Team: $P^2$

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Problem and Solution Overview

Montgomery County Schools exclusively use the Edline learning community management system and it is the only system available to parents. Edline is popular because of its ability to integrate well with the school the system, its grade book feature that allows teachers to enter students' grades online, and it makes performing administrative tasks easier for schools. The main focus of Edline is to provide strong infrastructure for the schools they serve. Therefore, providing an application that serves parents' need is not a priority for them. Although parents can check their children's school calendar, assignments and grades through Edline, it is not an easy task for them. Many schools hold training seminars for teachers and parents so that they can learn to use the system. Many parents lead busy lives, so attending these time consuming training seminars may not be an option for them, so they may never use the system. Consequently, these parents could be unaware of their children's academic performance and be unable to take the necessary actions on time.

Even though some parents know how to use the Edline, they are not pleased by the amount of time and effort it takes to do simple tasks like checking grades or finding help with homework for their kids. This is mainly due to the poorly designed user interfaces of the system. Another drawback of the system is the unavailability of the application for a mobile platform, so access to a desktop or laptop computer is required. To help our cause, we learned that two of our user evaluation participants do not own desktop computers or laptops. However, both of them own smart-phones and are able to use it proficiently.

Proactive Parent (P2) is a solution that is focused on providing parents with the convenience, ease of use and satisfaction that Edline fails to provide. Our goal is to promote intrinsic use of our application by implementing only the features and functionalities important to parents and students. P2 will provide parents with an intuitive user interface that will allow them to check their children’s grades, and find help on assignments effortlessly and quickly.
Prototype Description

Initially, we created sketches for a paper prototype, but instead of using those sketches, we decided it would be best to create the designs so that they could be displayed on a smartphone. Therefore, we used Adobe Photoshop to create each view of our application. Since the prototypes were mid-fidelity and did not support real interactions, we used the smartphone’s image viewer application to simulate the interactions. When a user performed an action, like touching the “view grades” button, we swiped to the corresponding image/view. This method was much faster and effective than creating paper prototypes and it gave our users an idea of the look and feel of our application.

Figure 1: Original prototypes used for user evaluations.
Figure 2 shows the first screen a user would see after opening the P² application. Users would start by either touching the thumbnail of their kid’s picture or by touching the larger white button beside it. After completing this action, they would be taken to the next view which is the main menu for that student where parents or students would be able to view grade reports, assignments etc. (figure 3).
The following close-ups illustrate the views a user would see after selecting “grades” (figure 4) and “assignments” respectively (figure 5).

Users would be able to view more details by simply touching one of the subjects from the list. For example: touching Algebra would reveal a detailed grade report for that specific subject (figure 6).
Figure 6 shows the result after a user selects algebra from the previous view. This view shows the scores a student received in each assignment, quiz or test. As in the previous view, users would be able to select one of the items from the list. As a result, another level of detail would be displayed. For example: selecting “Homework 4,” where Andy received a zero, would show the actual assignment that Andy submitted or did not submit. In the case an assignment was not submitted, a pop up would be displayed notifying the user about the missing assignment. Currently, the pop-up feature has not been implemented as part of our design, therefore it is not illustrated here.

Figure 7 shows the view where users can become learn about the due date and status of each assignment a student has been assigned. From here, users would be able to preview assignments or review an assignment that has been submitted. To preview or review an assignment, users would simply select the assignment from the list.
Figure 8 shows the result of selecting “Worksheet 3” from the previous view (figure 7). This gives users the idea of their children’s academic curriculum and also gives them the opportunity to use their formal education to help their children. If parents have become unfamiliar with the problems in an assignment, an option to get online help is provided. By pressing the green “get help” button, parents would be provided with numerous helpful online resources that are relevant to the current assignment (figure 9). If parents and students do not find these resources helpful, they can directly contact a teacher through the application by pressing the green button (figure 9).
Testing Method

Participants
In order to correctly evaluate the effectiveness of our prototype, we needed the correct people to test it. Simply having any person test our application was not going to give us the results that we needed. Since our main target users are parents, we tested our application with parents who already have experience with smartphones and with contacting schools regarding their children’s education. Whether or not these parents had used a similar system, varied. But, we wanted to target, both, parents that already use them and parents that do not have access to these systems because of a lack of time or a computer. When we interviewed the principal of Hyattsville Elementary School in the ideation phase of our project, we asked her how often parents call in asking about the ways they could be more involved in their children’s education. We learned that she gets several calls a day regarding this subject [2]. However, many of the parents do not own a personal computer, and therefore they do not have access to their system [1]. But, she stated that she sees a high number of smartphones among the parents at her school [1]. Because of this we decided it was very important to target both, parents who have access to computers and those who do not.

Study Environment
Since P² is a smartphone application, there is a very high chance that our users would use it in public places such as a grocery store or even at work. In order to fully understand the way P² would be used, we had our participants test it in those environments. Not only were the users able to work their way through our prototype, but they were able to use it in the context of a realistic situation. During the evaluation, our testers did not have access to personal computers or any other devices that they would not normally have. The only abnormal or uncomfortable element of our tests was the fact that we were constantly evaluating their performance and recording their reactions.

Tasks
In testing our application, we needed to ensure that we were testing the most important tasks. If our system is going to be useful to people such as our testers, they need to be able to easily complete tasks such as checking grades, assignments, and getting help on assignments. Since we were only using a low to mid fidelity prototype of our application, we lightly covered tasks such as logging in, which does not have high importance.

The first task our testers performed was viewing the grade report. Starting at the home screen, we wanted to make sure the testers could find the grade book feature and then navigate their
way through it in order to test all of the features. In designing the grade book task, we wanted to give users a summarized report of their students’ grades, and providing the option to view a detailed report for each subject, at the same time. The task includes a list of the grades for each subject the student is taking. To view the detailed report, users are able to touch the corresponding subject which takes them to the view containing a detailed report for each assignment, test or quiz. In testing this feature, we wanted to see the users’ reactions towards the simplicity of the designs and whether or not they could easily determine the next action to perform.

Our next task was to navigate to the assignments view where users would be able to check due dates for assignments, and preview the actual questions or problems in the assignment. Similar to the grade book task, this feature is simplified and it gives limited information on each screen so that users are not overwhelmed by the density of information. In designing this task, we needed to ensure that the parents not only see that there are assignments due, but that they can actually touch the subjects to see what the assignments are and when they are due. They should also be able to easily figure out that they can touch each assignment for details.

The get help feature was the final task that we tested. The purpose of this task is to allow parents or students to find help with assignments. This task complimented the “view assignments” task very well because if a parent or student encountered problems that were difficult, they would be provided with helpful online resources after using the “get help” option. In testing this task, we wanted to ensure that the users were first able to find the feature, and understand the information given to them.

Procedure
In order to test our application, we needed to find representative users and run the tests in the appropriate context - at home, out in public or work. All our participants were parents with one or more children attending middle or elementary school. They all own smartphones, and they all had expressed the need to be more involved in their children’s education without the unnecessary overhead that is encountered from using applications such as Edline.

We ran our tests in various environments in which potential users would find themselves while using P2. These environments included work, home and other public places. When we met our participants, we introduced ourselves, our project, and explained its concept as well as the advantages and benefits it brings to its users. Then, we briefed them about the way the experiment would be conducted, explained each step of the process, and the roles of the participant.
We had all the prototypes loaded in our test device so we manually transitioned from one view to the next. To simulate real interactions during the experiment, we had one of our team members switch the matching view after a participant performed an action. Another team member observed the participant and took notes of their expressions, thoughts, and feedback. In order to transcribe our participants thoughts we asked them to think aloud and narrate every single action they were doing. It was very important to record them walking us through their thought process.

**Test Measures**

Many factors were considered in measuring the output of our experiment. We let the participants make their own decisions without prompting them to do anything. They were told to perform the tasks without asking for guidance.

While performing their different tasks, the first thing we noted was the amount of time to accomplish a task because we want our users to perform a task in the least amount of time. Each task should be easy and straightforward. The users should be able to log in, keep track of their child’s achievement and go back to their normal activity.

During the experiment, we noted the difficulties users encountered while performing the tasks. They performed a set of three tasks which were rated low, medium and hard, respectively. The difficulty depended upon the number of steps that needed to be performed in order to complete the task. We recorded how easily they performed each of the tasks regardless of the tasks’ level of difficulty.

When users asked for more directions from us while performing the different tasks, we kept track of it each time. If users asked a lot of questions and required guidance then it implies that our design is not as intuitive or effective as it should be. While observing the users, we also kept track of their level of accuracy on choosing the right options and whether they were aligned with what they were trying to accomplish. If they pressed a button, and felt like the result was an unexpected one, we would record it and ask them about what they expected to see when they pressed that button.

Lastly, at the end of our experiment, we gathered all the observations we made, studied and used them to improve our interface designs. We also took any general comments and suggestions the participants gave us. It is important to note that we received very different results from our participants. Some of them took more time, directions in completing the tasks while others did not. We tried to use the two extreme results as ground measures to scale and evaluate how well the rest of the users would do.
Testing results

The user tests that we completed gave us important information about the ways we could improve our system. Our participants were eager to give comments, ideas on additional features and suggestions for designs and readability. There were also physical actions the users took while using the prototype that gave away some elements that needed to be done differently. Overall, the participants were able to get the main objective of the interface, and in most cases they were able to work their way through it. Most of the issues were due to some unimplemented features and lack of proper affordance.

The overall response towards the idea of our system was very positive. One tester stated that “this is a wonderful idea because I do not use a computer and find myself calling the school often for this type of information.” This is the main purpose of our application as we want to focus towards all parents, whether they have time to use a computer or not. One comment that was common among all of the participants was similar to: “would definitely use this system if it came out.”

However, our designs for this system were not flawless. During the experiment, we got feedback about the features users would like to see added and about their preference on the appearance of the application. One element of our design that seemed to cause a problem for multiple users was the actual size of the objects on the screen. On multiple screens, we were able to catch the users squinting as they tried to not only read the information on the screen, but to figure out the next task that they needed to complete. When we noticed this, we concluded that we needed to increase the size of the text on certain screens so that users could read the information easily.

Another major problem that we encountered during our tests was the fact that there were situations where the user did not know that there was a button to press. In particular, the assignments screen that gives the actual due dates of assignments caused a problem because the testers did not know that they could view another level of detail for each assignment. This raised a red flag because we did not provide the user with the proper affordance. Due this issue we decided to make the subjects and assignments look more like buttons on these screens so that they would provide the correct affordance.
Interface Revisions

After conducting the user evaluation, we learned about one major flaw in our design. In figures 4 - 7, users did not know that they could select the one of items in those lists. We realized that the table style did not provide the proper affordance. Although the time spent to figure out the proper action was not significant, it definitely made their performance slower. When they were presented with one of the views from figures 4 - 7, they had to pause and think about what to do next.

We learned that we had to provide the proper affordance, so we came up with two possible revisions for our designs. Figure 4 shows our first prototype while figures 10 and 11 show the two possible revisions.

In the first revision (figure 10), we made changes by removing unnecessary clutter such as the thumbnail and the big white button on the top of the view. Those two items had no use at this point of the task and only served as a distraction for our participants. We also changed the background color so that it would highlight only the important part of this view - the grades. Most importantly, we added buttons so that users know what to do in order to move to the next phase. However, the buttons in the first revision seemed small so there would be higher
chance of users accidentally touching the wrong button. Also, having the grades as buttons did not make much sense because users did not know what would happen after pressing one of those buttons. So, in our second revision, we used the buttons in the subject column which naturally made the buttons bigger and it gave users a better idea of what would happen after pressing the buttons. With the first revision, users did not know what to expect after pressing a button, but with the second revision users expected to be taken to the subject’s view where they could see a detailed report on a specific subject.

We have decided to revise this design once more because the current design does not use the space we have properly. In the upcoming revision we will add more padding between each row and make the buttons bigger vertically. With bigger buttons users will have to spend less time aiming and it will reduce the chance of accidentally pressing the wrong button. The third version will be illustrated in our next report.
Summary Discussion and Lessons Learned

With our application targeted towards easing the process for parents wanting to become more involved in their children’s education, we needed to ensure that it actually achieved that task. If our application is not intuitive and easy to use, it would not be any better than the current systems that are in place. Due to this reason, we tested the application with real parents so that we could get an idea of the way potential users view our designs. Through the results from these tests, we can clearly understand what needs to be done to make our application be used intrinsically.

After completing the tests, we learned that there are many parents that do not have access to the current systems in place, they do not have time to use them, or they use them but are looking for a better solution. This showed us that there is interest in a mobile system and there are parents that would count on our application to be the solution. We also learned from our tests that, as it stood, our interface had flaws that could easily be fixed to make it more usable. Issues such as readability and affordances came up as there were situations where text was too small or buttons did not provide the correct affordance.

With the feedback that we received from our test users, we were able to improve our initial prototypes to make them more accustomed to the average parent. We changed elements such as making the text bigger, beveling certain elements to make them look more like buttons, and even changing the background color of our interface to a darker color so that it would draw more attention to the actual details on each screen. With these changes, we feel that our application has greatly improved, and it will only get better.

The usability evaluation of P² was a great success. We were able to find the results that we needed to improve our system and even got feedback as to what could be added. Without this step in our process, P² may have made it to the building stage with many flaws that would have gone unnoticed. If we are building this application for parents, it is best that we know exactly how they are going to use it, and what attributes they would like the most.
Video Report

Out of the 4 participants, only one let us record their interactions with our mockup design. For the video we setup our camera on a tripod in our participant’s office. Our participant did not want his face shown in the video, so the viewport was set to only include the participant’s hands and the smartphone.

**Task 1: Checking grades**
Although our participant successfully completed this task without any guidance, the video revealed difficulties the user had moving to the next task - viewing assignments. It can be seen in the video that when the user was at the detailed grade report screen, he was unsure about what should be done next, so our team member had to give him some additional directions.

**Task 2: Viewing assignments**
From the video, we determined that our interface was not clear on how one would get to this screen. Although the screen contained instructions on how to move to the next step, we determined that the text was too small, and therefore it did not grab the user’s attention. After the user arrived at the assignments screen, he thought that the task was completed. Again, this screen contained instructions to touch one of the assignments in order to preview it. But, yet again, the user missed this instruction so our team member had to provide some guidance. Even after the user was reminded that he could preview an assignment, he still did not notice the instruction and attempted to complete the task the wrong way. Instead of pressing one of the assignments he attempted to backtrack. Our team member had to intervene again and remind him that he could press that part of the screen. This made us aware of the major flaw in our design. If we want users to use it like a button, then we should make it look like a button. We made sure we fixed this problem in our revisions. We also need to make instructions eye catching.

**Task 3: Getting help**
The user did not have any trouble with this task, except for finding actual help because that feature is not yet implemented. Since this part of the interface used big visible buttons, the user had no trouble completing the task effortlessly and quickly.

Our initial video was more than 10 minutes, so to get it to 2 minutes we decided to include only the relevant user interactions in the final cut. These interactions included what the user was trying to do and places he had a problem at.
Appendix A: Consent form

Proactive Parent Usability Test Consent Form

We are team Proactive Parent (P2), Computer Science students at the University of Maryland, and we are developing an application that is a significant part of our course work of Human Computer Interaction. The purpose of this experiment is to evaluate the usability and effectiveness of our application. We will collect our data by observing participants’ interactions with our application. During this experiment we will video and audio record all interactions and reactions of participants. All feedback from the participants will be logged.

Participation in this experiment is completely voluntary. A participant has the right to leave the experiment at any time for any reason without any risks. All data collected from the participant will be destroyed immediately upon request. A participant will be provided with a copy of all data collected from him/her upon request. No personal information will be asked for before, during or after the experiment. In the case when a participant shares any personal information, the information will not be shared or disclosed to the public or any other organizations for any reason(s).

I __________________________ agree to let myself be video and audio recorded by the Proactive Parent team while I am using their application. I understand that no personal information will be collected, and I can abandon the experiment at my discretion without any risks.

I __________________________ agree to let my face be on camera while recording of the video.

Name (print): __________________________________________________________________

Signature: ______________________________________________ Date: _____________
Appendix B: Video report consent form

Proactive Parent Usability Test Consent Form

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I  [Signature] agree to let myself be video and audio recorded by the Proactive Parent team while I am using their application. I understand that no personal information will be collected, and I can abandon the experiment at my discretion.

I  [Signature] agree to let my face be on camera while recording of the video.

Name (print):  [Signature]  
Date:  [Date]
### Appendix C: Raw Data

<table>
<thead>
<tr>
<th>User</th>
<th>Task</th>
<th>Severity Rating</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>home screen</td>
<td>0</td>
<td>“This is a great idea, I contact my daughter’s school often about grades, etc. and i do not have access to a computer.”</td>
</tr>
<tr>
<td>1</td>
<td>home screen</td>
<td>2</td>
<td>“There should be an option to contact the school from the home screen.”</td>
</tr>
<tr>
<td>1</td>
<td>grades</td>
<td>2</td>
<td>User was slow to press the subject, not knowing that he could touch it to go further.</td>
</tr>
<tr>
<td>1</td>
<td>assignments</td>
<td>4</td>
<td>User again did not realize subject pane was a button.</td>
</tr>
<tr>
<td>1</td>
<td>assignments (due dates)</td>
<td>4</td>
<td>User thought thought he was done with operation, did not know he could see details of assignments.</td>
</tr>
<tr>
<td>1</td>
<td>assignments (due dates)</td>
<td>2</td>
<td>User squinted when looking at screen, small text.</td>
</tr>
<tr>
<td>1</td>
<td>subject guides</td>
<td>2</td>
<td>User again squinted at screen, list of links too small to read clearly.</td>
</tr>
<tr>
<td>1</td>
<td>subject guides</td>
<td>0</td>
<td>“I really like this idea because I do not remember many of the subjects my daughter is studying.”</td>
</tr>
<tr>
<td>2</td>
<td>home screen</td>
<td>0</td>
<td>“I would definitely use this application if it came out.”</td>
</tr>
<tr>
<td>2</td>
<td>assignments (due dates)</td>
<td>4</td>
<td>Squinted at screen, writing too small.</td>
</tr>
<tr>
<td>2</td>
<td>assignments (due dates)</td>
<td>4</td>
<td>User hesitated to hit assignment, did not know he could touch it to go further</td>
</tr>
<tr>
<td>2</td>
<td>subject guides</td>
<td>4</td>
<td>Squinted, needs to be bigger, more readability</td>
</tr>
<tr>
<td>3</td>
<td>home screen</td>
<td>2</td>
<td>“The names for the different tasks on the home screen are too small to read clearly.”</td>
</tr>
<tr>
<td>3</td>
<td>grades</td>
<td>4</td>
<td>“Text is small, had to really try.”</td>
</tr>
<tr>
<td>User</td>
<td>Task</td>
<td>Severity Rating</td>
<td>Details</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------</td>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>assignments</td>
<td>4</td>
<td>Did not know to go further for details, needs to have better affordances (buttons)</td>
</tr>
<tr>
<td>3</td>
<td>assignments</td>
<td>3</td>
<td>assignments too small, had trouble touching correct one</td>
</tr>
<tr>
<td>3</td>
<td>subject guides</td>
<td>4</td>
<td>“Links are hard to read, too small.”</td>
</tr>
<tr>
<td>3</td>
<td>subject guides</td>
<td>0</td>
<td>“I like the idea of being able to find help with my son’s assignments.”</td>
</tr>
<tr>
<td>4</td>
<td>grades</td>
<td>2</td>
<td>user had no problem checking the grades of the different subjects</td>
</tr>
<tr>
<td>4</td>
<td>assignment</td>
<td>4</td>
<td>User was confused because the assignments were all mixed: we had homework, quizzes and tests under the same label</td>
</tr>
<tr>
<td>4</td>
<td>assignments</td>
<td>4</td>
<td>Screen shows assignments and homework under two different categories. “It is confusing to me because to me, assignments is really homework so I don’t know where to go and what to expect”, the user said.</td>
</tr>
<tr>
<td>4</td>
<td>homework help</td>
<td>0</td>
<td>User liked the fact that he did not have to go though the teacher to get help.</td>
</tr>
<tr>
<td>4</td>
<td>overall comments and suggestions</td>
<td>4</td>
<td>“We use edline at our school but I hardly sit on my computer and go through my daughter’s stuff. This is a great idea, and I love the fact that it is accessible by mobile”; “When will a prototype be available?” the user demanded.</td>
</tr>
</tbody>
</table>
References

