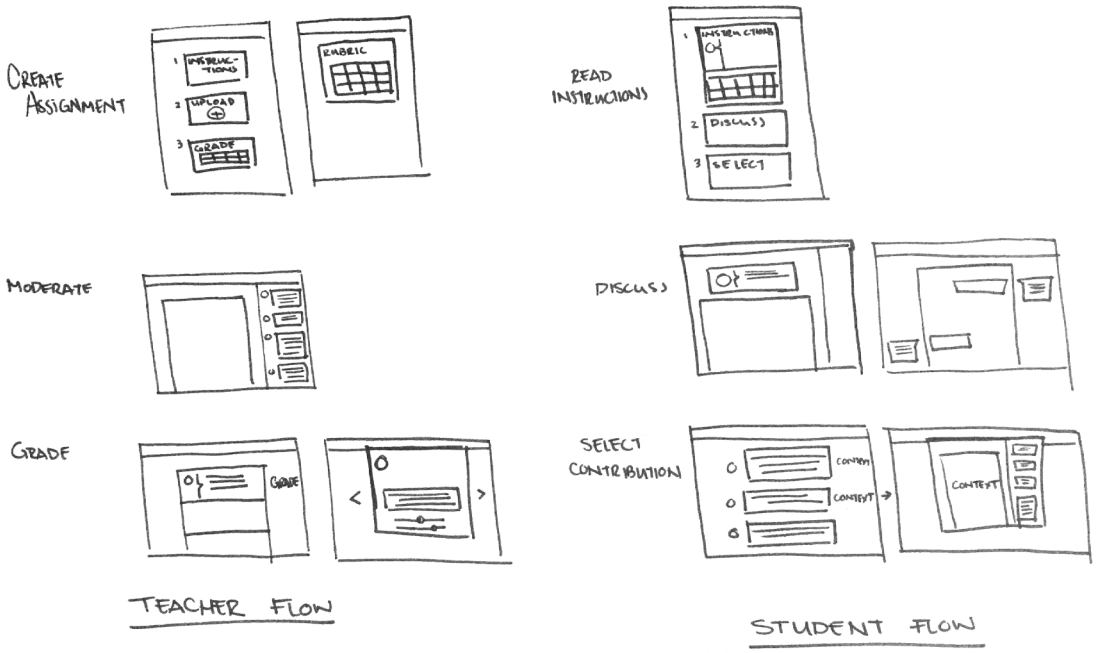


Figure 26. Preliminary sketches of the screen designs

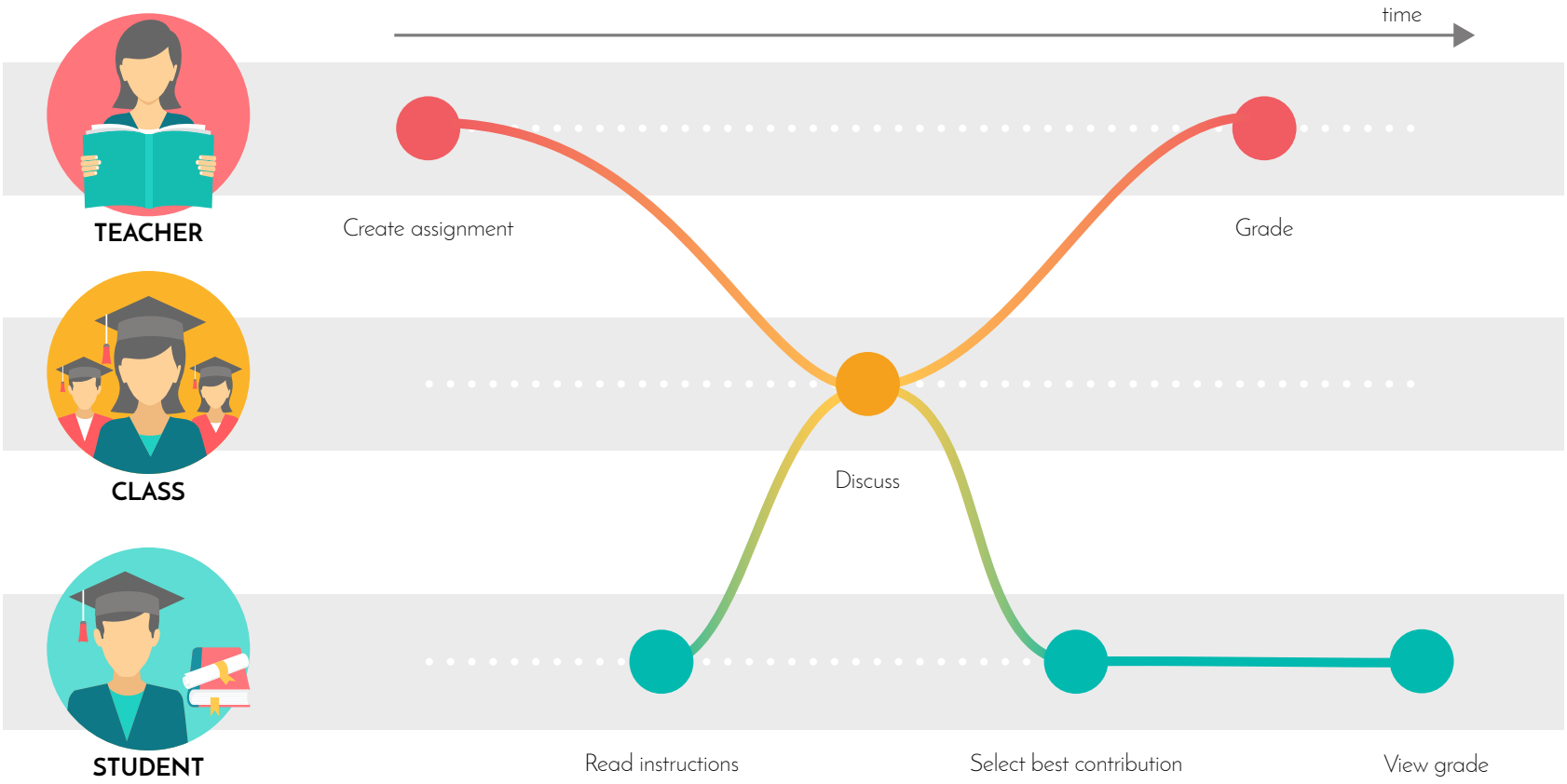


Figure 27. Flow of the Collaborative Learning interface

6.3.4. USER TESTING

The third step in the iterative process is user testing, the goal of the user tests was to test the usability of the design and to test the reactions of users to the general concept. Each of these two goals consisted of two main research questions.

USABILITY OF THE DESIGN:
1. Is it clear which actions are expected from the user?
2. Does the flow of the design feel intuitive?

REACTION ON GENERAL CONCEPT:
1. Are teachers willing to use this design in their class?
2. Do students feel that it would encourage them to participate more in class discussions?

To try and answer these questions a total of fifteen user tests were conducted. The user sample consisted of three different stakeholders.

One of these stakeholders was the company, where two different types of user tests were applied. The first user test with FeedbackFruits consisted of presenting the concept to a team of about eight employees and asking them for feedback on the design. The second user test with FeedbackFruits was a continual user test, where two of the team members regularly gave feedback on the prototype in Invision (the prototyping software) by placing comments within the document.

Tests were also conducted with four teachers. This test group was made up of the teacher who created the participation grading method, as well as someone interviewed at the beginning of the project and two teachers who did not have any prior involvement in the project.

Lastly, user tests were also conducted with students. The prototype was tested with a total of eleven students, four of the students are female, and seven of the students are male. The test group also consisted of four bachelor students and seven master students.

6.3.4.1 METHOD

Aside from the company user tests, all of the user tests with students and teachers were conducted as individual interviews. The users tested the design by clicking through the Invision prototype of the design. The users were given tasks to perform in the online prototype, the tasks that were given to the users varied per type of user.

The tasks that were given correspond to the flow that has been designed for the two types of users, see Figure 27. The teacher was first asked to create and publish the assignment, then to moderate the discussion, and then to grade the students. The students were first asked to read the instructions, post three contributions, and then to select

one contribution to hand in, and view their grade.

All of the tests were conducted within a span of one month, allowing time between sets of tests so that the tests could be evaluated, and improvements could be applied to the design and prototype before the next round of user tests.

6.3.5. EVALUATE

The fourth and final step in the iterative cycle is to evaluate the design and user tests. The results from the user tests were compiled into lists, during the evaluation it was decided what should be done with the remarks from the users. Whether they were things that had to be changed in the design, or if things had to be clarified to the user, for example.

Figure 28. The researcher Alienor de Haan, on the left, interviewing professor Cora Busstra during a user test

The last user tests showed that the users only had minor changes that they were suggesting, no large issues arose from those tests. This feedback showed that a satisfactory level of design-maturity had been reached.

6.3.6. EXAMPLE OF THE ITERATIVE PROCESS

To illustrate how the design process worked, this section will give an example of the iterative process for one of the screens of the design. In Figure 29 through Figure 34 images of the same screen at different points in the design process are shown. The screen shown in this example is the design for the page where students select their best contribution. Students have already read and discussed the material prior to accessing this screen.

The text shown in the speech bubbles beside the figures illustrate the feedback that was given on the designs in the user tests, this feedback was then used as input for the new iteration.

One can see that the changes, in the beginning, are significant, but slowly become smaller and smaller details. The first two screens (Figure 29 and Figure 30) show that this step is completely separated from the context of the discussion. One of the biggest changes that was made was to let students select their best contribution in the same screen as where they would be discussing the material. This will help create a context for their comments and will make selecting the contribution a lot faster and more intuitive. In the iterations after that, the changes that are made are smaller and smaller adjustments to fine-tune the design.

This is only one example of the iterative process within the design. This process was done for every screen, no screen that was created in the first step has stayed untouched throughout the whole process.

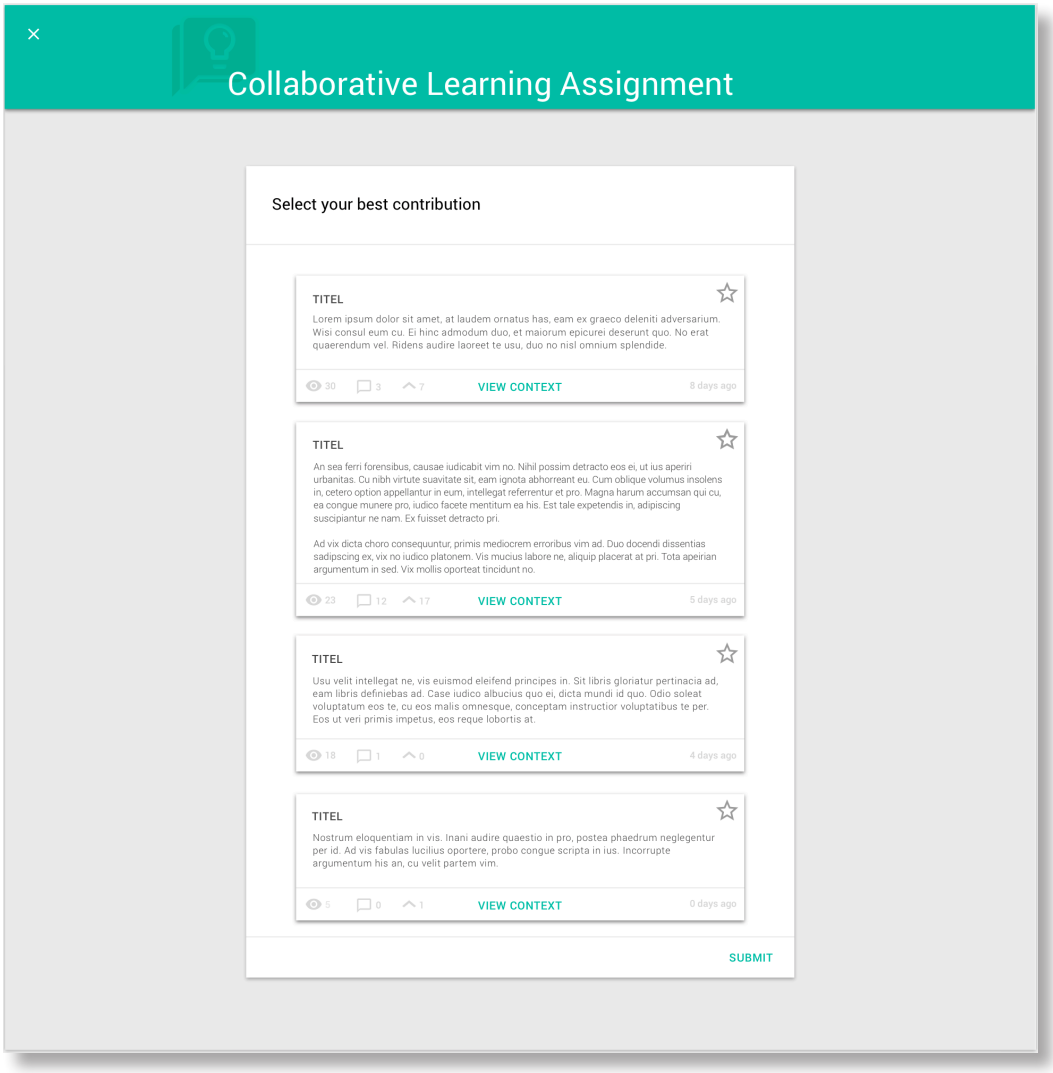
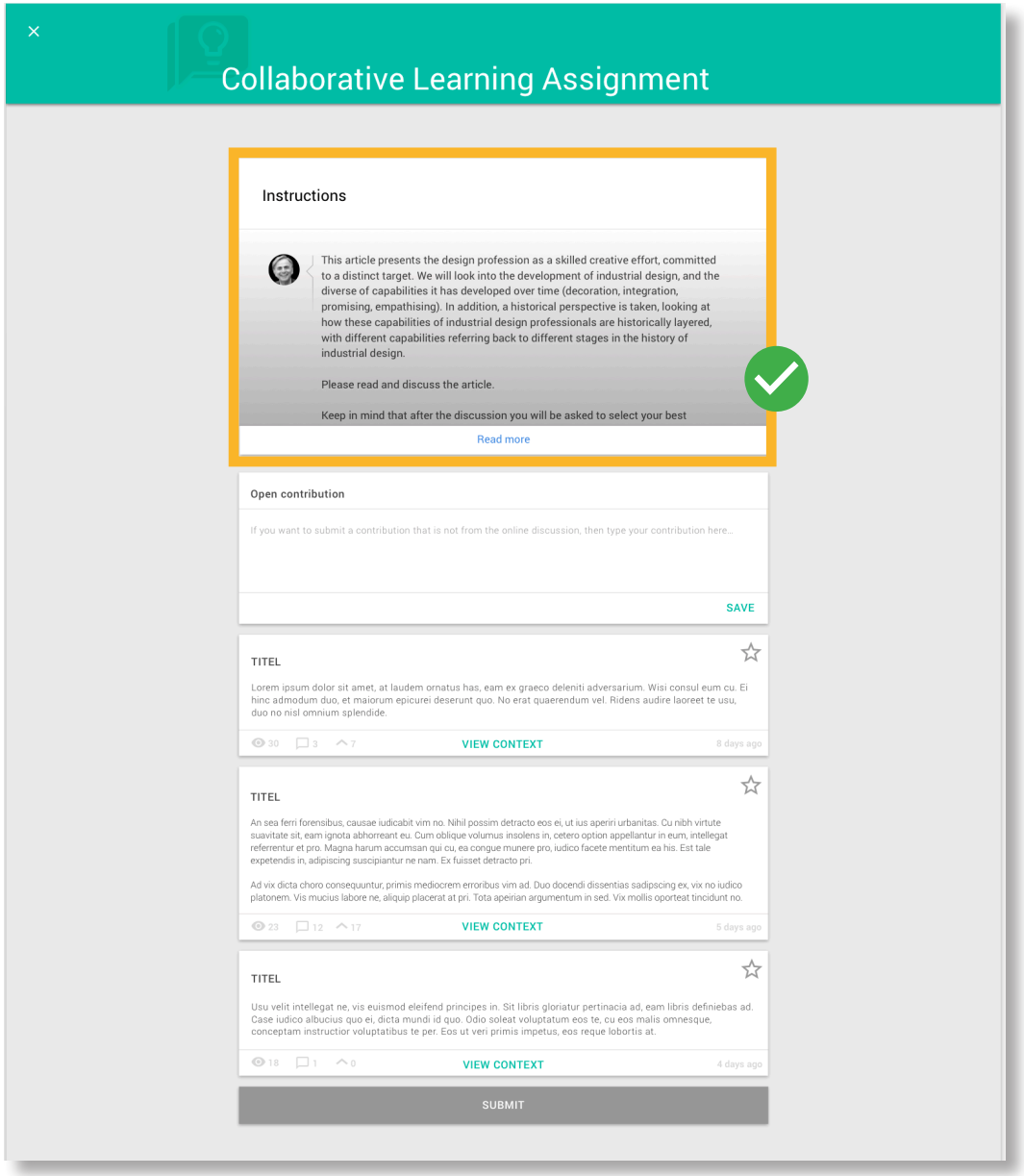


Figure 29.This is the first design that was made for the selecting contribution screen, it only showed excerpts of the personal contribution. Any extra context was given by navigating to a different screen.



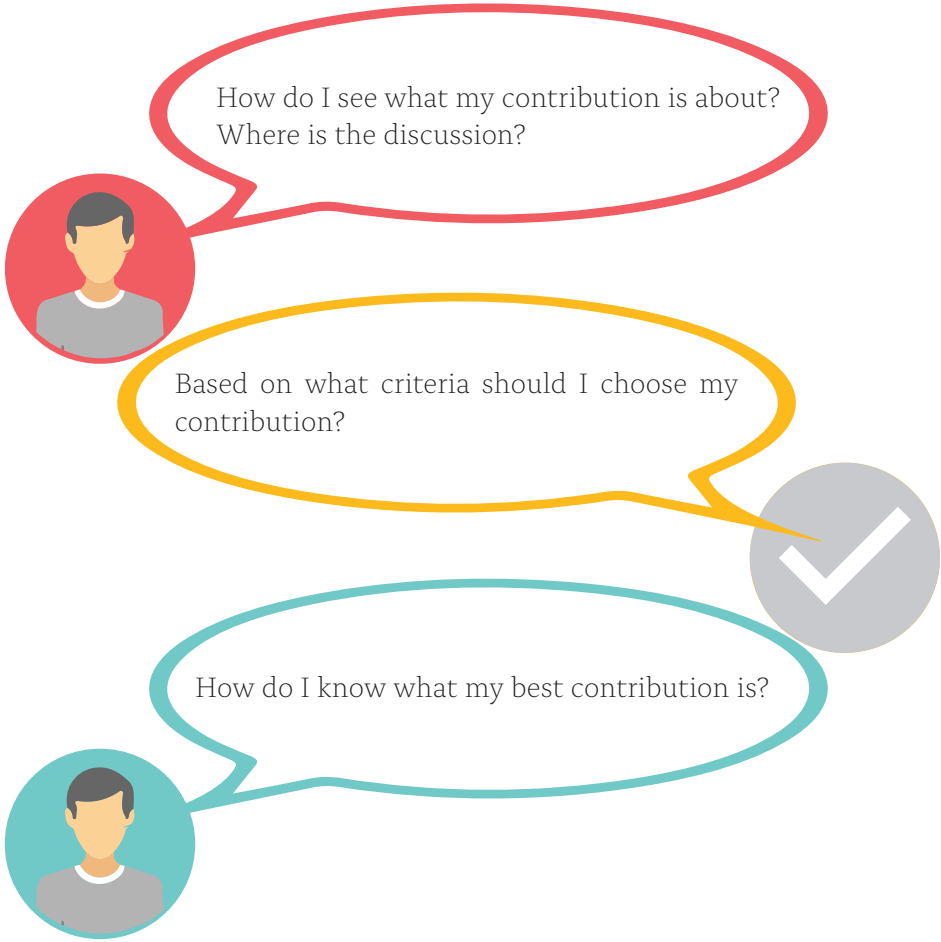


Figure 30. The second version of this screen included the instructions of the assignment at the top to help students read the requirements while selecting their contribution to be graded. Just like the previous design only excerpts of the contributions were shown.

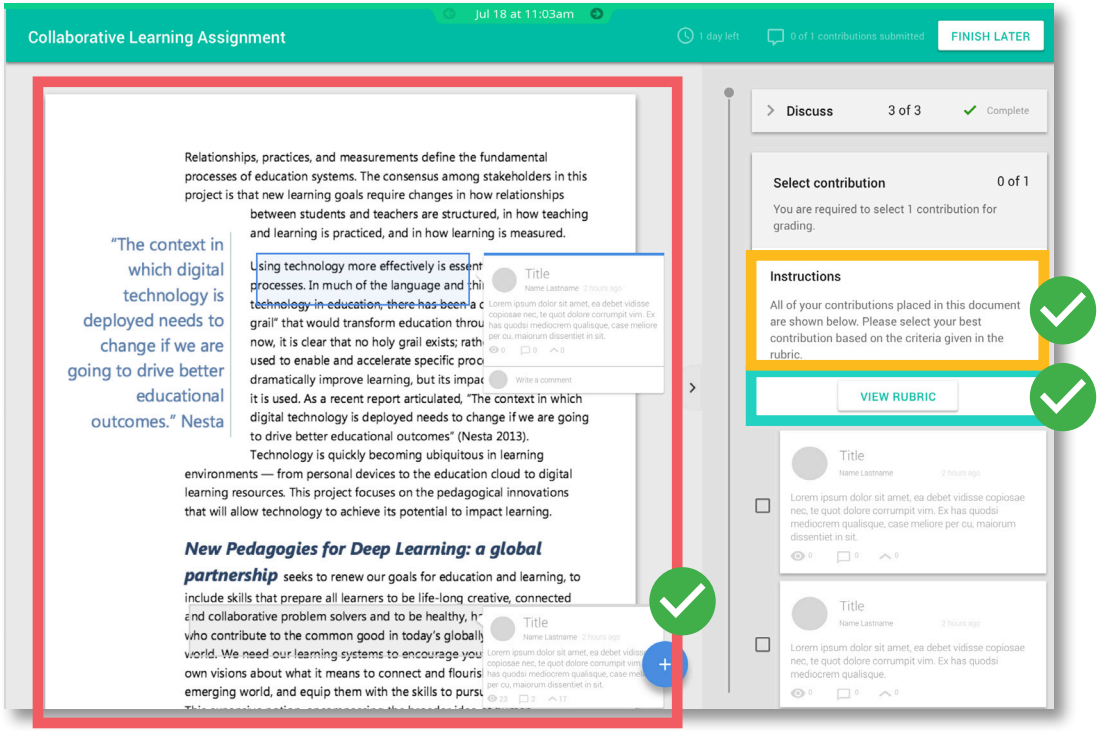


Figure 31.The design of this screen experienced a big change, the student is now able to select their best contribution within the same screen as where the discussion took place. This means they are able to see their contributions within the context of the discussion.

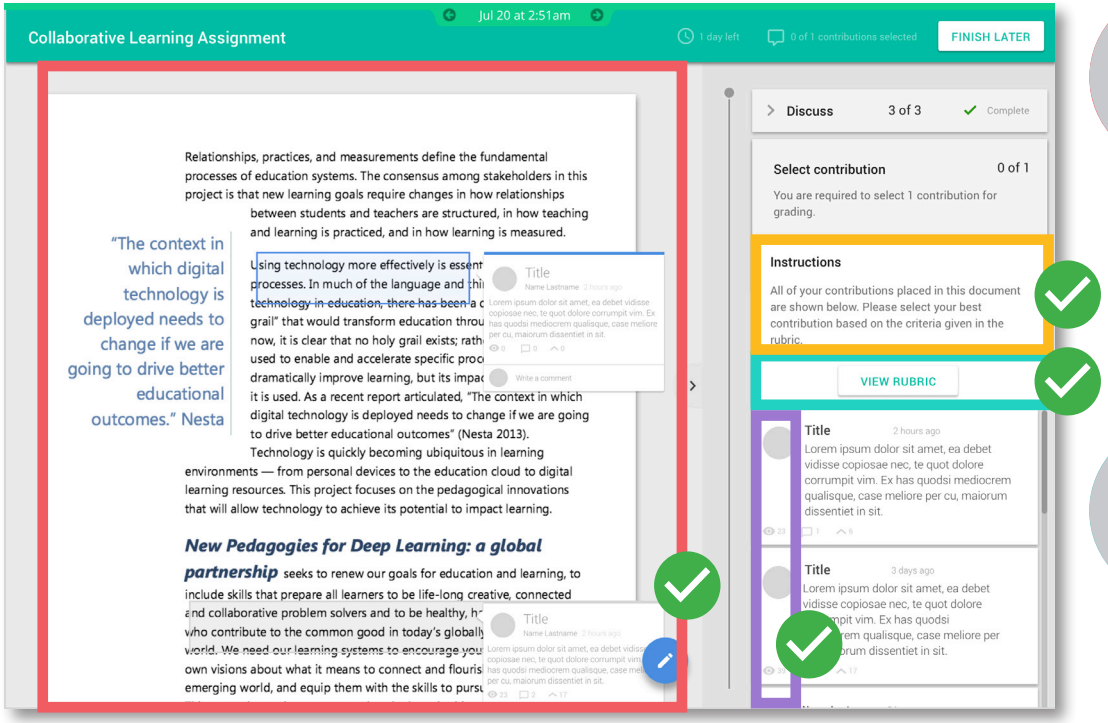
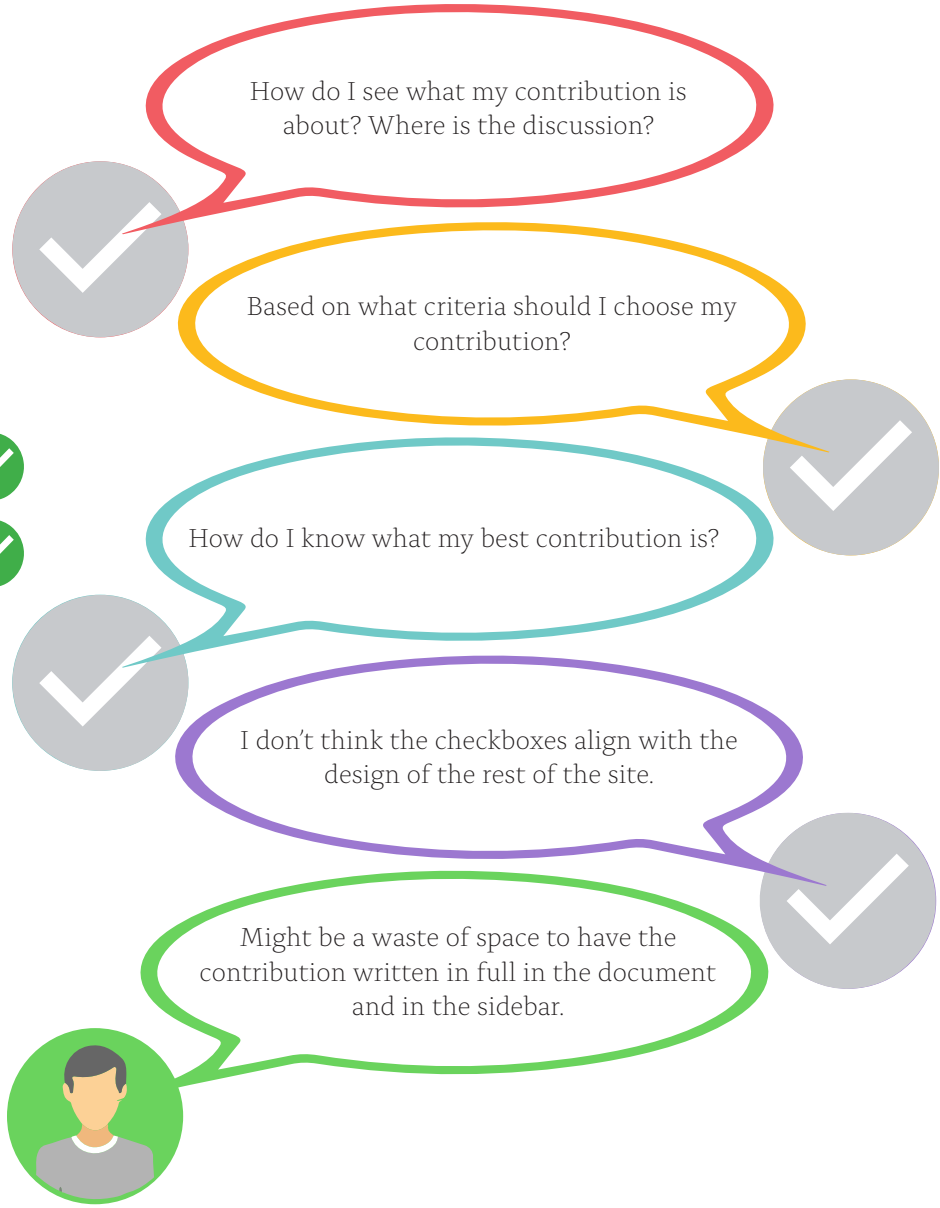


Figure 32. This iteration saw a smaller change, there are no longer any check boxes but the contribution can be selected by clicking anywhere on the comment.



How do I see what my contribution is about? Where is the discussion?

Based on what criteria should I choose my contribution?

How do I know what my best contribution is?

I don't think the checkboxes align with the design of the rest of the site.

Might be a waste of space to have the contribution written in full in the document and in the sidebar.

Can I edit my contribution before I select it as my best one?

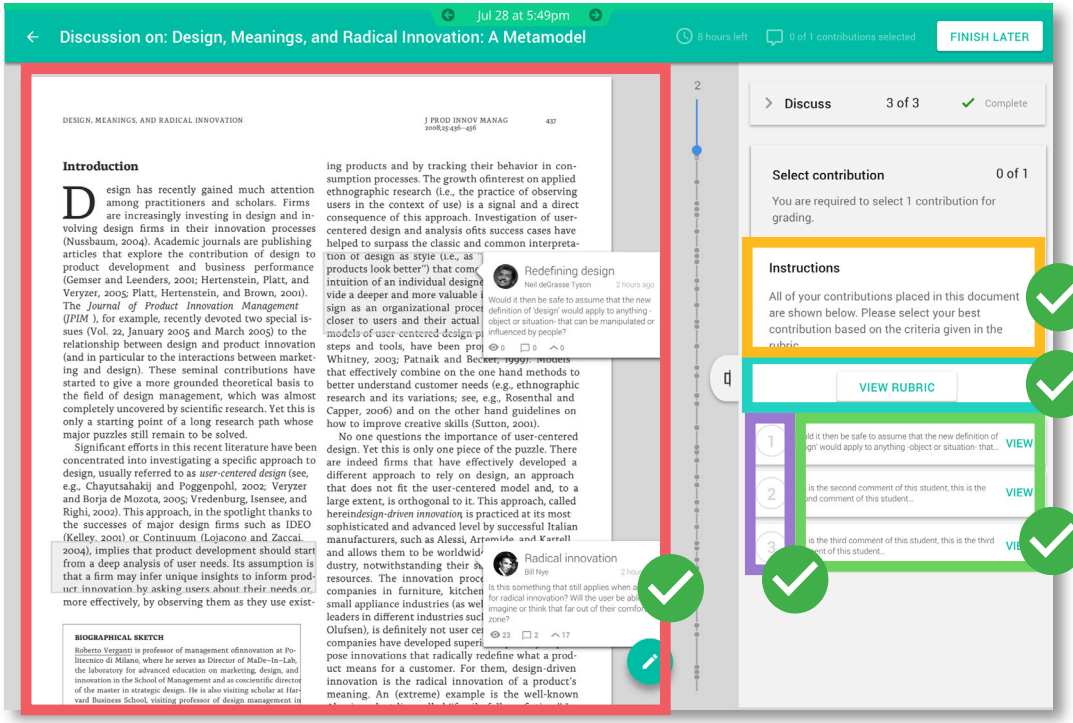


Figure 33. The placeholder text has been swapped out with fabricated content, this creates a better feeling for the design when testing. A big change has also been made in the selection of the contributions, these are now small excerpts in the sidebar.

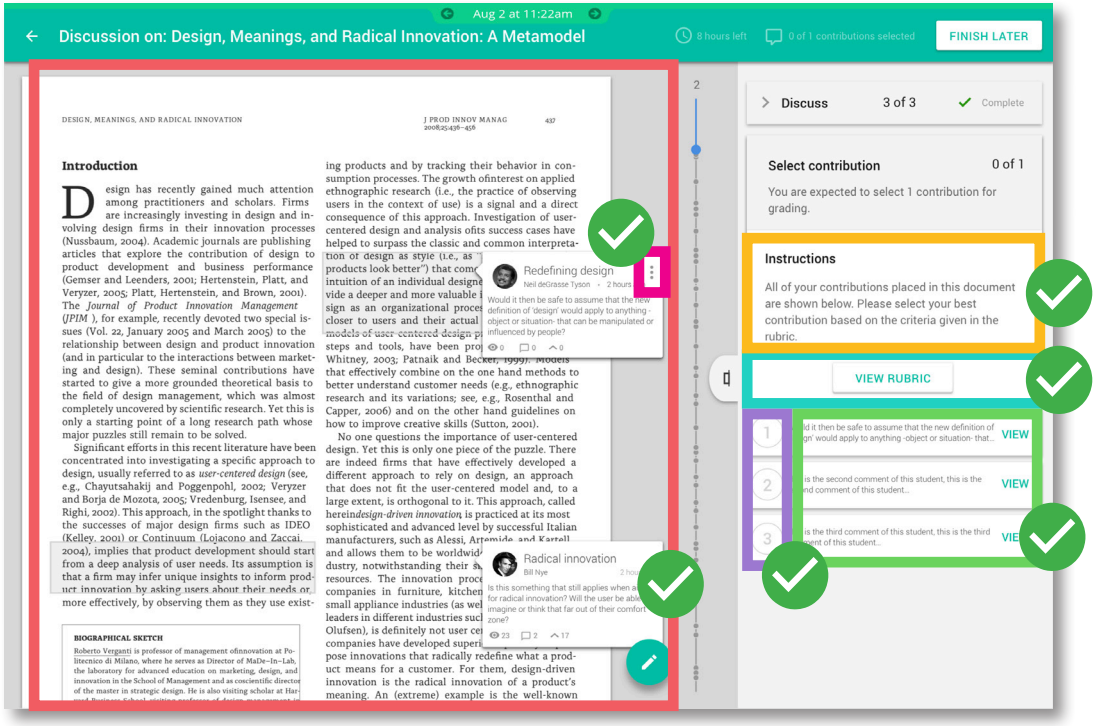


Figure 34. No big changes have been made anymore, only a small addition of students being able to edit their posted contributions if they wish to do so.

6.3.7. CONCLUSION

This chapter gave an overview of the steps and decisions that were made during the iterative design process.

The iterative process has been very effective in creating a well tested and well elaborated final concept. However, this process is challenging to document because it consists of so many minor changes. Another challenge of the iterative process is in choosing when the design is 'final,' as the process could always continue and refine the design even further. At a certain point, however, the design phase will need to end, as to when this happens should be based on the feedback from the user testing. If the tests are no longer revealing new input or resulting in changes, then the design can be deemed ready to build. The last round of user testing revealed no new input; therefor the main design process was brought to a close. However, small improvements and iterations will still be possible during the next phase of the project.

In the next chapter, the final design for Collaborative Learning is shown.

CHAPTER 7

COLLABORATIVE LEARNING DESIGN

This chapter shows the final design of the Collaborative Learning concept, the user flow of the design is shown as well as the corresponding screen designs.

7.1. COLLABORATIVE **LEARNING DESIGN**

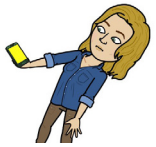
This chapter shows the final design of the concept: Collaborative Learning is an online tool that encourages students to participate in online discussions by using fair online participation grading. Teachers can upload documents, videos, or audio, that they want the students to discuss. Students actively participate in the discussion and are asked to select what they feel is their best contribution.

Since Collaborative Learning is essentially a website, the best way to show the design is on a screen. The researcher has created a clickable prototype and two video's that further explain the concept. To visit these videos either scan the corresponding QR-code or type in the given url. No internet? Printed versions of the screens can be found in Appendix D, but keep in mind that the concept is best explained through the videos.

To view a video of the teacher flow of the concept visit: https://vimeo.com/collaborativelearning/teacher

To view a video of the student flow of the concept visit: https://vimeo.com/collaborativelearning/student

The final concept can also be experienced by going to the prototype of the concept that can be found online, where it is possible to click through the concept. Use this link to view it: http://bit.ly/2x45tLD



Is your camera not scanning the QR code? Try installing a QR scanning app from the app store.

COLLABORATIVE LEARNING

Encouraging students to participate in online discussions

HOW DO YOU MOTIVATE STUDENTS TO PARTICIPATE?

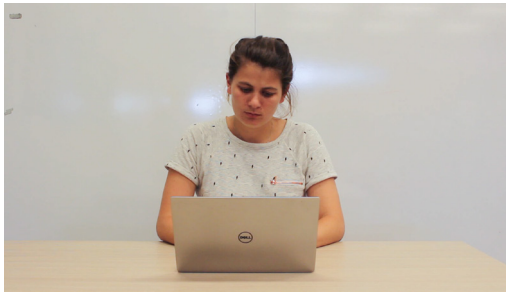
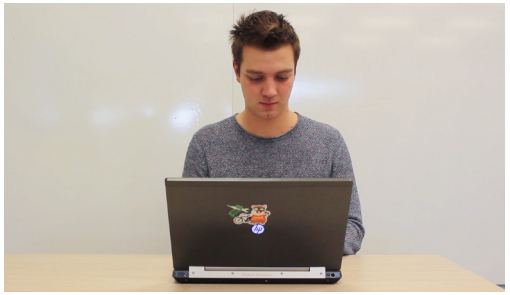
Online discussions can lead to valuable learning outcomes, but motivating every student to participate in an online discussion can be a real challenge.

Studies have shown that grading online discussions contributes to an increase in student participation. As an instructor, however, we want quality contributions, not just high quantity. So, rather than using a rigid algorithm to calculate whether the student actually participated, with Collaborative Learning we simply ask the student to select what they feel was their best contribution to the discussion.

Not only does it give students the freedom to participate in their way, it also provides a moment for students to reflect on their personal contributions. Thereby organically increasing the number of high-quality contributions.

Figure 35. Collaborative Learning design example on desktop




The scenario shown in the videos and prototype is one possible scenario; one can imagine many different variations of using this design. For example, having the discussion material be a video, not requiring students to post a minimum number of comments, or allowing students to select their best contribution one week after the entire discussion has been completed.

The concept is intended to be flexible enough to allow teachers to implement the assignment to fit their personal preferences, yet still, steer the teacher to create the assignment for optimized student participation based on the findings from the literature study. The concept is also designed to give students the freedom and flexibility to participate in the discussion in their way, as was shown to be a crucial element to motivating students from student interviews about their motivation.

In addition, the concept has been designed in such a way that FeedbackFruits can implement this feature as 'add-on' to existing products. One example of this is the implementation of collaborative learning on their peer review tool. Peer review lets students give feedback on the work of their peers. Asking the students to select their best contribution afterward will have a positive effect on the quality of the feedback and the motivation of the students to provide good feedback.

FeedbackFruits will be able to implement this design as a standalone product, and as an ingredient across their entire product portfolio.

CHAPTER 8

THE POSITIONING & LAUNCH STRATEGY

This chapter includes specifying a positioning for Collaborative Learning, as well as defining the launch & marketing strategy for the product and creating the corresponding marketing material. Finally, a roadmap is created that describes which activities will need to take place to be able to launch the product.

8.1. POSITIONING **OF COLLABORATIVE LEARNING**

Having finalized the design of Collaborative Learning, a marketing strategy needs to be created. Creating a marketing strategy is essential to the success of a new product: "the more marketing resources invested in the development and launch of a new product, the higher its probability of success." (DeBruyne, 2002).

The first step in creating a successful marketing strategy is defining a clear product positioning. This positioning will be the core message communicated throughout all of the marketing material. A positioning statement traditionally has the following elements; target audience, category description, point of differentiation, and the reason to believe.

The following paragraphs will explain each element of the positioning statement, which will then be compiled into one final positioning statement. This positioning statement will then be used to determine the marketing strategy for Collaborative Learning.

8.1.1. TARGET AUDIENCE

In the design brief, chapter 5, the target audience for the concept Collaborative Learning is defined as students and teachers. These will remain the target users for the concept, this however differs from the target audience for the marketing efforts. Seeing as universities are the stakeholder purchasing the license for the product, the target consumers are university staff and teachers as they are the individuals that can influence university investment decisions. Therefore the target audience for the marketing efforts are university staff, educational development departments, and the lecturers as they are the ones seeking new products for the school to use. Rather than targeting all universities worldwide, it is wise to narrow the scope further.

With ten Dutch universities using FeedbackFruits, the company is well established in the Dutch university market. However, an international focus remains to be defined. Two interesting metrics for this could be the Global Innovation Index and the Education Index. The Education Index assesses the expected number of years of schooling a student will receive, if this is number high then a large amount of the population attends university, which in turn makes it an attractive market for FeedbackFruits. This index is created by the United Nations Development Programme. The top 10 countries in 2013 are ("Human Development Reports," 2017), in order from 1 to 10: Australia, New Zealand, Norway, the Netherlands, U.S.A., Ireland, Germany, Lithuania, Denmark, and the Czech Republic.

The Innovation index is an interesting indicator of the likelihood that the national education system is open to incorporating innovative technologies. This index is developed by the World Intellectual Property Organization, Cornell University, and INSEAD. The top 10 countries in 2017 are ("Global Innovation Index 2017," 2017), in order from

1 to 10: Switzerland, Sweden, the Netherlands, U.S.A., U.K., Denmark, Singapore, Finland, Germany, and Ireland.

This information creates a couple of interesting target markets. The Scandinavian countries (Denmark, Finland, Norway, and Sweden) are well represented in both indexes, clustering these together as a target market will be wise.

Another dominant group in both lists are the predominantly English speaking countries: the U.K., Ireland, Australia, New Zealand, and the U.S.A. Who can also be clustered together, as cultural differences between these countries are minor according to the Hofstede dimensions ("Country Comparison," 2017).

The Netherlands can be viewed as the test market for FeedbackFruits, even though it might be due to circumstance, it turns out that the Netherlands is well represented in both of these indexes. It is likely that if the Dutch market rejects a product, that the other two market clusters will also be hesitant to adopt it.

The researcher suggests focusing the marketing and research efforts of FeedbackFruits to the Netherlands, the Scandinavian market, and the English market. While keeping the Netherlands as their test market for Research and Development.

In the positioning statement, the target audience is 'university staff and teachers,' as they are the type of consumer that will be targeted. The specifics of the cultural scope of the target audience will be taken into account when creating the marketing strategy and material.

8.1.2. CATEGORY DESCRIPTION

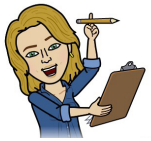
The second step in creating a positioning statement is defining the category in which the product will compete. Looking at the most basic elements of Collaborative Learning the following statements can be made; the product is online, the product is interactive, the product will be used as an educational tool, and the product will be used by universities.

Additionally, the main function of the concept is to create an online discussion environment. The focus on a discussion environment is also what sets Collaborative Learning apart from the other FeedbackFruits products. In summary, Collaborative Learning is an interactive educational tool for online discussions.

In the positioning statement, the category description is: an interactive educational tool for online discussions.

8.1.3. POINT OF DIFFERENTIATION

The third element in a positioning statement is the point of differentiation, or in other words: What makes this



In regards to using the Netherlands as test market, keep in mind that success in the Netherlands does not directly translate to success in Norway. It would be wise for FeedbackFruits to only proceed to the international market after success in the Netherlands but the international market will still need to be tested. To test these other markets the user-testing method developed in this report can be applied.

product unique? Although the market is not very saturated, Collaborative Learning is not the only product that is an interactive educational tool for online discussions. What distinguishes Collaborative Learning from other competitors is the grading technique which grades students based on the quality of their contributions, rather than using an algorithm grading students on post quantity.

By asking students what they think is their best contribution it gives students more responsibility and autonomy of their grade. In doing so, it leads students to think critically about what they are learning and why.

In the positioning statement, the point of differentiation is: the unique participation grading technique.

8.1.5. REASON TO BELIEVE

The fourth element of the positioning statement is a reason to believe; this needs to provide evidence that supports the claims made in the statement. The reason why this unique participation grading technique should be applied is because it motivates students to increase their participation in the class discussions.

Designing learning environments to encourage student participation is important, because this directly correlates to higher student engagement, resulting in higher educational success. This correlation has been discussed in the literature review section regarding student engagement. The literature review also showed that giving students an incentive to participate online, in the form of assessment is directly linked to successful online discussions.

In the positioning statement, the reason to believe is: the ability for the method to motivate students to participate, which leads to higher student engagement and greater educational success.

8.1.6. POSITIONING

A positioning statement generally follows this set-up: For [target audience], the [category description] is the [point of differentiation] among all [category description] because [reason to believe]. The following positioning statement has been created for Collaborative Learning:

For university staff and teachers, Collaborative Learning is the interactive educational tool that will motivate students to participate in online discussions. Collaborative Learning applies a unique reflective grading technique that grades students based on the quality of their work, rather than the quantity, which directly correlates to higher student engagement and greater educational success.

This positioning statement will now be used to develop the marketing strategy for Collaborative Learning.

8.2. MARKETING **STRATEGY**

Now that the positioning statement has been defined, the next step is to develop a marketing strategy that will ensure the right audience is reached. To do this, a look will be taken at the current marketing strategy of FeedbackFruits. Advice as to what the best practices for marketing this type of product, to this particular audience, is derived from the literature. From this information, the marketing strategy for Collaborative Learning will be created.

8.2.1. MARKETING STRATEGY OF FEEDBACKFRUITS

FeedbackFruits is currently still in the midst of developing an encompassing marketing strategy, but they do have several methods marketing they prefer to use. They apply different methods to the Dutch market compared to the International market. This is due to FeedbackFruits' established presence in the Dutch university market, but being new to the International market. Therefore different marketing tactics apply to each market.

8.2.1.1. DUTCH MARKETING STRATEGY

FeedbackFruits has an established client base in the Netherlands; they can use this presence to their advantage when approaching new Dutch universities. Pursuing new clients is done via the network already created. There is a limited number of institutions of higher education in the Netherlands, and all of the institutes work closely together. Word-of-mouth marketing has proven to be sufficiently successful thus far.

8.2.1.2. INTERNATIONAL MARKETING STRATEGY

FeedbackFruits is currently building its international presence, the marketing strategy that is currently used is quite passive. To gain some online discoverability, the FeedbackFruits products are listed on several educational 'app-stores,' where different plug-ins for LMS's are listed. Potential clients can fill out a contact form if they are interested in one of the products, after which they will be able to schedule a demo of the product. However, no active effort is made to approach new universities in the international market.

8.2.2. WHAT DOES THE LITERATURE ADVICE?

Countless studies have looked at the most effective way of launching new products on the market, this section will discuss some of that research. As well as looking into the effects of narrative-based marketing. Lastly, the most effective type of marketing for our specific target audience will be evaluated. All of the findings from these sections will then be compiled into a list of requirements that the marketing strategy for Collaborative Learning should fulfill.

8.2.2.1. LAUNCH STRATEGY

In the article Launch Strategy, Launch Tactics, and Demand Outcomes (Guiltinan, 1999) core dimensions for the product launch plan typology are identified, and the implications of those are discussed. According to this typology the

concept Collaborative Learning is technically an addition to an existing product line, but the didactic of participation grading is 'new to world'. Seeing as the potential learning outcomes of Collaborative Learning are differentiating from the other products in the FeedbackFruits portfolio, the 'new to world' categorization of this product is more fitting. The degree of innovativeness of the product and thereby resulting buying behavior will mean that potential buyers are more likely to be deliberative in their decision-making (Guiltinan, 1999). Based on the characteristics of the product, Collaborative Learning fits best within the high relative advantage but low compatibility category. Specific marketing techniques that are effective for this type of product are (Guiltinan, 1999):

- preannounce: to announce the launch of a new product before it is out yet.
- emphasize information-based promotion: in the marketing material created for the new product, there should be plenty of information provided about the product.
- selective distribution: this product will not be distributed/marketed to everyone, a niche will be targeted for distribution.
- brand names provide associations with new benefits: providing more information about your brand is important, to create associations with potential new benefits.

8.2.2.2. NARRATIVE BASED MARKETING

Looking beyond the launch strategy of new products, but at effective marketing techniques. There is a shift towards narrative based marketing. Narrative-based marketing is marketing that uses storytelling to create advertising and promotional material. According to Onespot, ninety-two percent of consumers want brands to make ads that feel like a story; consumers want companies to deliver content that is linear and expresses a clear narrative (Sternberg, 2017). It makes sense that this is effective because of our brains process images sixty times faster than words (Sternberg, 2017), and to the companies using this, it can be of significant advantage because messages delivered as stories can be up to twenty-two times more memorable than just facts (Sternberg, 2017).

Videos are often used to deliver narratives as they can combine audio with visuals, and evidence shows that this is effective. Simply using the word "video" in an email subject line boosts open rate by nineteen percent, and click-through rates by sixty-five percent. But not all videos are made to stick; they will need to include quality content and be relevant to the user to be the most effective. Consumers are looking to be informed and educated through the stories the company shows them.

8.2.2.3. MARKETING TO LOW-CONTEXT MARKETS

Lastly, looking at the specific target audience, there might be

some characteristics that appeal to this kind of audience. As discussed earlier, the target markets that have been selected for FeedbackFruits are: the Netherlands, the Scandinavian market, and the English market.

All of the target markets are categorized as low-context cultures (Copeland & Griggs, 1986). The main difference between low context and high context cultures, is that in low context cultures the communicator needs to be very explicit in their message, high context cultures will leave a lot more room for things to be left unsaid and for the culture to explain. Each of these types of cultures has specific marketing messages that will appeal to them. Advertising that is effective in low-context markets usually has these characteristics:

- clean design
- straightforward
- clear image of the product
- sufficient supporting text to explain
- strong call-to-action

These characteristics will need to be taken into account when creating the marketing material for this target market.

8.2.2.4. MARKETING REQUIREMENTS FOR COLLABORATIVE LEARNING

Similar to the design requirements for Collaborative Learning, requirements for the marketing strategy can also be set based on the results of the literature discussed in this chapter. The literature shows that an effective marketing strategy for collaborative learning will need to include the following elements:

- preannounce the product to potential users.
- create information-based promotion.
- create a strong link to the brand name.
- distribute the product only to the selected target audience.
- create a product narrative.
- use clean design.
- be straight forward in the communication.
- provide potential users a clear image of the product.
- ensure there is sufficient supporting text to explain the product.
- create a strong call-to-action.

In the next section, the findings from the literature will be translated into a concrete marketing strategy for the concept.

8.2.3. THE MARKETING STRATEGY

The marketing strategy consists of two layers; the first layer is through which channel FeedbackFruits should distribute promotional material, and the second layer is what the promotional material should include.

As mentioned in section 8.2.1. FeedbackFruits currently uses the following promotional channels: product website, word-

of-mouth, some social media, and posting on app-stores. The literature by Guiltinan (1999) shows that selective distribution and to preannounce the product are effective ways to promote Collaborative Learning, so in addition to the existing promotional channels a new channel will be added: an email newsletter. The details of why each of these channels is important is shown below.

The channels of promotion of Collaborative Learning will include the following:

WEBSITE

This is a crucial part of the marketing material. The website will be the primary source of communication about the product to the consumers. The whole website should have a clean design. It will also be a platform that enables the telling of the narrative of Collaborative Learning. Not only should there be videos and images explaining the product there should also sufficient supporting text to explain the product. A strong call-to-action needs to be included, as well as a link to the brand name.

All of the information needs to be up to date, and give potential consumers a clear image of the product. Any of the other marketing channels should lead consumers to this website.

ACTIVE SOCIAL MEDIA PRESENCE

This channel could help create brand and product awareness among potential consumers, as it is a way to actively reach a lot of potential users. To ensure the right users are targeted using common teaching terminology within the social media posts will be crucial for increasing the discoverability.

LISTING PRODUCT IN APP STORES

To create product and brand awareness for new customers app stores present a great opportunity. As it provides information-based promotion to consumers, who are specifically looking for new online education solutions.

E-MAIL NEWSLETTER

To be able to preannounce new products to the existing consumer base a monthly or bi-monthly email newsletter should be included as one of the marketing channels. Not only will it give FeedbackFruits the opportunity to easily promote new features, but it will also help the company to stay top-of-mind for its users. Which, in turn, will lead to more consistent use of the platform.

WORD-OF-MOUTH

FeedbackFruits has a good network of users, which they often interact with on different occasions. These continue to be excellent opportunities to promote new products.

8.3. MARKETING **MATERIAL**

Now that the channels through which the promotional material will be distributed have been defined, the promotional material needs to be created. This material needs to communicate a cohesive narrative, one way to easily achieve this is to create some modularity in the marketing material. By designing separate parts of the marketing material that can be used as inserts in different channels this cohesion can be achieved. The website will act as the central 'hub' of the material, from which, and to which, the others will lead. From the material created on the website, the rest of the marketing material can be created. In creating a modular marketing material system, FeedbackFruits will be able to create a cohesive and extensive marketing campaign with minimal effort.

In Figure 37 all of the modular elements are shown and how they form material that can be communicated through the different marketing channels. The marketing material revolves around the features' website; this is the central point for all of the available information regarding Collaborative Learning. This website has been designed, to view it visit the URL (https://alienordehaan.wixsite.com/fbf-thesis) or scan the QR-code:

No internet? A printed version of the website can be found in Appendix E.

The website is designed with the low context target market in mind. There is a clean and minimalistic page layout. The website is made to provide the user with straightforward information, all while using the tone of voice of the company communication strategy. The flow of this website is designed to provide more in-depth information as the viewer scrolls down the page, it follows the flow laid out in Figure 37.

The first step is a general promotional video of the tool; this video tells the narrative of what it would be like to use Collaborative Learning. It begins by showing the problem of activating students to read literature, followed by a scenario where the user flow of the product is shown.

The second step is a written description of what problem the tool is solving, and how it achieves that.

The third step is a description of how the tool can be used, with a video to avoid potential ambiguity.

The fourth step is a case study; this is an important aspect of creating trust of the product, which is essential as it can be seen as a risk to use this product because of its newness. As more instructors use the product more case studies will be added.

WEBSITE

WHAT	WHY
VIDEO	This should be the first thing people see, as it sends them the strongest message.
WRITTEN DESCRIPTION	After watching the video people will scroll down and want to read the details.
HOW TO USE	If people are still interested this will give them more information to see if it is relevant to their own use case.
CASE STUDY	With any new technology people will have doubts. Showing similar real situations helps to reduce doubt.
FAQ'S	These are answers to frequently asked questions by other potential customers. Once again builds trust in the product, to reduce doubt.
COMPANY INFORMATION	Showing the brand is important to build trust for new technologies, this will show that the company is a reliable partner.

NEWSLETTER

WHAT	WHY
COMING SOON!	Preannounce the new product.
VIDEO	Include a video in the announcement to ensure more people open & view the newsletter.
WRITTEN DESCRIPTION	Support the video with text.
LINK TO THE SITE	Call to action, for if they want more information.

SOCIAL MEDIA

WHAT	WHY
COMING SOON!	Preannounce the new product.
VIDEO	Include a video in the announcement to ensure more people open it.

APP STORES

WHAT	WHY
WRITTEN DESCRIPTION	Explain the product in text.
HOW TO USE	If people are still interested this will give them more information to see if it is relevant to their own use case.
VIDEO	Including a video will give them a better sense of what the product does.
COMPANY INFORMATION	Showing the brand will show that the company is a reliable partner.

Figure 37. Modular marketing material elements what they are and why

The fifth step is answering some FAQ's to establish more trust and reduce doubts the consumer might still have about the product. The questions that are shown and answered in this section aim to answer the concerns teachers raised during the user tests and the survey and interviews of chapter 4.

The sixth step is general information about the company; this will help to establish the credibility of the product. It will showcase a well-established brand with a broad assortment, this will give potential buyers more confidence in the product. As well as giving them the opportunity to check out other product by FeedbackFruits if Collaborative Learning does not fit with their wishes.

The marketing material for the other channels can be gathered from the website and compiled as shown in Figure 37. To make the marketing strategy a success new postings and updates about the product are necessary, particularly in the first three months of launching the product. The next section will lay out which departments will need to do what when to ensure Collaborative Learning's success.

8.4. LAUNCH **ROADMAP**

To give structure to what should be done regarding the launch and marketing of this product, Figure 38 shows the separate steps that will need to take place to make the launch of Collaborative Learning a success. This is split into three different departments, design, development, and marketing.

This roadmap will act as a blueprint for FeedbackFruits to use when they launch Collaborative Learning, it has been discussed with FeedbackFruits and has been created in consultation with the person within the company who will be taking over the product owner role for Collaborative Learning. The launch of Collaborative Learning is currently scheduled to take place in early 2018.

The roadmap works in such a way that the lower department will need to finish their work before it can move up to the next stage. For example, the design of Collaborative Learning needs to be completed before the developer can begin programming. The marketing can preannounce the product before the developer has completed programming the entire product, but needs to wait until the developer is finished before they can announce the launch of Collaborative Learning.

The time is split into four different sections, past, October-December 2017, January-March 2018, and April 2018 onwards. Looking to the last section, there are several 'improve and iterate' steps for design, development, and marketing. This is because there will be feedback on the product following its launch, and this will need to be processed and used to improve the product. The improvements and new case studies will also be important to communicate through the marketing channels.

The roadmap can also be abstracted to create a version that can be applied for any new product that they might decide to develop. By applying the same launch strategy to all new products FeedbackFruits will be able to build their brand, and create a cohesive company narrative towards their consumers.

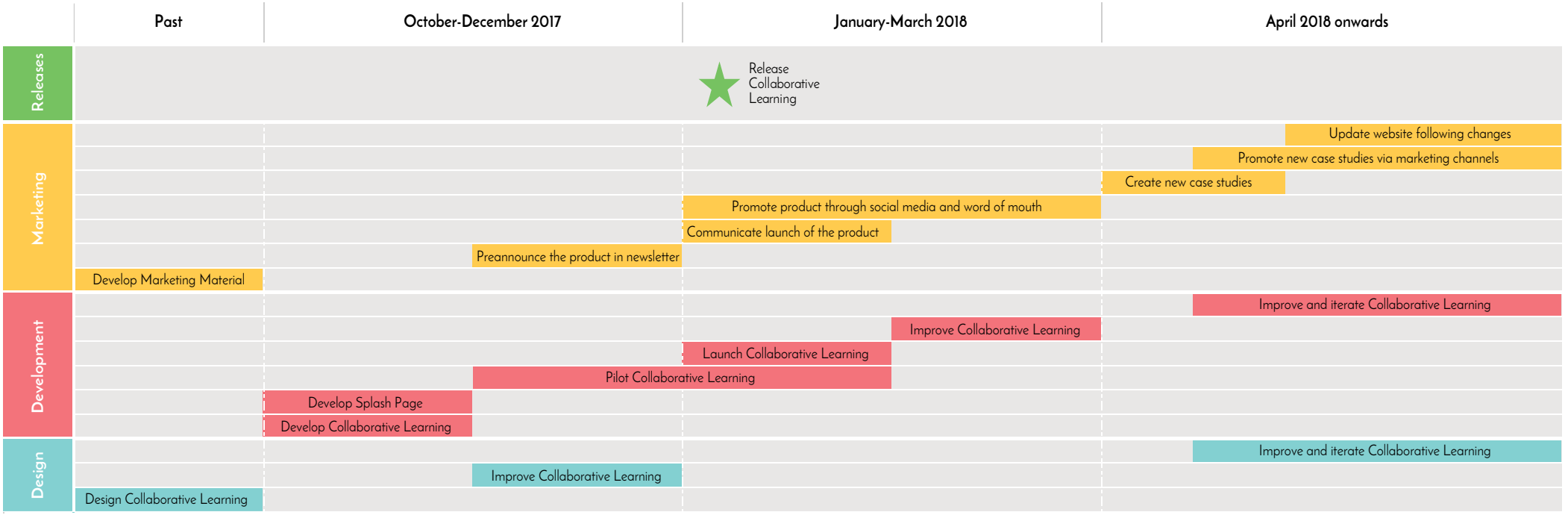


Figure 38. Collaborative Learning product launch roadmap

CHAPTER 9

CONCLUSION

This chapter will discuss and evaluate the link between the project goal, the analysis, the design, and the implementation strategy. Several recommendations will also be made for further development of this project.

9.1. DISCUSSION **& CONCLUSION**

9.1.1. DISCUSSION

Collaborative Learning has been positively received by FeedbackFruits. The concept adds value to the current product portfolio of the company as it implements an entirely new and unique approach to encouraging students to participate in online discussions. In bringing this concept to development, there are several points to be discussed.

CONTINUATION
FeedbackFruits has decided to begin development of the concept, as a standalone product, and as an ingredient across their entire product portfolio. The company has selected someone who will be the taking over the product owner role for Collaborative Learning; he will also be programming and developing the product. The new product owner of Collaborative Learning has been involved with the project during the design phase; this was done to ensure a smooth transition when this graduation project is completed. The designer at FeedbackFruits will be the one taking over the design role of this project. Additionally, someone from the marketing team will need to take an active role in creating and spreading new and updated marketing material as indicated in the roadmap.

VALIDATION
This report does not include a separate validation section or chapter, in the design process that was applied the validation of the concept was intertwined with the user testing of the concept. Throughout the user testing of the concept, the researcher asked the users what their opinions were regarding Collaborative Learning.

The researcher has gathered three quotes that demonstrate some of the opinions voiced by the users that participated in the user testing. After having tested the concept one of the teachers stated; “I can see a lot of potential for this.” A student who tested the concept said the following; “I have experience with several of these systems, and this is by far the most intuitive and user-friendly of all.” Another student who tested the concept stated; “Oh! So then I can read literature articles together with my peers? Wow! That would make it so much more fun.”

The quotes shown in the previous paragraph are just a couple examples of the responses from the users for the concept. All of the users that tested the concept were asked what they thought about Collaborative Learning, and they all replied very enthusiastically, they saw its potential and stated that they would like to use it in the future.

The researcher felt that this acted as sufficient validation of the concept, and thus no separate validation tests were conducted.

FURTHER DETAILING
The iterative process has led to a very detailed design of Collaborative Learning, fortunately no further detailing is

necessary before the company can begin its development. However, after piloting and launching the product, there will most likely be feedback which will result in potential changes to the design. Should this be the case then the product owner and the designer at FeedbackFruits will need to refine the design.

FeedbackFruits also wants to implement the participation grading method as a module for several of their other products. The researcher has created initial designs for this that should be sufficient to begin development, but some further detailing remains to be completed.

FUTURE HORIZONS

The participation grading method applied in Collaborative Learning has enormous potential in sparking student participation, even beyond the digital platform. Collaborative Learning is only the first horizon of this method, to many it will feel unfamiliar like any new method would, but it is essentially very straightforward for teachers to implement in their current curriculum.

The second horizon could be to apply the method in real class discussions, the discussions will be audio and video recorded. Voice recognition software could then be applied to the recordings to identify each student in the class, to make it easier for students to sort through the audio and identify their best contribution.

The third horizon could go a step further, integrating Artificial Intelligence throughout the discussion process, both online and offline. AI could be developed to not only analyze student contributions but more importantly to coach students to create the best contributions.

9.1.2. CONCLUSION

The goal of this project was to deliver FeedbackFruits a design and working prototype of a concept that integrates a unique form of participation grading. This concept was to be paired with an implementation strategy to effectively encourage teachers to apply this novel grading method.

The result of this project is the concept Collaborative Learning. Collaborative Learning is an online tool that encourages students to participate in online discussions by using fair online participation grading. Teachers can upload documents, videos, or audio, that they want the students to discuss. Students actively participate in the discussion and are asked to select what they feel is their best contribution.

This report has documented the entire design process of this feature, from analysis through design, to implementation. In the design brief, which synthesized the findings of the analysis phase, a bipartite problem statement emerged. In implementing the grading method there were two main challenges, firstly, convincing teachers to use this new

method and secondly, finding a way to implement this approach.

The final design of Collaborative Learning integrates the participation grading method and has been optimized to effectively encourage student participation through applying findings from the literature, user research, and user testing. In addition, an implementation strategy has been created to reduce the doubts that teachers have in using this new didactic by applying specific elements that will build trust.

FeedbackFruits has voiced their enthusiasm for Collaborative learning and is already reserving resources to develop the concept, the development of which is scheduled to begin in November 2017. Not only is the design going to be developed as a stand-alone product, but the participation grading element will also be implemented as an add-on to several of their existing products.

Collaborative Learning offers a unique approach to activate students to participate in online discussions. Hopefully, it will be able to spark many students to discuss and learn new material, and inspire them to think critically about what they are learning. Collaborative Learning will be an excellent product for teachers to use to motivate their students and a great addition to the FeedbackFruits portfolio.

9.2. GENERAL **RECOMMENDATIONS**

During the span of this project certain recommendations have been thought of that might be useful for the company and the project.

COLLABORATIVE LEARNING

- The current design only allows for one file to be discussed per assignment, should the feature request be placed by users then expanding Collaborative Learning to include discussions across multiple documents might be worth considering.
- The current design places all students in one discussion, in very large classes this might become very chaotic. Developing a groups option (where the class is divided into smaller groups) could be a good solution for this problem.
- The interface design of Collaborative Learning applied some redesigns of the platform, for example, the way comment boxes are placed in the pdf rather than only in the sidebar. If these redesigns are successful, then the rest of the platform might need to be aligned to these changes.
- During the user testing, some student felt that there might be a certain advantage or disadvantage if they were to be the first to comment on the material. This is something that might be good to test during a real pilot assignment.
- Collaborative Learning has integrated a grading method that will communicate the grades to students within the platform. However, it might be helpful for teachers if the grades they have given their students are directly pushed to the LTI system that keeps track of all student grades.
- Providing teachers an overview that visualizes which students are communicating most with which peers during discussions could generate some interesting insights for teachers.
- Should Collaborative Learning be successful then it might be worth extending Collaborative Learning to include offline discussions as well, as discussed with the future horizons.

FEEDBACKFRUITS

- Due to the current design of the platform being very clean and uniform it might be difficult for students to navigate through their different courses, as they all look alike. Allowing teachers to personalize their course pages somehow could be a possible solution.
- It might be useful to create a page where students can see a history of all their contributions to the different assignments and documents on the platform.
- The user testing method applied during the design of Collaborative Learning has worked well to create a tested and detailed design, this technique could be used for developing future features.

Hopefully you enjoyed reading this report! Thank you for taking the time to read it.

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APPENDICES INDEX

APPENDIX A. STUDENT INTERVIEW BOOKLET

Hi!

Please finish the exercises on the following pages before the interview. We will be talking about the things that you have filled in during the interview.

Before you begin, could you please tell me what you are studying and in what year you began your studies?

My name is _____ ,

I'm currently studying _____ and I began studying in _____.

EVERY DAY

WHAT DID YOUR PAST WEEK LOOK LIKE?

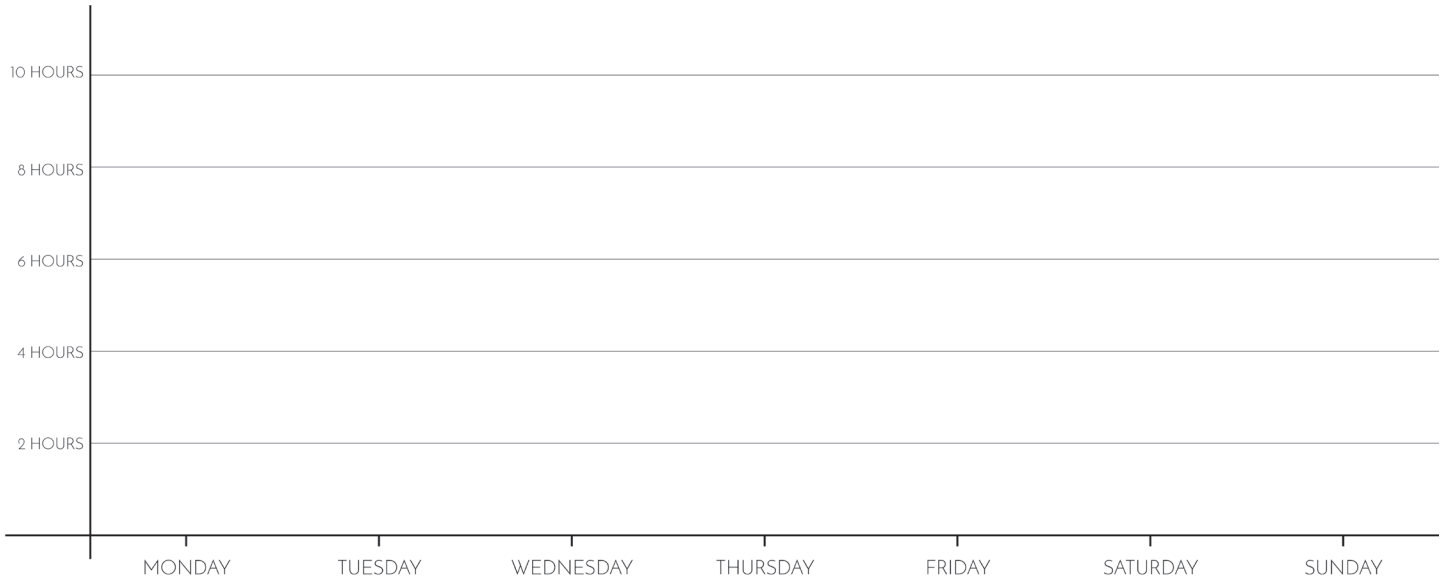
Please use text, colors, or symbols to indicate time spent on: working, studying, sleeping, sports, or other activities.

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
00:00							
03:00							
06:00							
09:00							
12:00							
15:00							
18:00							
21:00							
24:00							

EVERY DAY

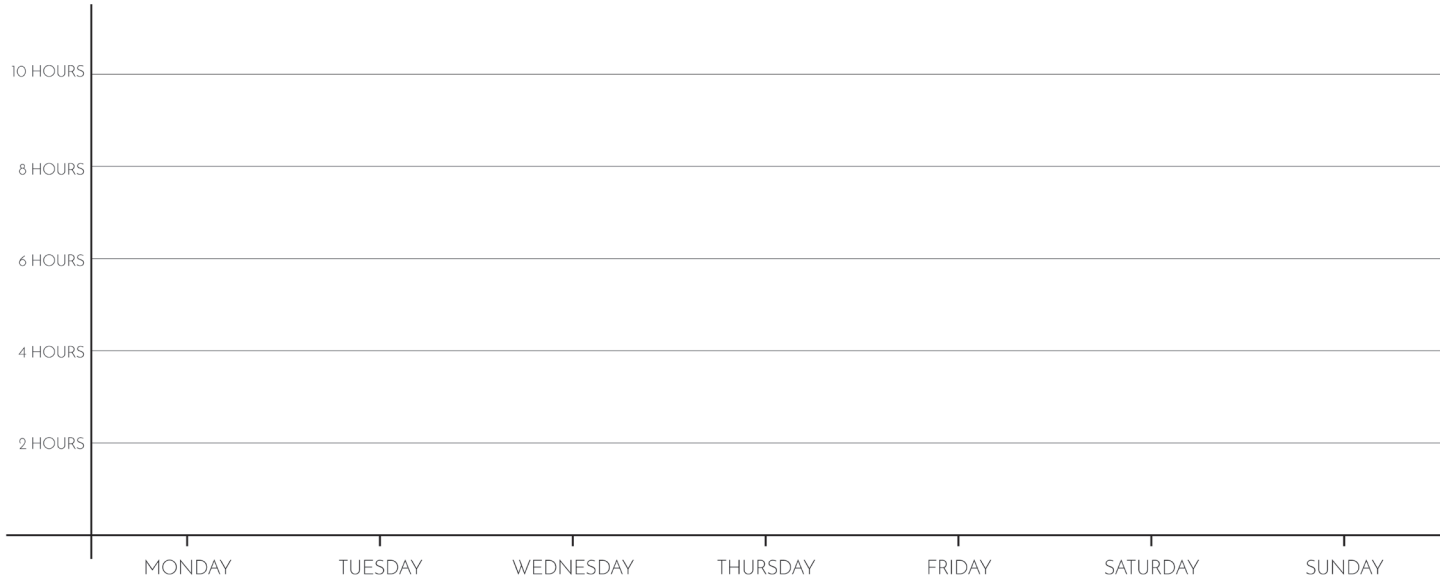
HOW MUCH TIME DID YOU SPEND ON STUDYING LAST WEEK?

Please indicate how much time you spent working on your studies last week, this includes group projects, lectures, homework, and independent study.



HOW MUCH TIME DO YOU SPEND STUDYING ON AVERAGE?

Please indicate how much time you spent working on your studies on average, this includes group projects, lectures, homework, and independent study.



DAY 1

WHERE DO YOU STUDY MOST OFTEN?

Create a top 5 of places where you study.

1.

2.

3.

4.

5.

DAY 2

WHAT DOES YOUR IDEAL STUDY ENVIRONMENT LOOK LIKE?

In what kind of space do you like to study? Does it have to have a lot of windows? Should it be a little noisy or very quiet? Do you like sitting somewhere with a lot of other people, or do you prefer sitting alone?

Describe, draw, or paste a picture of your ideal study environment:

DAY 3

WHAT WAS YOUR LEAST FAVORITE COURSE SO FAR?

Which course in your study did you like the least? What was it about?

Why didn't you like it?

Were there a lot of lectures, or was it mainly project-based, or were there a lot of discussions?

Was it because of the people in the course, or because of the teacher?

Was the course easy to pass, or did it take a lot of work?

DAY 3

WHAT WAS YOUR FAVORITE COURSE SO FAR?

Which course in your study did you like the most? What was it about?

What made the course so cool or fun?

Were there a lot of lectures, or was it mainly project-based, or were there a lot of discussions?

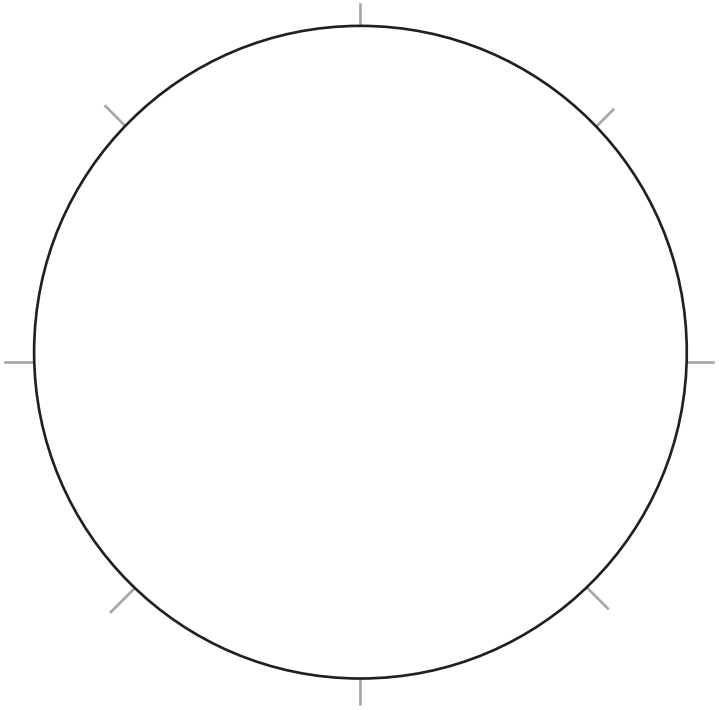
Was it because of the people in the course, or because of the teacher?

Was the course easy to pass, or did it take a lot of work?

DAY 4

HOW MUCH TIME DO YOU SPEND PER STUDY ACTIVITY PER WEEK?

How much of your study time is spent on: lectures, group projects, homework, independent study, or other.

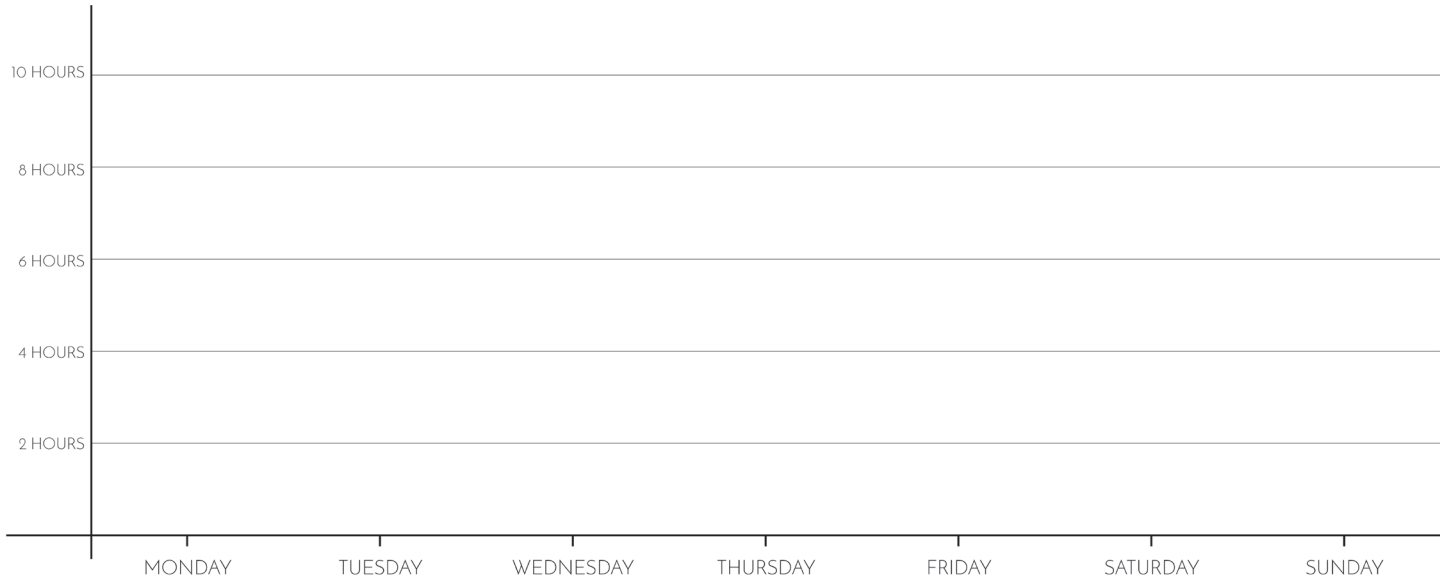


- ☐ Lectures
- ☐ Group Projects
- ☐ Homework
- ☐ Independent Study
- ☐ _____
- ☐ _____

DAY 4

HOW MUCH TIME WOULD YOU SPEND STUDYING IN AN IDEAL SITUATION?

Please indicate how much time you would ideally spend working on your studies, this includes group projects, lectures, homework, and independent study.



APPENDIX B. QUESTIONS TEACHER SURVEY

1. Students actively participate in my class discussions: (scale 1-7)
2. Which methods do you use to get your students to participate in discussions? (open question)
3. Do you use an online platform on which students can discuss course content? (yes or no)
4. If yes, which online tool or platform for discussions do you use? And do your students sufficiently use this platform? (open question)
5. Do you give your students a grade for their participation? (yes or no)
6. If yes, how do you grade student participation? (open question)
7. Why do you (or don't you) grade student participation? (open question)
8. This participation grading technique was initially developed especially for online discussions, but could possibly be applied to in-class discussions as well. Students are asked to reflect on what they think was their best contribution to the discussion. Students will then collect all of their best contributions into a small portfolio, which will then be handed in and graded. By asking students to select their best contribution to the discussion, this method aims to increase critical thinking as well as participation. I understand the described reflective participation grading technique: (scale 1-7)
9. Do you know a similar tool or method? If so, which? (open question)
10. I see possibilities with using this method: (scale 1-7)
11. I am enthusiastic about the possibilities with using this method: (scale 1-7)
12. I would like to use this method in my class (assuming it is easily implemented): (scale 1-7)
13. In which situations do you think you could apply this method? (open question)
14. Do you have any comments or suggestions you would like to share about this method? (open question)
15. At which university do you currently teach? (open question)
16. Within which subject area do you teach? (select from list)
17. How many years have you been teaching in higher education? (open question)
18. Would you like to know more about this project, then please enter your email below: (open question)

APPENDIX C. RESPONSES TEACHER SURVEY

Respondent #	Students actively participate in my class discussions:	Which methods do you use to get your students to participate in discussions?	Do you use an online platform on which students can discuss course content?	If yes, which online tool or platform for discussions do you use? And do your students sufficiently use this platform?	Do you give your students a grade for their participation?	If yes, how do you grade student participation?	Why do you (or don't you) grade student participation?	I understand the described reflective participation grading technique:	Do you know a similar tool or method? If so, which?	I see possibilities with using this method:	I am enthusiastic about the possibilities with using this method:	I would like to use this method in my class (assuming it is easily implemented):
1	5	Clickers, questions, group projects	0		0		It does not fal	5		4		4
2	7	Pair and group work, whole class di	1		1	Students w	To encourage	6		2		3
3	5	group work, presentations, in-class	0		0	i don't	It doesn't fact	5		6		6
4	6		1		0		hard to object	4		4		4
5	5	I mostly use debates where studen	1		1	I look at if	I think it is hov	5		7		5
6	6	- They perform a project in groups	0		1	with a rubr	1) To assess th	4		4		4
7	4	questions, debate	0		1	dependent	to make them	4		4		4
8	5	Ask questions	0		0	I don't	Too many stu	4		4		3
9	5	Extra credit at on report card	0		1	Quality of	To ensure the	6	no	6	6	5
10	4	stelling + reactie	0		0		kost tijd	6	nee	4	4	5
11	7	motivation	0	blackboard	0	no	It is not comm	5	no	5	4	4
12	6	- make sure they come prepared to	1	blackboard,	1	usually of s	because the a	6	no	4	4	4
13	6	I give you examples of news and fr	0		0		Why not	5	No, I do no	4	5	5
14	4	group work	0		0		to make sure	5	no	5	4	5
15	6	They work in groups during the clas	0		1	Student pa	I grade it beca	6		6	6	6
16	6	questions, opinions etc	1	slack	0		I don't becaus	7	no	7	7	7
17	3	Student presentations, questioning	1	Vrightspace/	0		Not part of as	5	No	4	4	3
18	7	challenging questions & subjects; c	0		0		undoable for t	3		2	1	1
19	6	Open conversations	0		0		There is no for	1	No	2	3	3
20	6	Buzz groups - Getting them to talk	0		0		I don't grade p	3	No	3	2	2
21	4	Enthusiasm, constructive content,	0		1	Informal re	Greater ability	6		5	5	5
22	6	Asking questions	1	Internal sche	1	Appropriat	it is important	6	NO	5	5	5
23	7	Ask questions, give rewards	1	Google docs	0		It isn't necessa	7		7	7	7

In which situations do you think you could apply this method?	Do you have any comments or suggestions you would like to share about this method?	At which university do you currently teach?	Within which subject area do you teach?	Other	How many years have you been teaching in higher education?
	Very interesting		Science		3
	This looks like it will be a lot of additional work for students with no educational		Arts and Humanities		2
			Science		2
			Social Studies and Law		2
			Education		2
	I think it really depends on your learning objectives whether this is useful or not. Next, I cannot estimate for what kind of course this would be suitable, since I cannot think of examples of discussions. Won't it be discussions just for discussions? Do they really have to discuss? Or ask relevant questions in time i.e. before they get stuck, (which could be difficult to value by 'likes' since students probably will only value/'like' answers, not questions, and I guess only if assistants can look over the shoulder of the project group, only then will they know if it was a useful question, or just a 'I do not understand anything, please explain everything' kind of question.) However, I can think of having online discussions for particular assignments, like explaining a novel technique from articles with a group. Students would have to read each other's contribution and ask questions. Both questions and answers could be rated by the students, I guess.		Maths and Computing		3
	no		Education		1
	No		Medicine and Related		1
Test prep		Fordham	Arts and Humanities		2
discussie met inhoudelijke kennis, bijvoorbeeld als voorbereiding op een debat		Laurenslyceum (VO school)	Science		25
never thought	np	St Andrews	Medicine and Related		2
	In practice, there is a limit to the amount of reflection, portfolio products, peer review within discussion groups. It is extremely difficult to get high quality products here, and in many curricula we see overkill in the application of these kinds of methods. (in university progams).	UvA/AMC	Medicine and Related		25
Before an exam	Not now	Nowhere for now	Social Studies and Law		6
		University of Amsterdam	Business and Management		1
I would apply it at the beginning of the course, during the course and at the end of it so that the students who are shy could have more options to loose their shyness for participating in those in-class discussions and those students who do not have this problem they could also improve their participation.	I like the fact that they exercise a self-reflection or introspection about their own performance.	In this moment I´m not teaching	Arts and Humanities		1
my lectures, especially the ones that can be watched online	it seems like a great idea! looking forward to hearing more about it	tu delft		entreprene	2
I do not know		TU Delft	Science		8
		Delft	Engineering, Technology, and Architecture		20
Discussions with no wrong or right answers	Big screen in the studio	TU Delft	Engineering, Technology, and Architecture		5
	From my experience, and the students I have taught tend to be very much motivated by grades. Therefore, I can see that if they get a grade for participating in class, students will be more likely to participate. They will be learning in the process, but do what extent will they be learning for intrinsic reasons rather than extrinsic ones? And will it merely be surface rather than deep learning?	A university in South East England		Psychology	3
Multiple. Tests, homework, group projects		UOW		Sport Coac	2
Group assignments	no	Politecnico di Milano	Engineering, Technology, and Architecture		10
After assignments		Nottingham Trent	Social Studies and Law		3

APPENDIX D. COLLABORATIVE LEARNING SCREENS

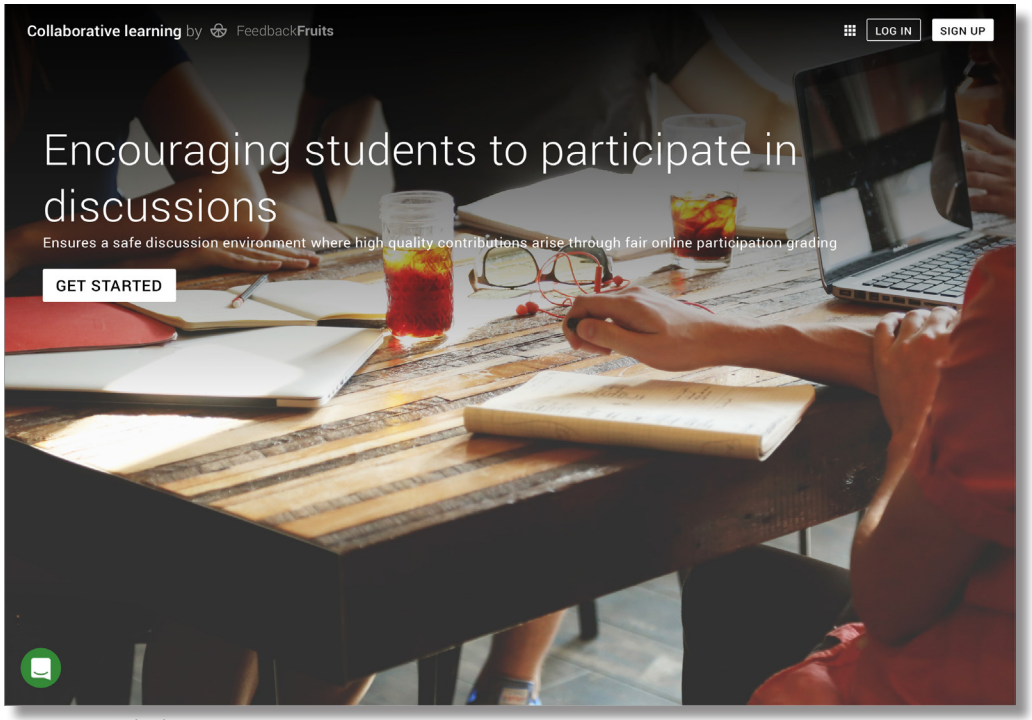


Figure 39. Splash page

This is the first page that both students and teachers will land on when using the Collaborative Learning tool. The page will give some information about the tool to first time visitors. Frequent users will rarely see this page because they will already be logged in.

TEACHER

Figure 40 through Figure 51 show the user flow that the teacher will experience when they use Collaborative Learning. The use case that is shown here follows a teacher that creates a discussion assignment for their class, then moderates the discussion, and grades the students.

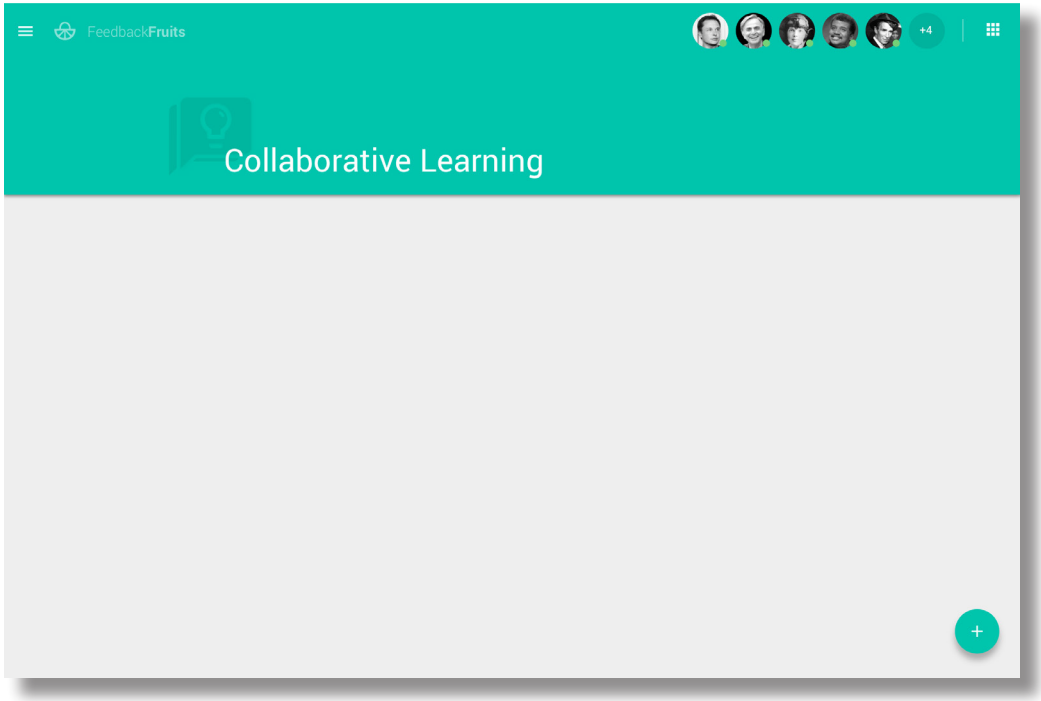


Figure 40. Empty home page for teacher

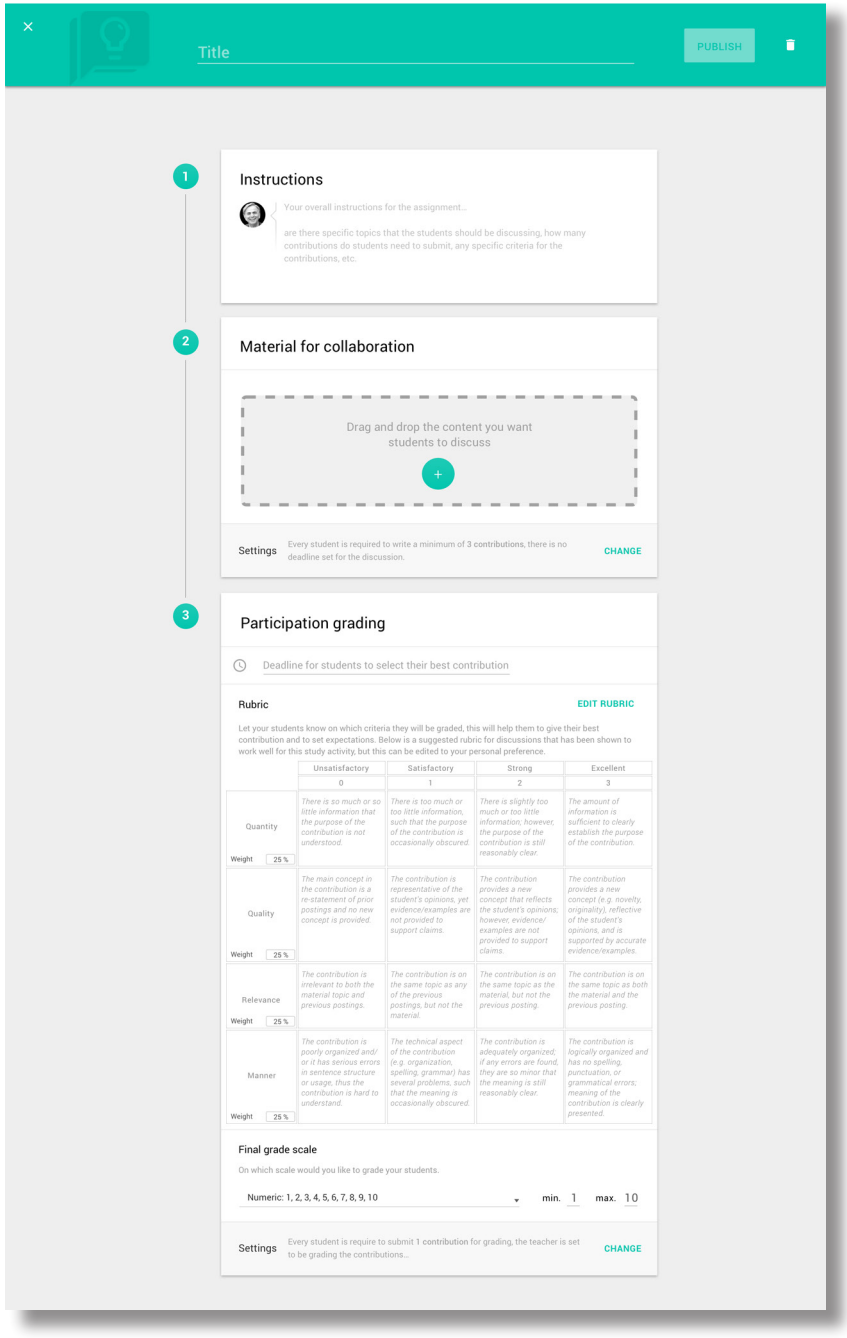


Figure 41. The teacher creates the assignment

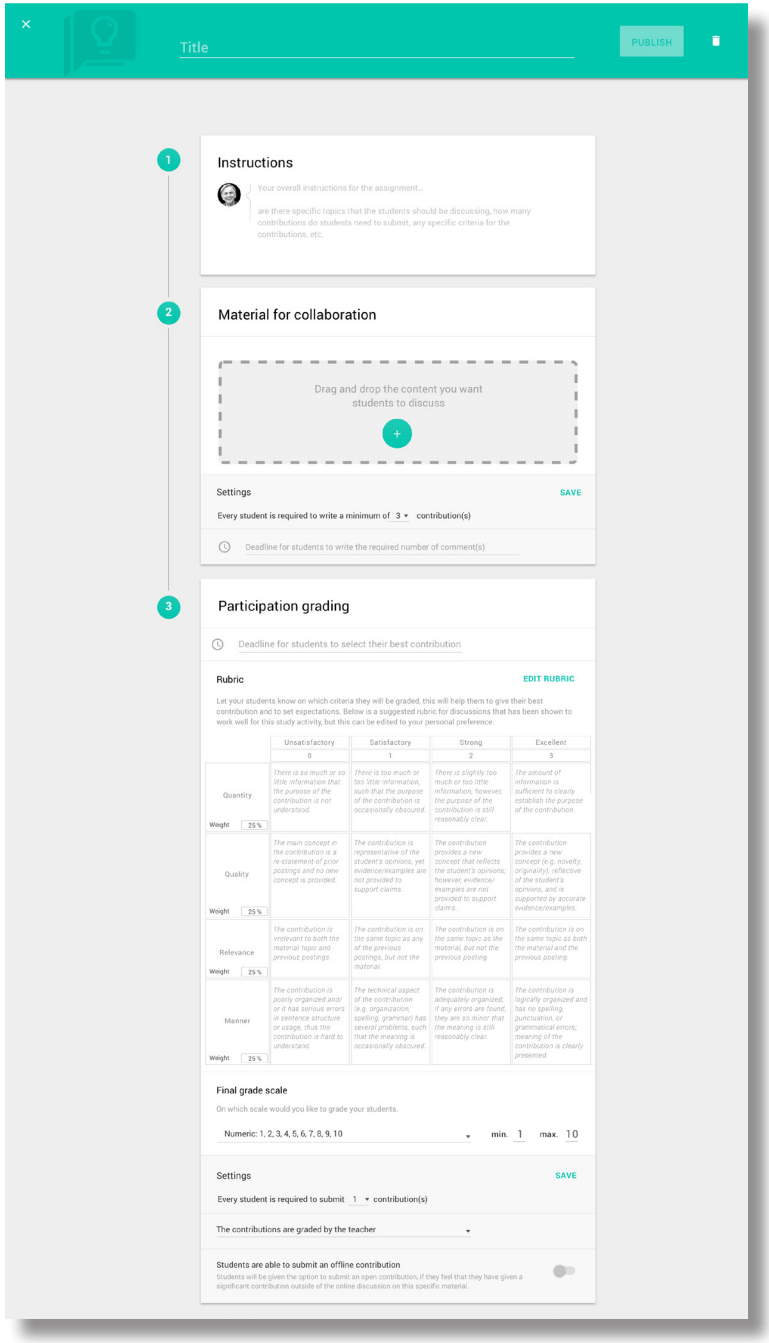


Figure 42. The teacher creates the assignment with extra settings

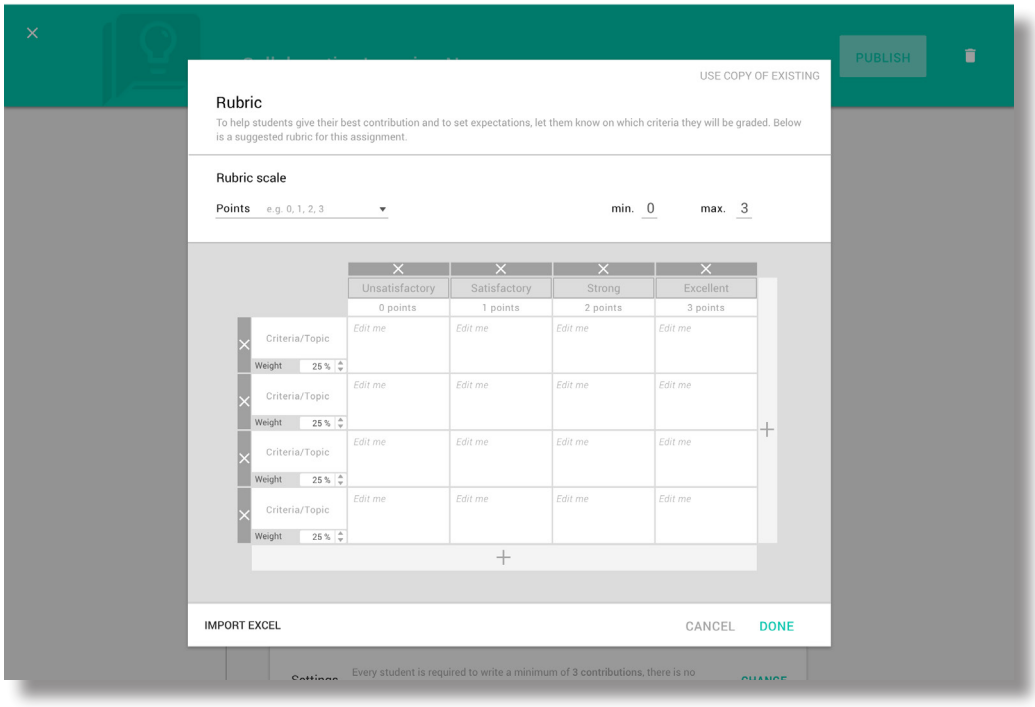


Figure 43. The teacher edits the rubric that will be used for the assignment, as mentioned in section 1.1.3. there is a recommended rubric that is proven to be effective for online discussions. This recommended rubric will act as the default, which the teacher can choose to edit

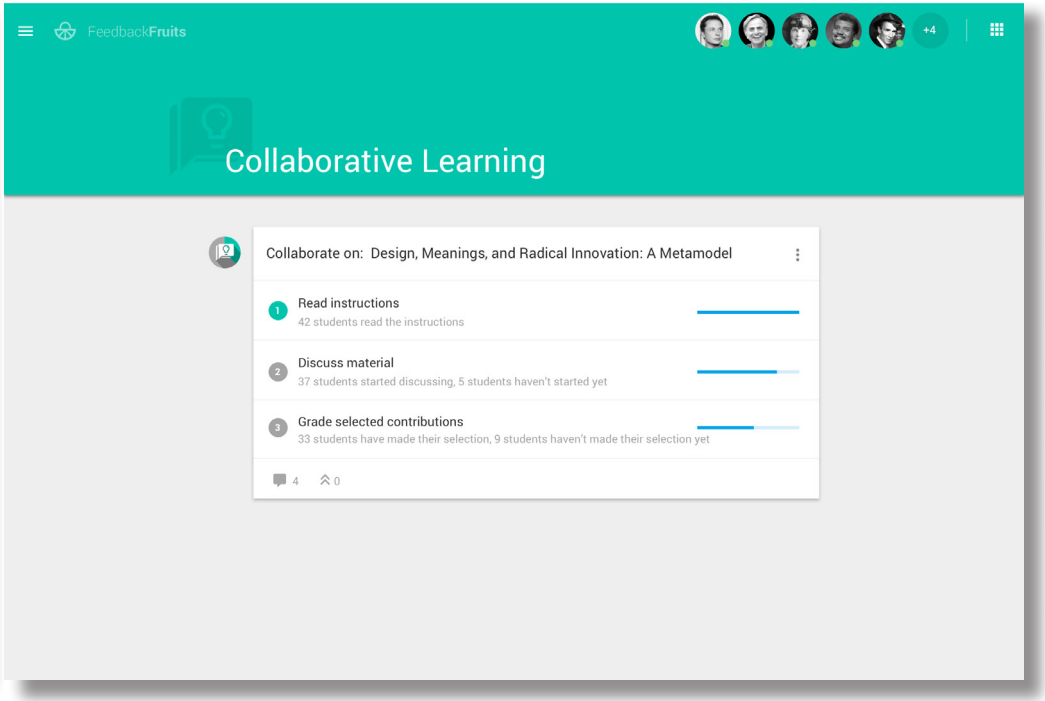


Figure 44. Home page with the created assignment for teacher, students have already been active in the discussion assignment

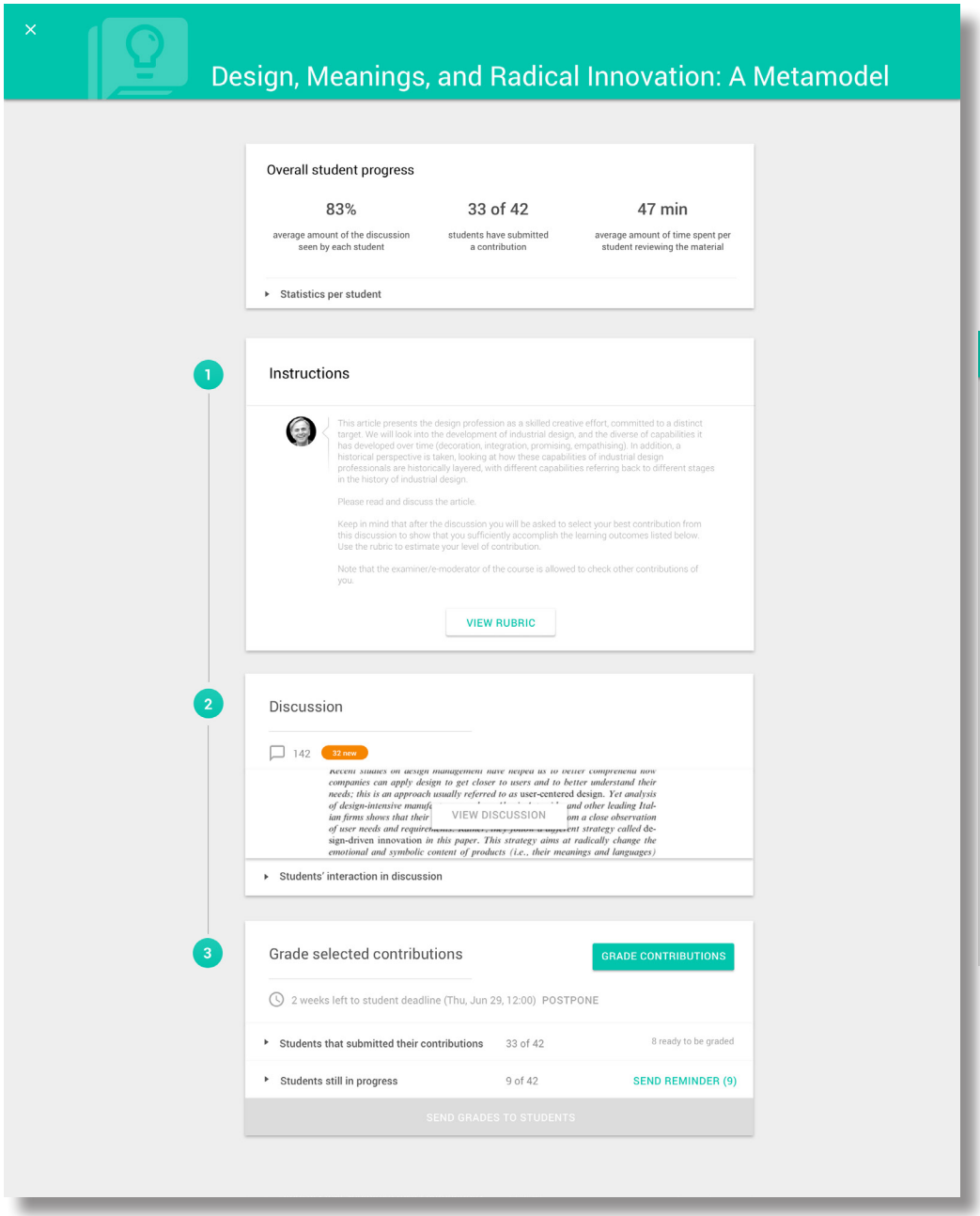


Figure 45. The assignment overview for the teacher, the teacher is able to view the progress of their entire class and of specific students. From this overview they are able to access the discussion, and to begin grading the contributions

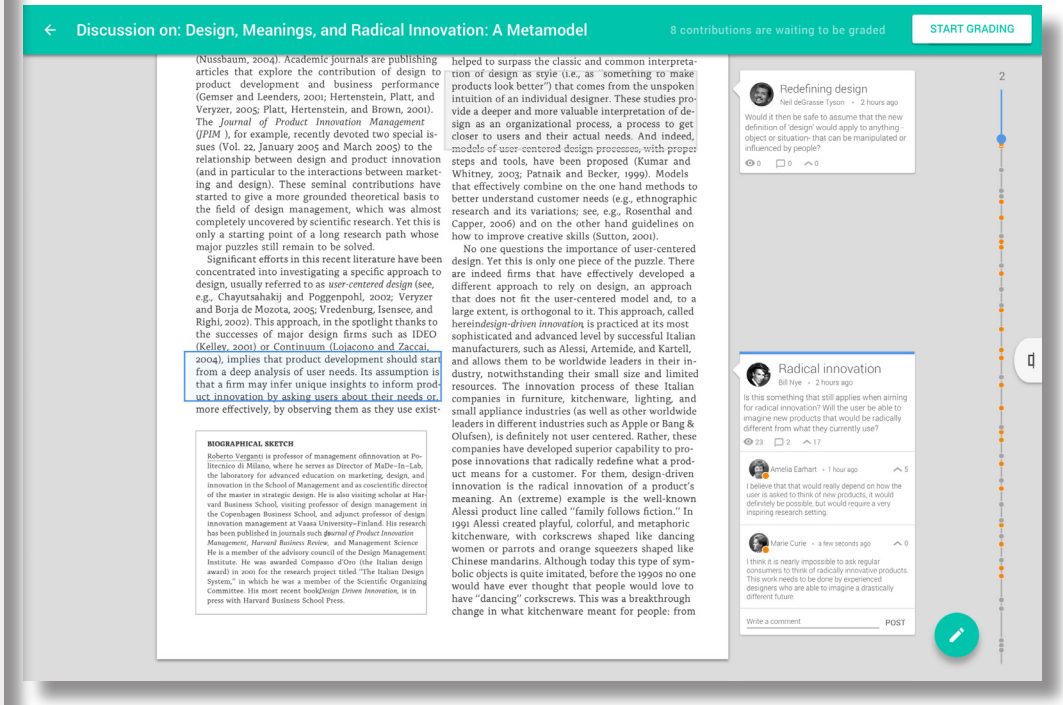


Figure 46. The teacher reads the discussion posts from the students, and, is able to reply on posts if desired or to post a general comment. The teacher is able to access the grading function by clicking 'start grading' in the top right

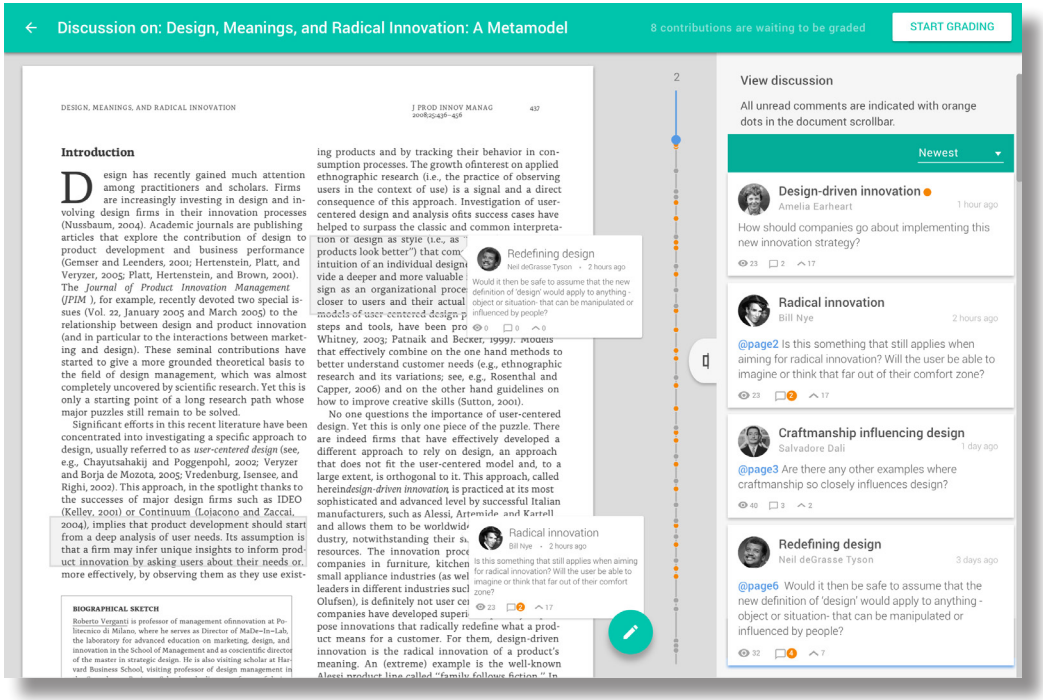


Figure 47. The teacher will be able to view and sort posts in the sidebar, any unread posts are marked by an orange dot. This will enable the teacher to act as the moderator of the discussion. The teacher is able to access the grading function by clicking 'start grading' in the top right

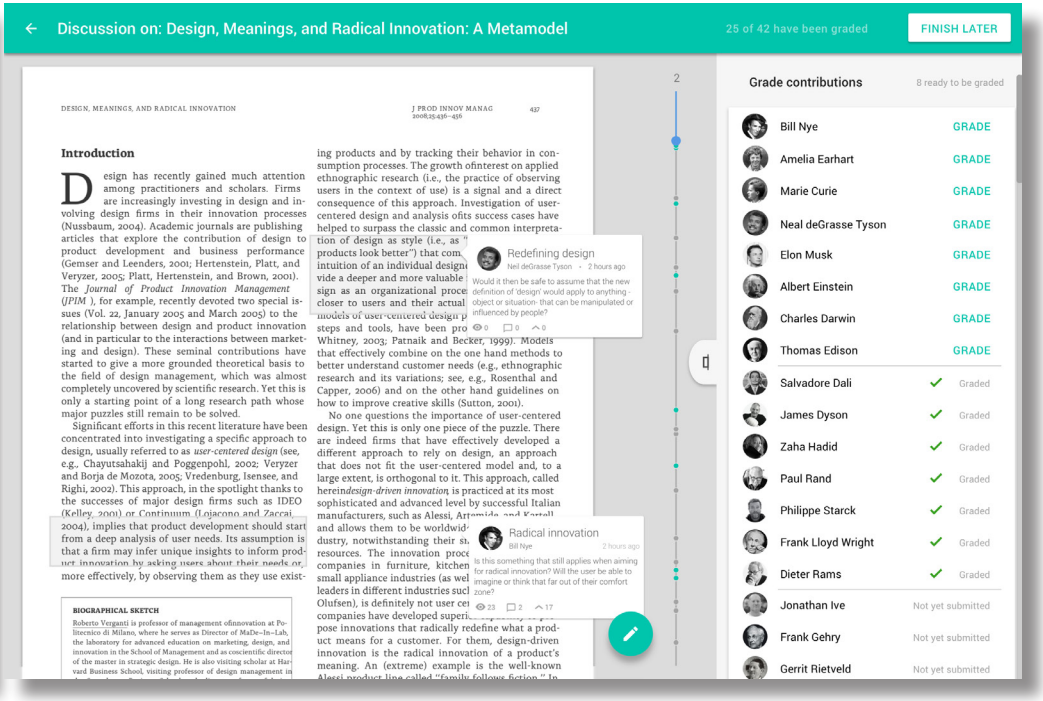


Figure 48. Once in the grading view, the teacher is able to view the grading status of their students, there are 3 options; not yet submitted, ready to be graded, and graded. From the sidebar the teacher can begin grading ungraded contributions, or edit the already given grades

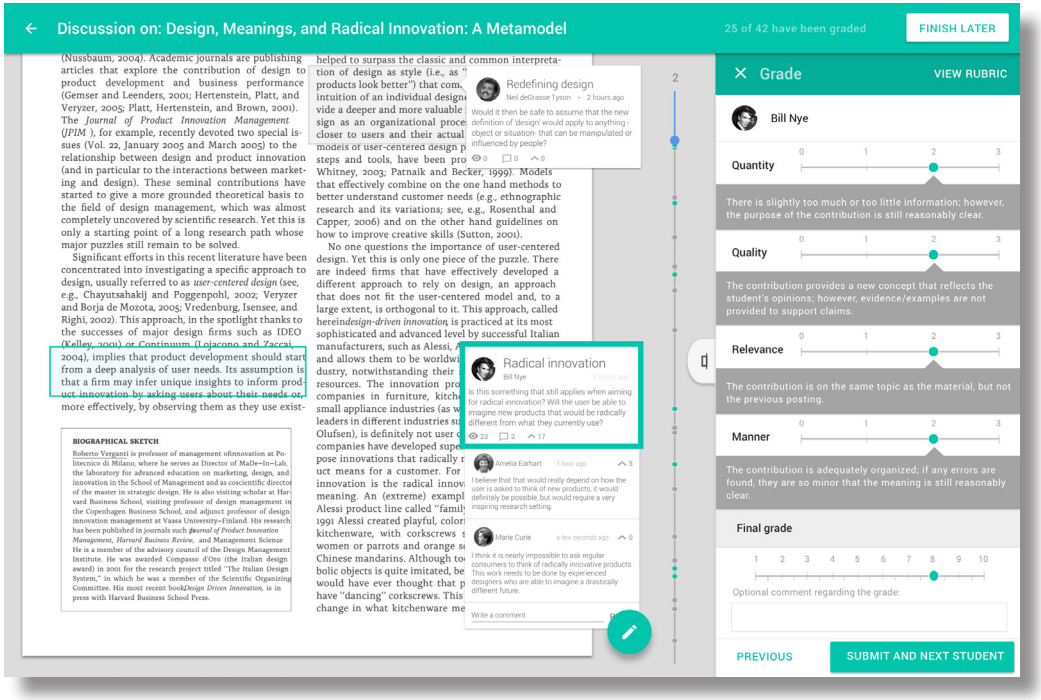


Figure 49. This shows the view for grading individual contributions. The teacher will grade the students based on the criteria that they entered in the rubric. The grading scale there corresponds to the scale that they defined with the rubric, these grades are then calculated into a suggested final grade, but the teacher is still able to slide this final grade to whichever grade they feel is fitting. There is also room for additional feedback from the teacher

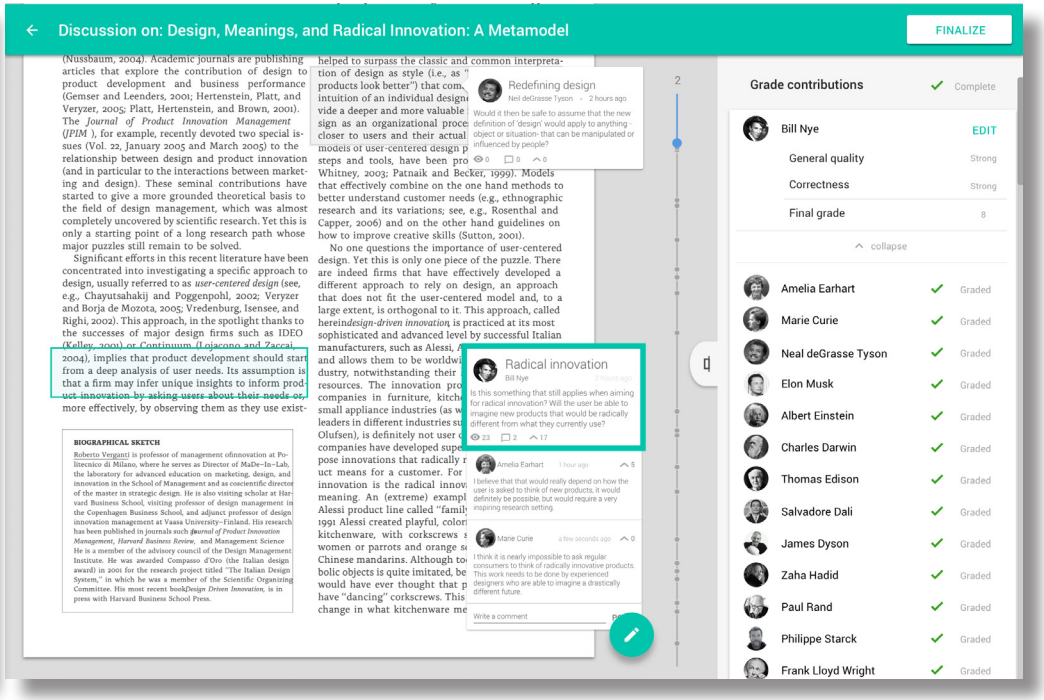


Figure 50. Once all of the students have been graded, the teacher goes back to the overview. From here the teacher can view and edit the grades of the students should they wish to do so

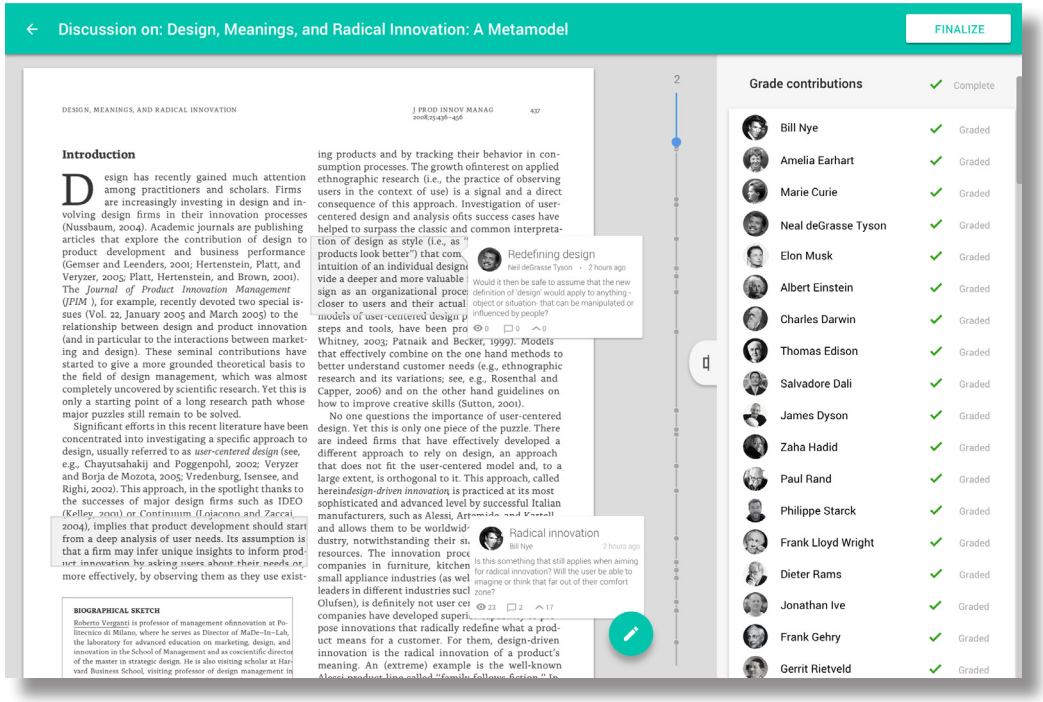


Figure 51. Once the teacher has graded all of the students, the teacher can finalize the grades, the teacher will receive a pop-up which will allow the teacher to send all of the grades to their students

STUDENT

Figure 52 through Figure 61 show the user flow that the student will experience when they use Collaborative Learning. The use case that is shown here follows a student that opens a discussion assignment, participates and reads the discussion, selects their best contribution, and views their final grade.

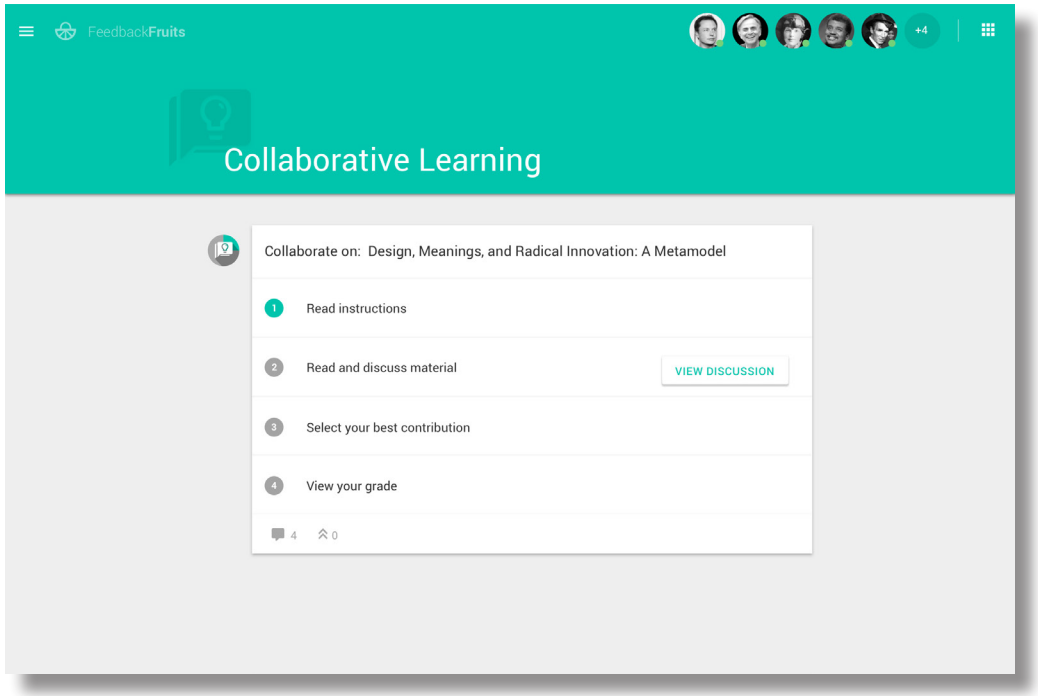


Figure 52. Home page for the student with the assignment

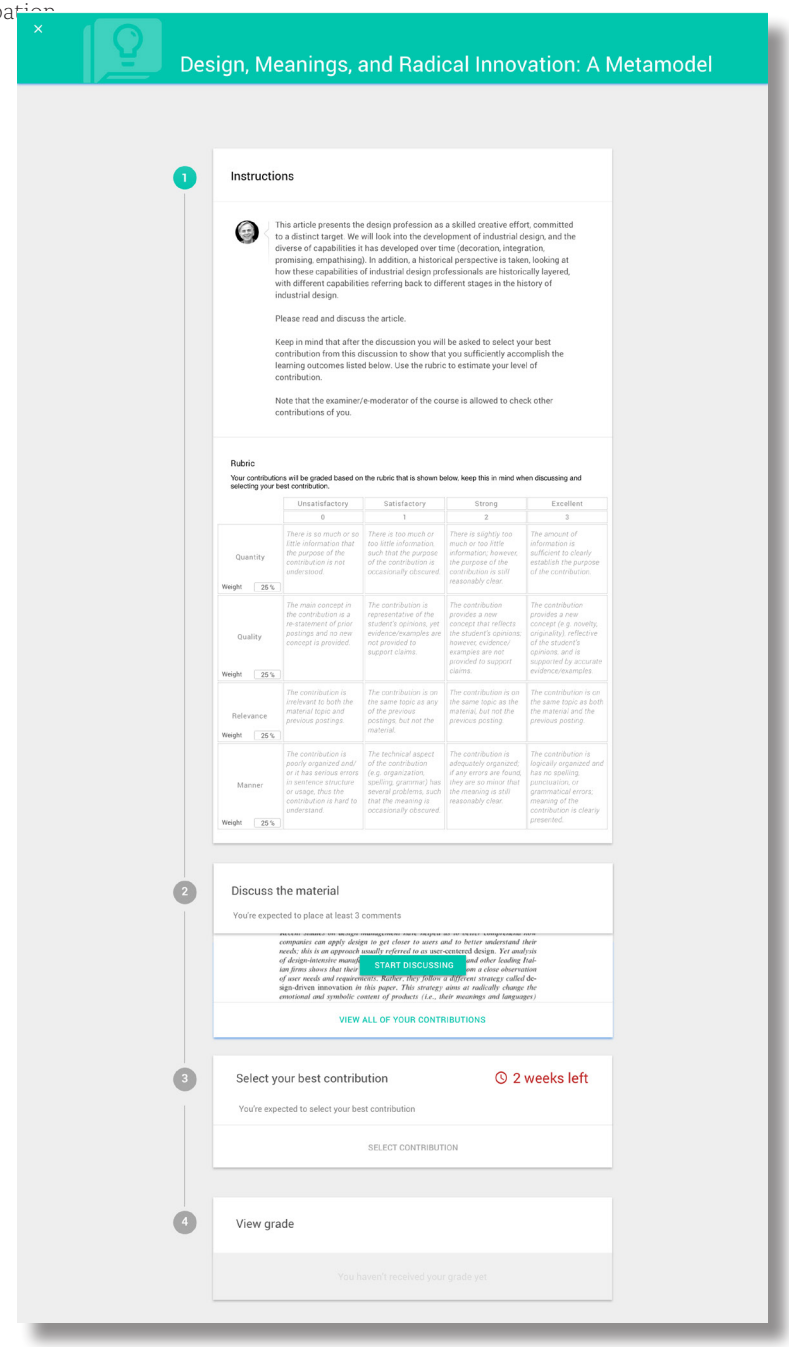


Figure 53. Overview of the discussion assignment, this shows the separate steps of the assignment that the student will need to take. It will intuitively guide the student through the assignment by showing which steps are completed, and what still needs to be finished

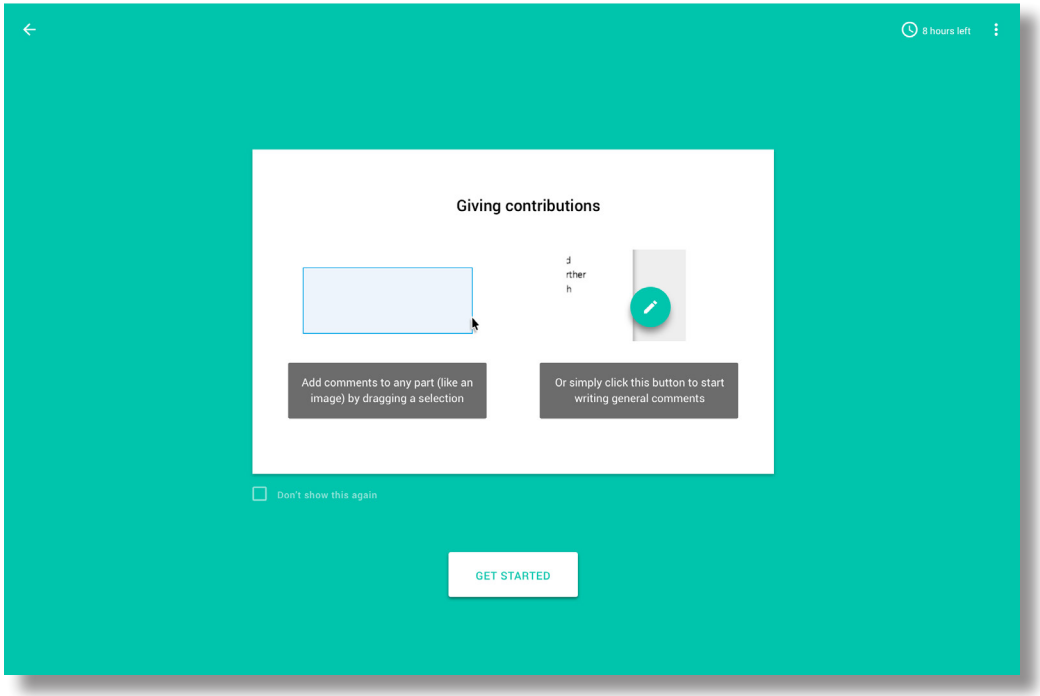


Figure 55. The student will see instructions of how to post a contribution on the document, they are able to drag and select an area of the document, add a general comment, or reply to the posts of fellow students

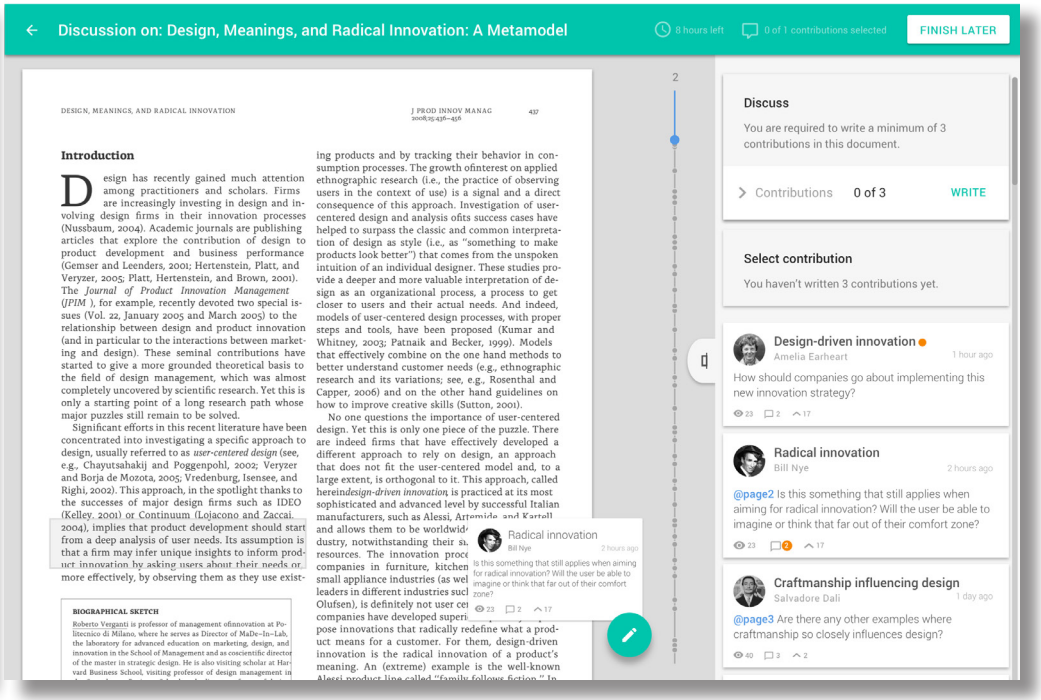


Figure 54. The student is able to view their personal progress on the assignment in the sidebar. The sidebar also shows an overview of the discussion, however, the discussion can also be seen as an overlay on the document

Figure 56. The student is able to post a contribution by making a selection of the text, or by clicking the pen in the bottom-right of the screen to post a general comment.

Figure 57. In this use case the student is required to write a minimum of 3 contributions, to guide the student through the assignment a small notification (or toast message) on the bottom of the screen will show what is still expected of the student or if they are ready for the next step of the assignment.

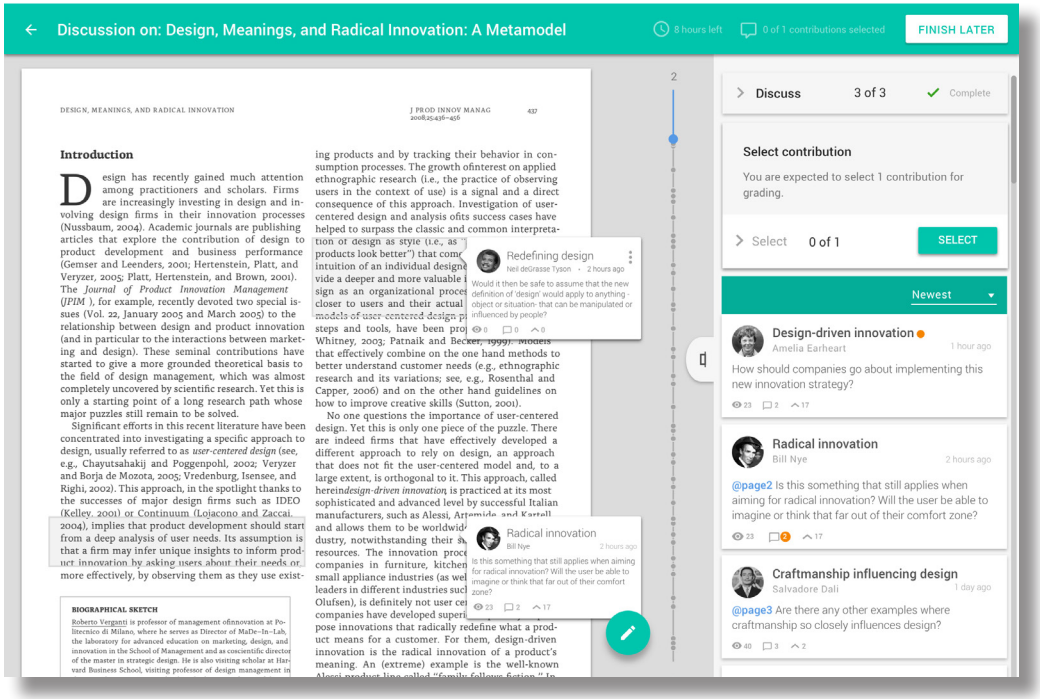


Figure 59. The student has completed the minimum of 3 contributions, and is now able to select their best contribution to be graded. They can also choose to still contribute in the discussion, or select their best contribution later

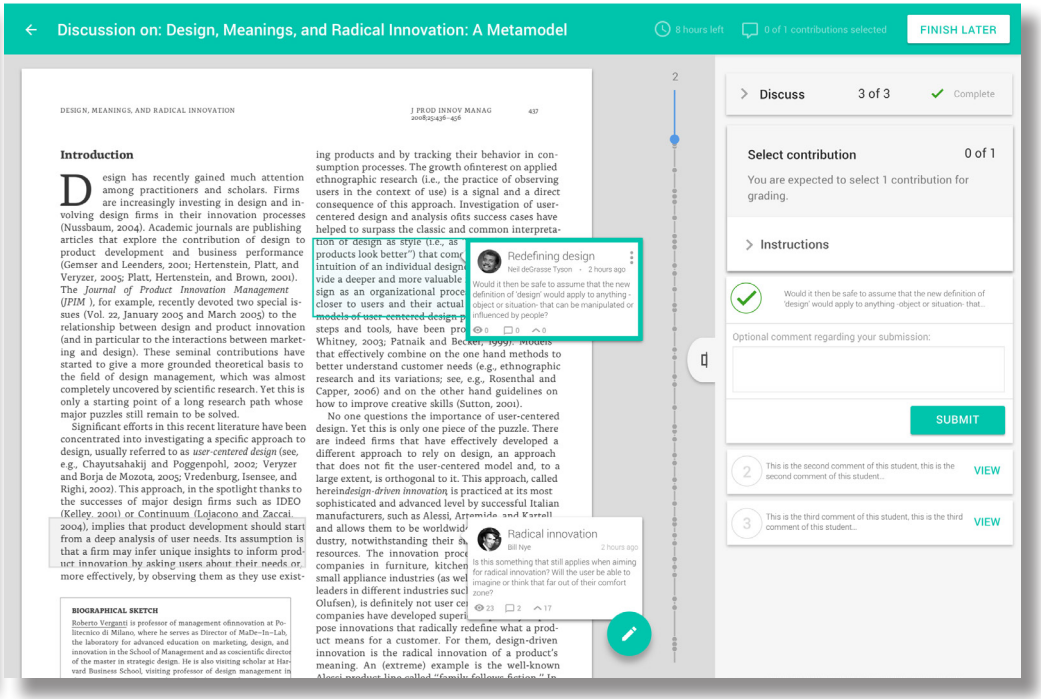


Figure 58. The student is asked to select which contribution they believe is their best, they are able to view the rubric to help guide their decision in this. Should the student want to add a comment regarding their selection, they are able to do so

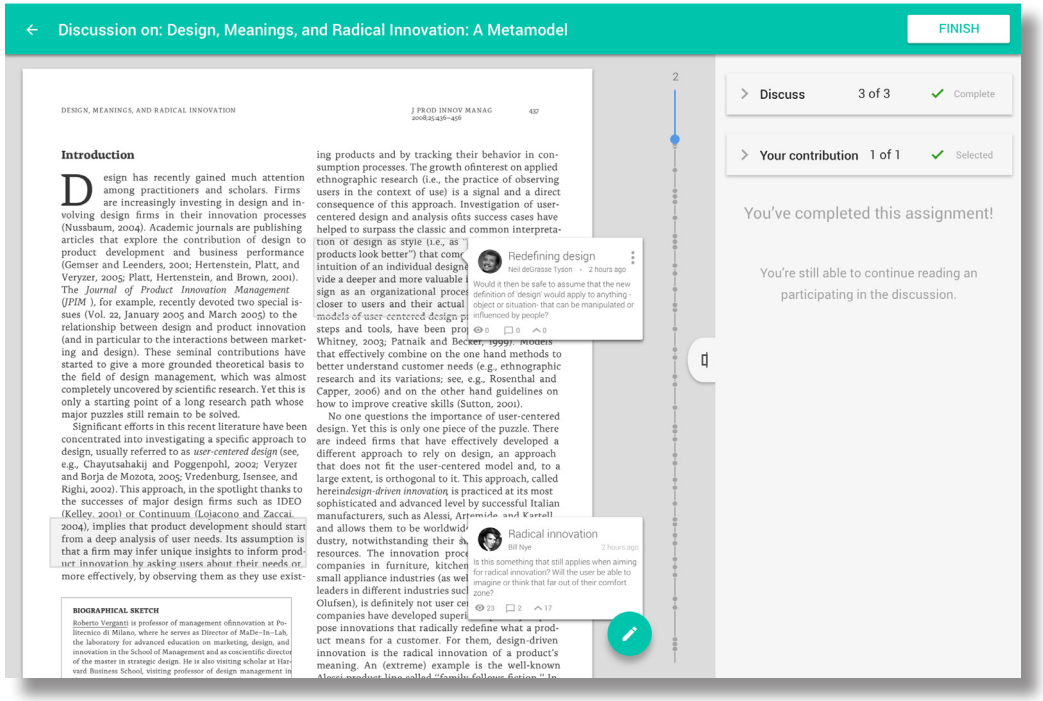


Figure 60. The student has completed the assignment, they are able to finish the assignment to close it. But they are also still able to participate in the discussion, should they want to still discuss the material

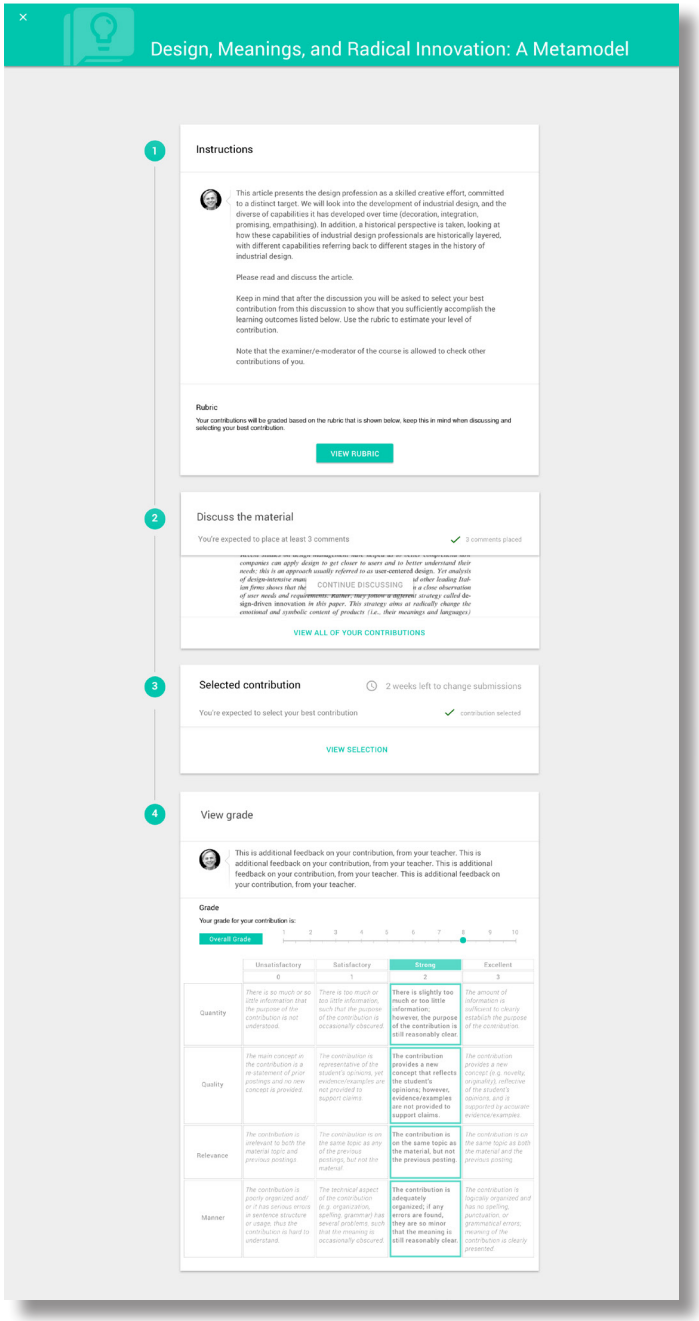
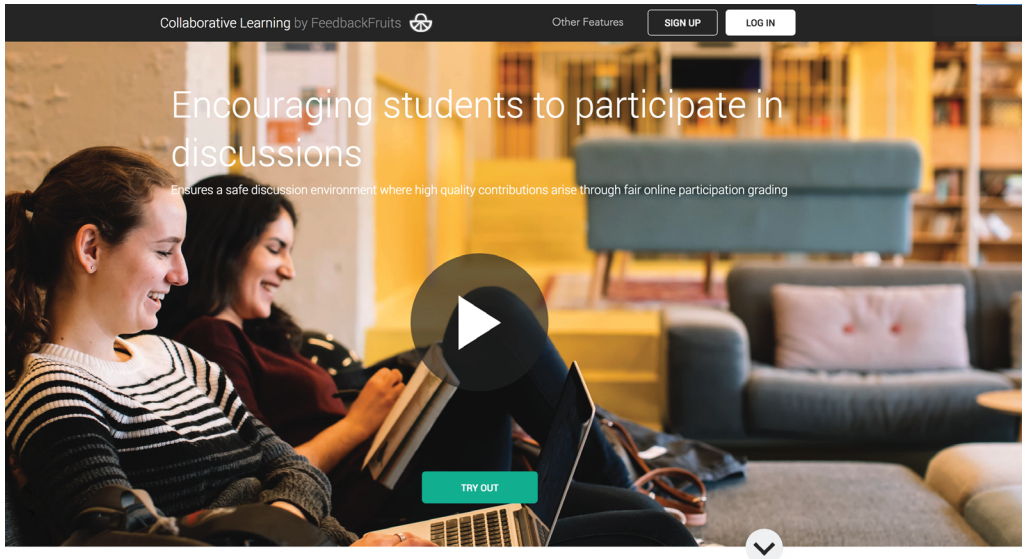
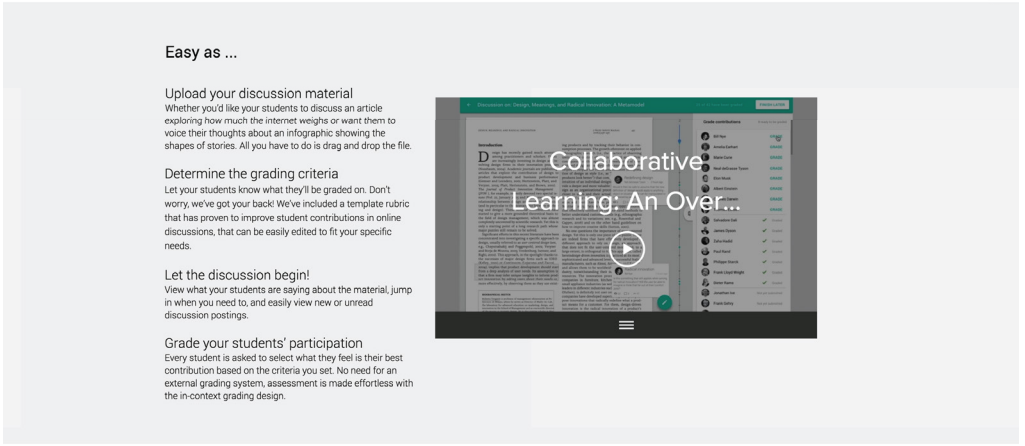
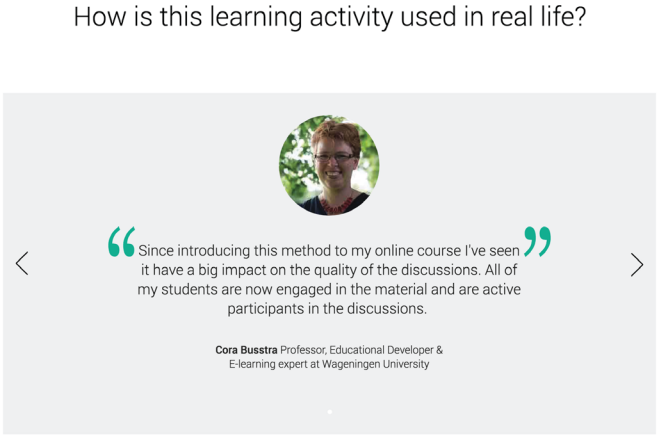


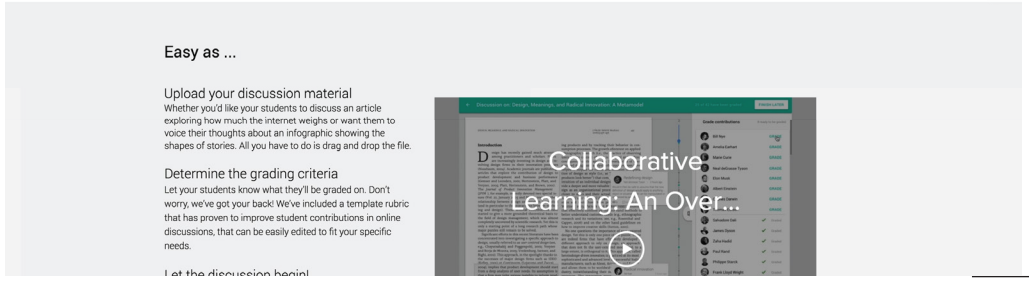
Figure 61. After the teacher has sent the grades to all of the students, the student is able to view their grade in the overview of the assignment. This will also show the teacher's additional comments, and what they scored on each rubric criteria

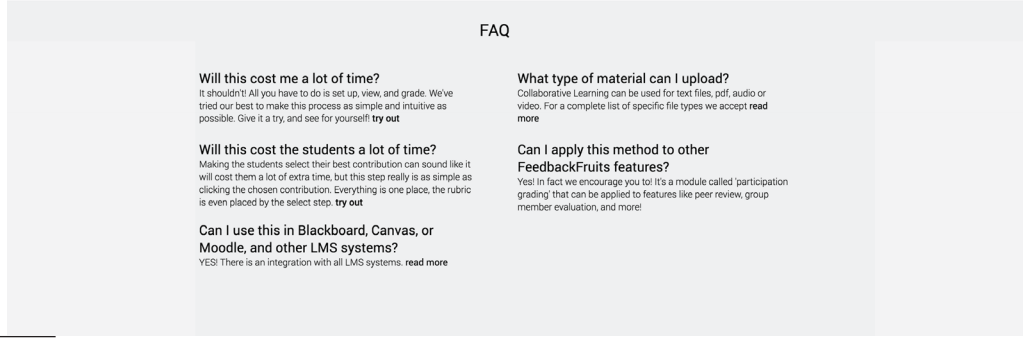
APPENDIX E. COLLABORATIVE LEARNING WEBSITE

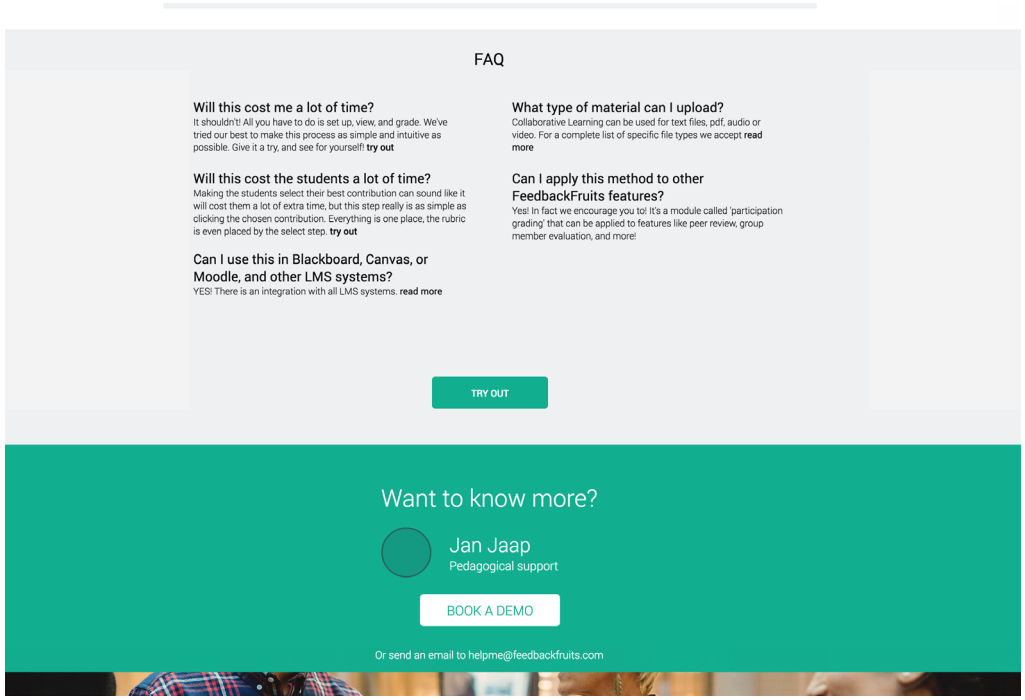











FAQ
Will this cost me a lot of time?
It shouldn't! All you have to do is set up, view, and grade. We've tried our best to make this process as simple and intuitive as possible. Give it a try, and see for yourself! try out
Will this cost the students a lot of time?
Making the students select their best contribution can sound like it will cost them a lot of extra time, but this step really is as simple as clicking the chosen contribution. Everything is one place, the rubric is even placed by the select step. try out
Can I use this in Blackboard, Canvas, or Moodle, and other LMS systems?
YES! There is an integration with all LMS systems. read more
What type of material can I upload?
Collaborative Learning can be used for text files, pdf, audio or video. For a complete list of specific file types we accept read more
Can I apply this method to other FeedbackFruits features?
Yes! In fact we encourage you to! It's a module called 'participation grading' that can be applied to features like peer review, group member evaluation, and more!
TRY OUT
Want to know more?
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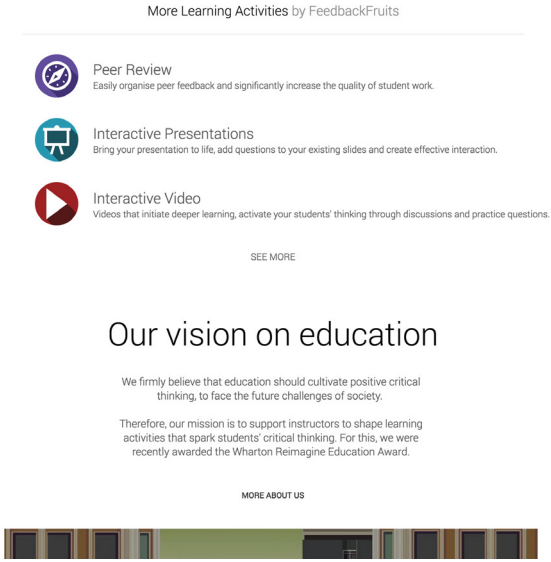
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We firmly believe that education should cultivate positive critical thinking, to face the future challenges of society.
Therefore, our mission is to support instructors to shape learning activities that spark students' critical thinking. For this, we were recently awarded the Wharton Reimagine Education Award.
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Videos that initiate deeper learning, activate your students' thinking through discussions and practice questions.
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