Design Project

Group A4

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1 Background

The COVID-19 epidemic has had a big impact on the already massive pre-school teachers' workloads. With parents no longer allowed to enter school buildings, children no longer allowed to be present in school when displaying signs of infection, and several teachers on sick leave, the teachers are left working harder than ever to make the day-to-day activities possible.

1.1 Target audience

The target audience for this design project was pre-school teachers in Sweden.

1.2 The Problem

During the data-gathering part of the project, a few problems relating to the COVID-19 pandemic were identified.

- Parents are not allowed to enter the school building, which produces more work for teachers during pick-up and drop off.

- Communication between parents and teachers becomes less frequent.

- With both teachers and children more frequently at home sick, child groups change more often.

1.3 Aim of the Design Project

The aim of the product was to provide an application that would improve the pre-school teachers' everyday work life by providing easy communication with parents, a perspicuous view of the child groups, and provide an easy way to keep track of when children arrive at and get picked up from the school.

The aim of the design process was to follow a method that focuses on the end product's usability. We tried to achieve this goal by following the steps recommended in the project description, and by following the principles from the book *Interaction Design: Beyond Human Computer Interaction* by Preece, Sharp, and Rogers, 2015.

2 The Design Process

In this chapter, the methods used in the project and their results, are described. A simplified version of the design process used for this project can be seen in figure 2.1.
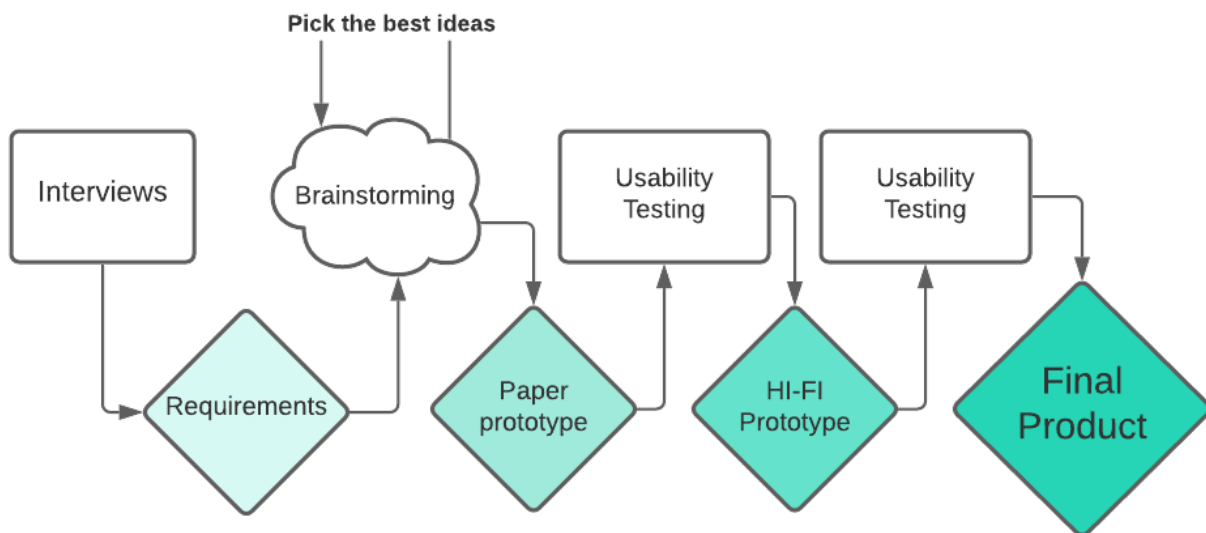
Figure 2.1: A simplified flowchart of the design process for this project

2.1 Interviews

The main source of data during this project was interviews conducted with pre-school teachers. Three interviews were held with teachers who had worked at Swedish pre-schools during the COVID-19 pandemic. All interviews were recorded and reviewed by all group members.

We aimed to make the interview semi-structured, meaning the questions were open-ended and the interviewer was free to probe deeper when the interviewee said something of interest. This approach was chosen to try to get rich and detailed information from the participants. Since the goal of the interview was to identify problems in the work-life for the participants, probing and following up on possible negative experiences would be helpful.

During the interviews, some interesting problems due to the pandemic were brought up. In the following list, a selection of interesting quotes from the interviews can be found, showcasing different problems. The quotes have been translated from Swedish to English.

- *"guardians can not enter the schools anymore, which in turn means more work with walking around gathering up belongings"*

- *"[it] means that you can not always find a substitute teacher, and then you have to redistribute the children in different groups, which makes it harder to work and a larger risk of getting infected yourself."*

- *"many [collegues] are very tired, easily irritated feel like they have given up, it has been tough to work during the pandemic"*

- *"the children are so dependent in the pedagogues they usually meet since they connect to certain people, you can't just put anyone in charge of the kids because that makes them feel unsafe and then they can't eat or sleep or play"*

- *"for example during pick-up hours, when many parents come to pick up their kids, in case a group of children hasn't come out [on the yard] until then, many parents come into the hallway, which they aren't really allowed to do"*

After all group members had acquainted themselves with the data collected, the group held a meeting where we identified the problems brought up by the participants. All problems mentioned by the interview participants were written on virtual notes, using the website Miro, and put on a virtual whiteboard for all group members to see.

2.2   Requirements

When the identification of problems is done, the process of defining requirements can start. Requirements specify a product's functions, and they should be made as specific, unambiguous, and clear as possible (Preece, Sharp, and Rogers, 2015, p. 285). For this design project, functional requirements and usability requirements were formed. The functional requirements tell designers what the product should be able to do, and the usability requirements tell how the use of the product should be from the users' perspective. When the requirements were specified, they were ordered by importance by the group members together. The requirements, sorted by their perceived importance by the group from most important to least important, can be seen in the following list.

1. The application should show child groups in an easy-to-understand way.

2. Teachers should be able to redistribute kids into other groups quickly and efficiently.

3. The app should have a teacher view and a parent view.

4. The application should be easy to learn and easy to use for both teachers and parents.

5. Teachers should see when kids/parents are close by.

6. Parents should have an easy way of calling their child in sick.

7. The teacher view should show which kids are present in school.

8. Teachers should be able to contact parents and vice versa.

2.3   Ideation and Brainstorming

Brainstorming is an important procedure in product development and it should ideally be carried out by designers, stakeholders, and users together. However, in this project brainstorming was only done by the designers since the users were hard to arrange meetings with and there were no clear stakeholders. The brainstorming was done over Zoom and although conference calls are not ideal, because of the increased risk of talking at the same time or interrupting someone when you can not see their body language clearly, it was preferable over voice-only virtual meetings. We used the guide on Ideation from the *Field Guide to Human-Centered Design* (IDEO, 2015) to plan and execute our brainstorming.

As mentioned in the data gathering section; everyone in our group acquainted themselves with the interviews either by listening to the recordings or by reading the transcript. After studying the interviews, we sat down together (online) to "download our knowledge" and through the use of the website Miro, we took turns to write down what struck us the most from the interviews onto virtual post-it notes. From these post-it notes, we continued into the phase "finding themes" where we divided the notes into different categories. We quickly identified three categories: child interaction, teacher interaction, and parent interaction. From there we were able to find some subcategories from the categories which we achieved through moving the notes back and forth until we reached unanimous approval for the categories, subcategories, and note placement. An example of how the Miro board looked after the categorization can be seen in figure 2.2.
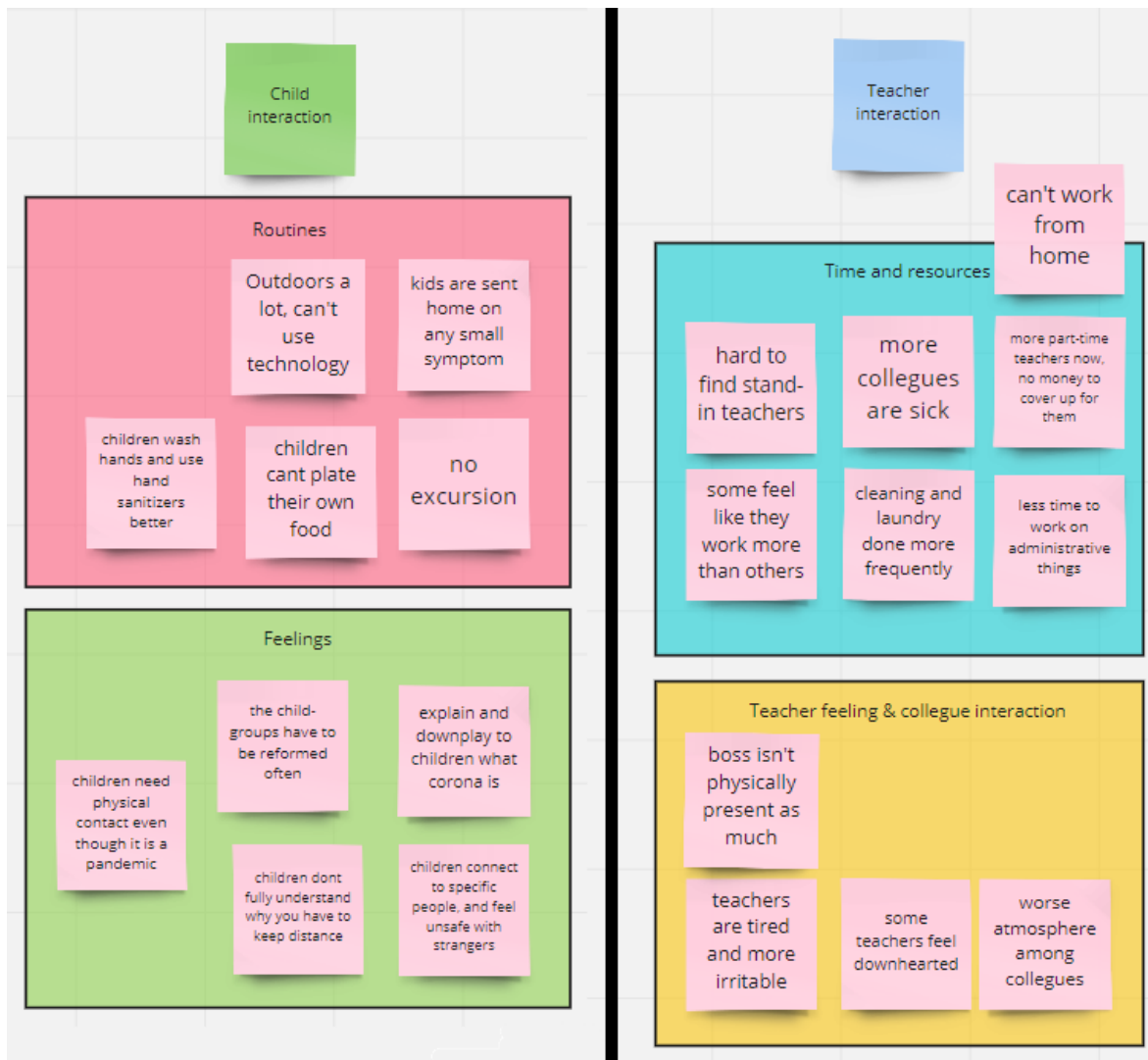
Figure 2.2: Part of the data organization board done in Miro. The figure shows two categories, problems relating to Children interaction and to Teacher interaction, and two subcategories in both.

From this, we combined brainstorming with a "How might we"-session where we looked at our notes and categories and tried to rephrase the problems brought up on the notes as questions beginning with "How might we...". After this, we looked at the questions formed and tried to propose solutions to these questions. While we were doing this we kept ourselves open to new ideas and built upon others' ideas, and kept in mind the golden rule of brainstorming: quantity is better than quality. The ideas were written down on digital post-it notes while we were performing the brainstorming session and once it was over we picked the ones deemed best by all group members to later present to our supervisor as our main ideas. Some of the ideas were; "food plating device/app", "relaxation app for children and teachers"or "rewards app for parents".

Since we did most of the ideation and brainstorming sessions together in a long meeting during one day the different stages felt like they naturally progressed into each other.

2.4   Paper Prototype

Using prototypes is a way of testing out an idea for a product before developing the final version. With a prototype, users and other stakeholders can try out the "product", and discover issues and opportunities, without having to go through an often complicated manufacturing process first. Prototypes can range from very simple, *low-fidelity*, mock-ups to highly complex, *high-fidelity*, models. Low-fidelity prototypes have the advantage of being cheap, simple, and quick to produce and modify, important properties in the early stages of design. In return, they tend not to look or behave a lot like the final product. High-fidelity prototypes on the other hand often have similar functionality and look like the intended final product, but are more time-consuming to develop (Preece, Sharp, and Rogers, 2015, p. 318).

For this project, a paper prototype was first made and tested on users, and the results from the tests were used to make a higher fidelity digital prototype. This was done in order to show the users the basic idea of the product and the functions it would include, without having to put too much time into development. A paper prototype gives a possible way to iteratively evaluate and improve upon a design during the formative phase of the design process, known as *"formative evaluation"* (Rettig, 1994). An example of the paper prototype developed for this project can be seen in figure 2.3.
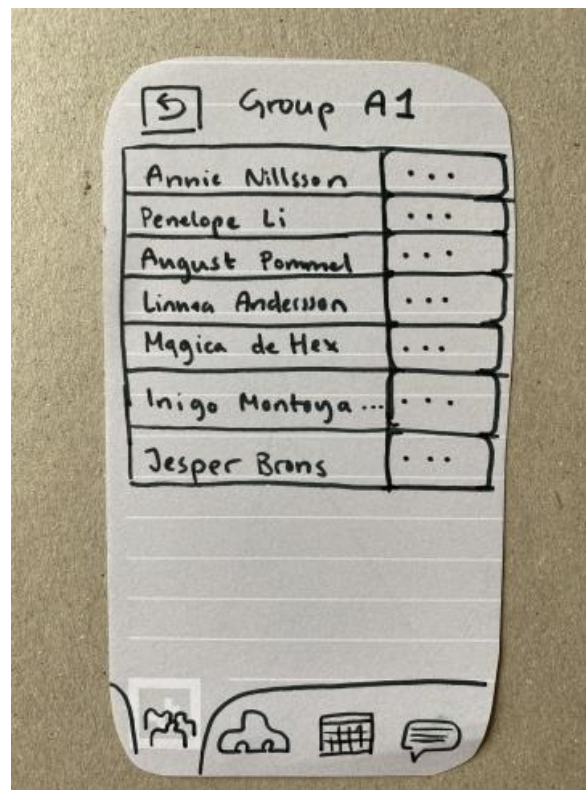

Figure 2.3: Example of the low-fidelity paper prototype showing the screen for the teachers to view groups in.

2.5   Usability Testing on Paper Prototype

To test the paper prototype, usability tests were conducted. These tests were done both with parents and pre-school teachers, as the requirements demanded that the application be accessible to parents as well. While the participants performed the tasks, they were observed by a group member, who noted where the participant had problems. The tests were also recorded, to allow for revisiting and reviewing the results later in the group. The test participants were asked to perform a set of tasks, which can be seen in the following list.

- Tasks for Teachers

  - Check the schedule for Thursday morning

  - Sign up for the application

  - Move Jesper from group A1 to group B1

  - Read the most recent messages

- Tasks for parents

  - Call in Emma sick

  - Find out who is Emma's teacher today

  - Send a message to Erik's teacher

  - Add an ETA for drop off of Erik

From the usability testing, it was discovered that users had problems identifying when a task was completed, and how to reverse a task. A parent-user also noted that it was hard to navigate the application, possibly since the parent view did not have a bottom menu, just a home screen and back-buttons. One teacher had some problems with interpreting the symbols used. These issues were kept in mind when developing the high-fidelity prototype. Some feedback was also provided from the other design groups in the course, regarding useful functionalities. It was suggested to add a *Profile*-page to the application, so that parents with their children at different schools, or teachers who worked at other schools than their children attended, could see who was logged in. It was also suggested that the parents should be able to see the schedule of the day and that teachers should be able to send announcements to all parents simultaneously.

In addition to usability testing, we also received feedback from the other project groups on our paper prototypes and the general idea of the product.

2.6   High-fidelity Prototype

The high-fidelity prototype was built using the software Adobe XD. With Adobe XD it is simple to build interactive interfaces, and since our product was intended to be a mobile application it was convenient to use a program where the screen size of a mobile application is easy to start from. An example of the high-fidelity prototype developed for this project can be seen in figure 2.4. The high-fidelity prototype was also tested using usability testing.
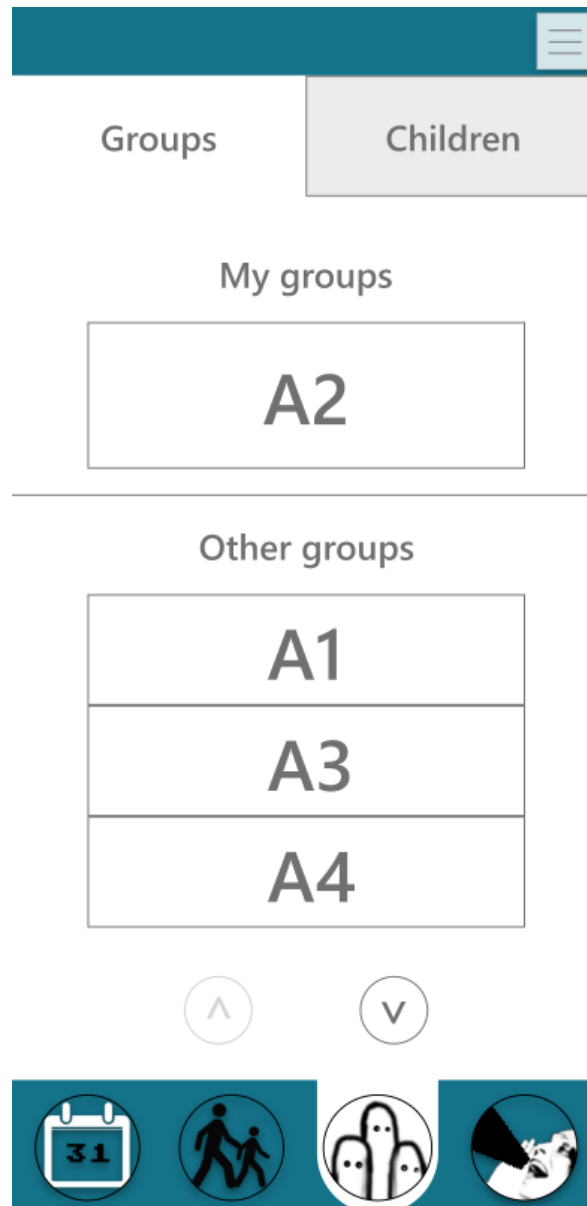

Figure 2.4: Example of the high-fidelity prototype showing the screen for the teachers to view groups in.

2.7   Usability Testing on High-Fidelity Prototype

The usability testing for the high-fidelity prototype was similar to the process for the paper prototype, but since the functionality of the application had somewhat changed with the feedback from earlier usability testing and the review from other design groups, some tasks were changed. The revised tasks for the high-fidelity tests can be seen in the following list.

- Tasks for Teachers

  - Check the schedule for Thursday morning

  - Move Jesper from group A1 to group B1

  - Read the message from Ken

  - Find out what email address is connected to your account

  - Send a message to Karin

- Tasks for parents

  - Read the message from Ken

  - Call in Emma as sick

  - Send a message to the teacher

  - Read today's announcement from the School

  - Find out what email address is connected to your account

  - Send a message to Karin

The test user was given a link to the high-fidelity prototype so that they could conduct the test on their own computers. By using Zoom and allowing for the test user to screen-share, both their faces and voices as well as the steps taken to complete the tasks was observed and recorded. After all the tasks had been completed the test users were given a short demo of the entire prototype and then asked the questions in the following list.

- How would you describe your overall experience with the app?

- How do you think an app like this would fit into your day to day work?

- What did you like the most with the app?

- What did you like the least with the app?

- Is there any functionality you would like to see added to the application?

From observing the users as they conducted their tasks we reached several insights. The first observation made was that users did not understand the icons of the main menu at the bottom of the screen. One test user directly went to the hamburger-bar on the top of the screen in an attempt to reach the schedule for the first task. As this failed it took a couple of seconds before the user realized that the main menu was, in fact, a menu of clickable icons. Another observation regarding the icons was that users found it difficult to understand what the icons represented. Rather than clicking the correct icon for a given task directly several users simply pressed icons at random in order to reveal where it would take them. The third and last insight from observing the users was that they had trouble seeing the children's group page for what it actually was. One user navigated to this page for the task "move Jesper from group A1 to group B2" but then quickly left the page without hesitation as if certain they were looking at something else than group options.

From the test users' answers to the questions, some of the realizations made from observing them were reinforced. The answer "I didn't understand the icons" was given by several users when asked what they liked the least. When asked what functionality they would like to see added several test users wanted the ability to add images to announcements, to be able to get pick-up and drop-off information in the app directly from parents, and also for siblings to be grouped in the check-in and check-out lists as they usually are dropped off and picked up at the same time.

3   Final version

In this section, the final version of the designed product can be found, together with some information on the process of going from high-fidelity prototype to the final version of the product.

3.1   Link to the final version

The final version of our design can be seen within the following link: https://xd.adobe.com/view/ab2f8898-cabd-49d5-a095-8f0dbc986393-fe7c/

3.2   Changes made for the final product

The final design focused on the feedback from the high-fidelity user tests and aimed to create a more cohesive and recognizable experience. The icons of the main menu were given a 3D-effect in the form of a shadow to better signify they afford clicking. The graphics of the icons were also changed to be more self-explanatory and cohesive, both within the application itself but also with icons of other popular applications and systems. For example, the icon for the page "Messages and announcements" was changed from a man speaking into a funnel into the commonly used speech balloons. The apple that was meant to represent a teacher was changed to a cartoon standing in front of a blackboard and holding a stick. In order to make it easier for the user to see that the "group page" was actually that it was somewhat simplified with a lesser amount of various objects, now only containing two lists of identically shaped objects representing the groups.

In addition to the changes above the functionality that the users suggested they wanted to see in the application was also added. On the announcement-creation-page, buttons to attach images were added. From a child's profile page the teacher was given the ability to read the pick-up and drop-off information from parents. The pick-up and drop-off lists were changed to group siblings together to minimize the number of check-ins and check-outs the teacher has to make.

4 Discussion

This chapter presents discussions about the design process, pointing out some of the issues through the design process.

4.1 Discussion on the Design Process

We created our design via the following stages quick sketches, paper prototypes, then a high-fidelity design whereby we utilized Adobe XD. Each stage followed a specific observation of the feedback provided by the testers in order to produce the best kind of progressive development within the design process.

Throughout the interaction and design stage, some visible issues were brought up by the testers. These could be categorized as either a change of a specific design choice or a request. These request had been things the testers mentioned they thought would improve or was needed within the application. Decisions were therefore made based on the type of request or design change made by testers and how such change would add to our current high-fidelity design. If the change required a clarification or better indication of how to perform an action or follow a specific user test, that that would be done. However, if a request was to add a specific feature that did not require newer icons or specifically developed steps then such a feature could be added if we had more time on the project.

4.2 Limitations and Problems

The main design issue conveyed via testers, related to the icons used and how they indicate specific functions within the application. The icons failed to convey accurate signifiers to the users and thereby creating confusion amongst the testers as to what each selected icon function was. If we observe the use of an "apple" to represent teachers within the first phase of high fidelity design, the apple was chosen in order to utilize an object with low gender relation but which still possessed a significant link to the concept of teachers, utilizing the established trope of an apple as a gift to a teacher from a student. And for this reason, we decided it would function well as an indication of a teacher. It became clear via feedback that this added more confusion to users thus a more suitable icon was picked. This was applied to all the icons to represent a specific function within the program. However, due to other testing issues, we can not fully argue that these issues would be present in a longer testing period if users got accustomed to the icons.

Due to the pandemic, it was very hard to find teachers who were willing to spend the time necessary to participate. Most teachers we had contact with would not meet in real life, for the risk of spreading illness into the school, making it more complicated to get good information. Many of them also simply did not have the time or energy to spend on a project from which they would not benefit themselves. This also meant the same users were "reused" for several steps, such as interviews and usability tests. The usability testing was especially affected by the lack of eye-to-eye meetings, as it is harder to judge the user's reactions when the tests are performed remotely. This, in combination with the low number of participating users, led to less quality data being gathered.

Since the product developed is a mobile application, it would have been useful to test it on a phone and not on a computer. Since applications tend to feel different than websites, it could have produced different feedback on different steps.

In hindsight, choosing pre-school teachers probably made the process of designing for usability extra hard. We might have had a better chance of finding willing participants if we had chosen another kind of teacher, which would in turn have produced better data.

References

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