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Supporting executive functions with a picture application

SPEECH- AND OCCUPATIONAL THERAPISTS VIEWS ON USEFULNESS

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Abstract

Neuropsychiatric diagnosing and the amount of diagnosis has risen significantly over the past years. This has led to long queues to specialized care and therapy. One reason for needing therapy is problems with executive functioning. Executive functions mean psychic processes, that help the individual to function goal oriented according to situation.

This study presents an application-protype designed to support executive functions with pictures. Purpose of this study was to test this prototypes' usefulness in therapy work and to get development ideas for the future. Prototype was tested with seven therapists for two weeks. Views on usefulness and development ideas were collected with an online questionnaire. Results were analyzed with content analysis.

Results show that the prototype was seen useful in occupational- and speech therapists work. It made therapist work easier, faster and gave the possibility to react to changing situations better. Most therapists gave development ideas as the visual design and functions did not suit all of their needs. This application-prototype seemed to work well in therapeutic use and with the given development ideas it would ease therapist workload and replace the use of physical pictures in supporting executive functions. In the future it could also be used not just by therapist but clients themselves which would transfer skills learned in therapy to everyday life.

Key words: Executive functioning, application development, usefulness, therapist, welfare technology.

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1 INTRODUCTION

Need for specialized medical care for children and adolescents with neuropsychiatric problems has risen significantly over the years. This has led to long queues to care and the need to plan and develop new forms of treatment and care (Lämsä et al., 2015). Social insurance institution of Finland has developed many new rehabilitation methods for neuropsychiatric diagnosis over the past few years (Kansaneläkelaitos, 2020). Neuropsychiatric disorders include autism spectrum and attention deficit hyperactivity disorder as well as some learning difficulties with similar background (Lämsä et al., 2015). People who suffer from these disorders usually have difficulties with executive functions as well.

Rehabilitation is expensive for our society and increasing amount of people needing it will add costs. Therapists all over the country are fully booked and their resources are limited. This is why it is so important that their working hours won't be spent in printing and cutting out pictures. This study will present one digitalized solution to this problem. Aronpuro, Laitinen and Metsäranta (2019) highlight the need for occupational therapists in schools and other everyday life environments because the aim in therapy is to transfer the learned skills there. This application-prototype could be used at schools or at home by clients themselves which could bring this transfer effect.

Purpose of this study is to find out speech and occupational therapists views on the usefulness of a picture application-prototype that supports executive functions. Purpose is also to gather development suggestions for further use.

This study answers to two research questions: 1) how the therapist experience the picture application in their therapy use and 2) how the picture application should be further developed based on the therapists' views.

A well-functioning application could bring financial benefits in saved worktime because there is no further need to print and cut so many physical pictures. Users themselves could benefit a lot in their day-to-day life as their executive functioning would improve.

Therapist tested the application for two weeks and reported their findings with an online questionnaire. Results were analyzed with content analysis, answers were coded and thematized. These results can be used in the further development of this prototype and the development of similar applications in the future. This tested prototype can be used as an example to justify the need for digital solutions for therapeutic use.

2 THEORETICAL FRAMEWORK

2.1 Executive functions

“The cognitive process that encompasses an individual's ability to organize thoughts and activities, prioritize tasks, manage time efficiently, and make decisions.” This is the way in which The American Heritage Medical Dictionary (2007) defines executive functions. Loss of one or more of these abilities due to a disease or syndrome is common and acquires rehabilitation. Närhi and Virta (2016) define executive functions as a psychic process, that help the individual to function goal oriented according to situation. They also state that people with attention deficit hyperactivity disorder (ADHD) usually have problems with executive functions. According to Loukkola (2021) problems with executive functions can be associated with many diagnoses such as adhd, asperger’s, tourette, epilepsy, brain injury and multiple sclerosis. Difficulties with executive functions appear in same way regardless of the diagnoses.

According to Autism speaks organization (2021), executive functions are essential part of autism rehabilitation. Autistic people usually have difficulties with organizing, planning and sustaining attention and inhibiting not wanted behavior which are all executive functioning skills. As with neuronormal people, difficulties come up

differently with different autistic people. Some focus all their attention to small details and some have problems with multitasking. Many autistic people have problems in impulse control, planning their actions and acting according to their plan in right order. These problems can be addressed with calendars, checklist and logs with pictures or text or both. (Autism speaks, 2021)

Simmons (2014) has collected communication enhancing applications for educational use to her study. She explains that autistic children commonly have a difficulty with reacting to change in their environment as well as change in their daily routines. Autistic people have also been found to be superior in visual tasks and localized information. She points out that visuals are an essential tool with autistic children to help them with their studies and everyday life. Kunda and Goel (2010) have found similar results in behavioral data suggesting autistic people having increased brain activation in visual-perception brain regions and decreased in verbal processing regions.

2.2 Use of pictures in enhancing executive functions

Augmented and alternative communication (AAC) has been studied and used for a long time, especially in speech therapy, to support people with communication difficulties. Schlosser et al. (2017) present ACC method and conclude that visual supports are an evidence-based treatment. Scene cues and video clips have also been tested in the same sense as ACC to support autistic children's everyday functionality. This has proven to be effective. Research data shows that pictures can be used to support autistic children's ability to follow given directions. Same kind of results are presented in MacDuff, Krantz and McClannahan's (1993) study. They have tested the use of photographic activity schedules for autistic boys because autistic people usually need prompts to move from one activity to another even if it is a known activity for them. With visual cues autistic people can start and complete sequential actions by themselves. Burcley, Tincani and Fisher (2014) state that schedules with pictures work in teaching people with disabilities complex sequenced actions. They have also found that the use of technology has good results because prompts are not connected to any individual and can be used independently. Schlosser et al. (2017) also have evidence

that using new technology to present pictures can be beneficial for getting the right pictures at the right time. Their study shows that pictures are as well understood from wearable technology as a physical picture.

2.3 Usefulness

As websites and mobile applications became the way people use a lot of services it came clear that usefulness of these sites and applications should be in focus. Usefulness can be defined in many ways and there are different definitions of what makes websites or applications easy to use. In this thesis Nielsen's (2012) theory is used to describe usefulness. According to Nielsen (2012) usefulness includes utility and usability; usability means the ease of use and utility means the features user needs. Application users in this study are therapists but also their clients. Therapists as professional in their work and clients who need the help to their executive functioning. Application should be useful to both user groups but this prototype version is designed to be used in therapy with the therapist so it should meet the therapists needs.

Usability is important because people have a lot of user interfaces to choose from. There are a lot of different webpages and applications offering similar service, so usability makes all the difference when a potential client is choosing services. In internal use it can mean significant saves in time used for example searching for data, so it has potential to increase productivity (Nielsen 2012).

Nielsen (2012) describes usability as a quality attribute that assess how easy some user interfaces are to use. Usability is also a part of improving user experience during a process. Nielsen defines five components for usability. First is learnability which means how easily a user can understand how the application works when it is used for the first time. Second is efficiency which refers to efficiency of use after the user has learned the basics, how fast wanted tasks can be done. Third is memorability which means the logic of the application according to user. When the user returns to the application can he remember how it works, is it logical. Fourth one is making errors while using the application. Do users make errors and can they help themselves out of them easily or get stuck. Last point is satisfaction, are users happy after using the

application, is it easy and meet their need. Nielsen (2012) also defines the difference between utility, usability and usefulness. Usefulness includes utility and usability, usability means the ease of use and utility if it has the features user needs. Improving usability usually means user testing. According to Nielsen (2012) five test users are enough to find out biggest problems and then fix them and re-test.

Garrett (2011) has researched user experience and explains user experience through a model with five elements or planes. These are from abstract to concrete strategy, scope, structure, skeleton and surface. Last and the most concrete plane is surface plane which means the things one can sense in using the application or web site. Garrett has used the term visual design but has changed it to sensory design as phone applications offer sensory input as well. This surface plane isn´t just about aesthetics. People can have different views on what looks good but visual design is more than that. Visual design must support the function and meaning of the site. Attention should focus on the right things in order to use the site for what it is meant to. Therefore, visual design is more than just aesthetics.

Garrett was chosen to compliment Nielsen's usefulness with visual design because even though Nielsen discusses visual aspects they do not come up as a specific item. Moshagen and Thielsch (2013) as well as Garrett consider visual design and aesthetics as one factor that is vitally important for the users and for the users to revisit the application. Therefore visual design has been chosen as a separate item to compliment

Nielsen's usefulness. Figure 1. shows how these terms are used in this study and how they relate to one another.

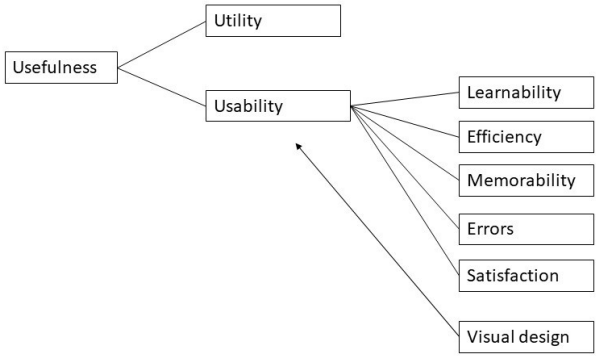

Figure 1. Essential concepts of this study and their relations.

3 RESEARCH METHODOLOGY/ STRATEGY

3.1 Approach

This study is conducted with deductive qualitative research approach because the aim is to understand the usefulness of the picture prototype that supports executive functioning. There are several possible analysis methods for qualitative research available. Content analysis was used in this study to organize the collected data and to gain meaningful information out of it. (Bengtsson 2016). This study uses deductive approach to content analysis. According to Tuomi and Sarajärvi (2017) deductive analysis relies on a theory or a model and the study is based on these terms. The terms and theory used in this study are presented in theoretical framework section and then tied to the results of the study.

3.2 Developing the prototype

The used prototype was developed by the author of this thesis and Satakunta university of applied sciences. Idea and the design were created from the need to ease therapists' workload. Therapists use a lot of workhours to print and laminate and cut pictures to their therapeutic use and to give to their clients to use at home. Problem was the use of worktime and that therapists couldn´t foresee what pictures were needed at each time and then some important pictures were missing. Client families got printed pictures, but the problem was that the pictures got missing or were somewhere else when they were needed so the prototype could also benefit client families. Author has many years of work experience as an occupational therapist and in this particular company to where this application was created. Prototype's idea is to replace printed pictures in therapy use when therapist uses them to create picture sequences of therapy session to support executive functions.

Prototype itself is simple. First there is a menu with two choices as shown in figure 2. First Koti-menu ("Home") brings you to select pictures and the second Admin-menu to the picture sequence.

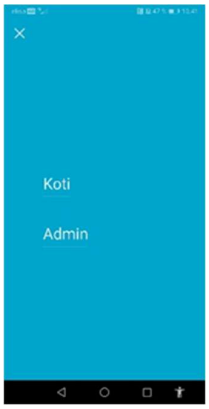

Figure 2. First menu with two options.

In order to get the sequence working, one must choose the pictures first from the Admin-menu. Admin-menu (Figure 3.) shows a picture gallery where pictures can be chosen from. In addition, there is an option to add a photo which opens phone's camera (Figure 4). These photos taken with phone's camera can be named and added to the gallery as shown in figure 5.

Figure 3. Admin-menu with picture gallery.

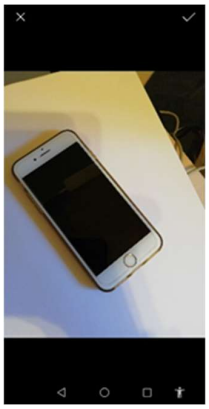

Figure 4. Phones camera opens from add a new picture.

Figure 5. Photo taken with phones camera can be named and added to gallery.

After the pictures are chosen, one must return to the first menu and select Koti ("Home") to enter picture sequences. One has two options, first is from one to six pictures and the other one is first-second-last template as shown in figure 6. After choosing either one of options the earlier chosen pictures appear in the chosen order. When the chosen activity is done during therapy the client can click the picture as done as shown in figure 7. Figure 7. shows both options for picture templates.

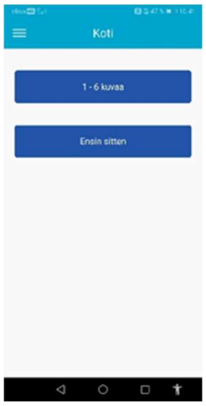

Figure 6. Koti (“Home”)- menu with two options for pictures.

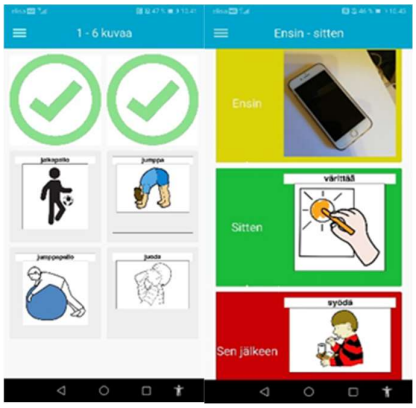

Figure 7. Two options for picture templates and done sign after completing a task.

3.3 Data collection

Application was tested in private therapy firm in Turku. This unit had about 15 employees at the time of testing. All of them were informed of the possibility to test the application and all of them got the link to download the application to their work-phone. Willing participants tested the application for two weeks and then got the link to the questionnaire. The link to use the application and the questionnaire link were sent to the whole work team so the researcher did not know who replied. Users didn´t get any guidance because one part of the study was to measure how fast and easy the application is to learn. Test group included speech- and occupational therapist working with children and adolescents.

Data was collected with an online questionnaire. This was chosen because the researcher knows the participants personally and online surveys will guarantee the best

anonymity and freedom of speech to the participants. According to Burns and Grove (2012) research participants have to have the right to anonymity and their answers should be kept confidential so that even the researcher cannot link the answers to any specific person.

Questionnaire (Appendix 1) contained 14 questions and some background information. Ten out of fourteen questions were open ended, and four questions were structured. Open ended questions were divided into three sections; therapist own experience on using the prototype, the utility of it in their work and the last section was client's perceptions of the application. Questions contained direct questions on the usability and utility but also questions on how to improve the application.

3.4 Data analysis

Holloway and Wheeler (2013) described qualitative data analysis as a complex process which is not a straight line but has structure and order. They consider qualitative analysis to be quite free of exact rules, but the analysis and researcher has to have its roots firmly in the collected data. Data analysis is described to be iterative which means that researcher moves back and forth in the process. Burns and Grove (2012, 281-282) explain content analysis to be a tool to organize words from text material and classify them into bigger categories. Idea is to search for repeated ideas or similar patterns of though. Researcher can use a guiding theory when searching for these patterns. Kyngäs et. al. (2011) say that the success of content analysis depends on the researcher's ability to reduce the collected data and to form categories from it that describe the wanted phenomena reliably. In deductive analysis, an analysis frame is made from previously known information and this is filled with content from the gathered data that fit the frame. Frame can be quite loose so that the researcher can form categories within the frame. Elo et al. (2014) conclude that one main factors in trustworthy content analysis is rich, appropriate and well-saturated data. They have also gathered a checklist for content analysis that includes three phases: preparation, organization and reporting. When following these phases in the checklist the analysis will be planned and reported in a good and understandable manner which makes it trustworthy.

In this study, the data was analyzed with deductive content analysis. First the data was read through many times then coded and categorized and finally thematized. Figure 8. shows an example of this process. All the data was analyzed the same way. According to Holloway and Wheeler (2010, 137-139) qualitative studies usually select sampling units according to selected purpose. This study uses purposive sampling and more exact convenience sampling which means that the researcher gathers the sample from where it is most convenient to get. In this study the sample was from one work-unit in Turku.

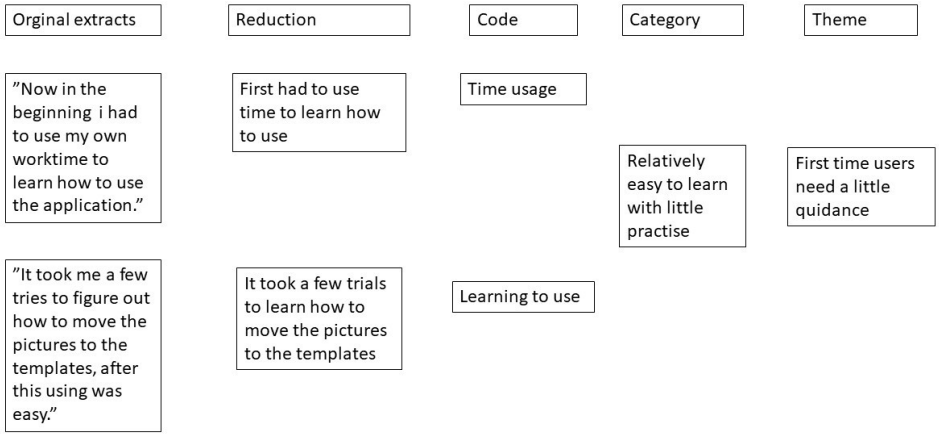

Figure 8. Example of the analyze process.

According to Holloway and Wheeler (2010, 127) the sample size should be linked to the research purpose and the optimal sample size would be between four and twelve, but this means mainly when using interview as a method. According to Nielsen and Landauer (1993) in user testing five test-users are enough after which the saturation is typically reached. This studies' sample size is seven which is well in these boundaries.

4 RESULTS

Seven people answered the questionnaire (n=7). Three were speech therapists and four occupational therapists. Four participants were between 20-30 years old, two between 31-40 and one 41-50 years old. Five test users used the application 3 to 5 times during the two-week test period, two test users used the application 1 to 2 times.

4.1 Therapists views on usability, utility and visual design

Therapists reported their opinions and experiences using the application. Although theoretically usability includes five components (Nielsen 2012) data analysis revealed opinions only on learnability and efficiency. Other components results were so scarce or non-existent they could not be analyzed. In addition to these, respondents also commented application's visual design and its utility. Results also include development ideas for the application which the test-users reported extensively.

Test-users experienced the learnability of the application to be good. Results are shown in analysis tree in figure 9. One test-user commented: *"I tested it [the application] only once but using it was relatively easy."* This means that they experienced the application to be easy to learn even without any guidance or instructions. Most of them had to try and fail a few times in order to learn how to use it. Some wished there would have been some kind of guidance in the beginning so that the start would have been easier. Nielsen (2012) considers learnability to be good when basic task can be performed easily with first attempt. Result show that learnability could be improved with a little guidance before the first use.

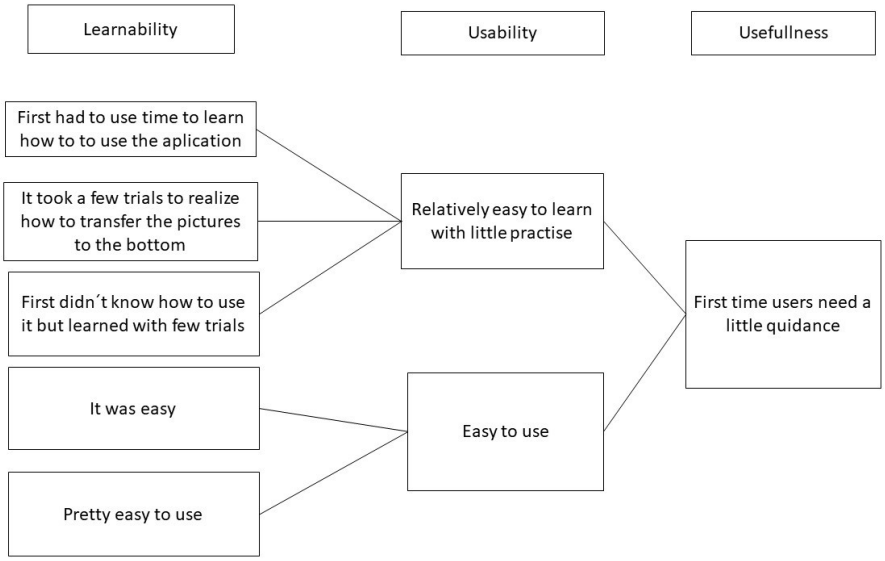

Figure 9. Learnability analysis tree.

Therapist experienced the menus to be somewhat unclear which affected the efficiency of the application as can be seen in figure 10. Practice was the key factor in making the application efficient. After practice it was quick and easy to use. Nielsen (2012) describes efficiency to be the speed users can perform tasks when they have learned how to use it. Results show that efficiency was good when users knew how the application worked. Visual aspects affected the results of efficiency as well.

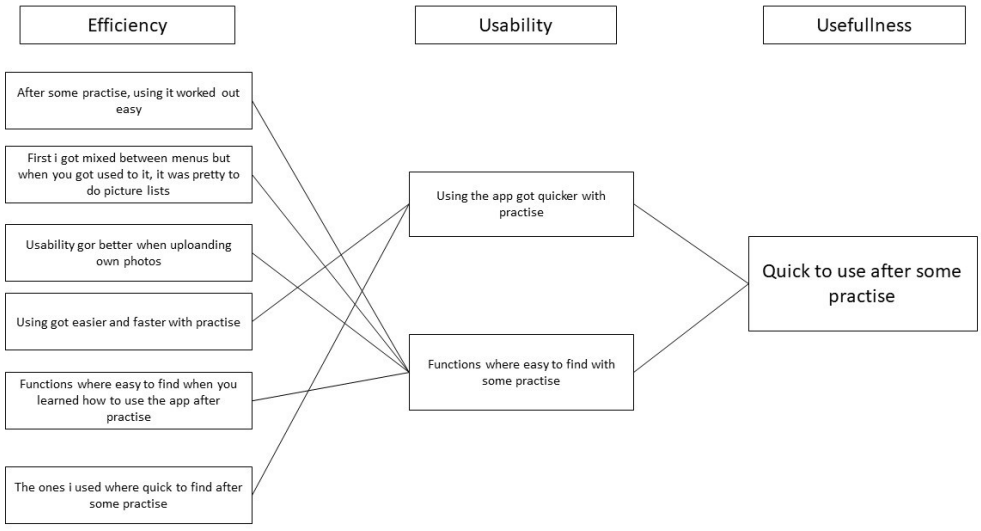

Figure 10. Efficiency analysis tree.

Therapist experienced the application utility good even when it had some problems with content. One user commented: *"I could see this [application] to be an everyday help with my clients to support their executive functions, if I would take photos of all the therapy tools I use."* Therapist normally need to print, laminate and cut physical pictures to use at therapy. This application removes those time-consuming parts. This is why the therapist comment for no need for printed pictures makes the therapist job faster and easier. This is part of utility as this is the key feature the users need. Most of the therapist thought that the ready-made content suits their job well, some thought it didn´t suit their job but they had the option of taking their own pictures. One big problem with photos was that users couldn´t remove the photos from the application. And there was also a worry about pictures showing to other application users. As figure 11. shows, results show that the content needs some improvement to meet all of the users' needs. Nielsen (2012) describes utility to provide the features the user needs. Functionality means the ability to perform tasks or functions and utility the way these tasks or functions are intended to function. Users also had development ideas on content and how it would better suit their needs.

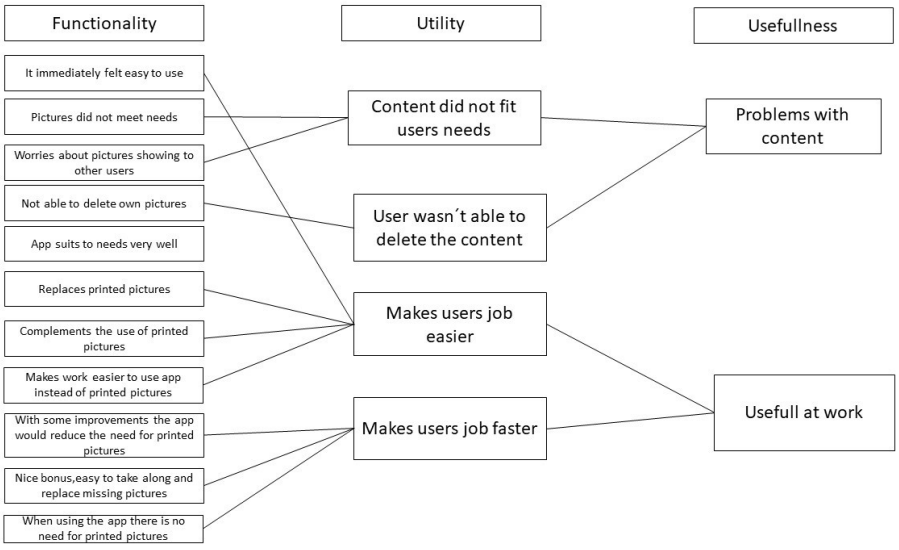

Figure 11. Utility analysis tree.

Visual design was considered to need some improvements. One big issue was that the application did not fit the phone screen perfectly and showed the phones own menus

in the bottom of the screen which made choosing of the last photos difficult. Menu names were also commented as unclear. Visually the application needs improvements to meet user's needs. Garrett (2011, 136-137) explains that visual design needs to support the objectives the application has. For example, if the application is designed to create picture templates the visual design should support in that effort. As figure 12. shows this application hasn't succeeded in visual design. Basic problems were the scaling of the application to the screen which made some parts of the application hard to use. Aesthetics were commented to be un-appealing and visual design unclear. User experience would suffer from this and as Moshagen and Thielsch (2014) results show users wouldn't come back.

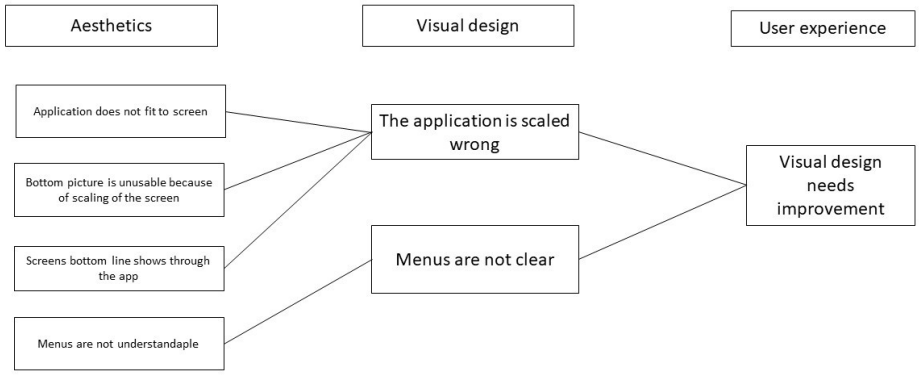

Figure 12. Visual design analysis tree

4.2 Development ideas

Therapist were eager to report development ideas in many answers. Ideas are collected in figure 13. and categorized into three bigger items, namely clarifying the user interface, using with multiple platforms and developing picture library. Clarifying the user interface means that users wanted to name the menus more clearly and make the application more visually appealing. Most therapist commented that they would have preferred the application to be used on an ipad instead of their phone. Because of technical and license issues this was not possible for the testing but in the future can be considered. Picture library got a lot of development ideas. Own photos were a good

and useful tool but therapists hoped that they could have named their own photos and deleted the ones they didn't need. Most therapist suggested adding more pictures and some kind of folder system for the pictures so that pictures could be easier to find. Ready-made templates were perceived as good but also got some ideas on development. The prototype had readymade picture templates, for example, first-second-last to insert pictures to. Some therapists wanted only first-second templates and some thought that this could also be used as and picture guide for playing which would need more than six pictures-templates. Although therapist had a lot of development ideas most of them were pleased with the application as this comment shows:*" I believe that with these improvements this application would be very useful at my work and would reduce the need for physical pictures."*

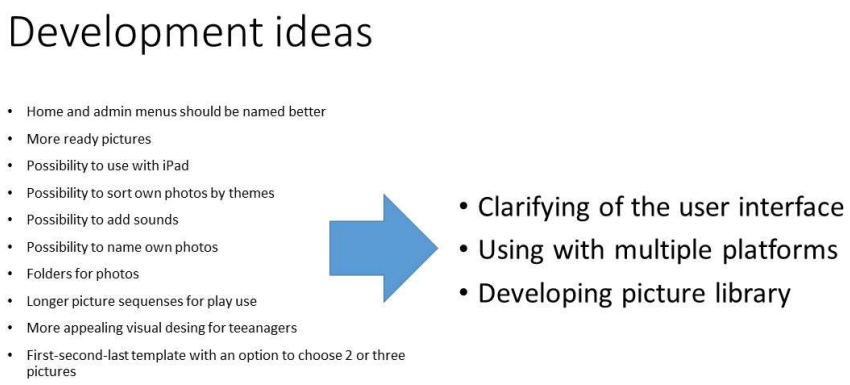

Figure 13. Development ideas

5 DISCUSSION

5.1 Applicability of results

This study answers to two research questions: 1) how the therapist experienced the picture application in their therapy use and 2) how the picture application should be further developed based on the therapists' views. Results suggest that therapist

experienced the prototype to be useful. Nielsen (2012) defines usefulness to be the ease of use and fulfilling of ones needs, Morville (2004) describes usefulness to have something original and to fulfill a need as well. Therapists described the prototype to meet their needs well and it can be suggested that there is some originality value as none of them commented that the prototype is similar to something they already use. Therapists also gave many suggestions for further development: clarifying the user interface, using with multiple platforms and developing picture library.

Results of this thesis can be applied to the development of this application. Results cannot be generalized as this was a qualitative study and the purpose was to get more understanding from this specific prototype. Therapists were interested in using this prototype and most of them hoped to get a developed version to their use. The diagnosis groups of the therapist's clients were not asked as it was not relevant in this study. Results suggested that some therapists use pictures to support executive functions with most of their clients so it can be considered that this kind of help would be needed to a wide range of clients as the theory suggests. This justifies the need for this kind of application even more.

Learnability means how easily a product, or a prototype can be understood and used by users (Ratchinsky 2019). Results suggest that the prototypes learnability could be improved with user training. Efficiency is defined by Wetzlinger et al. (2014) as how fast can the user perform tasks needed. In their study the efficiency was measured with how many times it took to get the task done. In this study the times of trial were not counted but the collected result suggest that tasks could be performed with few attempts. Duhig (2020) has described utility of an application to be better than something similar, to be something that gets the job done, to be something the user wants and needs. Therapist reported the utility of the prototype to be good. It does what it was supposed to do. There were some problems with the content meeting user's needs and problems in deleting the content, but it made therapist job easier and faster. Visual design, according to Babich (2020), has a key role in creating good aesthetics. He also claims that users can ignore some usability issues if the visual design is pleasing. Results of this study show that the visual design needs improvements.

There are several development needs but the basic need for this kind of application is visible. As one test-user commented that the application has all the features she needs. Schlosser et al. (2017) results show that it is important to have the right pictures at the right time and this study supports that finding and offers one method of doing just that. Executive functions are mainly linked to neuropsychiatric diagnoses and researched in that group of people (Simmons 2014, Kunda and Goel 2010). These results don't show what the client's diagnoses were but the therapists considered the application to be suitable for most of their clients which suggests that there were other diagnosis types as well.

Development ideas consisted ideas to visual design, content of the application and the platform it was used. These results support Garrett (2011, 136-138) and Moshagen and Thielsch (2014) findings on the importance of visual design. Visual design needs to be improved in order to achieve good user experience and for the users to return to the application. Schlosser et al. (2017) results showed that pictures from wearable technology are as well understood as physical pictures. This study doesn't support that finding because most therapist reported that pictures were too small from a phone and they would have preferred to use the application from a larger screen.

Silva et al. (2018) tested an ACC mobile application which is not totally comparative to this studies prototype but is similar picture application. They came up with results showing that mobile application is more socially acceptable than physical pictures. This can be suggested with this study's prototype as well. Physical pictures are difficult to use and draw unwanted attention. Spriggs et al. (2015) studied autistic adolescents and tested a video modelling instrument to support their ability to transition between activities and to complete some school activities themselves. Ipad based video modelling application supported autistic adolescents' ability to transfer between activities independently. This finding supports the use of applications to support executive functioning like transferring from one activity to another with an application. Spriggs et al. (2015) results also indicated that the use of this kind of application increases adolescent's independence as they are not so dependent with adults guiding them through the day. This study did not research this, but it can be suggested that same kind of results could be found in future studies.

Therapists also commented that it would be beneficial if the clients could use this prototype at home. Therapy in general has an underlined focus on transferring skills learned in therapy to client's everyday life, so that eventually therapy becomes useless. Babulal et al. (2016) have studied this transfer effect in occupational therapy. They gathered six principles that create understanding in how this transfer happens and how a therapist can support that. One of the principles is that the transfer should be addressed during learning, as it cannot be expected to occur automatically. This principle includes the concept of bridging and it means the skills should be taught in similar or same environment as they are supposed to be used to enable transfer effect. This study tested the prototype only in therapy setting but it could be used by clients themselves as well. Test-users as therapist saw this possibility in the prototype to use as a tool with transfer effect.

5.2 Trustworthiness, authenticity and ethics of the study

Holloway and Wheeler (2010, 298-304) explain that in qualitative studies terms trustworthiness and authenticity are more often used than reliability and validity. Trustworthiness means dependability; that readers can follow researchers trail-of-thought through the research process, it can also be used if the same research would be done again, credibility; people who participated in the study should be able to recognize the results as compatible with their answers, transferability; findings in one context could be transferred in another context by other researcher, confirmability; researcher should show that prior knowledge or bias doesn´t affect the results. Authenticity means that the strategies used in the study are appropriate for the use they were meant. Authenticity includes informed consent and the concept of fairness.

According to Holloway and Wheeler (2010, 304-305) there are strategies to ensure trustworthiness of research. Strategies include decision trail, member checking, peer review, reflexivity, thick description, critical thinking and triangulation. Kyngäs et al. (2011) consider the key elements in trustworthiness to be that the researcher can demonstrate a connection between the results and the collected data. Other key element is using direct quotes which show the decision trail in the analysis.

Trustworthiness in this study was taken into consideration through the whole process. This study could be replicated with the same type of sample size and participants. Problems during the process were discussed with supervising teacher in regular basis. Findings are reported as clearly as possible, and figures are added to the study to make it even more clear how decisions were made during the research process. In this study there are multiple figures to show the trail of thought of the researcher in different phases of the study. This gives the reader the opportunity to evaluate the decisions themselves. Trustworthiness could have improved if the participants could have read the result and commented them beforehand but due to resources this was not possible. Sample size came from theory and seemed to be enough as answers saturated even in this sample size.

Questionnaire's authenticity could have been improved. Some of the question did not get as descriptive answers as researcher hoped for. All in all, the answers to the questionnaire were short which made the data analysis harder and left the analysis a bit superficial. Still the research questions got answered reasonably well and research question got answered.

Ethical issues must be taken into consideration in all the stages of research. Ethical issues may appear in the design of the research, data analysis stage, interpreting the results or in presenting and publishing the results. (Burns & Grove 2012). This study was conducted in the researchers own workplace which brought out ethical issues. Holloway and Wheeler (2010) recognize that main problems in this are recruitment of participants, dual role of the researcher and the already existing relationships between participants and researcher. At the time of test-using period the researcher was not actively working which made this problem little smaller. Still researcher knew most of the employees. Questionnaire as a data collection method also minimized the effect of this dual role as researcher did not meet the participants at any time.

One of the key aspects in research ethics is voluntary consent with rights to terminate participation any time at their own choice (Burns & Grove 2012). All the participants in this study are legally and mentally competent adults and they had the possibility to decline taking part in the research in any stage of the process. Holloway and Wheeler (2010) warn that voluntary participation can be hard to reach in case where participants

know the researcher. Participants may feel more obligated to participate in-due to a familiar researcher than to an unknown. This risk was minimized with full anonymity so that the researcher did not know who participated and who didn't. At the time of the test-use there were approximately 15 people working in Turku office and seven of them answered so this would suggest that all of them did not feel obligated to participate.

Privacy of the participants was also important (Grove et al. 2012, Holloway &Wheeler 2010). All the research material was confidential and could only be used by the researcher for this purpose and were destroyed after use. Privacy was controlled using number coding instead of names and personal information gathering was kept to minimum to make sure participants do not stand out from the group. Questionnaires were filled online so that researcher could not differentiate participants by their handwriting.

5.3 Limitations of the study

As Elo et al. (2014) state the key to a good content analysis is rich, appropriate and well-saturated data. This was one key weakness in this study as the data was not rich. Most answers were short and not as descriptive as expected. This made analyzing the results harder. This limitation could have been avoided with a better questionnaire or another type of data collection method for example interview or observation. Interview would have made it possible to gather more information and ask more questions if the answers were short. Observation could have been a good option as well as many user-tests are observations. This would have given more detailed information about the problems that users had.

One limitation was the decision to not to give any guidance to the users before the testing. This decision was partly due to lack of resources but also the lack of understanding of how important that could have been. Researcher considered the prototype to be very easy and simple which apparently affected their judgement. Other clear limitation is that there was only one test-round. Usually testing of a prototype goes through many testing phases and then gets improved and tested again. This would

have been very interesting and beneficial for the prototype and for this study. In whole the research process should have been better thought in advance by the researcher to avoid these limitations. It would have been helpful to use Elo et al. (2014) checklist, when planning the research.

6 CONCLUSIONS

6.1 Key findings and limitations

The purpose of this study was to find out therapists´ views on the usefulness of a picture application to support executive functions and to collect development ideas for the application. Nielsen (2012) describes usefulness to be the sum of utility and usability. In this thesis this theory is complimented with Garretts (2011, 136) visual design theory. This study contained a testing period of two-weeks to selected group of test-users, who answered a questionnaire after the testing period. This questionnaire contained open ended questions about the usability, utility and visual design of the application. Answers were analyzed with deductive content analysis.

Most test users perceived the application to be positive addition to their work and that it made their work easier by reducing the amount of physical labor. Development needs were in the visual design of the prototype and the platform it was used with. Most therapist wanted to use the prototype with a bigger screen. Development ideas focused also into the picture library and the amount and content of it. Limitation of this study was the selected data collection method and the limited data it offered for analysis but as the results started to saturate it can be suggested that the collected data was sufficient.

6.2 Future studies

One future study idea could be to test this prototype again with the development ideas gathered in this study. One application possibility would be to offer this application to clients themselves to use at school or at home. This would make bringing therapy tools to everyday life easier and results in executive functioning could be more visible when used frequently. This tool could be also researched with groups of children using it in schools or daycare units. Other possibility would be to study this type of application in nursing homes for the elderly. Picture aids could be helpful for elderly suffering from memory loss.

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APPENDIX 1

Kyselylomake:

Taustatiedot

Ikä: 20-30, 31-40, 41-50, 51-60

Ammatti; puheterapeutti, toimintaterapeutti

Oma käyttökokemus sovelluksesta:

1. Millaisena koit sovelluksen käytön ensimmäisinä kertoina?
    1. Mikä oli helppoa ja mikä vaikeaa?
2. Montako kertaa olet käyttänyt sovellusta 2 viikon testiajan aikana?
    1. 0-2, 3-5, >5
    2. Mikäli vastasit >3, koetko sovelluksen käyttämisen muuttuneen käyttökertojen myötä. Jos, niin miten?
3. Mitä sovelluksen ominaisuuksia olet käyttänyt?
4. Onko sovelluksesta helppo löytää haluamasi toiminnot?
5. Mitä ominaisuuksia olet jäänyt kaipaamaan?

Sovelluksen soveltuvuus työhön:

1. Millaisissa tilanteissa olet käyttänyt sovellusta?
2. Miten koet sovelluksen soveltuvan omaan asiakastyöhösi?
3. Mitä haluaisit parantaa, jotta sovellus soveltuisi työhösi paremmin?
4. Sopiiko sovellus mielestäsi kaikille asiakasryhmille? Perustele vastauksesi!
5. Miten hyödyllisenä koet sovelluksen työsi kannalta kouluarvosanalla 4-10? Perustele vastauksesi!

Asiakkaiden kokemukset sovelluksesta:

1. Miten asiakkaat ovat suhtautuneet sovelluksen käyttöön?
2. Mitä kuvia olet käyttänyt:
    1. ainoastaan valmiita
    2. ainoastaan omia valokuvia
    3. sekä valmiita kuvia että valokuvia
3. Miten asiakkaat ovat ymmärtäneet valmiit kuvat?
4. Miten arvioit sovelluksen helppokäyttöisyyttä asiakkaille?

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