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Plan&Do - A Technology Probe Supporting Children with Intellectual Disabilities in Leisure Activities

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Abstract

In this paper, we discuss possibilities for how digital tools can support children with intellectual disabilities to carry out leisure activities. Leisure activities play an important role for physiological and psychological well-being, but children with intellectual disabilities carry out less leisure activities than others. In order to investigate what factors are important for supporting children with intellectual disabilities to carry out leisure activities, we have developed a mobile application, Plan&Do, acting as a technology probe. The contribution of this paper is based on results from a situated evaluation, and consist of a raised awareness of the many challenges parents and children face when choosing and preparing for taking part in a leisure activity, as well as early results from how this can be supported, and directions for future work.

Author Keywords
CCI; Mobile computing; Leisure; Special needs

CCS Concepts
•**Human-centered computing** → **Interaction design;**

Introduction
According to UN, people with disabilities have the right to participate on an equal basis with others in recreational, leisure and sporting activities [8]. Still, many children and youth with intellectual disabilities experience difficulty car-

rying out different leisure activities. Leisure activities are important, especially for developing peer relations and social inclusion, which are fundamental for psychological well-being [5]. So, participating in leisure activities can not only contribute to physiological well-being, but also to social competence, and ultimately increase quality of life [1].

Studies show that intellectually disabled youths have the same preferences and wishes for leisure activities as their non-disabled peers, and that both genders prefer sports and cultural activities [7]. However, for many, the difficulty lies in moving from "one place-A" to "a new place-B" and understand what needs to be done to get from A to B. It might be unclear what must be done before carrying out the activity. Especially trying a new activity is hard, as it is difficult to get an overview of what will happen and what preparations are expected, and therefore it might be easier to choose the simple and "safe" way, i.e. to stay at home. This leads to that children with intellectual disabilities do not try as many different activities during their childhood as others. Further, when the children with intellectual difficulties grow older, they are less daring and more critical towards trying new things. Although there is a need for supporting tools, there is not much research in this area. There are studies on the importance of leisure activities with aging e.g [6], and physically disabled e.g. [3], but a lack of studies on how to support children with intellectual disabilities in leisure activities. Based on this, a project was initiated in order to investigate what factors might influence how children with intellectual disabilities can carry out new leisure activities. In the project, we have developed a digital tool, Plan&Do, acting as a technology probe [4], where adults and children can meet in discussions while preparing for a leisure activity. By using the probe, the project aims to investigate what can make it easier for children to learn what activities exist, and then learn what steps they need to take

to go from A to B, where the result is to carry out a leisure activity. The ultimate objective of the project is to help more children and youth become more physically and socially active, have the opportunity to try new leisure activities and interests, and socialize with others.

Method
The main target groups are children with some degree of intellectual disability and their parents. We want to emphasize that we are talking rather broadly about diverse groups of children, which may have e.g. Attention-deficit/hyperactivity disorder (ADHD), Autism Spectrum Conditions (ASC), Down Syndrome, Cerebral Palsy, other Intellectual Disabilities, or combinations thereof. No information regarding diagnosis have been gathered or been considered in the analysis of the results.

Inspired by situated evaluation [2], interview questions were formulated to be asked before, during and after using the technology probe Plan&Do. Situated evaluation calls for understanding how innovations emerge through use, considering diverse uses, the contexts of use, and the reasons for the development of multiple realizations, and was considered suitable for the project. This paper reports on results before and during using Plan&Do. Half of the responses were collected using interviews and the other half using a questionnaire. The interviewed respondents also demonstrated how they use the application. The respondents were recruited through the authors' own networks.

Fifteen parents answered the questions before using the application, representing children between 4-20 years old (mean= 12,3). Ten parents, where two of them were also pedagogues, have so far answered the questions during use of the application, representing children aged 7-15 (mean=11,9). The frequency of use for the second round
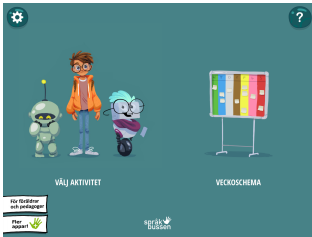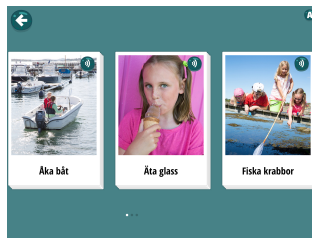
Figure 1: The start view of Plan&Do.

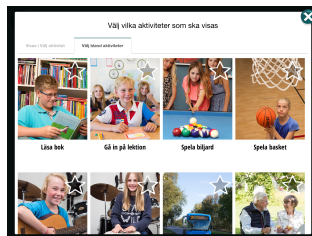**Figure 2:** The user's favourite activities.

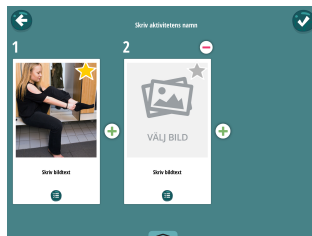**Figure 3:** The library of pre-defined activities.

Figure 4: Creating an activity.

of interviews spanned from daily to once a week.

Plan&Do

The main purpose of the Plan&Do application is to support children in carrying out leisure activities. The design is based on (i) the idea that visualizing what it's like to carry out an activity will motivate a Plan&Do user who otherwise may have problems getting started (ii) the idea that a step wise presentation of the various parts and actions involved in carrying out an activity will be an aid while the activity takes place. The presentation of activities is focused on the use of images rather than text. The application also works as an aid in remembering re-curing activities through the use of a weekly schedule view. So far, the application has been released and tested on iPads but the plan is to make it available for a variety of devices and platforms.

When the application starts the user can select between the two main functions activities and weekly schedule, see Figure 1. Since the activities part is the one that differentiate Plan&Do from other apps helping users organize their lives we focus on that part. If the user selects activities (s)he is presented with the view in Figure 2 which shows the user's most common activities. The user can select which activities to show on the start screen from a large number of pre-defined activities, as illustrated in Figure 3. Since there is no way to include all possible activities in the application the user can easily add more activities as illustrated in Figure 4. The new activities can be based on existing images from the app or the user's own ones.

The core function of Plan&Do is to support an activity as it unfolds. Each activity is presented through a series of images describing the various parts of the activity. Each step consists of an image, a label and a sound clip to make sure that the contents can also be grasped by users with limited
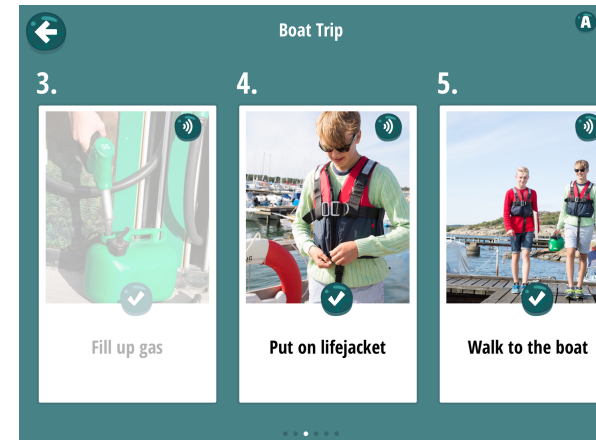

Figure 5: Some steps in the Boat Trip activity

reading abilities. Figure 5 shows some of the steps of the activity "Boat trip". You need to fill up gas, put on your life jacket and walk to the boat. Subsequent images show other parts of what it means to take a boat trip. Filling up gas is grayed out since this step has been marked accomplished. In total this particular activity contains 11 images with accompanying sound clips.

Results

Here the results from the situated evaluation will be presented, divided in before and during use of Plan&Do.

Questions asked before use of Plan&Do
The most common answer to the first question *"Can you describe how you usually communicate with your child about going to a spare time activity?"* is talking to the child about the activity using photos, signs and speech. One parent stood out by using a digital support for preparation. Some

parents also practiced the activity physically with the child at home, when possible. Additionally, some parents mentioned that if they knew others who also did this activity, then they talked about them. Preparations usually started days ahead and continued until the activity started.

The answers for the second question, *"Can you describe how/if you prepare and talk to your child about preparing for going to the activity?´´,* had a stronger focus on frequency. So several parents mentioned the importance of visual aids, and constant reminders from early on. Several parents also brought up the importance of preparing the bag, packing it together. One parent also mentioned that they talk about a reward for after the activity was carried out.

On the third question, *"Are you happy with how you communicate with your child about going to the activity or would you like to change anything?"* four people answered that the communication is satisfying to some extent. The other parents mentioned the constant need for repetition and reminders, and also a lack of visual, simple and accessible support, and support for being included in preparations. A typical situation experienced as difficult was the shift from doing some play activity at home in order to go to the leisure activity. Some stated that it was as if they force the child to the activity, although the child loves to carry it out.

The fourth question was *"Describe if/how your child communicate with you about leisure activities?".* Several parents answered that the child communicate with the parents by pointing to visual support schemes and photos, and also using signs and speech. Some parents mentioned that the child repeats what the parents are saying. One parent remarked that the child can become a bit hung up on an activity and talk only about this for a period of time.

Answers to the fifth question *"How does the child prepare for a leisure activity?"* varied from doing nothing while trusting their parents, to helping out to pack the bag using visual support. In common for all the answers was that the children need help and support in order to prepare. Another problem experienced was the sense for time and days, which makes it hard to prepare, "tomorrow" or "in one hour" might be too abstract.

The most common answer on the sixth question *"What do you experience as difficult for your child to go to leisure activities?"* was to shift from one play activity at home to actually move to another. Other problems mentioned were that the children get insecure because they do not know what is expected from them unless they are guided all the way. Further problems mentioned is the constant support that is needed from the parents before, during and after the activity. Finally, the children have problems with motivation, which is a consequence of that they are unsure about what is going to happen during the activity, and the parents have to go through all the details concerning all aspects of the activity as preparation.

Questions asked during use of Plan&Do
The answers to the first question, *"Can you describe how you use Plan&Do with your child?",* spanned from choosing activity and preparing, to carrying out an activity. Several have used it to choose between 2-3 activities, which made it easier for the child to choose and find motivation. Several have included their children in creating new activities with step-by-step guides, which has been a support in preparations for an activity, and been highly appreciated for the children. Some use it as a memory support to remember what should be packed in the bag etc.

The common answers to the second question, *"With the introduction of Plan&Do, has something changed in the way that you talk to your child about leisure activities?",* is eas-

ier to choose an activity, and having fun while choosing and preparing for the activity. The combination of personalized images and text that can be played as audio is appreciated. Also, it has become easier both to explain step-by-step, but also for the child to understand what is going to happen, Plan&Do makes the abstract preparation steps more concrete. One parent mentioned that it has become more evident for the child that there are certain steps that you have to go through before you can start doing the activity, another that they as parents have learned how well their child understand visual information.

Answers to the third question, *"Would you like to continue using the Plan&Do? In which way?"*, were to choose an activity. Several of the parents would like to add activities to the weekly schedule for the child to have an overview, but also to learn new activities, and to dare to go to the activity. If the child might be able to take some responsibility for preparing for the activity themselves, the tool acted a support in order to remember all the steps and get an overview, which increases their independence.

The most common answer for *"What role has Plan&Do had, what difference has it made (if any)?"* is support in communication about leisure activities. Some parents mentioned more independence due to the overview of the preparing steps, which reduces stress and makes the child less exhausted. Another mentioned that it is easier to establish goals and makes new activities concrete.

The next question was *"Describe how/if your child has support from using Plan&Do in order to prepare for an activity."* One family created a story about walking the dog, which made it much easier for the child to walk the dog as she knows what happens afterwards. One parent described how the child now prepare by herself for going swimming, dancing, etc. Plan&Do has mainly been used for preparing for activities, instead of the parents just saying what needs to be done and what is going to happen, the child can now see this for themselves. Parents mentioned that by introducing an activity, they train new words and signs.

The final question, *"Is there anything that you would like to change in Plan&Do?"* is interesting for future development. Respondents suggested functionality such as to search for images, save images from the app, add tags to the images, possibility to print images for step-by-step instructions, and improved instructions for how to start using the application.

Conclusion and Future Work

We see a lack of research in the area of digital support for doing leisure activities in children with intellectual disabilities. Taking part in leisure activities and social contexts is important for physical and psychological well-being [5, 1]. In this ongoing project, we wish to investigate what factors are important for children with intellectual disabilities to carry out leisure activities. We have developed a technology probe, Plan&Do, in which the children and the parents can meet in order to choose activity, and learn how to step-by-step prepare for and take part in an activity.

In the early results from a situated evaluation of the technology probe Plan&Do, it is clear that parents of children with disabilities spend much time motivating their children to go to activities. All children can defy because they do not want to go, but many children with intellectual disabilities are in need of more clarification of what is expected in order for them to prepare and carry out an activity. Although parents spend much time in preparing the children for the leisure activities, many times it seems as if the children are not presented with the information in a way that they can receive and understand. However, while using the Plan&Do probe, we can see two clear changes. Firstly, as pictures

show what the activity is and what is going to happen, several children choose new activities and seem to cultivate a better self-understanding and confidence in this. Secondly, the step-by-step visualization of what needs to be done in the preparation to get to the activity seem to be on a level that the children can understand and clearly leads to less frustration among the parents.

Future work, in accordance with the Situated evaluation approach, is to ask the same type of questions again after longer use of the technology probe. Also, we would like to extend the target group with teachers and assistants, as they meet the children daily and do different activities together. Many of these children have difficulty communicating and we would like to investigate if this technology probe would facilitate their ability to influence what activity they want to do and learn how to do it. Finally, all children are different and need different support in their learning. Children in need of special support often need more adapted learning situations and more clear teaching. Developing a digital tool based on the needs of children with intellectual disabilities could open up for the possibility that it can be a support for all children, something we would like to further investigate in future work. Adapting learning for children in need of special support simplifies and clarifies the way to learn, which also benefits other children. Finally, it is the hope of the authors that this work can inspire others to do research in the area of leisure activities and children with intellectual disabilities.

Acknowledgments

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