MIDTERM REPORT
Parson Programming Puzzles and Field Studies

March 31, 2020

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0.1 Abstract

In this report, I will talk about the current status of the field study and our future plan regarding data analysis and creating additional loop lessons. We have started the field study with Elissa and have gotten preliminary results on the background survey and the pre-test surveys. We have also collected feedback from some undergraduates which led to some improvements of our interface. In the future, we will be looking into data we have gotten from Elissa's classroom and also start building new puzzles and surveys for our loop lesson.

0.2 Implementation

The preparation of the field study was done through zoom video calls. We utilized a shared screen and a shared working document so that Elissa had easy access to all the information she needed. Jeff was able to design an interface on the homepage so that students can access all the survey links easily. We also talked about how to prepare students during the warm up phase and how much instructions we should give them explicitly. We have agreed that Elissa should answer all the questions they have and also tell the students to put the "When Flag Clicked" block as the start of every puzzle. In addition, she liked the revision of the puzzle instructions. Although the instructions are still in a paragraph form, there are words like "then", "after" and "finally" to clearly separate out each step of the instruction. Also, we have added the "number of blocks required" hint because we have found that it is too challenging for the Scratch condition otherwise. In this way, we give all conditions the necessary information for them to complete the puzzles. An example of this would be:
In this puzzle, you are going to bake a pie for your friends! First, you go to the location (x= 170, y=0), which is where the oven is located. Second, you wait for 3 secs while the pie cooks! Then, you change the costume of the sprite(next costume). This will turn the cake from unbaked, to baked! Next, you take the pie to the location (X=-150, y=0), which is where the table is. Finally, you are happy with the result and say: "Your pie is ready!" Number of blocks required to solve this puzzle: 6

The field study was conducted in Elissa's classroom with 20 students. However, due to internet blockage issues, we were only able to collect data for the pre-test and the background survey. Therefore, we couldn't get feedback for the puzzles. Although limited,

the field study from Elissa's classroom was still helpful. From the result of the pre-test survey, we were able to realize that some of the questions are a little too challenging for the students. By looking at the answers from Qualtrics, students also didn't get some of the questions that I thought as introductory. Therefore, I am planning on doing two things about it. I want to analyze their answers in a chart/diagram form so it is easier to visualize and understand their performance. In addition, I would like to have some of my non-computer science major friends to attempt at the pre-test and get feedback from them in terms of clarity and difficulty. Therefore, I can possibly adjust the difficulties of some of the questions in both the pre-test and post-test accordingly.

In addition to the field study in Elissa's classroom, we were also able to get feedbacks from undergraduates. This helped us improve both the puzzle instructions and the student interface. The list of feedback is in a document inside the SAGE folder in google drive. Some are direct feedbacks from our participants and others are from me observing them play. In general, the Scratch condition was the most challenging for students since they weren't given the Parson's block. However, testing people with that condition has helped us improve the learning experience in the student mode in general. For example, we have put some information in the instruction as bold letters to highlight them. In addition, we have given them the specific block name in some cases, such as "next backdrop" to avoid contextual confusion. Therefore, we have made sure that students using the Scratch, as well as the other conditions, have the sufficient information to solve all the puzzles. Overall, we found that we had to disable some functionalities in the student mode to avoid accidental incorrect clicking. In addition, we delayed the auto-submission pop up by 5 seconds to give students time to input their last attributes of their last puzzle block. Therefore, they would have a more coherent experience while completing our puzzles.

0.3 Limitations and Assumptions

Due to current unexpected situation in NYC, schools are closed. This definitely puts a limitation on our field study. It not only makes it very hard to conduct field studies, but also to get feedback from a more varied teacher group. This in return makes the improvement of our platform and the progress of the study challenging since we would have limited data to work with. The biggest limitation is that we don't have data on Parson's Puzzles from Elissa's students yet. However, as the school system moves online, we can possibly still come up with creative solution. Jeff have mentioned a resource that

Columbia has called Outreach at Columbia Engineering. This could be an interesting approach for our next step. In addition, we can potentially ask Elissa to have her students complete the puzzles at home. This would be a very helpful solution since the students have already done the pre-test survey.

0.4 Future Work

Currently, we do have all the materials ready to conduct a field study. Therefore, we will be ready if any opportunity arises. In addition, as I have mentioned above, we will analyze the data on both the high school freshmen and undergrads. I will also be collecting data on more undergrads and hopefully some middle school students. Regardless, I foresee interesting result from our current data. This will also prepare me to build the loop lessons. We already have the loop pre-test survey and the post-test survey from last semester. Therefore, I have a strong base to work from. If I am able to finish the loop lessons this semester, then we would also have a strong addition to the range of field study we can do in the future.