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Master's Thesis
Academic Year 2016

Supporting Self-learners Through a Social Learning Application

Keio University,
Graduate School of Media Design

PI TING SHUO ETHAN

A Master's Thesis
submitted to Keio University, Graduate School of Media Design
in partial fulfillment of the requirements for the degree of
MASTER of Media Design

PI TING SHUO ETHAN

Thesis Committee:

Professor Keiko Okawa	(Supervisor)
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Abstract of Master's Thesis of Academic Year 2016

Supporting Self-learners Through a Social Learning Application

Category: Design

Summary

This paper introduces the design of *Step*, an application that supports personalized learning through social learning and documentation process. Since the booming of internet technology, there are wide ranges of educational tools available for self-paced learning. However, the majority support for those platforms are in the form of online discussion forums. The goal of this research is to design an application that support self-initiated learning that is more collaborative in nature and help learners to have better chance achieving their desired learning outcome.

This research shows that the level of motivation and engagement is increased when learners are involved in the process of managing their learning goals publicly, as well as sharing their learning progress, and contributions to the learning community. Supportive experience, as part of learning, was found to be a vital factor for increased motivation and productivity. Fieldworks surveys and an online web-site prototype was created to evaluate the effectiveness of the proposed design.

Keywords:

Design, Education, Online Learning, Learning Support, Social Learning, Personalized Learning

Keio University, Graduate School of Media Design

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Chapter 1

Introduction

1.1 Background: Current Status and Trends in Education

Education, the vocabulary to express the learning process of almost all subject and all matters, has been a topic of discussion for thousands of years. As all the key issues around the world, the ideal education system doesn't come with a simple solution. For centuries, scholars have been woking on theories and findings from different backgrounds such as cognitive psychology, behavior studies, and biometric measurements to understand how we acquire knowledge. As the study of education system evolves in such dynamic pattern, the technological development plays a significant role in mapping out new possibilities of how people learn. This research investigates education theories, defines current obstacles in the school system, and proposes a new learning approach that aids personalized learning by using social application. After all, education is not something only happens in school but a lifelong experience.

To grasp the necessary changes in school system recently, advocates such as Sir Ken Robinson belief that school can and should do everything they can to nurture creativity in kids through instruction that is personalized and customized for the communities in which students live(Strauss 2015) . Robinson also suggests the driving force of changes are happening from group up, meaning schools and institutions are taking initiatives to explore new classroom settings and teaching methods rather than adapting policies from government.

On the other hand, the government in different countries have noticed

the needs of modifying education system. In Finland's education reform as an example, the governance became highly decentralized; schools using a loose common standard which encourages local schools' involvement in curriculum planning. The Finland change also introduces phenomenon-based learning and letting students involved in lesson design(Sahlberg 2015). As a result, the success of the education reform in Finland not only showing by outstanding average ability test scores but parents and authorities also agree on how successful their school is in achieving set goals(Sahlberg 2016). In the U.S., the Department of Education scheduled agendas in re-evaluating education system and published guidelines to encourage implementation of education technology. Important trends in the education landscape include blended learning, personalized learning, project-based learning, and using different approaches to testing and assessment. Among all, various degrees of education technology were applied.

Combining with technology, the demand for high-quality educational apps is increasing as communities become more connected, devices become more affordable.(Arne Duncan 2015) However, access to technology doesn't lead directly to change. Technology is a tool, a medium, allowing us to accelerate the change. The above trends build up the ideal timing for developing tools which support the paradigm shift in how people define education.

1.2 The Problem: The Absence of Support in Personalize Learning

This section covers two major trends in education that the current school system, in general, is lacking and will take years for the system to adjust. The first trend is driven by the rise of Massive Open Online Courses (MOOCs). More than 35 million people have enrolled in online courses from 2012-2015 (Bersin 2016). There are more than five thousands MOOC courses available online and increasing. Courses cover subjects from business, math, computer science, to art, graphic design, and religion study.

Besides the contents currently available, most platforms provide credentials that allow participant to receive accreditation with a fee. Members are showing the willingness to complete the courses with certificates and believing the

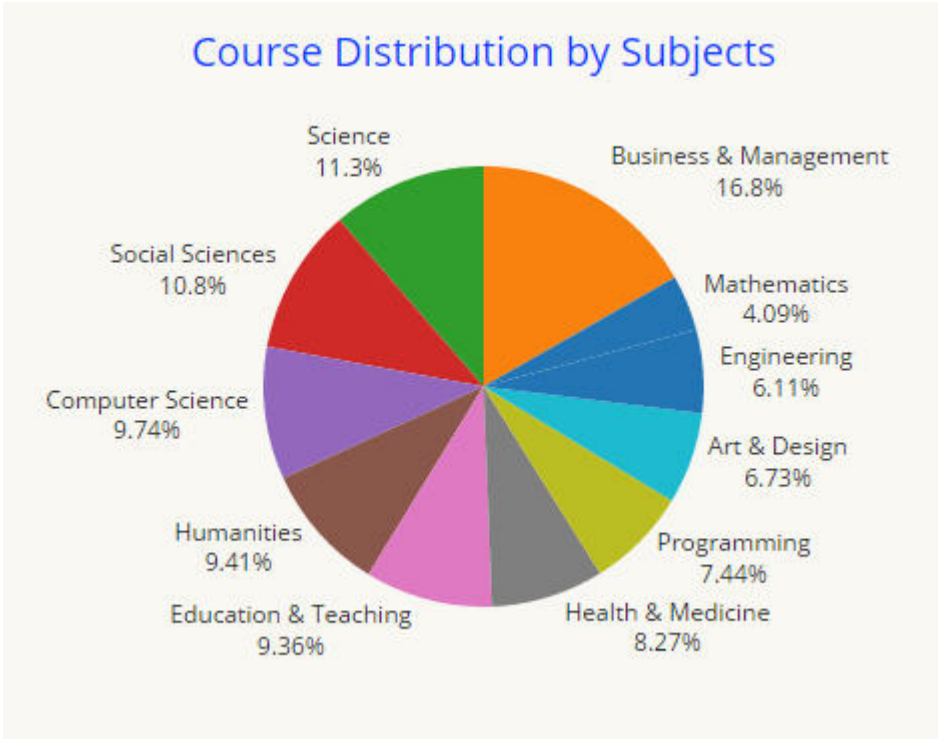

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Figure 1.1: Distribution of Courses6]

certification would open up more opportunities for them such as job advancement or free-lance works.

There are several reasons why MOOC platforms are growing exponentially. Facts and knowledge are changing in radicle speed, the materials we learned last year could already be obsolete a year later. Unlike traditional textbooks which take several years to go through the publication process, MOOCs are concise, smaller units, delivered in timely and concise information. Global internet connectivity is another factor pushing the growth of MOOCs. People are now having easy access to web contents from multiple forms of devices. Platforms such as Corsera and EdX were starting to offer specialization certificate which issued after completion of four to five related courses. Career-oriented social network LinkedIn also began to recognize the value of MOOCs by allowing their user listing all the courses they've completed on the profile page.

The second major trend in education is the rise of the evolved type of schools. These new teaching institutions are using entirely new learning models. Make School, located in San Francisco, for example, offers a two-year program with zero tuition cost. Aiming to replace traditional Computer Science (CS) education, selected students will focus on learning about how to build apps and websites with guaranteed job placement. Tests are not in the curriculum at Make school; instead, all are project-based work. Founder of Make School, Jeremy Rossman, expressed that instead of just letting the higher-education system keep him down, he decided to do something to change it. Another example would be the Minerva School. The classes are not conducted in classroom settings but online. Students are divided into small discussion groups and interact with instructors online. Within the school year, they will travel so multiple locations around the world to experience the different lifestyles and different cultures. Minerva is trying to build a learning community where learning went beyond school but merged with daily life and the environment.

Experimental schools are challenging the current educational models, but the biggest problem lies in the lack of support for new tools and institutions. Learners of all ages are playing with new tools to learn things, but sometimes it is too free for the students to stick with their goals until they reach their original learning objectives. There should be a more systemic and supportive framework helping the learning to be more personalized and supportive. This thesis will be

focusing on the design of such tool, a learning process that supports self-initiated learning.

1.3 The Premise: The Need for Personalized Learning Engagement Design

As explained above, there is an apparent gap between what people think of the ideal ways of learning and the existing education system. The author intends to create a learning process to support learners who are early adaptors of the new tools. The process will involve social learning, goal setting, collaborate learning with theories at the backbone supporting the new learning experience.

The concept of group learning, the collaboration and pairing of learners for the purpose of achieving common learning goals, has been broadly examined and advocated throughout professional papers. The term "group learning" refers to a teaching method where students at different performance levels work together in small groups toward a common goal. The students are responsible for one another's learning as well as their own. Thus, the success of one student helps other students to be successful.

This thesis is about exploring the topic of helping learners to find others with similar learning goals on a web-platform so the users can collaborate, discuss, and working together towards the same learning goal. It could be taking an MOOC course online, forming a study group, or helping each other to solve problems related to their common learning goal. The goal of this research is to let self-initiated learning to be more collaborative and have better chances of achieving individual desired learning outcome.

The first part of the design is aiming to confirm user's personal learning goal to provide sufficient support. To achieve that, participants will determine their learning objectives in a particular matter. Participants will also be asked to determine personal strength for them to be someone else's supporter. Members can then decide to choose learning partners by geographical location, or assigned by suggestions from the platform.

The second part of the design is leading users to be actively involved in a social learning environment. Participants are encouraged to documenting their learning progress frequently. They will receive feedbacks from their learning partners and supports promptly. Overall, this learning environment encourages participants to build up confidence level on achieving their learning goals, and also create social bonds within the learning community where they can feel supported while making contributions at the same time.

The platform itself aiming to finish with the web-framework by using Ruby on Rails and entering into concept testing by acquiring actual users into a multiple days trial. Users will be able to register, create their profile, set their learning goals, documenting learning progress, and follow people with similar learning goals and search for others by learning goals, or geographical location. A pre-survey will be given to select suitable candidates with scalable learning goals.

1.4 Thesis Structure

This thesis is organized into five chapters, plus appendices. Chapter 1 introduces the background and overview of the current situation, making problem statement, and the premises of the solution.

Chapter 2 reviews educational theories and implications which supporting the proposed solution.

Chapter3 consisting of the analysis of two related field work, the concept of design, initial survey result, and user feedback.

Chapter4 evaluates experiment result, with summary of data collected from the research.

Chapter 5 summarizes the findings and future work suggestions. ff

Chapter 2

Literature Review

2.1 The Evolution of Learning Theory

Before discussion of the design, in developing education tools and apps, it is important to build on the foundation laid by decades of education research. Often times, when apps are fully functional but based on learning theories that researchers debunked years ago, so they underperform in their core purpose (Arne Duncan 2015). In this section, we will explore the history of educational theory and how technologies used in education have changed the content and procedure of learning and teaching.

Behaviorism

The behaviorist perspective of learning originated in the early 1900s, and because mainstream in the beginning of the twentieth century. The basic idea of behaviorism is that learning consists of a change in behavior due to the acquisition, reinforcement and application of associations between stimuli from the environment and observable responses of the individual (UNESCO 2016). The behaviorist school of thought, influenced by BF Skinner, claim that observable behavior indicates whether or not the learn has learned something, and not what is going on in the learner's head (Anderson 2008). In Skinner's view, rewarding the parts of behavior reinforces it, and encourages its recurrence. Therefore learning in behaviorism is by learning sequential practices alone with the use of reward and punishment. Various educational system worldwide adapted this idea in the early

stage in such behavior control, reward, and punishment mechanism integrated into the school system. However, many educators claim that not all learning is observable through behavior, and there are more things to consider about one's learning. Since the mid-twentieth century, there has been a shift away from behaviorism to cognitive learning theories(UNESCO 2016).

Cognitive Psychology

Cognitive psychology was developed in the 1950s, and is one of the factors to the shift away from behaviorism. Learners not viewed as the respondent to outside stimuli, but as information processors. Cognitive psychology claims that learning involves the use of memory, motivation, and thinking (Anderson 2008). Cognitive theorist view learning as internal processes, and the amount learned depends on learners effort, leaner's processing ability, and the depth of the understanding. Therefore, the preferred cognitive methods of instruction are by reading textbooks and from lectures. In many cases, this refers learners as passive agent receiving information from the instructor.

Constructivism and Constructionism

Constructivism developed in the 1970s, arguing the idea that learning is not passively receiving information, but the learners construct their knowledge actively in a mental process through interacting and responding to the environment. In brief, constructivism is that knowledge is created through genuine experiences, for example, hands-on learning, experiential learning, or project-based learning. Jean Piaget came up with the theory of cognitive schema, what one does is construct, takes in the information and creates what we call mental maps in the brain. Those mental maps grow and change over time. The implication of such view in classrooms, one might see students working in groups, picking up ideas, doing investigations, asking questions. Teacher's role in such environment acts as facilitators so that they will observe student's understanding on the individual level, and evaluate then ask deeper questions.

Constructionism is a theory developed at Massachusetts Institute of Technology(MIT) by Seymour Papert that evolved from constructivism where Papert studied with Piaget. To Papert, the cycle of self-directed learning is an iterative process by which learners invent for themselves the tools and mediations that best support the exploration of what they most care about (Ackermann 2001). This point of view is crucial when developing tools to support self-directed learnings.

Many new learning tools take the approach on integrating constructionist theories with their tools. An early example would be Logo. The Logo is a construction tool using the Logo programming language. Professor Hal Abelson presents a case study of a programming language that enabled students to work with computers in a different way by applying constructionism in teaching(Kafai and Resnick. 1996). Children were actively participating, learning by doing, having active discussions. Abelson addressed that, "If you want to make something that is useful to the community, it is really good to share". Logo later evolved into Scratch, created by Dr. Mitch Resnick and graduate student Ricarose Roque at MIT. Resnick was a doctoral student of Papert.

Both Logo and Scratch support people in design, create, experiment, and express themselves which take learning into a much more dynamic level. As such situated learning environment, the social side is an important part of the learning process and demonstrate the value of the social interaction that people both get ideas that are inspired by other things and from others' feedback.

In summary, Papert's research focuses on how knowledge is formed and transformed within specific contexts and processed in different people's mind. While Piaget focuses on his genesis of internal mental stability, Papert is interested in the dynamics of change (Ackermann 2001). For Papert, the image of a learner enjoys finding novelties, and likes to remain connected with people and things. The learners learn from personal experience rather than from being told. This model can be greatly related to self-initiated learning nowadays.

2.2 The Concept of Social Learning

Over time, the learning tools have been adaptive and blended all the theories above. The theory of social learning which derived from behaviorism is applicable on the widely available self-study content on the web. Social learning has been developed by Albert Bandura, his theory of learning suggests that people learn within a social context, and that learning is facilitated through concepts such as modeling, observational learning, and imitation (UNESCO 2016). Bandura argues that children learn from observing others as models. In modern online learning platforms, such as MOOC platforms, social learning is a key element done through an online discussion forum.

Role of Interaction in Online Learning

Since distance education, interaction has been valued. As most online learning materials, the following chart provides an important visual realization on the level of interaction within different educational media.

As mentioned above, currently the most interaction involved in online learning are considered as forums and discussion boards. However, two features of the forum activities highlight the problem in those forums. First, the decline rate is high. For each course online, the volume of discussion activities fell continuously throughout the duration of the course. The second problem is related to high-volume discussions. Due to the high volume of a user base, with courses almost reaching hundred thousands of participants, at least twenty percent of the classes produced new threads at rates that are infeasible for students or teaching staff to read through (Brinton 2014). Research shows even the course facilitator and supporting staff actively participated in the discussion; there is no significant improvement to the first problem. To solve the second issue, researchers proposed a generative model for the discussion threads, which allows online learning content provider both to choose efficient thread classifiers and to design an efficient algorithm for ranking thread relevance (Brinton 2014). In chapter3, the author will explain an alternative method which encourages interaction among participants but does not involve complicated algorithm by dividing learns into a smaller scale,

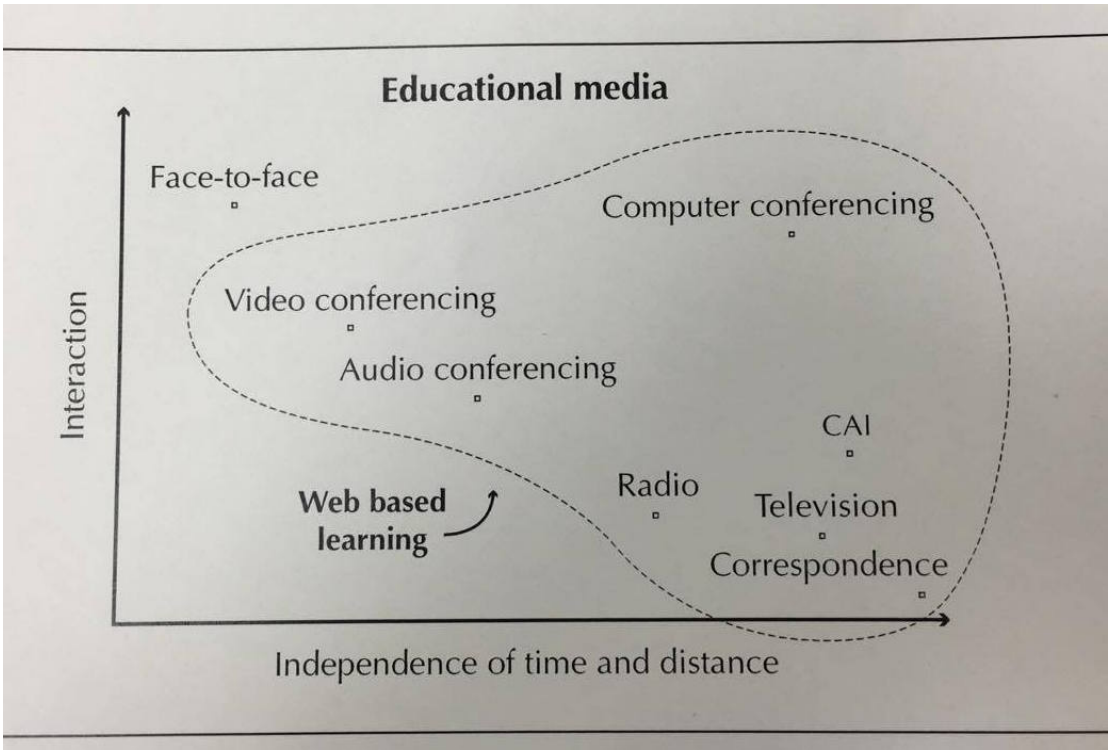

Figure 2.1: Distribution of Courses[9]

manageable group.

Another factor in the context of social learning is motivation. Learners should be motivated to learn. It is a simple fact that no matter the quality of the content if the learners are not motivated, they will not continue their learning. Usually, learning support comes in encouraging intrinsic motivation and extrinsic motivation (Anderson 2008). Social opportunities affect motivation. Feeling that one is contributing something to others appears to be especially motivating. Learners of all ages are more motivated when they can see the usefulness of what they are learning and when they can use that information to do something that has an impact on others? especially their local community (Bransford and Cocking. 1999). We can also apply the same theory in online learning: if learners can envision their impact of the contribution they make to an online community, such realization could motivate them in the online community which encourages them to stay with their learning intent and keeping the interaction with the learning community.

2.3 The Concept of Personalized Learning

Personalized learning is a core part of the vision sketched by the National Education Technology Plan. Personalized learning puts students at the center, empowers them to take control of their learning, and offers engaging learning experiences for all learners (Arne Duncan 2015). Personalized learning can both be facilitated inside the classroom and for self-paced learners. Inside the classroom, it can be a great asset to teachers because it provides tailored support for students need more attention or give student more choices to manage their learning. The tailoring can define as instructions paced to learning needs and varies on learner's particular interest and learning preferences. In an environment that is personalized, the learning objectives, content, method, and pace may all carry. It is important for learners to choose learning method because different students learn with various styles. For example, experience learners prefer specific examples in which they can be involved. They like group work and peer feedback, and they view instructor as helpers. Observation learners like to observe before taking action. They prefer going through all the information available and avoid making mistakes. Observation learners also show less interaction with others.

Personalized Learning in Schools

In 2012, the school districts in the US invested more than 350 million in funding to support efforts to personalized learning and improve student achievement. The Metropolitan School District of Warren Township for example, which has around twelve thousand students, had a plan to implement personalized learning to the school. Some of the personalized learning goals set out by the district are: build a comprehensive online curriculum that takes advantage of instructional technologies; integrating new instructional technologies and high-tech environments. Their technology-based approaches include: introducing Chromebooks and iPads to the classroom; making the virtual course as an option so students can select for their classes; some teacher using a blended learning approach that utilizes course materials on Apex Learning platform. Apex Learning is a virtual learning solution provider to US schools. Apex Learning provides digital curriculum in English, science, social studies, math, and world languages.

The Metropolitan School District of Warren Township monitor the results of implementing personalized learning system by aligning assessments to Career Ready Standards and district tests. The online testing system has given the community the ability to gather data and act on it more efficiently than using paper assessments. Reports also showing high student engagement in the new environment.

Another example of implementing personalized learning is Facebook. In 2014, the Zuckerberg and Chan Foundation founded by Facebook CEO, assigned a team to work with a California charter school network called Summit public schools. Together, the engineers and educators are developing a digital platform called the PLP, short for Personalized Learning Plan. The Zuckerberg and Chan Foundation's plan the establishment of a free private school that will operate with a local community health center and aims to meet the needs of individual students and families (Herold 2016).

Personalized Learning in Online Learning

Online learning and especially for self-paced learning is considered as a form of personalized learning. Online learning includes contents in different learning styles, not only text but with videos, audios, graphical explanation and discussion forum. It is a leaner-centered environment. A learner-centered, according to Bransford and colleagues, includes awareness of the unique cognitive structures and understanding that learners bring to the learning context (Anderson 2008). Learner-centered activities make use of diagnostic tools and events.

The screen cap from EdX MOOC platform showing how the course structured into chunks of small units. Each unit containing sessions of contents delivered in different forms. Users can easily manage their learning progress by following the linear direction flow as directed. Inside the content window on the right side, the progress navigation is also giving user clear direction of when to move on to the next step.

However, as mentioned in Chapter 1, the only learning support available on the leading online platforms is the course discussion forum. The discussion

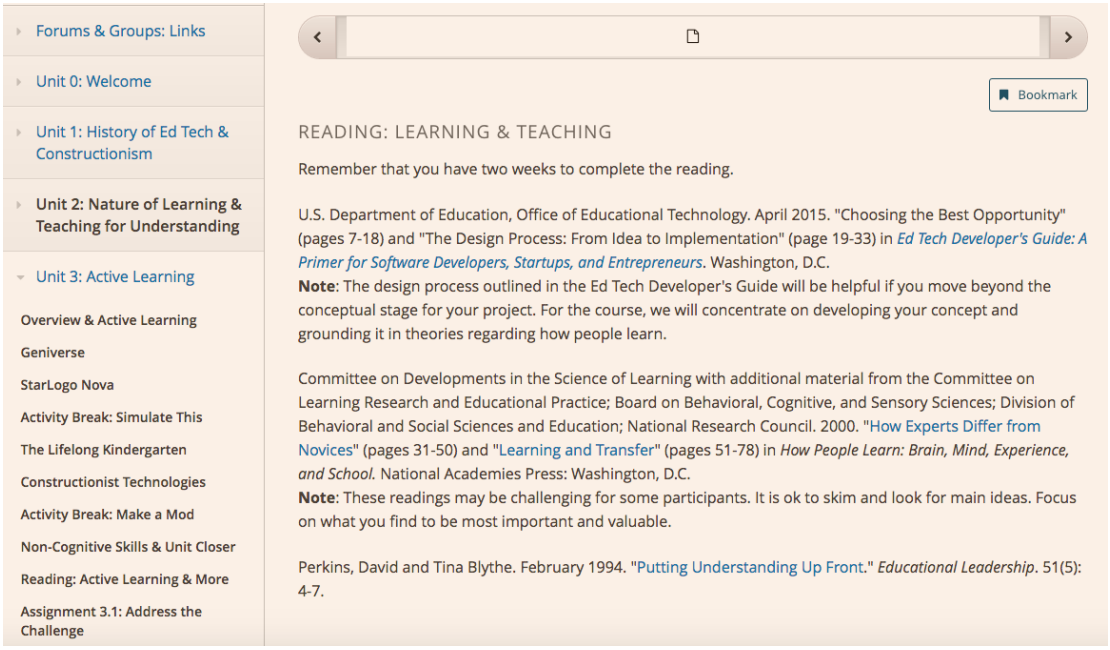

Figure 2.2: EdX Learning Content

forum in online MOOCs can have too much information to follow and filled with unrelated discussions. As statistics showed that the completion rate in online courses is extremely low, therefore, it is important for education developer to think of new ways of providing support rather than using discussion forums. In the next chapter, the author will propose a learning process which provides learners taking online courses the support and motivation to be engaged in such learning environment.

2.4 Significance of the Research

Chapter 1 introduces the current situation and issues in education, with the recent trend of educational reform from both inside and outside of the school system. Schools are aware of the problems and taking actions to adjust curriculum, utilizing technologies, redefining standards. Non-traditional institutions are also driving changes by disruptive innovations of using educational technologies. There are so many online course platforms available, but learners' learning outcome are

still not optimized.

Following collaborative learning, social learning, and personalized learning approaches, Step, a learning support platform, is introduced. It furthers the idea of using technology and proven theories to support self-paced learning. Rather than treating learners as passive information receivers, they are active participants. The platform encourages students to define achievable learning goals, to form small size study groups, to record learning progress and outcomes, and promote interactions.

Chapter 2 depicts the theoretical assertion of the development and changes in learning theories. From behaviorism, cognitive psychology, constructivism, to the new experiential learning and multiple intelligence theories, education activists are experimenting ways to develop new educational tools and platforms interwoven with different ideas. The concept of social learning and personalized learning are also introduced for explaining the essential elements in online learning. However, unlike classroom settings which are rich in social interactions, the majority of social aspects in online learning are only based on discussion forums. The Step platform aims to increase user's involvement in a social learning environment.

Having an active social learning environment itself is not enough to provide learning support. To make users feel that their participation is personally meaningful, the author introduces the learning partner system. Users will confirm their personal learning goals and determine individual strengths to provide support to others and get feedback.

This research emphasizes the concept of providing learning support tools through the process of documentation and socially active. Users are treated as goal oriented, active learners. Based on the examples and theoretical framework discussed in Chapter 1 and Chapter 2, this research can be encapsulated in the following research question:

If learners could be involved in the process of publicly managing their learning goals, could share their learning progress, and make contributions to the learning community, would their motivation and engagement in the learning experience increase?

Chapter 3

Design

3.1 Design Objectives

Step aims to Help self-learners of online courses through a constructive and engaging process. The first part of the design is seeking to confirm user's personal learning goal to provide adequate support. The second part of conception is leading a user to be actively involved in a social-learning environment. This process is to create value for the user and create a sense of involvement and contribution. The issues which are considered as challenges for the design are listed below:

- What kind of support should be given to the online learners?
- Is interaction in online learning necessary?
- What kind of support do online learners find most helpful?
- Is the support critical to user's achievement?
- Does user comfortable working in a social learning environment?
- Is element of competition or comparison of learning progress necessary?
- What would be the optimal number of users in an online study group?

Through field work, surveys, and user definition, we will find answers to the above challenges and finally shape the prototype of Step Leaning Platform.

3.2 Fieldwork

CS50 Study Group

Two fieldworks were conducted before we define the user story of Step prototype. First, an online Facebook discussion group aiming to support group members to solve coding problems. All the members of the study group are participants of an online course, Computer Science 50, provided by Harvard University in collaboration with EdX online education platform.

The author organized this study group for two reasons. First, the official discussion board having over 80,000 members. It?s difficult for participants to keep track of the posts and members are easily get distracted by the unrelated posts. Second, the content is relatively difficult, and participants agree that by organizing smaller study groups, participants will have better connections, and the support needed to continue the courses.

Figure 3.1: Participants page of the CS50 Study Group

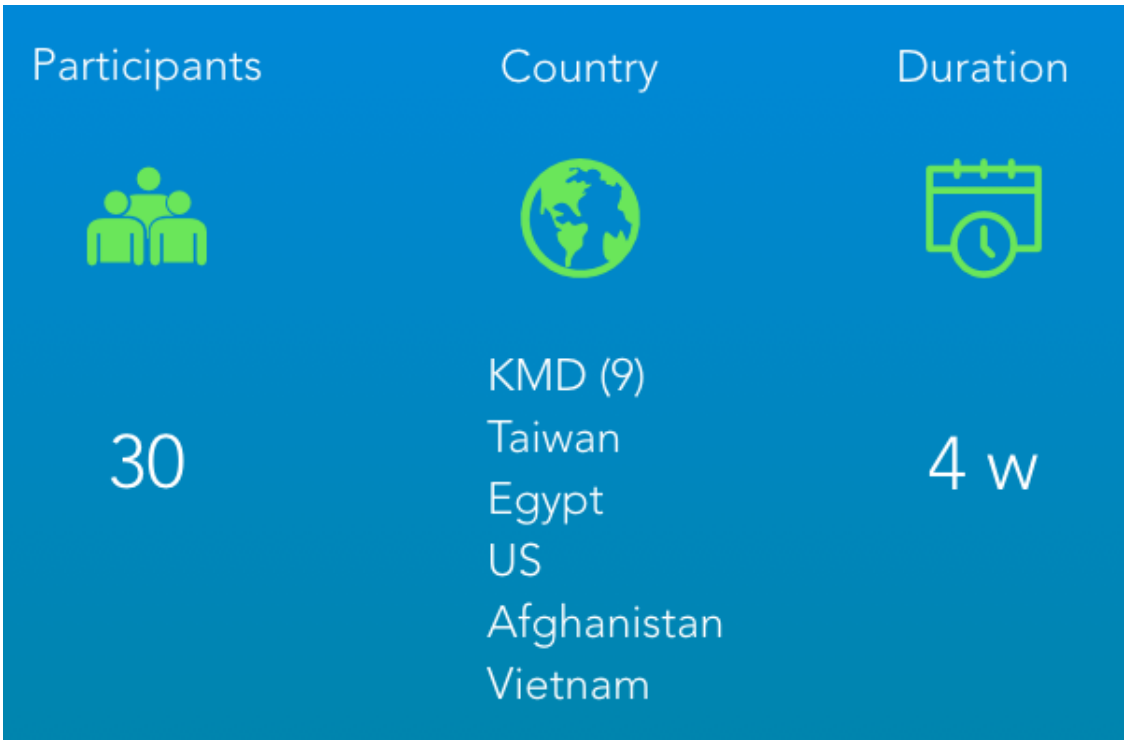

Figure 3.2: Participants page of the CS50 Study Group2

After publicly announced the study group, 30 members joined after one week, from all across the world: Taiwan, India, Egypt, Afghanistan, Vietnam, the United States plus nine local students at Keio Media Design. The study group organized weekly meetings on Google Hangout. The activities continued for four weeks. Overall, there are six active participants stayed till the end, and 1 completed the course. Some positive feedback claims: "I like working with a group," "I'm very motivated to work with people from different part of the world."

This experience is valuable in thinking the design of Step platform. After analyzing how to improve such smaller scale study group, few key elements were indicated after interviewed with the participants. Interaction with other people is necessary for course participants to find motivation. Members also claim they would like to know other people's progress so they can feel the sense of co-working rather than taking the course alone.

Lighthouse Labs Web Development Bootcamp

Second fieldwork conducted in summer 2015. The author spent 12-weeks in intensive programming boot camp. According to a definition, a coding boot camp is a technical training program that teaches the parts of programming with the biggest impact and relevance to current market needs. It enables students with very little coding proficiency to focus on the most important aspects of coding and immediately apply their new coding skills to solve real-world problems (FIREHOSE 2016).

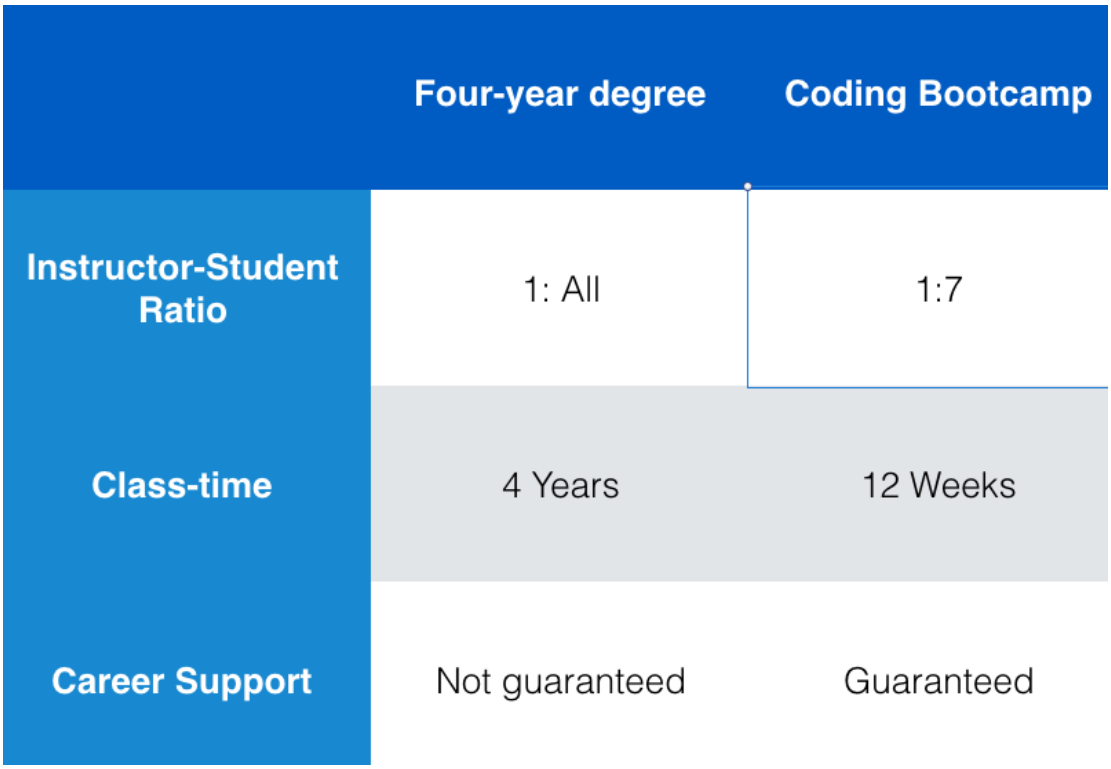

Figure 3.3: Comparison between 4-year degree and bootcamp

Compare to standard classroom settings; coding boot camp is extremely intensive. However, there is some fundamental difference listed in the chart. The most significant difference is the lecture style. In the boot camp setting, lecture only consists of 20 percent of the total class time. The rest eighty percent of the time were distributed to self-paced problem sets online. Another fundamental difference is that at the boot camp, there are always teaching assistant available.

Each teaching assistant is responsible for taking care of seven students. In the classroom, it is encouraged to ask for personal assistant every time a student needed help, and the waiting time is usually less that ten minutes. The atmosphere in the boot camp is extremely intensive, students following a fixed working schedule start from 9:00 am to 10:00 pm every day, seven days a week. It is quite amazing to witness how productive people can be under such intense learning environment with high pressure.

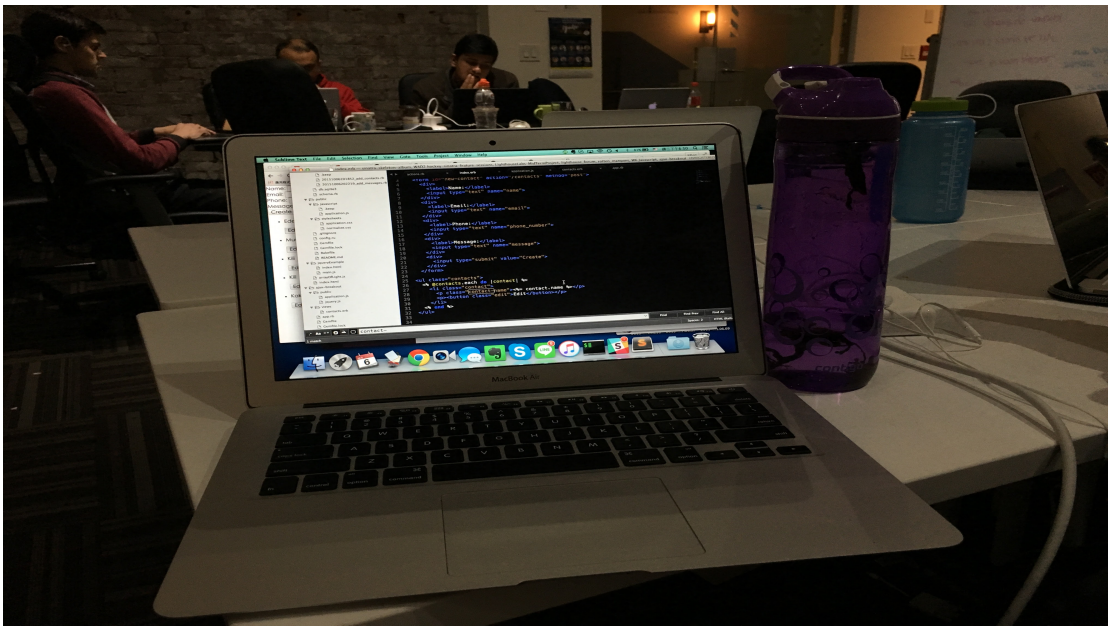

Figure 3.4: Classroom settings of the bootcamp

The boot camp experience is valuable in thinking how the well-managed blended learning environment can be extremely effective and efficient in helping students achieving their learning goals.

There are three factors lead to the success of the boot camp regarding course completion rate and career placement. Clearly stated and monitored daily objectives providing a clear guideline for students. Support provided to students were available in multiple channels. Students were highly connected working in small groups on daily basis. More design questions raised such as if a strictly managed working timetable is critical for learner's success or if financial commitment is an important factor for students to be committed to the learning.

3.3 Initial Survey

To better understand the behavioral patterns of the learners, a survey was conducted to find out people's learning behavior and preferences. Ten participants were selected for the survey. Surprisingly all the participants reported they have tried to learn something by themselves in the past 24 months. Here are the summary of survey findings:

- The age range of the participants are between 23-26.
- There are nine graduate school students and one entrepreneur.
- All participants reported they tried online learning in the past 24 months.
- 3/10 of the participants completed their original learning intent.
- 6/10 of the participants prefer learning with others. Support is highly important in their learning experiences.
- All members had used online educational resources and did not pay for any tuition, one paid for the certification of completion.
- The feeling of ?learning together? helps with motivation to continue.
- Out of the successful participants, they claim the course support and interaction is critical for them to achieve their learning goals.
- Some prefer their learning progress been monitored.

The author asked the participants to rate their level of procrastination, where 1 being a total procrastinator and five being they are good with time management. The data plotted in the bar chart showing the result that people are leaning towards being procrastinated. Another interesting finding is that one participant clams that the social aspect of the online learning "help with motivation - seeing others are doing it too, success or struggle, both motivate me.", another replied "?course support and interaction is critical for me to achieve learning goals.?

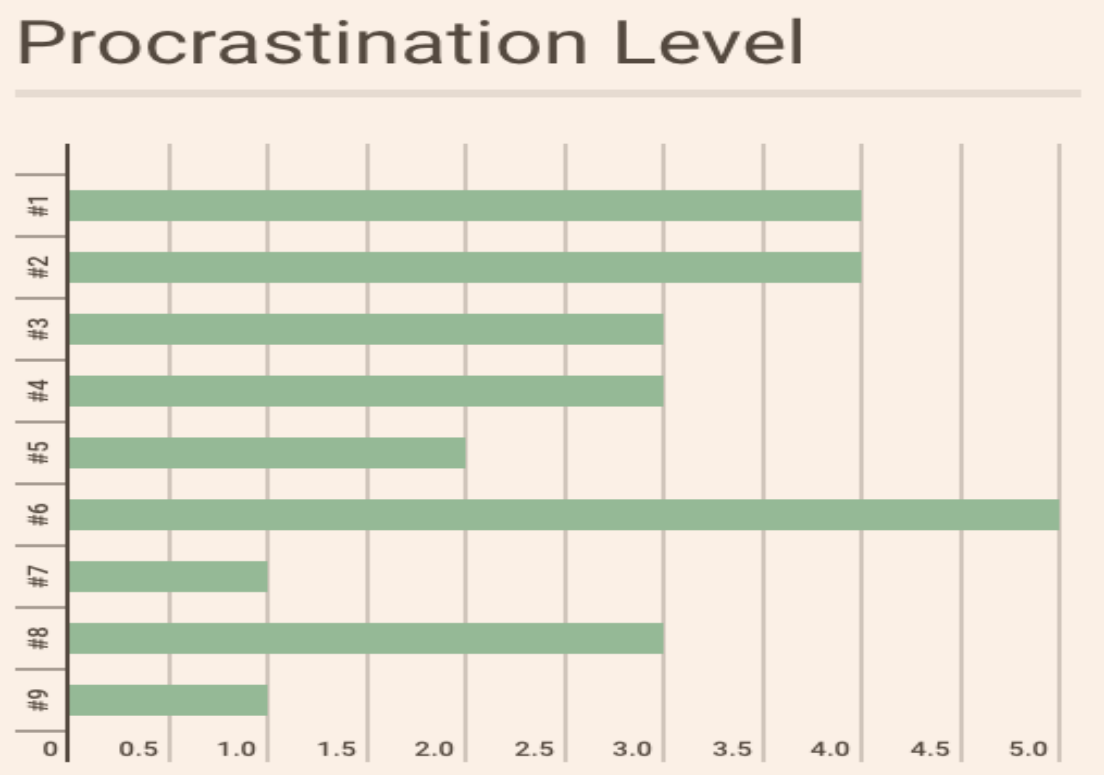

Figure 3.5: Level of procrastination

3.4 User story

Analysis of the field works and survey above uncovered the needs of online learners. User stories are part of an agile approach that helps focus on the product development. It s a series of scenarios about the desired functionality. The following are some key features to be included in the Step application.

Users can set learning objectives so that they can keep tract on the learning progress.

Users can set personal strengths, and they will be assigned as a tutor to another user so that collaborative and cooperative learning are encouraged to facilitate constructivist learning.

Users can join small groups of 10-15 people with similar learning goals

so that learners stay motivated. Learners will also be able to use the strengths of other learners, and learn from others.

Users can document their learning progress so that the learning is an active process. Keeping learners active doing little meaningful achievement results in high-level processing. Each improvement treated as building blocks for the bigger goal.

Users can receive feedback from others, so they have the time and opportunity to reflect. Learning in an interactive environment promote higher-level learning and social presence, and the environment helps learners to develop personal meaning(Anderson 2008).

The list above are critical functions should be formulated in the Step application and served as the solution to the design challenges.

3.5 Target Persona

Target persona for this project is a 20 years old woman. The target persona is studying in a university and is currently thinking about her career path. She is an outgoing and curious person, always likes learning something new. She is considering taking some online courses to learn some practical skills and to polish her resume. However, she tried taking an online course before but didn't have the motivation to continue and gave it up. But this time, she is quite determined and trying to pay for the certify track. She also considering to find a friend to study with her so they can study together and work at the same pace. She enjoys the time when she and her friends formed studied groups before the exams and working together.

3.6 The Concept of Step

Combined with the findings above, the author designed a learning support process aiming to improve motivation and engagement of the learners. By involving dif-

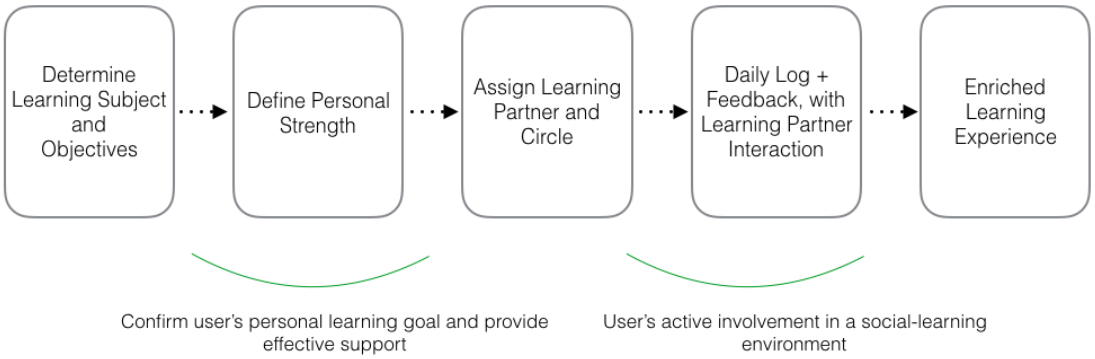

Figure 3.6: The concept of Step

ferent levels of involvement, Step, as Figure 3.6 indicates, consists of two aspects to provide learning support (The documenting process) and encourage interaction in which users are actively involved (The social learning process).

The social learning process

As learners work through the content, they will find the need for learner support.

The process of social learning in Step occurs at the very beginning when the user interacts with the app. At this stage, users are involved in creating an account and a series of measures in determining their learning goal. After we established the goals, users will be asked to describe the subjects they are good at. It can be a language, skill, a particular topic or some courses they completed before. Based on the skills, the app will suggest pairing up with other users who are learning those skills. The idea is that each learner is encouraged to be another's tutor so that they can respond to the questions directly. Moreover, the user which been helped will feel been supported by someone who is more knowledgeable.

Finally, the learner will be placed into a group of 10-15 people who are learning similar materials. They can interact with each other. Inactive users will be removed from the group to make sure the small social group stayed active.

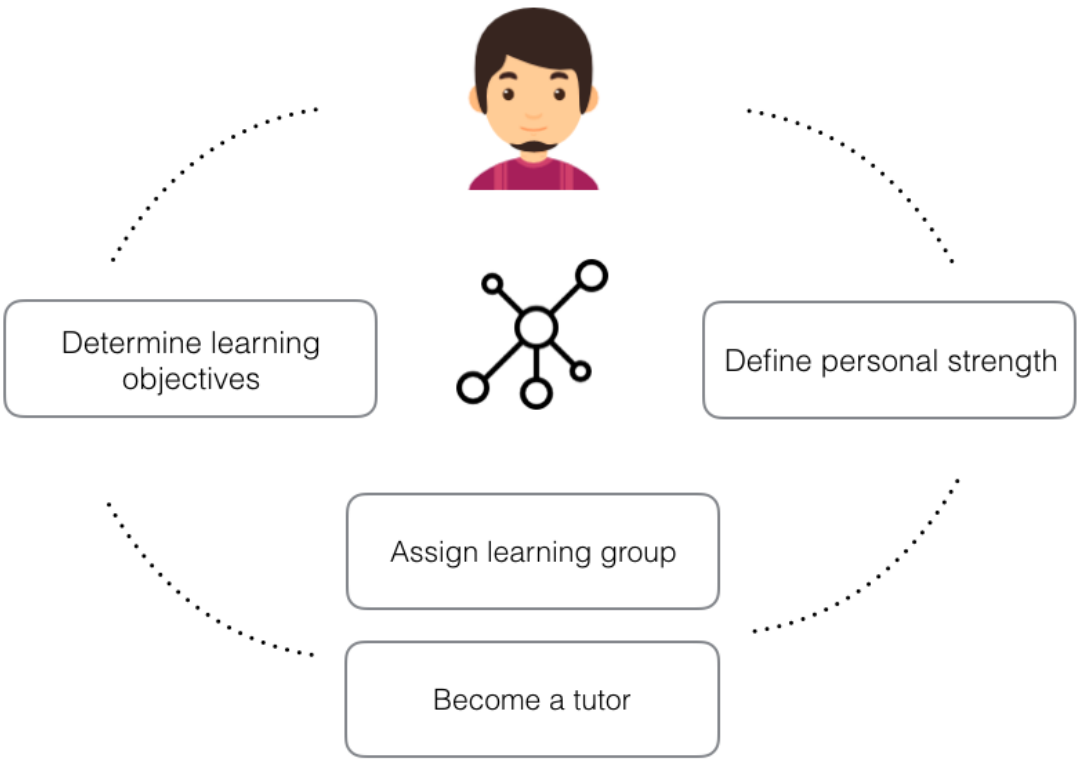

Figure 3.7: The social learning process

The documenting process

Along with the learning, users are also encouraged to log their learning progress.

The documenting process as described in Chapter 2, is an important role for learning support. Similar to fitness tracking application, which records exercise duration, distance, tracks, learning log serves the purpose as letting user documenting the learning progress, summary, or raise any questions. Other group members can viewed records and notes by the member and for giving feedback. User's mentor can also make comments on the notes to provide guidance.

The support given from the social learning process and documenting process are aimed to provide support for online learners and help them to be more motivated and engaged in the learning experience.

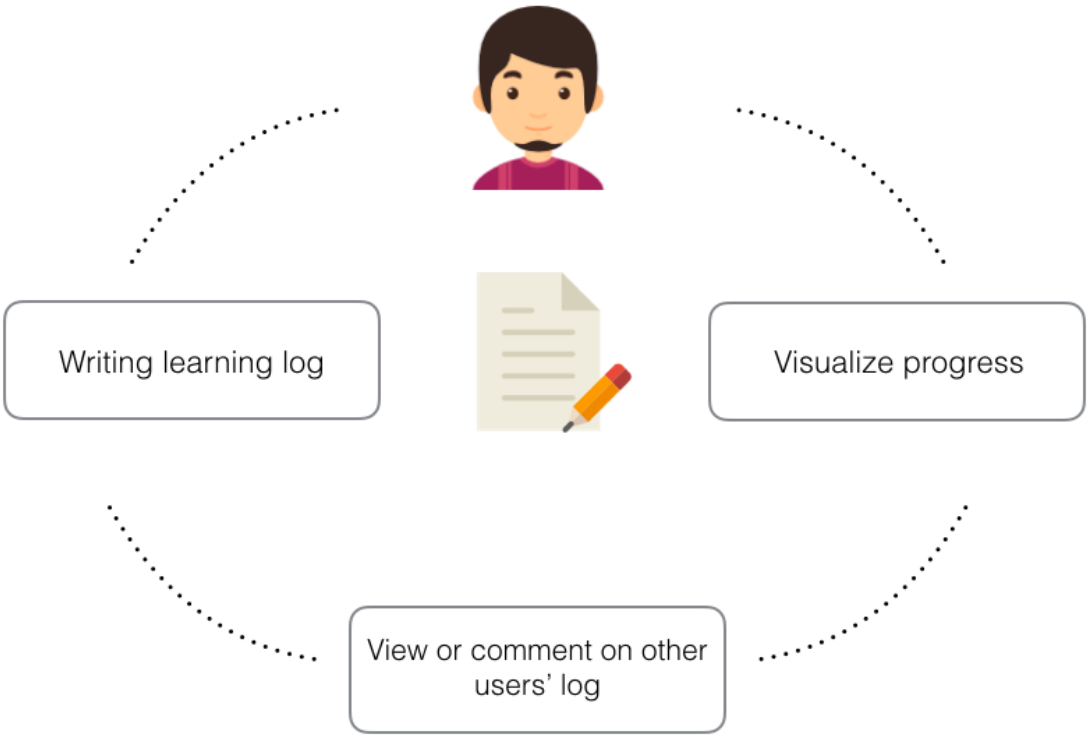

Figure 3.8: The documenting process

3.7 First Stage Prototype of Step - Mobile Application

Based on the findings from the survey, literature review, and design concept, the function of the app is defined in this session as shown in the concept sketch. To be more specific on the learning subject. The wire-framing application focuses for learners who are interested in learning computer programming.

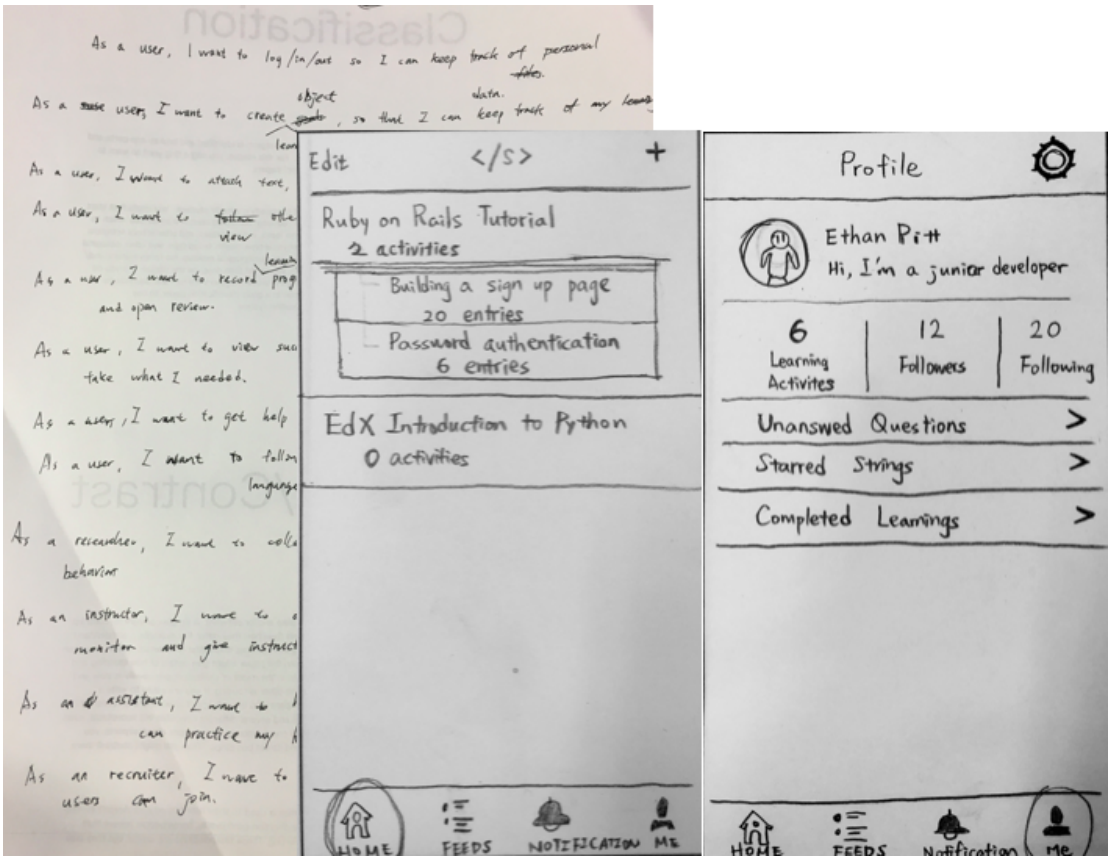

Figure 3.9: Concept sketch

Profile Page

A user can create their profile, with a profile picture. A user can view their current learning goals, following learners and followers. If user receives any questions from the tutee, it will show here. All the completed learnings will also show in this section.

Learning Log

The second page of the app is the learning log; users can view their current learning goals. Under each learning activity, there are sub-entries where learners can list

out more detail information. By clicking the learning goal, the sub-level entries will show up. A user can see how many other users are learning the same topic. Other users can up-vote on certain entries. There are also questions and answer sections where learners on the same subject can exchange information.

Learning Group

The system will assign learners with same learning goals into a small-sized study group. The study group will display in this section that group member can share information based on their studying subject. If necessary, they can arrange local meet-ups.

Initial Feedback

Five interviews were conducted for initial feedback, asking volunteer learners about their opinion on the system and their willingness to participate in further testing. The initial feedback suggested that online learning is usually through a web browser by using a personal computer or laptops. Therefore, it is more reasonable to develop the app as a web-based application. Learners also want to see other learning options instead of programming courses.

3.8 Second Stage Prototype of Step - Web Platform for Documenting Process

Implementation and Technology

The author developed the Learning Log function using Ruby on Rails. The code and the structure of the Step learning platform forked from an open-sourced project and also publicly available on GitHub. The prototype was developed

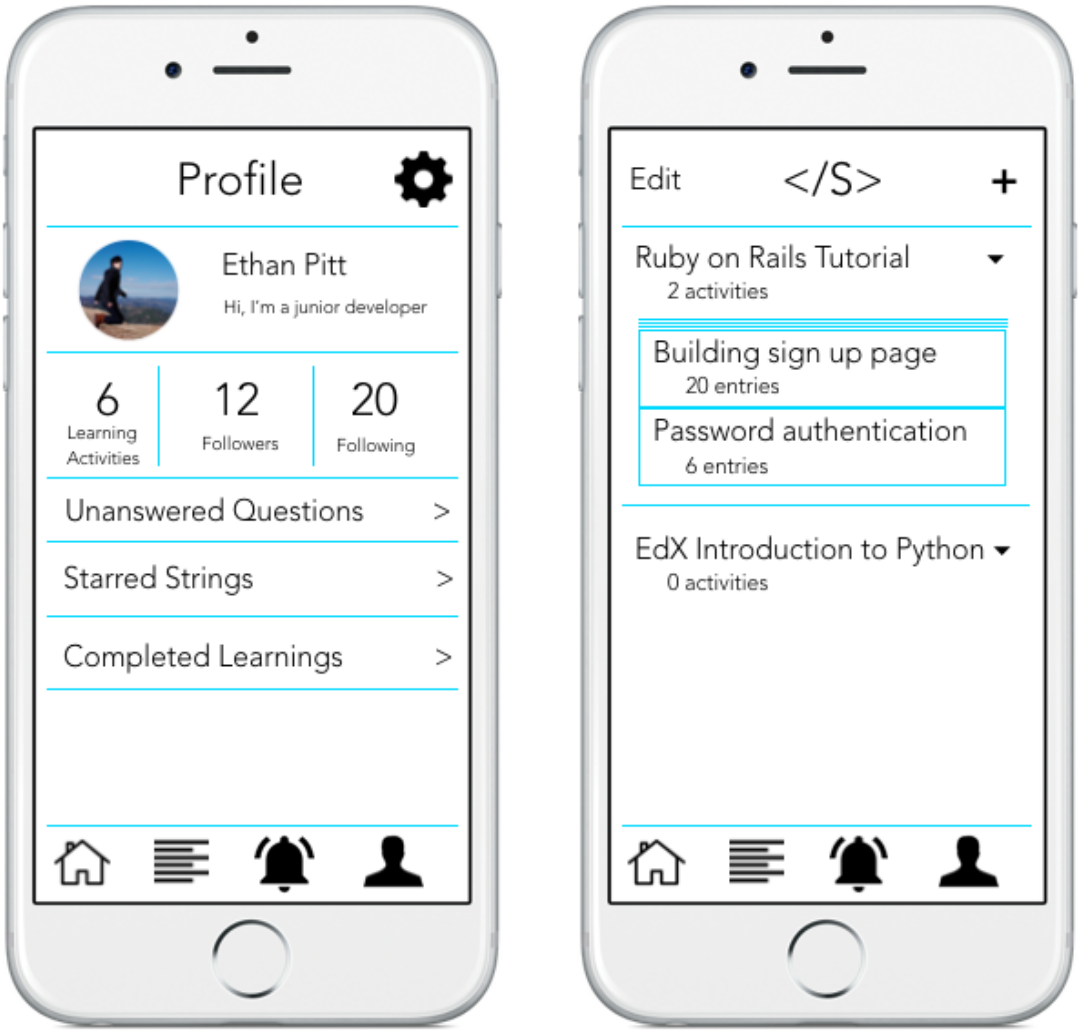

Figure 3.10: Interface 1

in local host and tested in Heroku. The structure and function of the application are less than the precious mobile prototype and focus on the supporting documentation process.

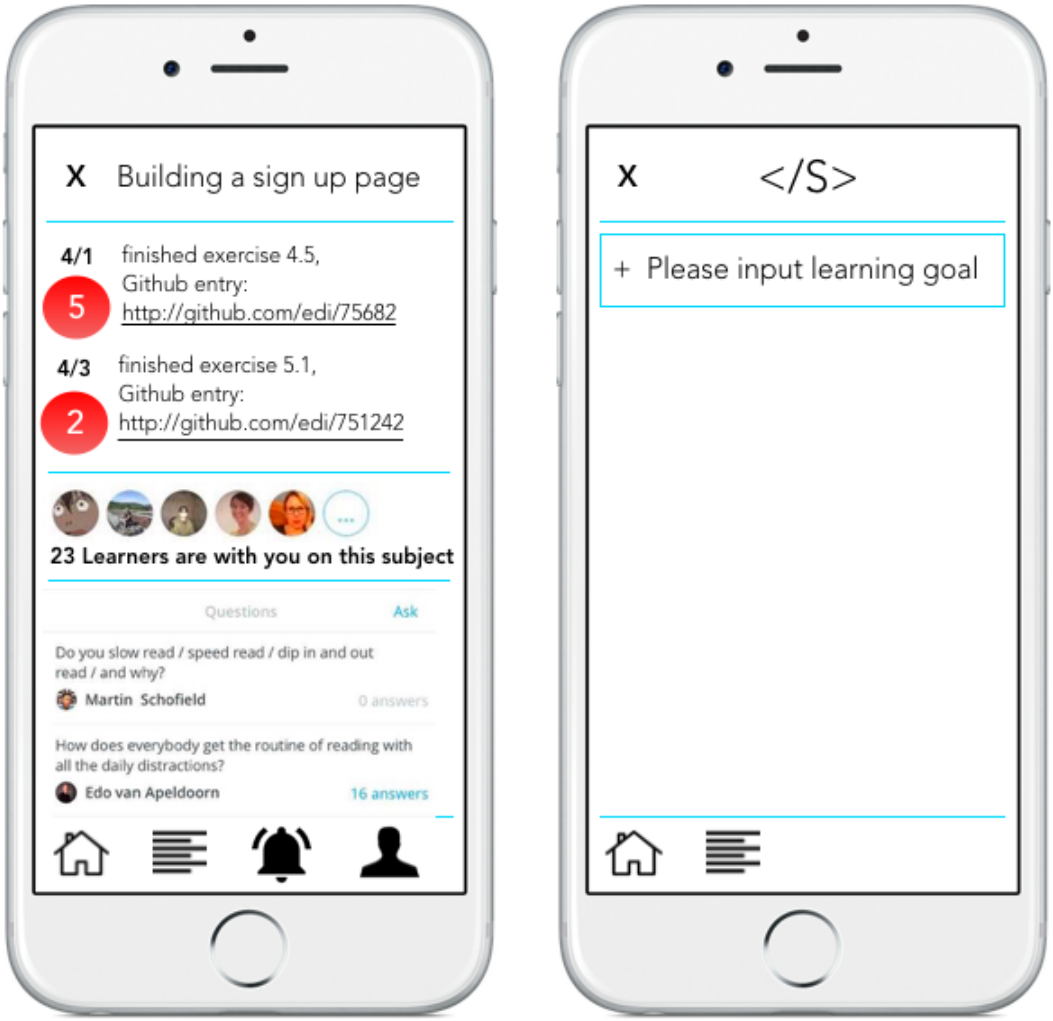

Figure 3.11: Interface 2

Interface: Function and Interaction

The interface of the application was relatively simple so that the user can focus on the function at this stage. Figure 3.12 Shows the learning log page after the user logged in. It is clickable to enter the second layer of a more detailed record. After the learner is assigned to study groups, learners can view progress logs from all members of the group. Figure 3.13 is the entry form for entering the learning log. Users can input their learning progress, make notes, express

reflections, or ask questions in this section. Figure 3.14 is the second layer of the learning log; users can view their entries in detail. Study group members and tutor can make comments on the logs to give feedback. Ideally, learners in the same group can compare learning results by their progress so that their motivation of participation increases and so does their sense of competition similar to sports logging applications.

Figure 3.12: Clickable Log Entries

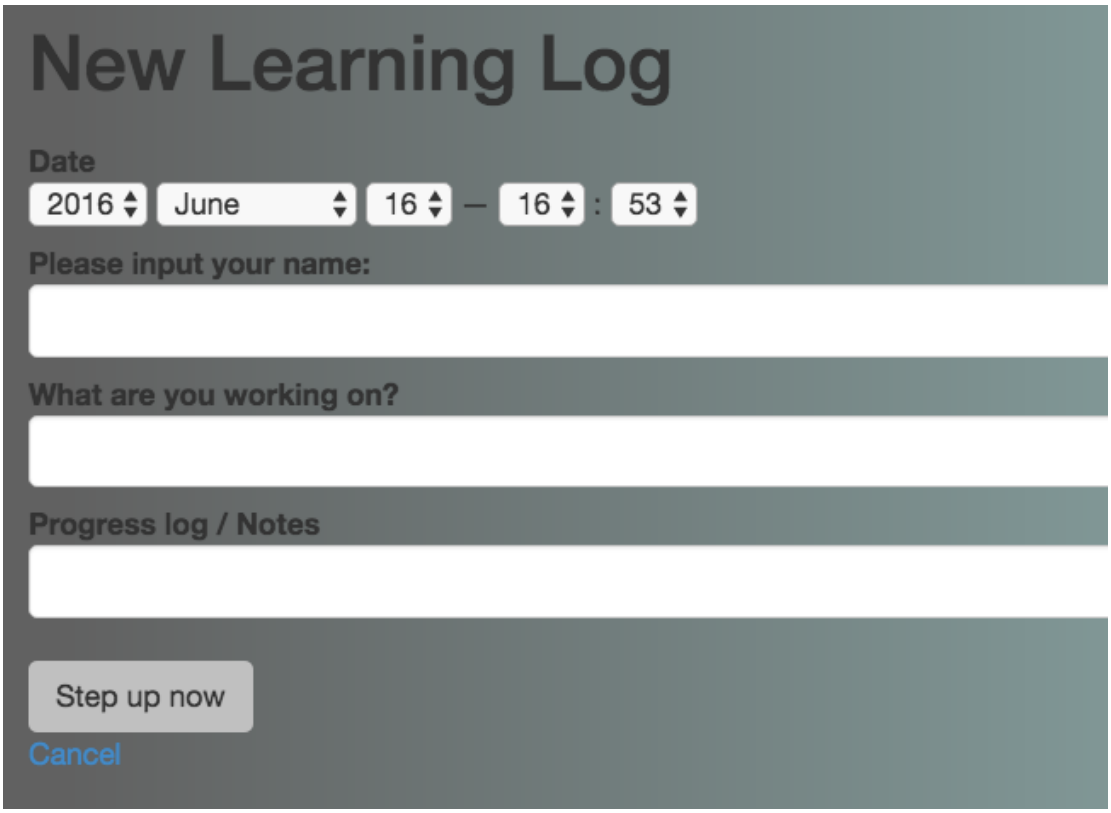

Figure 3.13: Entries Page

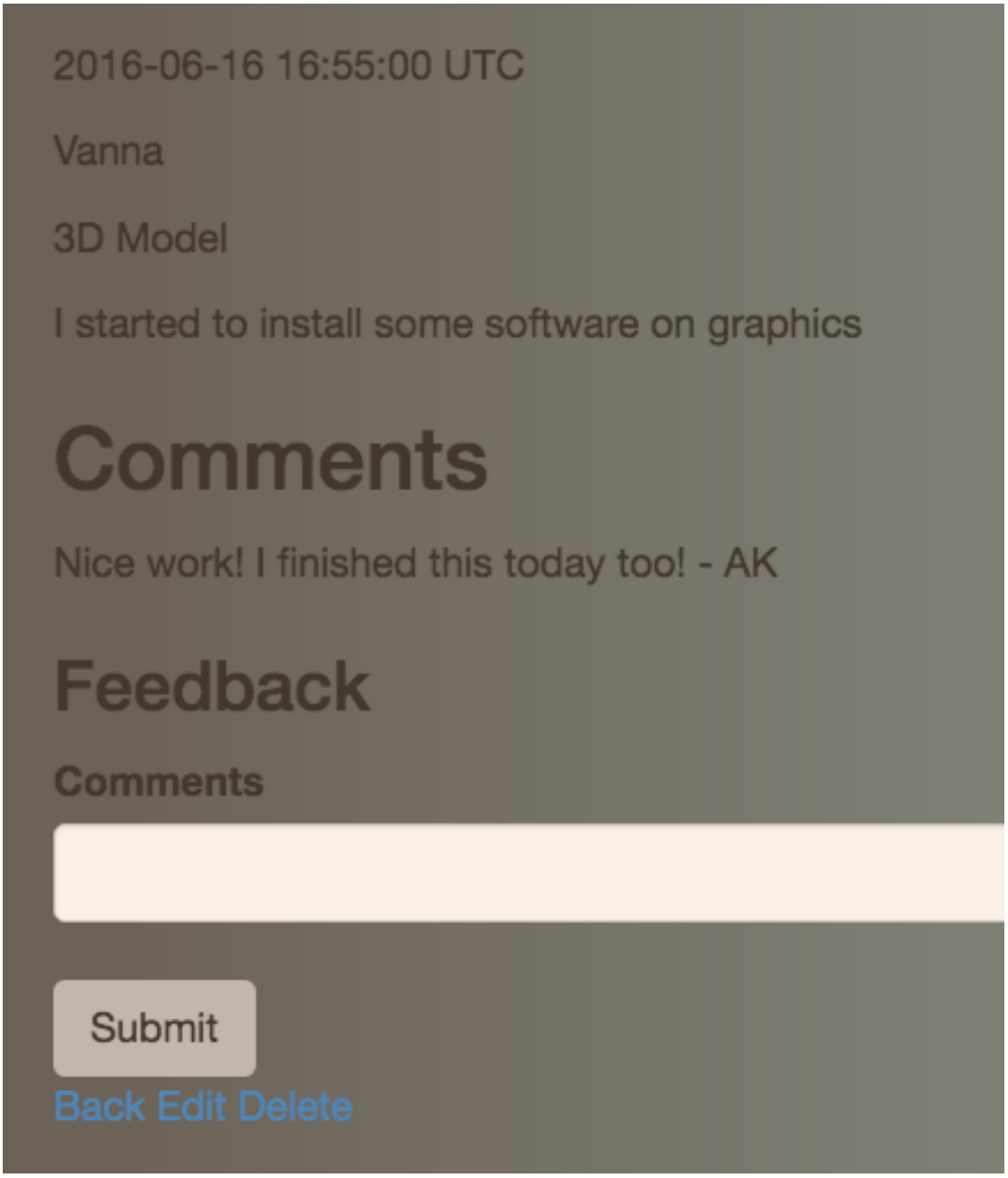

Figure 3.14: User Feedback

Chapter 4

Evaluation

4.1 Experimental Design

The evaluation is to test the design of this prototype. The goal of this research was to observe if the users are enjoying the design of the Step learning process as a whole idea and whether following the Step Learning Support Platform in documenting their progress make their learning experience more motivated and engaged.

4.2 Objectives

The purpose of the evaluation is to evaluate if the concept of Step platform, and the web platform create value to the users. The evaluation will check if the platform increases user's confidence level in achieving learning goal if a user's motivation increases in taking online courses, and if the users are willing to contribute to the learning society.

Sample Description

The author recruited participants from students currently studying at Keio Media Design. To be eligible, they are selected on the basis of being readily available to participate and having previous experience of taking online courses.

Non-probability sampling approach is used to draw a sample group of 10 respondents, 50 percent male, and 50 percent female. All participants are in master's degree with a range of age from 23-28, and cultural origins including Thailand, Canada, Japan, United Staes, Russia and Indonesia. Participants are evaluated one at a time and face-to-face. All participants were assured that there are no right or wrong answers, and they should respond to the question as honest as possible.

4.3 Procedure

The evaluations are conducted on campus at the Keio University.

The process of evaluation consists of the following stages:

- Each participant is given a brief explanation of the procedure and purpose of this research.
- The whole idea of the Step learning flow is explained
- Each function of the app is described.
- The participants will test the learning log function on the web platform, inputting their learning subject and progress.
- After the participants experienced the platform, a user survey questionnaire is given to them follow by a 10 minutes interview.
- The first page of the user test survey asks their feedback on each function of the application.
- The subjects have been invited to rank each designed interaction in the app on a 1 to 5 scale, where 5 being most important and 1 being less important.
- The second page of the user test survey asks their sense of contribution and engagement towards using the app.

4.4 Results

According to the results, as shown in Figure 4.2, users rated the importance of each major function in the app. Based on the average calculated from 10 participants, it shows being able to get feedback from other users is the most important feature for the users while the profile page being less relevant for them. In Figure 4.3, the users showing high likeliness of using this service when they do online learning. Participants are feeling motivated working with a group. The tutor and tutee function creates a sense of contribution. Overall, they feel more connected and their confidence level of completing their learning goal increased.

One user claims that "The possibility of viewing other's learning log helps me to see how they are learning, what methods they use, how long they took, what tools they used, then I can also come up with my progress. It would also be nice to see icons on what people are learning rather than plain text, for example, the image of Javascript logo or other visual presentations."

4.5 Proof of Concept

Based on the results from the observation of the user test, the effectiveness of each primary function in the app was evaluated. Learners are likely to use this service in supporting them with different learning goals. Reviewing the research question: If students could be involved in the process of publicly managing their learning goals, could share their learning progress, and make contributions to the learning community, would their motivation and engagement in the learning experience increase? The result of the user test shows positive results that both increase participants' motivation and connection by going through the documentation and social learning process of the application.

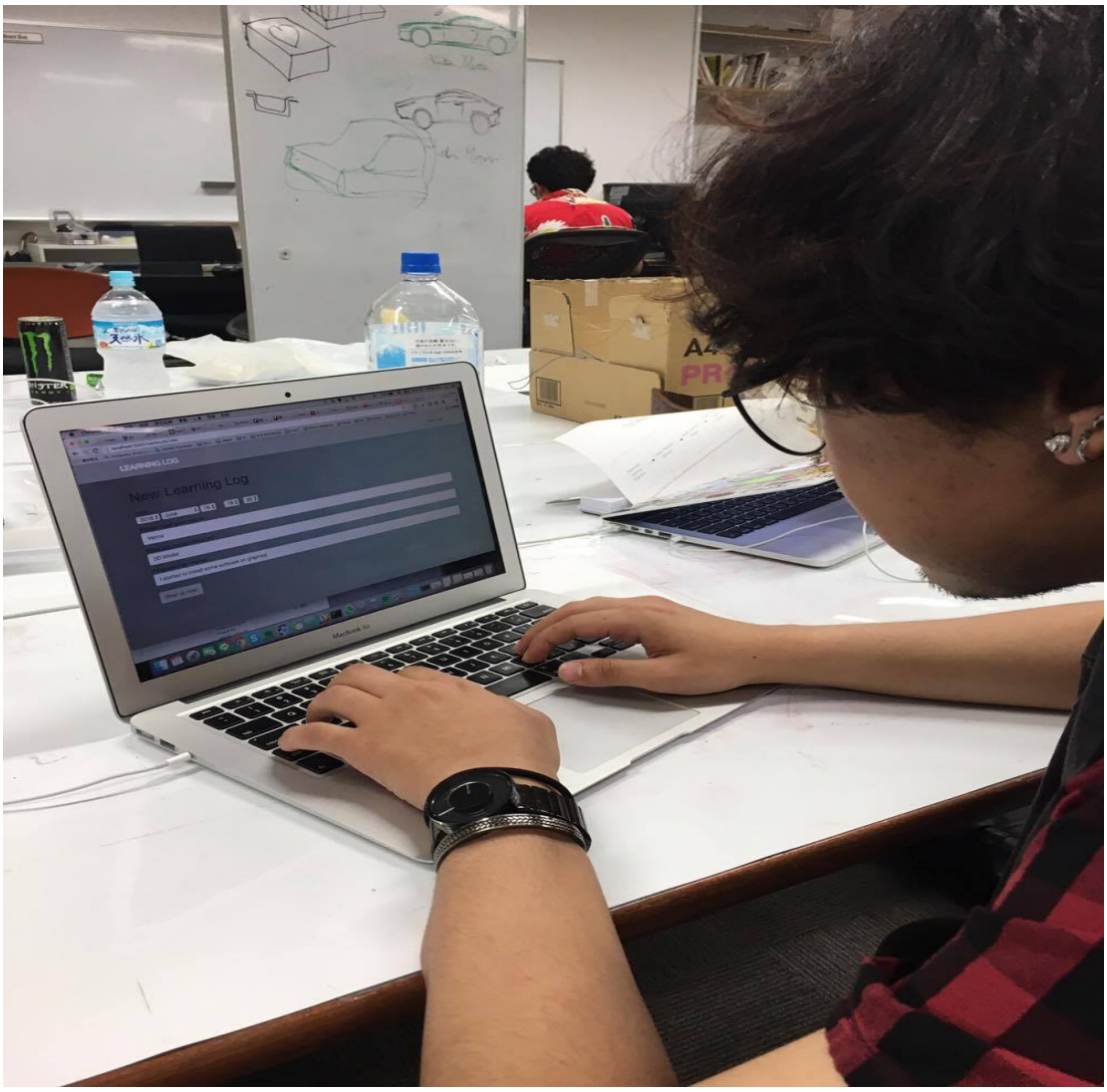

Figure 4.1: Level of procrastination

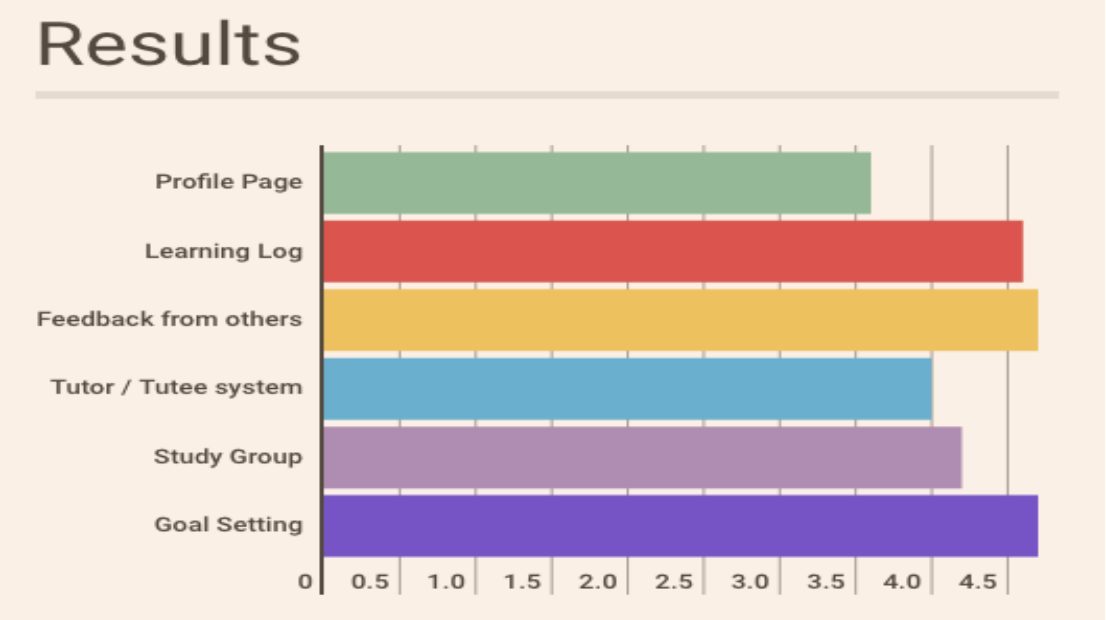

Figure 4.2: Function Evaluation

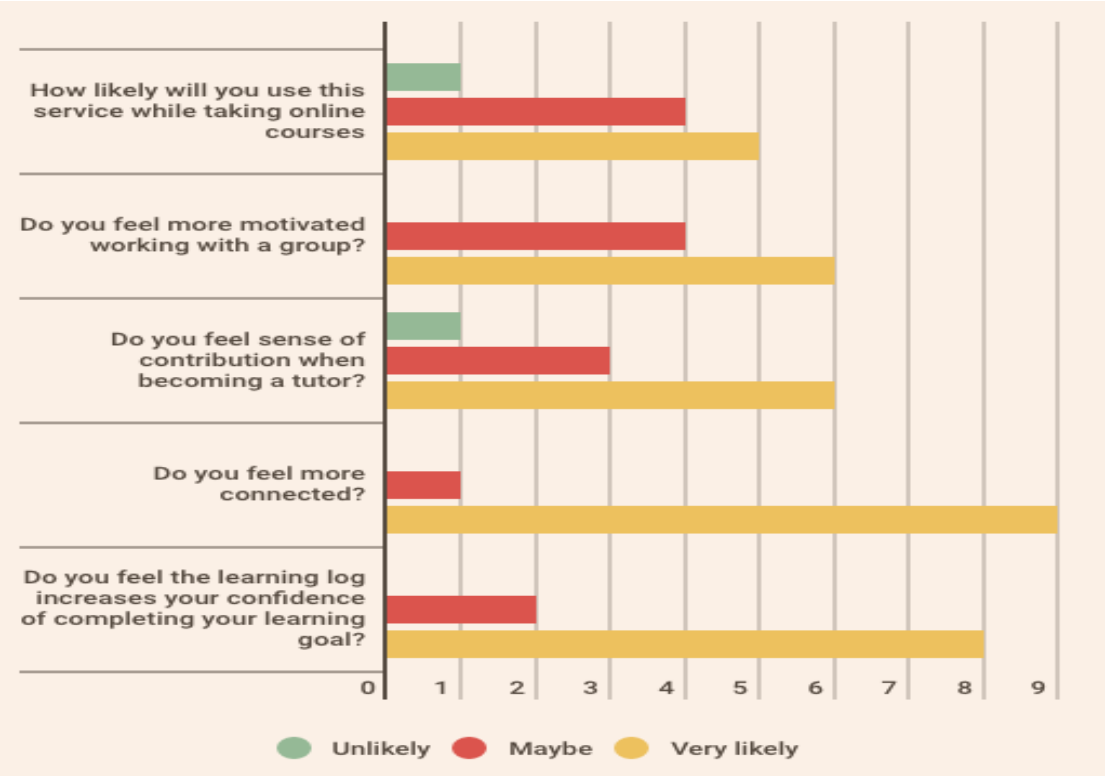

Figure 4.3: Emotion Evaluation

Chapter 5

Conclusions

5.1 Conclusion

Linking to the purpose of evaluation, the result of the assessment showing users are more confidence in achieving their learning goals, they are feeling more connected, willing to contribute to the online community and likely to use this service while learning online. Although the working prototype only working for the documenting process, users are happy to see their progress been logged. Users remain positive in seeing more participants and excited to interact with others with similar learning goals.

The uniqueness of the Step platform is that it creates a bonding, small-scale online community dedicated to learning, this is something currently lacking in the educational technology field. Most of the available platform are having a broad range of activities rather than learning so the learning focus is sometimes blurred and learners are easily distracted.

The research of Step learning platform dedicated to researchers focus on online learning and would like to utilize the readily available resources.

5.2 Future Research Recommendations

Although the experiment shows positive results on improving learners engagement and motivation, there are few improvements can be made for future research rec-

ommendations. First, there is no algorithm involved in selecting learning partner at this stage. Learning partners are manually assigned based on participants interests and strengths. If the platform can implement algorithms, it is expected to have more accurate and optimal results. For example, the platform could suggest users to follow based on the similarity of learning interests or location.

Second, the sample size is not randomly selected but only from the graduate school. The result will have more accurate reflection if the sample can include participants from a more various sample pool.

Third, learning is a metacognitive composition which takes a longer timeframe to evaluate. Even though the result is optimal in this short-term research, future user test is recommended to conducted in an at least month-long timeframe.

Overall, personalized learning and self-learning skills are considered as a necessary skill in the current education settings. The author believes this thesis can help drive more positive changes in developing revolution educational tools for future developers.

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References

Ackermann, Edith (2001) "Piaget's constructivism, Papert's constructionism: What's the difference," *Future of learning group publication*, Vol. 5.3, No. 438.

Anderson, Terry (2008) *The theory and practice of online learning*: Athabasca University Press.

Arne Duncan, Richard Culatta (2015) "Ed Tech Developer's Guide - A primer for software developers, startups, and entrepreneurs," *U.S. DEPARTMENT OF EDUCATION*.

Bersin, Josh (2016) "Use Of MOOCs And Online Education Is Exploding."

Bransford, Ann L. Brown, John D. and Rodney R. Cocking. (1999) "How people learn: Brain, mind, experience, and school.," *National Academy Press*.

Brinton, et al., Christopher G. (2014) "Learning about social learning in MOOCs: From statistical analysis to generative model.," *Learning Technologies, IEEE Transactions*, Vol. 7.4, pp. 346–359.

FIREHOSE (2016) "Coding bootcamps explained."

Herold, Benjamin (2016) "Facebook's Zuckerberg to Bet Big on Personalized Learning."

Kafai, Yasmin B. and Mitchel Resnick. (1996) *Constructionism in Practice: Designing, Thinking, and Learning in A Digital World*: Routledge.

Sahlberg, Pasi (2015) "Finland's school reforms won't scrap subjects altogether."

Sahlberg, Pasi (2016) "FOUR QUESTIONS ABOUT EDUCATION IN FINLAND."

Shah, Dhawal (2015) "By The Numbers: MOOCS in 2015 - How has the MOOC space grown this year? Get the facts, figures, and pie charts."

Strauss, Valerie (2015) "How to really change education excerpt from Sir Ken Robinson's new book."

UNESCO (2016) "Most influential theories of learning."

Appendix

A Step Pre-Survey Questions

Pre-Survey Page 1

1. Have you ever tried to learn something by yourself in the past 36 months?

2. What are the subjects that you were tried to learn? Please name ALL of them

3. In what way the courses have been conducted? eg. self-help books, online learning, vocational school, bootcamps. Please also provide course provider's detail:

4. Did you have to pay for the learning? how much was the cost?

5. Have you successfully completed the learning intent? If not, what was the reason?

6. Were the learning allow interaction with other participants Yes (Continue to next question) No (Skip to question 9)

7. Do you think interaction is necessary? Yes No

8. What did you like or dislike about the interaction

9. Where there any support provided for the courses you took? eg. learning partner, teaching assistant, online forum.. YES (Continue with the next question) NO (Please go to section 2)

10. Is the support critical for you to complete the course? What's the reason.

Pre-Survey Page 2 1.Please name something that you're interested in learning about

2. Would you prefer learning the above subject with others? Yes, learning with others would be fun! —Continue to Question 3 No, I prefer learning by myself! – Continue on Question 4

3. Please choose one of the learning environment you prefer: - Studying with my friends and besties - Meet up with someone new and work together - Doesn?t matter! I just love working with people

4. Do you consider yourself as a procrastinator? Yepp Nope

5. Pease evaluate the following statement: I perform much better if someone can watch-over me and coach me. Sotrue 1 2 3 4 5 Noway

6. Pease evaluate the following statement: I'm a discipline person and can usually get things done as planned Sotrue 1 2 3 4 5 Noway

7. Please evaluate the following statement: I'm a competitive person, I like to compete and win over others. Hell yea 1 2 3 4 5 Let's all be peace

8. Will you be willing to try out a 5 days learning experience journey for experiment? Of course, I'm such a nice person Shut up and don't bother me

9. Please leave your name and contact information (Optional)

B Evaluation Questions

C Learning Log on GitHub

https://github.com/etpi1/Learning-Log

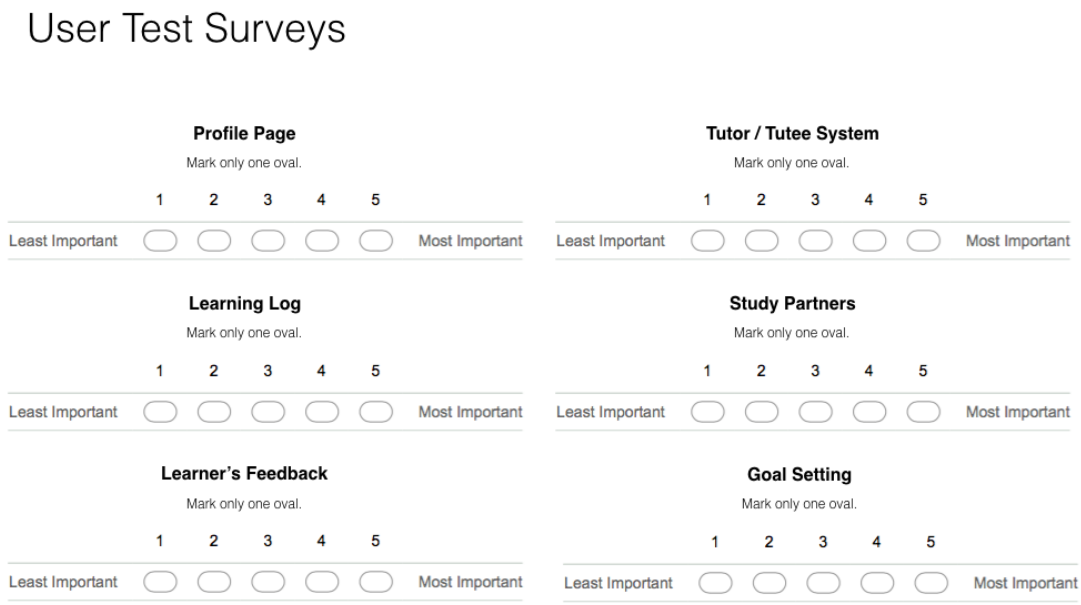

Figure B.1: Evaluation 1

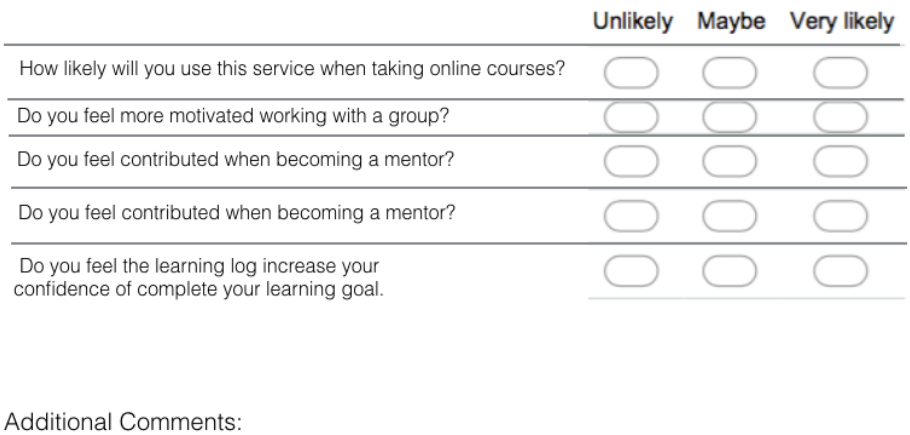

Figure B.2: Evaluation 2