APPENDIX E - Raw Data Material aggregated for the Scenarios Design and Lifeworld Analysis

The consent forms from interviews and lab sessions of the LIVE-IT project used by all 4 partners clearly state that any data collected will only be shared if it's aggregated. Therefore, at this present moment and considering the project has now ended, the reasonable way of releasing any form of raw data is in anonymised and aggregated form and in a way that has been meaningful for the project: for the Co -LAB Scenarios Design and for the Lifeworld Analysis. Although, as suggested using personas as a form of analysing and aggregating this data is very interesting and useful, at this point, creating personas involves several hours of additional work that the project does not have.

1. Overview of User Needs Identified in WP2 (Lifeworld Analysis)

Using the W3C Key Topics and User Story Categories in Table 2 as a frame for analysis, all lifeworld analysis (Task 2.1) data was reviewed to identify user needs. We took a multi-layer approach to identifying user needs. First, we identified challenges mentioned by users during the interviews and/or focus groups conducted during the lifeworld analysis. Then, we grouped the challenges by W3C Key Topic, which we consider to be the main user need categories. We consider the W3C Key Topics to be synonymous with user needs for our data set, because the challenges identified could all be grouped by W3C Key Topic. This step was undertaken to both confirm that the W3C Key Topics were a good match for our data and to determine if any additional user need categories should be added to the list.

Table 1 – Lifeworld Analysis Key Topic Frequency

W3C Key Topic (User Need)	Total
1) Help users understand what things are and how to use them	61
2) Help users find what they need	78
3) Use clear content (text, images, and media)	86
4) Help users avoid mistakes	54
5) Help users focus	60
6) Ensure processes do not rely on memory	75
7) Provide help and support (computer-based and human)	191
8) Support adaptation and personalization	129
9) Test with real users	0

Table 3, above, is a frequency table depicting the number of times a particular key topic, or user need, was mentioned across all lifeworld analysis activities conducted by all project partners. Note that the *provide help and support (computer-based and human)* user need was mentioned most frequently. Also, the *test with real users* has a frequency of zero, which is interesting, because that means that none of our lifeworld analysis participants

mentioned testing solutions with real users. This indicates that PwCD have been so marginalised in this research that they do not see themselves as part of it.

After grouping challenges by W3C Key Topic, we also grouped the challenges by the presenting impairment. Rather than group by diagnosis, we decided to group by presenting impairment so that the findings may be more applicable to a broader audience. We define *presenting impairment* to be the primary cognitive issue related to the participant-reported challenge. This process generated 9 categories:

- Memory
- Focus
- Time and organisation
- Mood
- Physical barriers
- Reading, writing, and comprehension
- Numbers
- Digital skills
- General problems

It is difficult to provide both an overview of big picture themes and details of individual context within a single document. The tables and quotes that follow will aim to provide an overview of what has been learned through the lifeworld analysis activities that is relevant to the co-lab scenario development. Please visit the links above for additional details not provided below, such as individual diagnoses.

Challenges associated with Memory
Participant quotes associated with *difficulty recalling sign in information such as passwords*:

- 'He could never remember the simple passcode to access the iPad though.'
- 'I struggle with remembering passwords, codes etc. and the different processes involved in (navigating) different sites. If I've established a route in my brain about how to access info, I have to remember the path to get to info. Really convoluted routes to finding stuff that are unique to me and wouldn't necessarily make sense to others. Things I use to signpost steps.'

Participant quote associated with *difficulty recalling personal and family information*:

- "At this point [of his illness/diagnosis] he has started losing information about us, about himself. Sometimes he really struggles to remember who he was. Other times, and that's kind of shocking, he remembers everything with great detail. Like it was in a fog and then he wakes up. He remembers his wife, us…he is asking what we are doing. Then again, all his memories faint away again, and we are waiting for that glimpse of remembrance".

Participant quote associated with *difficulty to remember which button to press each time*:

- “He faces difficulty following steps, like one series of actions with many steps. Even if he remembers that the YouTube is a platform that amuse him, he is unable to consistently take the steps to get into the application and use it.”

Participant quote associated with *difficulty remembering the steps taken in a calculation when they are not shown on the screen*:

- “I use a calculator because my, my main errors are not in…it's not in understanding the formula. I understand the formula, but I struggle to execute the formula. I usually use a calculator. Usually, a piece of pen and paper just to write down what was calculated just to commit it to memory because I cannot again, remember very well.”

Participant quotes associated with *difficulty remembering processes*:

- “Eventually after many times showing him how, I had left an icon on explorer for the Welsh rugby, and he managed to go to explorer, Welsh rugby union, and watch it. He would get a little bit lost and make mistakes, but because it was all on the same site more or less, he would ask for help a few times, but he was using it for a couple of years. It was very difficult for him but where he had motive which he perceived as valuable he managed.”
- “I struggle with remembering passwords, codes etc. and the different processes involved in (navigating) different sites. If I’ve established a route in my brain about how to access info, I have to remember the path to get to info. Really convoluted routes to finding stuff that are unique to me and wouldn’t necessarily make sense to others. Things I use to signpost steps.”
- “One [client] has lost contact with her daughter, who wants to communicate by text, and she doesn’t know how. It’s a process of teaching. We’ve taught her how to send text messages. Its unfamiliar, learning takes longer due to processing speed being slower, short term memory issues. I have to keep repeating myself, re-explain how to do thing. I don’t know if it’s all the cognitive impairment or also mental health issues as they can present in a similar way to a cognitive impairment.”

Participant quote associated with *difficulty remembering appointments and important tasks*:

- “I like Google Keep. Reuse the checklist, saves me time. Doesn’t just disappear like on most list/task apps. Alexa, Google voice prompts, but privacy means they don’t just say the reminder, instead it ‘ruth you have a reminder’ then you have to prompt it to tell you. If you forget or get distracted, you miss the reminder.”

Participant quotes associated with *difficulty retaining information*:

- “I can read, but reading a book isn't possible. I'd have to remember what I had just read, processing issues.”
- “Sometimes my trouble would be tuning out in the middle of a lecture and then going from there so it's always handy to have the recording to listen back and then

go “Oh, that's what they said.” And then compare that with whatever notes I have or whatever notes I saved or uploaded.”
- “And with the Text 2 Talk reading it to me…that was a huge help because it would take me hours to read something, and I would forget what I've read. Whereas now I can actually finish it. I followed what I was reading, and I could hear it…it was so much better for me.”

Challenges Associated with Focus

Participant quotes associated with *difficulty staying focused*:

- “If I have my task, my mindmap, that keeps me focused.”
- “Concentration is difficult. 10-minute limit.”
- “I find myself blanking out, especially when I’ve recently had a seizure.”

Participant quotes associated with *cognitive overload in the presence of complex interfaces or too much information*:

- “I get lost in a rabbit hole of link after link. It’s overwhelming because I work visually, and I can’t see where I am in the order of things. Millions of tabs. I’m like how I need to navigate through this, I click a link then I've lost the source so I always end up with about thirty thousand tabs because I right click and open link in new tab.”
- “Overload, you bake your cake, get your ingredients, get your six words to prompt you to do what you need to do to not get side-tracked. Simplify appropriately and create the appropriate gateway system, circumstances, and recognition.”

Participant quotes associated with *cognitive overload from pop ups and other distractions*:

- “Websites have lots of colours, patterns, it’s too distracting. Adverts, pop ups.”
- “As I said, it's just the way that they organize everything, you know, it can be quite overwhelming…there’s so much, but you know…that they're trying to catch the eye…there’s stuff to try to catch your eye.”

Participant quotes associated with *delayed processing*:

- “Can’t do it. My brain doesn't register it now. Short term memory loss interfering with reading, writing, and concentration. Can't concentrate for long.”
- “Encourage people to take their time, correct mistakes, delete what they need.”

Focus group observer quote associated with *difficulty understanding abstract concepts such as the internet and its navigation for example understanding the structure of websites and how to navigate them using menus or buttons*:

- “Both in the preliminary tests and when interacting with the platforms, children had difficulty navigating the systems, reading web pages, and understanding the next steps in the online process. They could know from when to start when interacting with the surfaces.”

Participant quote associated with *difficulty communicating with people when they are not visible/there is no face-to-face contact*:

- "Without visual cues - I can't process the information. because of the way my brain works. I have to see. If I see your mouth moving, I can hear you!"

Challenges Associated with Time and Organisation

Participant quotes associated with *difficulty with time management and organisation*:

- "'Fatigue management' is really just customised 'time management' and I was introduced to journaling and diary organisation through OT's at rehab. I find it difficult to focus if I am trying to multitask and fatigue very quickly."
- "I can spend all day trying to do one thing. Frequently spend hours in front of the laptop not quite getting stuff done."
- "When I have to do a job on the computer I get fired, I lose my sense of time and at the same time because I know from the beginning that this will happen, I get stressed, and this helps me to make more mistakes."

Participant quote associated with *difficulty remembering the date, day or time*:

- "I use my phone to tell the time, know the day/date/month."

Participant quote associated with *difficulty finishing tasks*:

- "I have to work hard to build habits, even if I know they will help me. I find it hard to finish tasks."

Participant quotes associated with *difficulty sequencing and completing multi step tasks*:

- "Struggle with sequencing, getting stuff done consistently. It's hard having to organise and sequence all the steps of something and get to the end."
- Focus group observation - "Cognitive deficits are at such a level that they shape the functioning of working memory in different ways. Difficulty focusing on multiple stimuli, usually no more than 1 or 2 at a time let alone performing multiple procedures together."

Participant quote associated with *difficulty understanding time*:

- "Mum manages my time. I don't understand time (dyscalculia)."

Participant quote associated with *difficulty planning for the future*:

- "Autistic people can only see now, not ahead. They need prompting, reminding, visual timetables, text them."

Participant quotes associated with *difficulty avoiding or managing online distractions such as Netflix or social media*:

- “It's another thing that's also common in people with autism is difficult with managing and understanding their own emotions. So, for me, if I could have…like I won’t…I would like to have to have technology to help me to like to help me to point out when I am closing to I state that I'm upset…or, like, if I get close, could help me to tell me okay you need to pause you need to do something because you're not well right now.”
- “I watch YouTube videos and Netflix. I lose time on them easily.”

Participant quote associated with *difficulty organising and managing files*:

- “What I find quite handy about Google docs is that there's a lot of add-ons that you can use. I don't want new/multiple programmes. I don't want a new app. I want something that's going to work with my existing set up. I want an ad on or a patch if that makes sense it's kind of like you want it all in one place you don't want to keep leaving and having to go somewhere.”

Challenges Associated with Mood

Participant quotes associated with *anxiety and low mood*:

- “I felt very isolated from the world when I was unable to use technology in the same way as before and as it is such an important part of my life/our world I was very worried about the potential impact on my life in the future and this did contribute in a big way to my low mood and anxiety.”
- “…the amount of upsetting stuff you might see. And I would find very hard to forget an upsetting thing I've seen as opposed to someone else who might be like, ‘Oh, yeah, I saw that as well,’ I might be thinking about a few days later. And they would be like, ‘that was a bad five minutes after that,’ you know? So just kind of like being able to not…well, to set things up, and like tag things correctly. So, I've tried to like, delete certain words like so that they don't show up. But sometimes, things still set through.”
- “Confidence. Nothing being confident enough, not trusting yourself. I suppose…and I suppose having all of that from a young age. Like, I suppose…because I work in childcare it has really brought to my attention that if someone tells you, you’re going to be a nobody. It's very hard to change”
- “But I need to be mindful because it's like too much information. So, if I don't, if I'm not careful about this. I have a lot of mental problems with a lot of anxiety, a lot of stimulation can disrupt my sleep, or make me not sleep. So, for me, I would say that is the, the main issue like to really filter…the…my access…to not get all the things that are out there in the beautiful world of technology and get myself lost in it.”

Participant quote associated with *lack of motivation*:

- “He is held back by a lack of motivation, inability to focus and lack of understanding.”

Participant quotes associated with *feeling isolated*:

- “Zoom Parkinson’s exercise group. Isolation is the huge thing. We have a family WhatsApp, when you can see somebodies face, it’s a very different form of communication than speaking on the phone. I would always try and include him in those conversations on WhatsApp (by showing him them). Communication feels closer when you can see somebody.”
- “I have an Autistic (and deaf) client; they have no issues; their life is online gaming. In fact, they function online better than in the real world. As a result, they have engaged with social services better since lockdown and things going virtual. They have chosen to stay online for appointments, and I think she has stuck with us and engaged better. She prefers text over calls too. When she feels distressed, she goes online/games/forums for support.”

Participant quotes associated with *fear of trying new things*:

- “I do not want her to interact with the internet or other … eeee… web things. I am afraid of them. I do not let her watch tv. So, even if she is curious about the internet, I do not feel secure enough to let her use it. I can't understand them, I do not like them. All nowadays have to do with machines, we have lost the benefits of human contact.”
- “For instance, complex programmes or things I haven’t used before are too hard. To have to learn to use them requires too much energy.”

Participant quote associated with *difficulty with self-belief and imposter syndrome*:

- “Impostor syndrome – people with ability, great coping skills, and complex problems, slip through the net, can’t get support.”

Participant quote associated with *difficulty managing emotions*:

- “Since the stroke I have no frame of reference for fear, worry, anxiety, regret or depression. Because I don't know what it is. I don't identify it. I don’t feel it like that, I have feelings but can't name or categorise them. Negative dark thoughts, but I can’t verbalise them easily. I can reach out and talk but find it hard to explain. Alarm bells when watching sensitive content - I didn't know I had such dark thoughts.”

Participant quote associated with *difficulty with handling the unknown or the unexpected*:

- “If he is presented with something without preparation, he can become very frustrated and smash things.”

Participant quotes associated with *need of support in getting things done*:

- “When I want to do something, I have the big picture but I haven't identified the steps to take to get there. Clearer guidance would help. Revisitable guide. Real people help.”
- “You may need someone to go through it with you. Real life support from someone who understands the issues you have.”

Challenges Associated with Physical Barriers
Participant quote associated with *difficulty in movement and motion for example due to a tremor*:

- "Even mobile phones with big buttons aren't big enough. His physical tremor combined with his double vision makes his hand eye coordination very poor."

Participant quote associated with *difficulty using a touchscreen*:

- "They can't use a touchscreen without our help."

Participant quote associated with *difficulty using external hardware/devices*:

- "She is not able to understand the way to navigate and remember the function of each button and each device. At the end the devices cause her frustration and make her nervous."

Participant quotes associated with *visual impairment*:

- "Visual images are easier than words, I tend to have blurry vision, I disregard words in a way."
- "But now tech is too small, he has poor eyesight. Pressing the wrong buttons when scrolling."

Observer note from focus group associated with *motion sickness and vertigo*:

- "Participants experience motion sickness and vertigo."

Observer note from focus group associated with *difficulty with speech and language*:

- "Most of the children in the focus group do not have expressive speech or have difficulty enough (say a few words or their name)."

Participant quote associated with *difficulty with spatial navigation and getting lost*:

- "He can't control his hands; he can't control his body."

Participant quote associated with *risk of falling over*:

- "I strongly believe that if one device could help a person with dementia like him, surely it would be detecting risks and danger devices. For example, something like a smart house or an alarm that notify caregivers, important others or family when they are absent about a danger. Usually, we are all the time in order to protect him from falling -but even when we are absent for a while in a next-to door room we are afraid. We are also afraid when he is bathing-so something like a fall alarm would also be useful there. And also, a director that would notice other people or

movements of human beings in the house and alarm us and him simultaneously. For example, something like that it could be useful in cases a person with dementia is in danger because of thieves".

Participant quote associated with *difficulty noticing alarms and reminders*:

- "She has a smart watch alarm/timer for when she is doing activities, but when it goes off she won't remember why. She won't even acknowledge it."

Challenges Associated with Reading, Writing, and Comprehension

Participant quotes associated with *difficulty reading*:

- "If there is a lot of reading to do, she finds it difficult. She needs to take breaks due to information overload. When there are lot of images and words it's hard for her to find the information, she needs."
- "He was playing Minecraft, sometimes it asks you questions. He can't read them and gets frustrated, was crying, telling me 'I want to kill myself'. He was frustrated and this is how he reacts. He's so upset."
- Observer's notes: "The vast majority of people cannot read a written text and those who can, their reading level does not exceed that of the first grade."

Participant quotes associated with *difficulty writing*:

- "I would always use like Microsoft Word, you know that app, like, that…the thing that can read it out loud? So, like if ever I'm sending an email, like, I'll copy and paste that back into like Microsoft Word and read it out loud so no there's no mistakes and then send the email."
- "I, actually, will not send anything to any parent until someone else reads it, and they will pick up if it's wrong. And there's also…but I will not send them to someone else reads it. So, I wouldn't trust myself to send them this very simple answer, I would not do it."
- Observer's notes: "The majority of children cannot read or write, only some people can read or write at a very basic level like some words or their name."

Participant quotes associated with *difficulty with spelling*:

- "When I'm writing my essays, I do not write them. I dictate them because the way I write. It's like almost every word turns red, in Word. So, I dictate them to Word."
- "Spell Check. Um, spellcheck in like every aspect of life would be another one. Like obviously I have spell check on my phone, but then when you just say if you have to use like, you know, if you go to sound like an email, you can have spellcheck, but if people log on to, like, something else and they're trying to…I'm trying to think of something… like forms like we used. A lot of was in, like, is it Microsoft forms? You know, and stuff that has text boxes but doesn't do any of the formatting?"
- "There's definitely an anxiety element to having bad grammar and spelling, especially online, where like, oh, you might not…like sometimes I might sit there and

I'm like, I really shouldn't say that because I probably spelt something wrong and it's like…it drives up the anxiety levels, you could just be like, I don't need to be heard, right now, or stuff like that."

Participant quotes associated with *difficulty with punctuation and grammar*:

- "I use Grammarly pretty much all the time. Literally, any…any type of online platform…Twitter, Facebook, Instagram. I type something out, I autocorrect with Grammarly, and it feels great."
- "The technology is good there to help. So even I would kind of hold back from texting or anything like that because I'd be afraid to check the grammar..."

Participant quotes associated with *difficulty reading and following instructions*:

- "I needed assistance from other people much more frequently so while shopping/ordering food/making complaints or responding to emails I would avoid using technology (i.e., screens) and would have to see the shopkeeper directly rather than use self-serve, I would need to call someone and ask them to fill in some paperwork on my behalf rather than responding with an email with forms attached."
- "When a text has many instructions, I just do not read them. I do not read fast on paper here - I do not manage to read digital instructions."

Participant quotes associated with *difficulty filling out forms*:

- "Digital forms – sometimes can be so much easier, paper is really hard, word is overwhelming. One question at a time can be confusing, without the context of the other questions."
- "I might print of YouGov forms etc for clients who can't. Many people don't have access to computers, they aren't affordable for those on benefits. Or even if they can access them, they don't know how to use them."

Participant quotes associated with *difficulty finding information*:

- "To know which site to go to, to get the correct information that I need is difficult."
- "But yeah, if that was like if things were more straightforward like getting your timetable was just like that. Like the websites were more like I don't know how like clothing websites are. I think, older people, maybe people with dyslexia…Like, I noticed like with my parents because they're older using technology. They need a button that says click here, you know like, it needs to be obvious."
- "…and you're trying to figure out what each different person's storage style is…which is something that you know, on there, just makes it kind of exhausting to remember each and every one."
- "I spent a day and a half, trying to find a tax form, because there's so many forms of…that, you know, for somebody who only fills in this form, maybe once every three years. And, a day and a half, you know?"

- Observer's notes: "The majority of children cannot read or write, only some people can read or write at a very basic level like some words or their name. It is very difficult for them to understand abstract meanings."

Participant quotes associated with *difficulty understanding information including long and complicated text*:

- "I'm currently unable to read. I can read, but reading a book isn't possible. I'd have to remember what I had just read, processing issues."
- "The language they're using is highly academic. Use visual words. Picture words. I have problems with pronunciation. Using the right wording for the level of the individual."
- Observer's notes: "They use specific platforms from the internet for fun and as part of their education or video games. So, they are not familiar with using the internet as a search engine to extract useful information. Maybe it would be difficult for them to do without a guidance."

Participant quote associated with *difficulty understanding what fake news is and what is accurate news*:

- "I would worry about them finding incorrect information, knowing how to screen that, getting mislead."

Participant quotes associated with *difficulty answering calls due to not being able to read caller ID*:

- "I can't use it as an actual phone. So, I can't actually text. And I can't actually call. It has the calling app, but I can't do it. Because I can't read. And when I call. I don't know how, like the numbers. I don't know which number because of my dyscalculia. If someone calls me, I don't know who it is, because I can't read it. And I can't remember whose number that is. So, I just ignore the phone."

Challenges Associated with Numbers

Participant quote associated with *difficulty understanding numbers and carrying out basic calculations*:

- "Paying bills is a big source of stress."

Participant quote associated with *difficulty transposing numbers correctly*:

- "I can't see a mistake if I read something. I can't see a mistake and that…and I could read it 100 times, it can be read 200 times, I can't see a mistake. And that's what I found very hard, because even Grammarly maybe only picks up some things, and it doesn't catch everything…like, 2016 is a big year in childcare. I had written 1916, and I had read that 100 times, and I didn't see that mistake."

Participant quote associated with *difficulty making calls due to not understanding numbers*:

- “It has the calling app, but I can't do it. Because I can't read. And when I call. I don't know how, like the numbers. I don't know which number because of my dyscalculia.”

Participant quote associated with *difficulty answering calls due to not being able to read caller ID*:

- “I can't use it as an actual phone. So, I can't actually text. And I can't actually call. It has the calling app, but I can't do it. Because I can't read. And when I call. I don't know how, like the numbers. I don't know which number because of my dyscalculia. If someone calls me, I don't know who it is, because I can't read it. And I can't remember whose number that is. So, I just ignore the phone.”

Participant quote associated with *difficulty using money due to not understanding the value of money*:

- “I can't even pay because I don't understand the value of money.”

Participant quote associated with *difficulty using bank cards due to not understanding the value of money*:

- “Okay, I hate bank cards. I like money. I can't even pay because I don't understand the value of money. But the thing that people don't understand is with the card, you can be anything you want, and you don't know what you're paying for. See what I mean. And that's kind of a danger in a way if you don't understand. Because mom's like money's important. You need to know what you're using it on because you're in a budget. But if you have the card, if you have a card, especially the tapping thing (contactless), you don't know what you're spending on.”

Observer’s notes from focus group associated with *difficulty navigating the internet*:

- “People in the focus group cannot navigate the internet even for the basics without the help of a caregiver. They cannot login, type, understand the meaning of symbols.”

Challenges Associated with Digital Skills

Participant quotes associated with *difficulty operating online in unstructured environments such as social media platforms and search engines*:

- “because when there's too many options, it gets too confusing, and then you don't have the time to figure out which option is best for you, and then that just becomes overwhelming. And I think you just put it off altogether then, too, I think as well.”
- “I suppose so… Like I haven't really…I don't think I've really experienced this, but like it's this kind of like knowing which site is like reputable… or like which is, you know,

like that you're not going on to sites that like aren't giving wrong or bad information…"

Participant quotes associated with *need of support in using digital devices*:

- "You may need someone to go through it with you. Real life support from someone who understands the issues you have."
- "I believe as a family [they have undertaken her care] we can't provide our support in that field. She needs someone who know, someone expert to constantly help her interact and understand the way that devices work"

Observation associated with *difficulty using keyboards for example due to buttons being too small*:

- Participants have difficulty using keyboards because the buttons are too small

Participant quotes associated with *difficulty with online learning*:

- "My workplace has implemented a large amount of online learning for my future career progression and while I understand the convenience and financial advantages of this it does seem very daunting to start online courses as it requires a lot of concentration. Another positive though would be that you can work through courses in short portions and do it at 'your own pace', but I do feel that I have a disadvantage over my peers who can perhaps concentrate for longer periods at a computer screen."
- "Online learning is new to him. Didn't know how to use the tools. Using the pen, mouse. Just talking about the computer, he runs away."

Participant quote associated with *difficulty understanding non-standard symbols or images used in place of words*:

- "So sometimes if I'm not used to design, and if it's very like hidden in the back like the little buttons that are on the side. I don't read like well, I read, but that's majority of the time I go according to pictures and then notice like remembers where everything is on the website so if it's out of order more different than other than I have problems."

Participant quote associated with *difficulty avoiding risks online such as viruses, inappropriate content and cyberbullying:*

- "Enormous need for relevant information and support for people hitting problems, especially those with disabilities, as they are more likely to be further isolated and possibly targeted by scammers unless they have their systems working properly."

Participant quotes associated with *difficulty finding and paying for goods and services*:

- “Overwhelmed with finding service (electricity) suppliers. Too much information. I chose a supplier based on easy-to-use website, easy to pay. Too much choice is hard.”
- “I didn't do online shopping because I couldn't work it out. I can only buy food based on seeing it, so online didn't work for me. Or any shopping actually.”

Participant quote associated with *difficulty booking appointments/activities online*:

- “Doctors online thing that really confused me, it isn't geared to anyone who can't process stuff.”

Participant quote associated with *lack of computer skills*:

- “They may not have the gadget or skills. The parents may not have the skills either.”
- Observer’s note: “Many individuals with cognitive difficulties- such as those in our school- in addition to cognitive problems that prevent them from using appropriate digital tools, have not received adequate training, as education, unfortunately, focuses on covering very basic learning skills rather than focusing on basic digital skills, such as computer skills. This factor worsens their familiarity with digital media. Many do not even have a smartphone or computer at home, due to the area where the school is and the unfamiliarity of the population with these media.”

Participant quote associated with *difficulty finding accessible training on using digital tools*:

- “When I am in the workplace, or when I left university, like it is a big, big expense…like some of the software are quite expensive, and so…I suppose I feel like I've been lucky to getting things through the university.”
- “But it's hard to access those online resources that were in person. Because either not many people know about them or it's too complicated to get into, and you don't…well, you fear your problems will not be solved or you might not have the confidence to do it sometimes…like, you feel you might be wasting their time where they could be with someone else who need it.”

Participant quotes associated with *difficulty saving specific information in an accessible way*:

- “I’m doing open university, my module this year is online only, previously I would get a book as well, so it’s been really tricky, all the stuff on the screen. Juggling lots of information, different tabs/docs/PDFs. I got an ocular migraine. High stress, low energy, visual overwhelmed.”

Participant quotes associated with *difficulty accessing digital devices or tools*:

- ‘Many people don’t have access to computers, they aren’t affordable for those on benefits.’
- “And but yeah, as I say, going into third level was a game changer in terms of assistive technology. But like, the thing I suppose I always worry about is like, my mother always says this as well. It's like, getting to that third level…to like the place

with the supports, like that's the struggle, you know? So yeah, so I don't know if that's kind of the information you were looking for, but."

Participant quotes associated with *difficulty navigating websites without search bars*:

- "If it doesn't have like a search bar, to type in the exact word, then it can be kind of difficult."
- "if the information is like in a way messy and not clear, and not like positioned in a way that you can easily find it. So, for example I wouldn't use a system that I can't, I can't even easily find something. I guess it's yes…I can't remember…I can't think of an example that I remember that oh this is really nice. Not right now."

Participant quotes associated with *difficulty reading text when there are no options to adjust font, size and colour*:

- "It could not read the text for me. And it took me a week to read it because it was in columns, and it was tiny letters that were distorted. And it took me about a week to actually read it with comprehension"
- "Just having more options…Even like the backgrounds…by changing just kind of ensuring that they are in applications that you can. Because a lot of applications you can't."
- "For example, if you have a lot of colours at the same time, it's like too much information. Like, I tend to struggle with that if it's too much information, especially from different channels."

Participant quote associated with *difficulty navigating complex menus on apps*:

- "I don't really like the layout of the text reader. I only used one stop and I could not figure out how to rearrange the layout of the menu."

Participant quotes associated with *lack of awareness of tools*:

- "But I've always said that if it was something that was maybe introduced to you at a younger age, you might be able to get the benefit but it's like you're so used to…like I was studying for 18 years without any support."
- "And it's, well the big thing for me, like, because I've noticed that with other people like some people are just afraid to ask or to inquire what they're entitled to. And I just wish that people had the confidence to do that."

Participant quote associated with *difficulty using websites with Grammarly*:

- "I guess like there could be like certain websites not working with Grammarly…like, maybe other websites just don't like certain parts and…like certain plagiarism checkers can stop Grammarly from working properly because, you know, you might be putting in a word or text in Grammarly to check if it's all spelled it correctly, then the plagiarism thing tings as if I've copied it from somewhere else, even though it's just Grammarly changing it. I had that problem in the very beginning of the year,

where my lecturer came back, and I had a 90% Plagiarism warning on a completely unique piece of work."

Challenges Associated with General Problems

Participant quote associated with *no FAQ section*:

- "I get really annoyed with being ignored…or being patronized…just stick up an FAQ somewhere, you know? Now, and, you know…and then leave it up to the duration of the course, because if I'm frustrated, I might need to visit it again and take more from it than I did the first time. But really, that would be so stress relieving, if they just stuck-up answers to questions."

Participant quotes associated with *broken URL's*:

- "The links take you places that you didn't think they should be taking you, and then you're back to where you started, and you don't have the information that you need. Like, I couldn't find where the login to your student profile was…"
- "Things like broken URLs…. I mean, take them down, or fix them. I'm doing a lot of secondary research. So, you know, I could be doing productive stuff instead of going into something that looks like it makes sense, and meeting a broken URL…like, come on guys. Somebody gets paid to do these things, not me, so do them."

Participant quote associated with *difficulty finding employment opportunities*:

- "There's some good stuff online to help with employment, we have a jobs club with volunteers from a charitable organisations with laptops to help with job searches."

Participant quote associated with *difficulty working from home*:

- "I hated working from home, useless at it, couldn't create a routine. Covid 19 shifted us into a very virtual space in which I did not cope. Poor management from work, no team meetings. I need the physical office space, routine, structure to help me work. I did not manage to use the online tools that everyone else did. Online virtual tools didn't help me. I think I was quite depressed at the time."

Participant quote associated with *difficulty trusting new people or technology*:

- "There was Bristol UWE were wanting disabled people to join some work they were doing on technology in the home, and they were happy to put in various technological equipment designed to help people in the home to test it. He wouldn't do it."

Participant quote associated with *difficulty finding non-text options*:

- "One thing that can help is like the caption of the video. You know the caption, because sometimes I'm overloaded with the sound, and even the sound of a video,

like instruction in video, it's like, it's too much. So, I put it on mute, and then I just read and watch the video. So, it also helps me."

Participant quote associated with *text composed with Grammarly being flagged as plagiarism by assignment submission systems*:

- "and he's like, "What, what happened here?" And I'm like Grammarly…it's never done this before, and like these issues aren't getting solved, obviously. But at least my lecturer understood, I was able to push forward saying, Okay, I'm just going to mark you off the plagiarism thing we're going to get we're getting a new one."

Participant quotes associated with *difficulty understanding and entering captcha information*:

- "Yeah. Well one thing I find really hard actually is this, you know, when they ask are you not a robot? Um, they always say like click the palm trees that are in thing…I know where they are, but somehow, I never get it right and so that's something that really bothers me, because it's quite frustrating when you go and want to like purchase something or join something and this kind of is a barrier."
- "Yeah, it's, it's kind of a loop…and I have this tolerance for getting it wrong once. And, but…because if I get it wrong once, then I can figure out where the problem is. I usually invert threes and fives; eights and threes can be tricky. But, if I don't get it right the second time, then I tend to lose complete patience with it."

Participant quotes associated with *PDFs not compatible with T2S tools or screen readers*:

- "After talking to the professor and I explained why I would prefer if they can put the better-quality scans on after that, there was no problem."
- "What I think will be really useful for me and that maybe isn't what I don't have already…is like things that would help me read like some like physical documents so like I mean, the improvements with the types of things that can read what's on the laptop or the computer have been really great. But like, for example, if you're on the go, or in some meeting or something like that…that I would…that you would just hand out an agenda…I think it would be really helpful to have something that could enable you to read what was on it."

Participant quote associated with *difficulty navigating audio files to find useful information*:

- "But even getting lost in the voice note. It'd be great if you could like maybe had like a timer stopwatch or something like. And then, at least, it knows. But if it's automatically picked up on how to start the conversation and maybe even just transcribe the first sentence, to some extent, at least you can jump down and know."

Participant quote associated with *difficulty creating passwords and signing in*:

- “He does not remember his name nor his passwords, let's say in his bank account. We are in charge of protecting his personal data and everything. We also made a YouTube account in order to store his video preferences, and also there we (meaning the family) are managing his profile.”

2. Challenges, Tools & Quotes, during co-labs sessions

Pre-Lab sessions & Observation Lab sessions

In that stage, we examine along with teachers, experts and end-users (PwCD) more tools, so that we can exclude some and make a shorter list from the catalogue in order to enroll those tools from the shorter list to scenarios from the LAB session phase.

Challenges	**Tools**	***Quotes***
The majority of the tools of the Toolkit where in English, so they were unsuitable for use in the Greek population of PwCD (who hardly maintain and develop linguistic skills in their mother language, Greek) Solution to that problem in the lab sessions: During the prelab sessions, with help from teachers and caregivers of PwCD, we select tools from the toolkit that are also translated in Greek or have a Greek version	Many tools, platforms and applications of the Toolkit i.e. UK Bus Checker ICE - In Case of Emergency When to call 999 Contact the Police 101 Online How to Assess an Emergency Situation Uber (other culture - Uber is not developed in Greece)	*"The problem is we can not use many of the tools because they are in English and our people are not going to understand the guidelines, the use, even with us beside them"* *"Excellent tool, but the problem is that it is only for English speakers"* *"If only it was in Greek…"* *"We tried it but it was in English, so it was not useful enough for us"*
Many tools were not free Solution to that problem in the lab: During the prelab sessions, we select from the toolkit the tools that were free of charge. Mapping accessible free tools	accessiBe Teach Tap in Gadgets coloradd - color identification system	*"Ohhh good idea… but not free of charge"* *"Nice tool but we need to pay in order to access it"*

A lot of tools needed to be downloaded and the hardware (PC) of the special schools could not download them (This is a very important issue, because even when we find a solution to conduct the programmed lab sessions, the majority of public special schools and some educational organizations with PwCP, do not possess technologically updated systems (most of their PCs that public schools have are operating in Windows 7 and some tools of the toolkit need Windows 10 to run properly without functioning problems -environmental characteristic) Solution to that problem in the Lab: Educators and caregivers with guidance and assistance from our team, brought and used their own laptops or smartphones	Read and Write Visual Keyboard Magnifier Microsoft OS Narrator Apple Voice Control Apple Switch Control Apple Assistive Touch Apple Touch Accommodations Apple Back Tap Apple Siri Apple Accessibility Keyboard Apple Dictation Apple Predictive Text Apple Notes Penfriend XL Microsoft Windows 10 Accessibility: Vision Action Blocks	*"When we downloaded the app our PC froze"* *"When we run the app, everything in the PC frozes and suddenly nothing functions"* *"Our hardware systems are very old. We need to use our own, but old PC systems which you are seeing in our establishment, is the national educational reality. It is like taking a photograph of what is the technology level of equipment for schools in Greece"* *"Using those apps in Greek special schools is like trying to run the software without the hardware".* *"We need to modernize the technology we use in order to run these apps".*
The majority of PWCD do not own or use smartphones Solution: Educators used their own smartphones, when tools required use of smartphone	Alexa Switch Access for Android VoiceOver	*"Alexa would be useful, but most people in our school do not own their own smartphone – especially end-users".* *"Only some of the children use smartphone but with limited use."*
PwCD could not use the tools without the help of the caregivers and educators. Solution: Implement educators and caregivers to the procedures	General	*"We have to sit by their side to guide them"* *"We have to repeat the scenario a lot of times"*

Lab Sessions/Observation sessions - On going process

Challenges	**Tools**	**Quotes**
Convert text into speech	Text to Speech	*"Without our help it is difficult for them to choose text"* *"Useful tool in order to help people to read online instructions and webpages"* *"Under the guidance of a teacher, the student managed to choose Greek language and the tool displayed the words most of the times normally. In this tool, the user could select the option of clicking the correct word by the automatic word search on google, which succeeded with relevant guidance".*
"Search information" "Check and search emergency numbers"	Google Chrome	*"They were already familiar with such processes".* *"We use it more or less every day".* *"The good thing about this tool is that it automatically displays the suggested web pages according to the spoken word".*

		"This tool was easy for the particular student as well as the familiarization with computer use is satisfactory and he does not present particular speech problems." *"The positive with this tool is that it automatically displays the suggested web pages and the specific one student has satisfactorily mastered the reading skills".* *"Our student managed to use the tool successfully.* *Her teacher chose the Greek language and the tool displayed all words normally. This tool is enabled by right-clicking (if the desired word is marked) to automatically search for the word on google. Even though our student did it, he did it with the teacher's guidance, therefore it is not considered particularly useful".* *"The good thing about this tool is that it automatically displays the suggested web pages according to the spoken word, a fact that excited a student, in oppose to having to use the computer through the keyboard (in which case he needed constant support".*
Convert Speech to Text	Microsoft Speech to Text converter	*"This tool includes more options (shrink, zoom, clear the content, etc.), which could help visually impaired students. The observed*

		student managed to make proper use of the voice command most of the time. An additional upgrade we would suggest is that the tool could display more than one option when the spoken word is not clearly identified".
Convert Speech to Text	Text from to Speech	*"When the word is long it does not identify it".* *"[..] because the student has speech problems, the tool could not display the words correctly. An additional upgrade that we suggest is that the tool could display more from one option when the spoken word does not sound very clear".*
Convert Speech to Text	Microsoft Speech to Text converter	*"Improvements for identifying the words when people face difficulty in pronunciating them in a clear way. It is a useful tool, but if the word is not clear dictated from students - just like in our case, it is not useful".*
Convert Speech to Text	Text from to Speech	*"Could be useful with improvements in the voice recognition mechanisms".*
Search online Interact with online interfaces	Visual Keyboard	*"It is very frustrating for children".* *"They need constant help from us in order to achieve interaction with this tool".* *"This tool did not help our student much. He showed that he preferred to use the actual keyboard".*

		"Maybe this tool would help visually impaired children". *"This tool did not help our student much, due to visual-motor coordination difficulties".* *"He showed that he preferred to use the actual keyboard".* *" We liked that it is easy in use".*
Correct written words Writing online	AutoCorrect Windows 10	*"This tool did not help our student. It corrects only small words".* *"This tool did not help our student because he is not used to reading and writing skills".* *"It was the only tool that picked her interest and she cared about 1-2 minutes by pressing various buttons".*
Writing online	Coloradd-color identification:	*"With this tool our student managed to change colors in the title bar".* *"The majority of students disliked this app - even if they succeed in using it".*
Writing exercise Transform written script	Access Angel	*"Under the guidance of the teacher, the student used the various options of the tool, such as changing the font itself or the font size but did not seem to like it".*

		"The student was unable to use the tool. Since there was guidance from the teacher, he did not understand the changes in fonts and font size".
Correcting writing speech	AutoHotKey Microsoft Windows	*"This application is useful".* *"Some people find it hard to understand its functions, because they could not understand they made spelling mistakes in the first place".*
Personalized help through internet navigation	Google Assistant	*"The PC froze when we downloaded it and we could not use it. Perhaps it has high technical requirements".*
Keeping short notes	Microsoft Sticky Notes	*"Not useful for people who are not performing writing skills".*
Keeping short notes Schedule a programme	Microsoft To Do List, Tasks and Reminder	*"Difficult in use".* *"Majority of students failed in using it".*
Transforming written texts	contrastchecker	*"Under the guidance of the teacher, the student managed to make color changes both in the "background" and in the "foreground" for 2 to 3 minutes, however, it does not have any useful function for our student".*
Personalized help- Give instructions to smartphone/ Searching information	Alexa	*"[...] it is helpful, but only with the physical help and guidance of a caregiver who transmits what Alexa says to students and help the interaction".* *"Some students found this tool really helpful and they were excited by following the*

		instructions and then see data appearing on screens". *"Really useful for searching on searching machines".*

CO-CREATION LAB SESSIONS RESULTS OF ADULTS WITH ADHD

QUESTIONS	NOTES
1. What kind of digital devices do you usually use (tools, frequency)?	• DeepL Translate: an application for translations. It is simple for them, user-friendly, effective, facilitates their work, and has only a few choices (which is an advantage for participants). "The options are as many as needed, so that we don't get confused". • Google Drive: Helps to coordinate their drafts and work, it provides a friendly digital environment with pleasant colors as well as, quite space ("easy on the eye"). • Google Maps: characterized as very useful, pleasant, used-friendly tool. All participants find the colors and symbols (car, pedestrian etc.) of Google maps, quite assistive for them. They use this application frequently. • Finale (software), Wave-Lab (software) & Q-Base (application): used for music production, is helpful and comprehensible, when being familiarized with them. • Microsoft Word/WordPad: for job requirements.

2. Do you face difficulties while interacting with them? If so, what kind of difficulties do you face? If not, what would help you improve your experience?	Microsoft Word/WordPad: those tools are quite difficult, but assistive for participants with ADHD. They need some education to use them properly, or some help when they forget "what to do next". Pop-up advertisements in websites or YouTube accelerates their stress or frustration and their attention-related weaknesses. In use of digital devices (smartphone/laptop/PC) in general: they sometimes struggle to find exactly what they type in search engine (maybe due to spelling mistakes). "I have difficulty in finding articles about a particular theme on websites, for my job, for instance. I would like to speak up and the correct results to appear automatically". They also mentioned that "simplicity is the ultimate of sophistication", "I would like all the apps to be more simplified for us. Less text, more explanatory animated videos, images with dialogues, less options - only as much as needed". There was also a common preference for the white, bright background instead of the black.
3. Are there any areas in your daily life where you consider that ADHD diagnosis affected your interaction with the various digital devices and tools? If so, which are they and in what way was your interaction with these devices and tools affected?	There are some difficulties in recalling specific, common words or even names (tip-of-a-tongue)[1]. As a matter of fact, they cannot remember the right word to type in a Google/Bing search engine, but they do remember the category or information of the word (e.g., a city near Thessaloniki, around 50 km north, not the name of the city). Difficulties in remembering passwords, as well. Cognitive difficulty in selecting "key-words" when they want to search something, but they can describe general information about what they want to search (difficulties in specification). "Without key-words, the search on the Internet becomes even harder for us". Difficulties regarding fast typing during their job tasks. In addition to that, some participants mentioned difficulties in using the keyboard in two (2) different languages. Participants also mentioned difficulties in typing the right word in Google Chrome, spelling a song correctly in YouTube etc. (spelling mistakes). Attention deficits due to "bunch of colors" on some websites.

[1] Memory deficits are not a common or frequent symptom in people with ADHD (not included in DSM-5 criteria for ADHD in adults), however difficulties in memory can appear due to socio-psychological factors or changes in neuronal network connectivity.

	Difficulties in putting acute accent on Greek words (spelling mistakes). When they get stressed or overwhelmed, they are more vulnerable to "get lost" into websites, mails on Gmail, Word drafts etc. and have difficulties in task and time management.
4. Are there any compensatory strategies that you used?	They do not have any compensatory strategies regarding memory deficits, keyword finding or using 2 languages alternately on keyboard. They give themselves time to remember/think some appropriate, each time. When they feel overwhelmed, they tend to return into "obsolete", as they said, approaches, like writing down their tasks (with pencil and a piece of paper) instead of using some calendar application (e.g., Google calendar) that requires some attention and some concentration when typing.

5. Do you think that the tools you tried will help you in your daily life? In which way?	Microsoft Text from to Speech: it is very useful when writing emails, documents or keeping various notes. It is preferable to be used on smartphones. Speech To Text: It is quite helpful but more complicated. “It has many options that I cannot understand, and I need the help of an expert to show me how to use it properly”. Google Calendar: It is quite pleasant and useful; however, it causes some frustration due to the many different color options and its structure. Participants expressed the need of some instructions or, even better, some training on how to use this application to be able to utilize all of its features. As a matter of fact, sometimes they avoid using calendars in general (they write down the tasks). Nevertheless, it helps that Google calendar has reminders and specific options regarding time. Grammarly: It is a highly assistive tool for them due to their spelling mistakes. They will use it daily when typing an email or a task for their job. NVDA: Helpful, but not with clearly comprehensible steps regarding downloading, installing and running it. Cookie Notice Blocker & Minimal consent: They are helpful as distraction blockers, but some participants need help of experts to understand how to download and use them.

Do you have any suggestions for improvement regarding some of the tools you interacted with?	"Tools should have an incorporated tool regarding password (passwords reminder)". "Google could have a tool only for that, instead of a pathway of restoring your password or making a new one". "Applications should be in black-grey and some blue. These colours do not tire and do not distract our attention". "T2S converters should also have the ability to copy & paste in a prominent place and share something easily". "All the tools should have gaps between the menus to be distinct at each point". "It is generally preferable having white/bright background and letting space so that the content could "breathe".

Co-creation lab with ADHD adults

QUESTIONS	NOTES

3. What kind of digital devices do you usually use (tools, frequency)?	• DeepL Translate: an application for translations. It is simple for them, user-friendly, effective, facilitates their work, and has only a few choices (which is an advantage for participants). "The options are as many as needed, so that we don't get confused". • Google Drive: Helps to coordinate their drafts and work, it provides a friendly digital environment with pleasant colors as well as, quite space ("easy on the eye"). • Google Maps: characterized as very useful, pleasant, used-friendly tool. All participants find the colors and symbols (car, pedestrian etc.) of Google maps, quite assistive for them. They use this application frequently. • Finale (software), Wave-Lab (software) & Q-Base (application): used for music production, is helpful and comprehensible, when being familiarized with them. • Microsoft Word/WordPad: for job requirements.
4. Do you face difficulties while interacting with them? If so, what kind of difficulties do you face? If not, what would help you improve your experience?	Microsoft Word/WordPad: those tools are quite difficult, but assistive for participants with ADHD. They need some education to use them properly, or some help when they forget "what to do next". Pop-up advertisements in websites or YouTube accelerates their stress or frustration and their attention-related weaknesses. In use of digital devices (smartphone/laptop/PC) in general: they sometimes struggle to find exactly what they type in search engine (maybe due to spelling mistakes). "I have difficulty in finding articles about a particular theme on websites, for my job, for instance. I would like to speak up and the correct results to appear automatically". They also mentioned that "simplicity is the ultimate of sophistication", "I would like all the apps to be more simplified for us. Less text, more explanatory animated videos, images with dialogues, less options - only as much as needed". There was also a common preference for the white, bright background instead of the black.

6. Are there any areas in your daily life where you consider that ADHD diagnosis affected your interaction with the various digital devices and tools? If so, which are they and in what way was your interaction with these devices and tools affected?	There are some difficulties in recalling specific, common words or even names (tip-of-a-tongue)[2]. As a matter of fact, they cannot remember the right word to type in a Google/Bing search engine, but they do remember the category or information of the word (e.g., a city near Thessaloniki, around 50 km north, not the name of the city). Difficulties in remembering passwords, as well. Cognitive difficulty in selecting "key-words" when they want to search something, but they can describe general information about what they want to search (difficulties in specification). "Without key-words, the search on the Internet becomes even harder for us". Difficulties regarding fast typing during their job tasks. In addition to that, some participants mentioned difficulties in using the keyboard in two (2) different languages. Participants also mentioned difficulties in typing the right word in Google Chrome, spelling a song correctly in YouTube etc. (spelling mistakes). Attention deficits due to "bunch of colors" on some websites. Difficulties in putting acute accent on Greek words (spelling mistakes). When they get stressed or overwhelmed, they are more vulnerable to "get lost" into websites, mails on Gmail, Word drafts etc. and have difficulties in task and time management.

[2] Memory deficits are not a common or frequent symptom in people with ADHD (not included in DSM-5 criteria for ADHD in adults), however difficulties in memory can appear due to socio-psychological factors or changes in neuronal network connectivity.

7. Are there any compensatory strategies that you used?	They do not have any compensatory strategies regarding memory deficits, key-word finding or using 2 languages alternately on keyboard. They give themselves time to remember/think some appropriate, each time. When they feel overwhelmed, they tend to return into “obsolete”, as they said, approaches, like writing down their tasks (with pencil and a piece of paper) instead of using some calendar application (e.g., Google calendar) that requires some attention and some concentration when typing.

8. Do you think that the tools you tried will help you in your daily life? In which way?	Microsoft Text from to Speech: it is very useful when writing emails, documents or keeping various notes. It is preferable to be used on smartphones. Speech To Text: It is quite helpful but more complicated. “It has many options that I cannot understand, and I need the help of an expert to show me how to use it properly”. Google Calendar: It is quite pleasant and useful; however, it causes some frustration due to the many different color options and its structure. Participants expressed the need of some instructions or, even better, some training on how to use this application to be able to utilize all of its features. As a matter of fact, sometimes they avoid using calendars in general (they write down the tasks). Nevertheless, it helps that Google calendar has reminders and specific options regarding time. Grammarly: It is a highly assistive tool for them due to their spelling mistakes. They will use it daily when typing an email or a task for their job. NVDA: Helpful, but not with clearly comprehensible steps regarding downloading, installing and running it. Cookie Notice Blocker & Minimal consent: They are helpful as distraction blockers, but some participants need help of experts to understand how to download and use them.

Do you have any suggestions for improvement regarding some of the tools you interacted with?	"Tools should have an incorporated tool regarding password (passwords reminder)". "Google could have a tool only for that, instead of a pathway of restoring your password or making a new one". "Applications should be in black-grey and some blue. These colours do not tire and do not distract our attention". "T2S converters should also have the ability to copy & paste in a prominent place and share something easily". "All the tools should have gaps between the menus to be distinct at each point". "It is generally preferable having white/bright background and letting space so that the content could "breathe".

9. Would you suggest to a friend to use one of the tools you used today? If so, which one and why?	"All tools have a specific utility". They all expressed that all tools have applicability in daily life: "it depends on the needs of every adult with ADHD". "Education from experts is important. Each participant has different needs, perception, familiarization with technology etc.".
8. How does the Toolkit seem to you? Do you think that it serves its purpose?	It serves its purpose - it includes a clear categorization of the tools as well as basic information of each tool.

9. Do you agree to include these tools you used in the toolkit platform? If not, which of the tools do you find useful to include?	All participants agreed that all the tools should be added in the Toolkit. They mentioned that some tools may be less helpful for some people hence, the same tools useful for others with the same diagnose. As a matter of fact, it is vital having choices when it comes to web accessibility.

10. Do you have any suggestion for the improvement of the Toolkit?	There was some common preference in: having a video for descriptions of the purpose of the toolkit and maybe for each category. Narration in every information. Maybe some melodies when “touching” a special category (e.g., makerspace). Small image/logo of each tool that represents in short, what it does.

Cognitive Disability and the Digital World: Overview – Coding and Quotes

Digital Joy	Reports of feeling joy, enjoyment, satisfaction, happiness, fulfilment, and other related emotions when using digital technologies and/or interacting with the digital world.	EP	n/a
		FA	Like I actually find like using technology easier than using, you know, like pen and paper...because, like, when you, you know, when you write it kind of corrects. It nearly knows what you're saying.
		LD	Not really now because I, I will say that I'm quite literate, I guess. So, I kind of use it a lot for different…different things. It's something that I kind of utilize too often that I'm just always I would struggle to even name. But, it could be a struggle because I find it so much easier to use

			that I other aspects of my life yeah, you know I'm quite…I find it as like my main access to the things I enjoy.
		JN	I use Grammarly pretty much all the time. Literally, any…any type of online platform…Twitter, Facebook, Instagram. I type something out, I autocorrect with Grammarly, and it feels great.
		GC	I like how my whole…my course it was done mostly online. And I thought, I'll never do this but I actually loved it. Last year cuz things were recorded. If you go to a lecture, and you don't hear it or you might miss something, it's gone. For this we were able to go back in and listen to your that like to me that was a huge benefit.
		PJ	You know, I'm loving the online education thing. Absolutely loving that because it's overcomes a lot of a lot of the dyspraxia stuff.
		RH	I'd say my confidence with technology would be really high if you like, eight or nine out of 10.
		AS	I'm a person that…I love technology. So, I always put technology in every part of my life unitl I get to the moment that I say I cannot use a screen anymore, but I use technology a lot.
		AP	Other than those, like I suppose the online world has really you know…um, made things great for me, and I use the internet like every day. I'm on social media, as well, and I suppose, like, the…I've been very lucky that I've got everything through the university, but like I think for…like if I wasn't it would be hard to get like assistive technology.
Digital Anxiety		EP	n/a

	Reports of feeling anxiety, nervousness, and uncertainty when using digital technologies and/or interacting with the digital world.	FA	I think it's like, it's the overwhelming part of it, you know like if...I remember actually in my first year, I hadn't got a hang of, like, because you know you get like a new email address, and it's like a different system
		LD	I guess, the biggest thing is that, you know, you can't control what you see on the internet. So, it's my only big issue, but you might have seen an extremely upsetting post.
		JN	there's definitely an anxiety element to having bad grammar and spelling, especially online, where like, oh, you might not…like sometimes I might sit there and I'm like, I really shouldn't say that because I probably spelt something wrong and it's like…it drives up the anxiety levels, you could just be like, I don't need to be heard, right now, or stuff like that.
		GC	I, actually, will not send anything to any parent until someone else reads it, and they will pick up if it's wrong. And there's also…but I will not send them to someone else reads it. So, I wouldn't trust myself to send them this very simple answer, I would not do it.
		PJ	Since the HSE hack, I have gotten absolutely paranoid about online security. And, I mean, not at all sanely paranoid about things…I come from a family who are security paranoid anyway. That really freaked me out.
		RH	I guess just your confidence when you're emailing or typing or something they're like, kind of overthink and then what you're writing.
		AS	But I need to be mindful because it's like too much information. So, if I don't, if I'm not careful about this. I have a lot of mental problems with a lot of anxiety, a lot

			of stimulation can disrupt my sleep, or make me not sleep. So, for me, I would say that is the, the main issue like to really filter…the…my access…to not get all the things that are out there in the beautiful world of technology and get myself lost in it.
		AP	like it is a big, big expense…like some of the software are quite expensive, and so…I suppose I feel like I've been lucky to getting things through the university…
Self-Advocacy	Having to remind others of the services and/or supports that one is entitled to through DSS; having to make known to others that one has a disability in order to received the appropriate assistance	EP	After talking to the professor and I explained why I would prefer if they can put the better quality scans on after that, There was no problem
		FA	I'll get feedback, you know like the news site on Blackboard they'll write comments, and they'll write comments that are like showing that they've went directly against the guidelines like I'll get marked down for grammar and then I'll have to email the lecturer and explain that like you know if I use the wrong were in a sentence, it's like you can take a mark off that dyslexic and I'll have to tell them that I'd like they say oh you should have sent the Lens report and I'll be like well I sent it twice
		LD	Or they'll say that they want you to come in person to get all the notes. They'll say that like, "Oh, I don't post anything on there." They will post like lecture slides. And then like, a lecture like, rundown of the lecture doesn't put the very basic intimate information there. And then, if you say, like, I was entitled to notes from each lecture, under my disability
		JN	One other thing I could think of…I'm so bad with this…I thought about it because I had to do it recently…it was a

			whole problem with sending my lens reports out. I forget to do it. I got reminded this year. Like, “Oh, did you say your lens reports?” And, I’m like, I should probably do that, because the college keeps telling me…is it especially in first year
		GC	And, and I did contact them and in fairness, some of the lecturers were very good, some of them just…just didn't want to entertain me.
		PJ	And I, I also think in that case, being a woman, and being, having to be persistent because of my condition, which I'm sure there are many who have it, as well. But being a woman, I feel it's a different…If I say a different tone on it, or a different color, do you know what I meant? Yea. I’m sure there’s a nice English or scientific word for it, I just can't remember at the moment because I use phrases like tone and color
		RH	n/a
		AS	n/a
		AP	And it's, well the big thing for me, like, because I've noticed that with other people like some people are just afraid to ask or to inquire what they're entitled to. And I just wish that people had the confidence to do that.
Diagnosis	Descriptions of when and how an individual was diagnosed; descriptions of the effects diagnosis had on an individual	EP	I was not aware of my disabilities until the late age. And before that, it was like assumed that I would figure it out simply and for everything literally it was assumed that I should know that. And we know, like, especially with maths, I would study, and then nothing would stick, and that's the only problem that I found out after I was diagnosed. The problem was also to find a place to get a

			diagnosis as well as an adult. And after that, it was much easier
		FA	it was just when I started at NUI Galway.
		LD	So, I got an official diagnosis when I was, like, 23. So late age diagnosis.
		JN	I was in second or third class, I believe, in primary school. Then, re-tested for the junior cert.
		GC	. I knew I had struggled, but I would have had a very bad experience in primary school, which made me believe that I was stupid. No could never learn. And, with going back to school, I thought… I have to prove I can do this. I did do it. And I think everyone is everyone's just driven differently, it depends, it depends.
		PJ	I had to have at least two other reports, which found other things wrong or right depending on your way of looking at the latest one came up with dyslexia, dyscalculia, and dyspraxia, and it took me years to figure out how to say dyscalculia.
		RH	Yes. So I, I have dyslexia. So I just struggle with reading. Words are kind of hard to kind of pick up a meaning.
		AS	Okay, so, I was diagnosed with autism spectrum disorder. I was diagnosed as an adult, It was here in Ireland, yeah. What else can I say. I don't know, it's so general the question that I don't know.
		AP	Yes, so I'm dyslexic and I have always been you know. I was diagnosed when I was very young and when I was only maybe a year or two into primary school. So, I was only maybe six or seven I think at the time and I suppose I found school like very difficult.

Social Support	A need or desire for community built around shared expriences	EP	n/a
		FA	I, like, actually don't know what the numbers are. Just say for example it was maybe more than five. But I might know, I think I know two other people in my town, that are dyslexic, and it's the kind of things like in schools where I live in would not be something that would be kept confidential or private like if somebody in my town was dyslexic everybody would know, because it's just such a small town.
		LD	But, I was like, no, I need more than just academic help. I need someone to like help me organize my car, like someone just to help me like even go through, like the different processes of planning on purchasing things and like emailing lecturers and that kind of thing. Keeping an eye on dates and times and try not to get overwhelmed. procrastinating would be the big one, I guess.
		JN	There's a big group chat for all, for everyone in our course that… “oh, this this thing went on” or, like, “at this time there's a new assignment ready, we can do it now, get a head start.” Or, sometimes, it’s “stop,” or “make sure you've done the assignment” or “the grades are up now” kind of stuff.
		GC	Feedback. But, I don't know how it can be done digitally. And that would be something I would have kind of struggled with, you know, not having feedback from an assignment. Because you're…you're submitting something and that's it, it's gone. Where I felt if you could send it in and look at this small change you might need to make that would bring up your marks, that would reassure people I think. I don't know I don't know

			it can be done through technology, I don't know whether it can or can't
		PJ	And I've heard that a lot in the community.
		RH	n/a
		AS	n/a
		AP	meeting other students with disabilities is a really, really big thing and understanding like common kind of, you know, difficulties. When I was in UL, for example, we had a room in the library where everyone with a disability could go and no matter what disability I had, and like, for me, it was nearly like social support to go there more than anything else…to realize I'm not the only one stuck and they tend to have like an open access or an open office. So, the staff were like sitting around the place, and then the computers for us were in the middle. So, they were really approachable and you know, that kind of thing.
The Human Element	Descriptions of innovations or improvements needed that deviate from a focus on the digital to a focus on the humans creating/setting up/managing tools and platforms; descriptions of systemic issues involving human interactions	EP	n/a
		FA	you know like the way every teacher, every lecturer has like a different module? Like some of them will upload lectures on there like week one, week two, some of them I'll just put them everywhere, so like that part of it can be really frustrating. I don't know if that's coming from a place of dyslexia or just not liking it
		LD	People kind of not using the potential on the other side of it, as opposed to my difficulty on my side…you know, like difficulty with using Blackboard on my side. They have like, so many different ways of organizing the files. And the same with websites where some people will

			have learning materials on it. Lecture notes are there. But then some other people would have folders. And it's trying to figure out how each person does it differently.
		JN	But it's hard to access those online resources that were in person. Because either not many people know about them or it's too complicated to get into, and you don't…well, you fear your problems will not be solved or you might not have the confidence to do it sometimes…like, you feel you might be wasting their time where they could be with someone else who need it.
		GC	I'm a grown adult, and I keep saying I'm going to go back to that primary school teacher, and pull him up for it because he actually destroyed my confidence.
		PJ	That drives me particularly crazy because I have to put in so much effort to do my job properly. And then I see people who don't have the same challenges as I do, who were very casual about it and I can sort of live with that and the impacts on me and then I lose my temper.
		RH	n/a
		AS	n/a
		AP	But I often found like teachers didn't really understand dyslexia, like, they didn't understand why I was like intelligent or like engaging in the class but then when it came to assessment that I was I was doing like poorly for example, in the in class assessments, if I for example, didn't have assistance in reading and all that.
Text-to-Speech	Use of digital or web-based text-to-speech tools	EP	it could not read the text for me. And it took me a week to read it because it was in columns and it was tiny

			letters that were distorted. And it took me about a week to actually read it with comprehension
		FA	So, I think if things were more spoken, but I know that's probably not the same for, like, I think everyone might not need that…the things that I struggle with are spelling and reading out loud, whereas I know other people would struggle with maybe talking or like other things like that pronunciation. So, I think that would help me.
		LD	n/a
		JN	But like, I guess, online reading is difficult to find and I…trying to find like specific things I may need like documents are very hard to find. The, even though we have the stuff through college for the papers and stuff it can be very difficult to find them all drawn out perfectly. In their final form, sometimes they're broken up awkwardly and it's not very convenient.
		GC	And with the Text 2 Talk reading it to me…that was a huge help because it would take me hours to read something, and I would forget what I've read. Whereas, now I can actually finish it. I followed what I was reading and I could hear it…it was so much better for me.
		PJ	n/a
		RH	n/a
		AS	No, no, not in this case.
		AP	And, also, as well, like my parents for example I put all my books on tape at the time which is it was a long time ago. And for…so like for me…is that I audio listen to everything, you know, and they put all my books on tape at the time which was a big kind of endeavor, you know, for my state examinations. And then I suppose…I like…we

			weren't really aware or didn't know of any kind of assistive technology when I was in school but I don't think it was really as good as it is now anyway.
Speech-to-Text	Use of digital or web-based speech-to-text tools	EP	when I'm writing my essays, I do not write them. I dictate them because the way I write. It's like almost every word turns red, in Word. So I dictate them to Word.
		FA	I'm sure you've noticed…like really fast here in Donegal. And, if I listened to, like, other accents or other people speaking, it's kind of like you feel almost like it's you have like ADHD or something and you can't sit through it.
		LD	I guess transcripts of lectures would be very handy if you could get, like, a written transcript of what was actually said in the lecture and you could choose between the two, or you can read along with it, you know? I know some lecturers do Close Captions on the bottom but it also could be quite handy just to have something you can print out the exact written word of the lecture.
		JN	n/a
		GC	n/a
		PJ	n/a
		RH	And I've used applications like the otter software, which converts text..or, um speech to text.
		AS	that one thing that can help is like the caption of the video. You know the caption, because sometimes I'm overloaded with the sound, and even the sound of a video, like instruction in video, it's like, it's too much. So I put it on mute, and then I just read. So, it also helps me.
		AP	n/a

Text Composition	Use of digital or web-based tools that support text composition by checking grammar, spelling, tone, and/or other text elements	EP	And after that, I just click on the red words. And if some more, some words like, though, and some words that are kind of our counter-intuitive spelling, those who have to google search the meaning and select the spelling for the right word, instead of relying on my writing.
		FA	I would always use like Microsoft Word, you know that app, like, that…the thing that can read it out loud? So, like if ever I'm sending an email, like, I'll copy and paste that back into like Microsoft Word and read it out loud so no there's no mistakes and then send the email.
		LD	Grammarly, the software, I use a lot to help with the just for the editing because it's a lot more than the Microsoft Word one where it's like, it even tells you the tone that you're using. You know, is the grammar is correct? But this is not an academic tone. Or the grammar is correct but, it's very academic and you're sending a personal email. So, I find that quite helpful for myself when I'm emailing lecturers to be like, “oh, what kind of tone are you going for?” It’s… because that's something I would struggle with is tone, making sure that I'm saying what I want in a message or that I’m not, like, not being too formal or too informal about the email.
		JN	I use Grammarly pretty much on a daily basis for spelling and grammar.
		GC	Probably in a way…I probably over rely on it. And I trust the computer to do it right. It’s new to me this year when I got Grammarly and Text 2 Talk. Because I had never heard of text… whatever it is…and Grammarly. Now, I wouldn't do anything now without putting into

			Grammarly. Because I couldn't see simple mistakes myself.
		PJ	So, I have to put my BIC and my IBAN in a computer…you know, in a large computer with people I may or may not know, standing around going, “Hurry up.” And the machine is going, “Beep, beep.” And, I’m like I wouldn't be doing this but you're forcing me to do this. And so, yeah. But the problem is I don't know about how good or bad I am at inputting information until I try. So yeah, it makes things tough…I… putting in anything. I could, I could be similar with, with words, except that I have all this lovely software that calls me, maybe, or even fixes it for me, but there isn't one like that for, for that kind of information.
		RH	And I use Grammarly… I’m using Grammarly all the time as well help with text and anything like that.
		AS	No, no, not in this case.
		AP	n/a
Voice Notes	Use of digital or web-based voice recording tools	EP	n/a
		FA	My aunts always send me big, long WhatsApp messages and like it's very handy to use voice notes.
		LD	I know for me, what I do find very helpful, and what I tend to use like on the word a lot is…I would use a dictaphone thing to like record my own voice kind of saying things myself. I find that's handy.
		JN	n/a
		GC	Probably the recorded sessions for people would be…like most sessions are recorded now, I think, and that is an excellent resource also to be able to go back and listen if

			you didn't hear something right to go back from here as you can.
		PJ	But then, you know, at the time I had the recording device, my lecturer teacher refused to let me use the recording device…A) unless I stood up in front of the group and said I'm dyslexic so I'm going to be recording you. And B) said, I couldn't do it in case, various chats would break out in the workshops, which I completely understand. But, if you're worried about them, be equally worried about me.
		RH	So voice notes, I would use a lot of the time, just for time, because I'm not kind of taking all that time by typing everything. Because that would be a lot, I'd be correcting all my grammar and spelling. I'm slow with that. They would help a lot. And Otter I'd use as well.
		AS	n/a
		AP	But, as well, yeah, like I suppose as well in terms of like social media and that kind of thing I have started to use like voice notes on on WhatsApp a lot. I just think it's a lot easier than writing out sometimes…the text.
Work-Arounds	Self-developed coping mechanisms developed to assist in overcoming challenges or barriers	EP	available I use any search engine. The first one that comes up, basically. And usually it's Google because it's installed on anywhere but I'm not picky. As long as I just put the approximate spelling of the word after that meaning, and then it just pops out the list of and then I go to that and choose one that I'm looking for.
		FA	but I think I was at the age where I'd already learned to work around it myself and I had like a good system, so like they weren't that useful but they were still there.

		LD	If it doesn't have like a search bar, to type in the exact word, then it can be kind of difficult.
		JN	It helps sometimes but it's not very good. I just rather look up the definition on Google and then try and figure out the word aloud.
		GC	Now you'll probably have to go back and try and find other ways which I think anyone who's learning disability…they all learn how to cope differently with it. And what I will miss…I definitely would miss it….But I've had to cope with it I suppose. I've coped…I coped for the last 53 years, not even realizing I was dyslexic.
		PJ	I had a lecture yesterday between half nine and one ish. Because I had computer problems I didn't join until 10 ish. And then I was all…I was up the walls and so my brain wasn't really there at all. So, today that I'm calmer, I, you know, I would really benefit from sitting there and taking notes or whatever. It's not online.
		RH	Yea, so it's recorded. And then I just feed it into Otter.
		AS	What else I need to today, like nowadays I've already developed some coping mechanisms. So, I understand more how to interact, but it takes a lot of energy to put in practice, because it's not like second nature to me.
		AP	And, also, as well, like my parents for example I put all my books on tape at the time which is it was a long time ago. And for…so like for me…is that I audio listen to everything, you know, and they put all my books on tape at the time which was a big kind of endeavor, you know, for my state examinations. And then I suppose…I like…we weren't really aware or didn't know of any kind of

			assistive technology when I was in school but I don't think it was really as good as it is now anyway.
Easy to Find	Mentions of easy to find information on the web	EP	Sometimes through Web Layout is not, like, I have to literally have everything in front of my nose to notice it. And sometimes it's hard to find, like especially on the NUIG website.
		FA	Like I don't have any issues with online shopping, or like things like banking, because it is so straightforward because they want your money whereas like Blackboard you're paying to get an education and every, like, you know there's this sense that if you want to be here you'll work hard and you'll figure it out by yourself.
		LD	I guess it would be kind of website layout, because I would have an idea of how I think about like, where a website should lead you and if you click on something. Sometimes, I'm like, this did not take me where I thought this was gonna go, because they store things in very different places. Everyone has a different…like, where they store like their contact information is down here or someone else will have it in their about section. So, it's just how the internet is very…like, everyone can make it look however they want so can be hard to find when you're going somewhere new to find the exact information you want.
		JN	And I'd like, I guess like a nicer use of the, the, the NUIG app, more things, would it would be nice to put onto it, like, just, if you could like put your course code in there put all your lecture stuff in there. Maybe put reminders and stuff in there so for that.

		GC	n/a
		PJ	100%, absolutely, positively: written instructions. From: put your thumb under the computer to open the computer screen. The big button with the arrow on it is probably your power button. Push this once. Breathe. Wait. Instructions that basic.
		RH	Kind of just similar thing. It's kind of even the way things are worded. Their wording is an awkward way sometimes it's hard to take in information.
		AS	Also, another thing I struggle like I told you I struggle with, like, the other meaning of things. So, if I'm using a system. If the questions not clear, or if the structure is not clear…like exactly clear what you want from me, I, I struggle with it. So, I, I spend a lot of time trying to figure out what they are trying to ask from me, if they are not clear enough so that's another point.
		AP	And I suppose as well like just more engagement with like primary school and secondary schools in terms of like you know, ensuring that the students there have access. I think it's after improving dramatically since I was in school but for me I had no really no real like psychological support which was, as I say, a real game changer when I came to tertiary level. So I think that that's really, really important

Digital Joy

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult			

FA	24	Masters	Dyslexia	Adult	Like I actually find like using technology easier than using, you know, like pen and paper...because, like, when you, you know, when you write it kind of corrects. It nearly knows what you're saying.		
LD	27	Bachelors	Autism	Adult	Not really now because I, I will say that I'm quite literate, I guess. So, I kind of use it a lot for different…different things. It's something that I kind of utilize too often that I'm just always I would struggle to even name. But, it could be a struggle because I find it so much easier to use that I other aspects of my life yeah, you know I'm quite…I find it as like my main access to the things I enjoy.	so I spend a fair bit of time in the digital world.	If I don't have to engage the person on the phone and have them come to me with a time and lead the conversation because sometimes it end up in me agreeing to an appointment that doesn't work at all because they they brought it up and I don’t want to say no. But if I have it online, and the calendar is open, I can go, “Oh, I don't think I want to do this time, I want to do that time.” And I can just click on that.

							And it's less stressful that way.
JN	20	Bachelors	Dyslexia	Primary	I don't really have an issue with the digital, thankfully, because I'm computer science. I, kind of, like, very early on during like secondary school and stuff I just kind of engrossed myself into the PC like kind of culture and just kind of absorbed everything forcefully nearly.	I use Grammarly pretty much all the time. Literally, any…any type of online platform…Twitter, Facebook, Instagram. I type something out, I autocorrect with Grammarly, and it feels great.	I guess like I've met some of my friends through the internet, and in the same vein, my friends are on the internet at the same time. My friends have some kind of social media, follow me and my other buddies play video games. We communicate through discord, Facebook Messenger, WhatsApp the whole time.

GC	53	Other	Dyslexia	Adult	Probably in a way…I probably over rely on it. And I trust the computer to do it right. It's new to me this year when I got Grammarly and Text 2 Talk. Because I had never heard of text… whatever it is…and Grammarly. Now, I wouldn't do anything now without putting into Grammarly. Because I couldn't see simple mistakes myself. And with the Text 2 Talk reading it to me	And with the Text 2 Talk reading it to me…that was a huge help because it would take me hours to read something, and I would forget what I've read. Whereas, now I can actually finish it. I followed what I was reading and I could hear it…it was so much better for me.	I like how my whole…my course it was done mostly online. And I thought, I'll never do this but I actually loved it. Last year cuz things were recorded. If you go to a lecture, and you don't hear it or you might miss something, it's gone. For this we were able to go back in and listen to your that like to me that was a huge benefit.

PJ	57	Other	Dyslexia	Adult	You know, I'm loving the online education thing. Absolutely loving that because it's overcomes a lot of a lot of the dyspraxia stuff.	Constantly. Yea…it's…I'm always on one screen or another for whatever reason, entertainment, or education or being in contact with people. I lived somewhere else for 20 years. And it's just easier for everybody to chat online, or, well, we're of a certain age so we don't do the camera stuff much, but, yeah… I mean it's pretty much…I don't want to say it's my world, but it's pretty much my world	
RH	22	Bachelors	Dyslexia	Secondary	I would, I feel like I'd be okay, I'll be quick to pick it up. So I might be slow, maybe at first using a new application, or something like that. But then once I get it, I get it.	I'd say my confidence with technology would be really high if you like, eight or nine out of 10.	I wouldn't kind of see it too much. I really like it's kind of like always adapting and building so just kind of like waiting for it to like what you're doing.

AS	34	PhD	Autism	Adult	I'm a person that…I love technology. So, I always put technology in every part of my life unitl I get to the moment that I say I cannot use a screen anymore, but I use technology a lot.	I told you that I have this problem with social and also the input right now because of COVID and all the limitations is actually way better for me. Because at my home, I have all the setup for my computer, and I am isolated from outside inputs that are usually disturbing. I remember when I was going to the office for doing my research, every day, it was so stressful. It used to take a lot of energy to do, like, just with people passing in making noises, and, like, interrupting me and a lot of things related with that. So now I can say that I can, for example, use the technology like concentrating better	like I told you I love technology, so I love to read about things, to access information, and so on. But I need to be mindful because it's like too much information.

						like because I'm more in a sense, my environment are more separated than other people so I don't have this problem with living and working the same house, like I have a separate like my bedroom, and my living room to work. And for me works fine.	

AP	32	PhD	Dyslexia	Primary	Other than those, like I suppose the online world has really you know…um, made things great for me, and I use the internet like every day. I'm on social media, as well, and I suppose, like, the…I've been very lucky that I've got everything through the university, but like I think for…like if I wasn't it would be hard to get like assistive technology.	I don't think I really ever feel digitally excluded… but I tend to, as I say, like, use my phone all the time and I'm always engaged in the digital… probably way too much on social media, and just like even everything connected to the university you know, maybe it's not so good that I have everything on my phone, you know…I like can access you know, things kind of late at night when I should be like winding down and going to bed you know…but in terms of feeling digitally excluded, right? I don't ever feel excluded.	I mean, it's a great place for me to find like, I suppose, different people researching in the area…

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult			
					I think it's like, it's the overwhelming part of it, you know like if...I remember actually in my first year, I hadn't got a hang of, like, because you know you get like a new email address, and it's like a different system	you know, when you get so many emails, and so many notifications from college? And like, some of them are just like a weekly newsletter, but some of them could be very important. But you're kind of like put off reading them, so it gets to a stage where you're avoiding it because it's overwhelming. Because there's so much stuff to read, and then like, you get more overwhelmed and anxious because you're scared you're gonna miss out on a really important email.	Or I remember, first year I missed, like, I didn't know I had like a separate location for like an in-class test. And it was because I just couldn't…like I had about 60 unread emails and it was week three. So, like it's just like they bombard you with emails. On Blackboard as well, they kind of bombard you with notifications. So, it's like it's just the overwhelming side of it that you're just, you avoid it totally then.
FA	24	Masters	Dyslexia	Adult			

LD	27	Bachelors	Autism	Adult	I guess, the biggest thing is that, you know, you can't control what you see on the internet. So, it's my only big issue, but you might have seen an extremely upsetting post.	but it brings up the unpredictability of accessing different websites, and I do try to keep all my personal profiles private as well. So just the anxiety of like, socializing publicly on the internet, private balances are a little bit murky	the amount of upsetting stuff you might see. And I would find very hard to forget an upsetting thing I've seen as opposed to someone else who might be like, Oh, yeah, I saw that as well might be thinking about a few days later. And they be like, that was a bad five minutes after that, you know, so just kind of like being able to not…well, to set things up, and like tag things correctly. So I've tried to like, delete certain words like so that they don't show up. But sometimes, things still set through.

JN	20	Bachelors	Dyslexia	Primary	there's definitely an anxiety element to having bad grammar and spelling, especially online, where like, oh, you might not…like sometimes I might sit there and I'm like, I really shouldn't say that because I probably spelt something wrong and it's like…it drives up the anxiety levels, you could just be like, I don't need to be heard, right now, or stuff like that.	It's like, well, you're putting yourself down for no reason. And you just have to think about it a bit more and then, then you're ready to do, but there's definitely that element where you're like oh I'm not ready or. No one's here to listen to someone who can't type and spell correctly.	
GC	53	Other	Dyslexia	Adult	Now I will avoid digital if I can but I, I do. If have to deal with it, though, I do. It's part of my job, so I have to use it.	. I, actually, will not send anything to any parent until someone else reads it, and they will pick up if it's wrong. And there's also…but I will not send them to someone else reads it. So, I wouldn't trust myself to send them	And then this year, everything was to turn-it-in….using that freaked the life out of me. I just, when I went to submit, it's just…you press a button and it's gone. Nothing…you don't know what it looks

						this very simple answer, I would not do it.	like, and that freaked me out.
PJ	57	Other	Dyslexia	Adult	Since the HSE hack, I have gotten absolutely paranoid about online security. And, I mean, not at all sanely paranoid about things…I come from a family who are security paranoid anyway. That really freaked me out.	Now, I understand that with the University the people who are putting the information online are coming from their own headspace. But that's not always broken down enough for jackasses like me to figure out what they're talking about. And that creates a lot of emails, and that creates a lot of stress	I don't shop online much, because the putting in of the credit card number at the end of the process. Yeah. That can be…you know, on good days, it's great, on bad days… I…you know that it Nigerian prince that keeps trying to give you money? I think I have charged things to his credit card more than once. Very much with inputting information it's a day to day thing. Some days I'm fine, other days… And, because I'm privileged enough to just be able

							to put the screen down and go not today. Or I'm better off doing 30-minutes of yoga than dealing with this frustration, which is lovely when I'm not on a deadline.
RH	22	Bachelors	Dyslexia	Secondary	the technology is good there to help. So even I would kind of hold back from texting or anything like that because I'd be afraid to check the grammar and things might be all for different things	There's certain kind of software's and stuff I wouldn't be able to use if I was in a library or something like that, because you might need headphones in order to use it. It needs to be playing out loud. That can	I guess just your confidence when you're emailing or typing or something they're like, kind of overthink and then what you're writing.

					like that or spelling, whatever.	kind of be annoying and a struggle.	
AS	34	PhD	Autism	Adult	I get to really overstimulated by screens, so that's myself not the technology, doing that for me, for me, yes.	But I need to be mindful because it's like too much information. So, if I don't, if I'm not careful about this. I have a lot of mental problems with a lot of anxiety, a lot of stimulation can disrupt my sleep, or make me not sleep. So, for me, I would say that is the, the main issue like to really filter…the…my access…to not get all the things that are out there in the beautiful world of technology and get myself lost in it.	So, if I have a lot of options to go through, I tend to get lost, and oh my god I don't know how, which to choose where to go. So, if I have a limited amount of options, I tend to be more focused and have less stress over the selection activity, let's say. So that's one thing that could you prove my experience.

AP	32	PhD	Dyslexia	Primary	like it is a big, big expense…like some of the software are quite expensive, and so…I suppose I feel like I've been lucky to getting things through the university…	I'd be very proactive…on Twitter and like I go through phases where I tweet a lot and then phases where I don't tweet a lot, because, basically, like sometimes I'm just not interested in engaging in that space you know can be so bad… and I don't know if it's always healthy. I think that the Twitter's feed has become a little bit like an echo chamber, and a little bit like just people giving out you know, instead of finding solutions or that kind of thing…	And I tend to actually, sometimes go on late at night, and I think that's really bad because it affects my sleeping pattern actually. So, I do my best…I know that it's an issue and I understand it's a bit addictive you know…I like to go on and see what's going on. But I really have tried to like to control like the digital technology in terms of like making sure that like…I try and finish work you know, at a reasonable hour and that I…sleep is so so important for me, you know? …and I do think that if you're on your phone or working too late that it does interrupt your sleep pattern…and it's… I suppose that that's another thing…

							it's really hard to disengage, like it's so, so difficult

Self-Advocacy

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult	After talking to the professor and I explained why I would prefer if they can put the better quality scans on after that, There was no problem		
FA	24	Masters	Dyslexia	Adult	I'll get feedback, you know like the news site on Blackboard they'll write comments, and they'll write comments that are like showing that they've went directly against the guidelines like I'll get marked down for grammar and then I'll have to email the lecturer and explain that like you know if I use the wrong were in a sentence, it's like you	I think there's like a paranoia part or like a constantly because I had like a bad experience with my first year where I just assumed because when you go for like an initial meeting with like the disability services, they tell you: you email like your course coordinator with your Lens report and you email your lectures privately to	And that was it, like, but no one taught me that like you actually have to keep reminding them which I don't really think it makes sense but I know what it can be like, like if you're so busy and you have so many students, but there's a part of it, and then when I realize, like a lot of the time you're paranoid, are they actually taken into

					can take a mark off that dyslexic and I'll have to tell them that I'd like they say oh you should have sent the Lens report and I'll be like well I sent it twice	let them know that you have it.	consideration the fact that I'm dyslexic,
LD	27	Bachelors	Autism	Adult	Or they'll say that they want you to come in person to get all the notes. They'll say that like, "Oh, I don't post anything on there." They will post like lecture slides. And then like, a lecture like, rundown of the lecture doesn't put the very basic intimate information there.	So it's about education about that, okay. You read the post, you know, disabled people exist, people with cognitive issues exist, and they shouldn't have to beg for resources, it should just be as easy as possible to access it. Like it should just be the norm that you	

					And then, if you say, like, I was entitled to notes from each lecture, under my disability	post everything online, as opposed to having to have people, you know, come up to you and ask you like, I need this.
JN	20	Bachelors	Dyslexia	Primary	One other thing I could think of…I'm so bad with this…I thought about it because I had to do it recently…it was a whole problem with sending my lens reports out. I forget to do it. I got reminded this year. Like, "Oh, did you say your lens reports?" And, I'm like, I should probably do that, because the college keeps telling me…is it especially in first year	Then, it's like you're wondering if something bad is going to happen if I have to keep reminding them. But, like once you said, "No, it's not that big of a deal," like you understand, like, oh yeah, that's fine. We'll give you whatever you need, which is nice.

GC	53	Other	Dyslexia	Adult	And, and I did contact them and in fairness, some of the lecturers were very good, some of them just…just didn't want to entertain me.		
PJ	57	Other	Dyslexia	Adult	And I, I also think in that case, being a woman, and being, having to be persistent because of my condition, which I'm sure there are many who have it, as well. But being a woman, I feel it's a different…If I say a different tone on it, or a different color, do you know what I meant? Yea. I'm sure there's a nice English or scientific word for it, I just can't remember at the moment because I use phrases like tone and color	And I said, "Look, I have a disability," which I don't like to say that because people see disability differently, you know. And you man looked at me, and he said, "Well, you don't look like you have a disability." Okay, I do see it from his point of view…when you see me, I don't look disabled. So, I said, "Do you have a disability liaison?" Now, I knew they didn't, but I was trying to get it through his head that not everybody is in a wheelchair or blind or	Or, just quickly, the other side of that is sometimes when I say to people, This is a problem because I'm dyslexic. And then they talk to me or sort of get self-congratulatory because they're helping the disabled person. That's more annoying to me than having to stand there having to put in the BIC and the IBAN all day. If they didn't force me into a situation that didn't suit me, and there's nothing I can do anything about.

						has a visible disability. Um, no. “You need to go to the University for that”
RH	22	Bachelors	Dyslexia	Secondary	n/a	
AS	34	PhD	Autism	Adult	n/a	

AP	32	PhD	Dyslexia	Primary	I was always very open with them and the lectures about like, being dyslexic, and everything like that. And they were always very accommodating of me…I suppose I did go to all the classes and stuff like that. So, they knew me and my undergraduate degree was in Politics and International Relations. And it was a new enough class. So, we were a small class so that we knew the lecturers quite a lot. So yeah, I always kind of made myself known. Because I knew that I would be going to them seeking like additional support or information.	And but yeah, as I say, going into third level was a game changer in terms of assistive technology. But like, the thing I suppose I always worry about is like, my mother always says this as well. It's like, getting to that third level…to like the place with the supports, like that's the struggle, you know? So yeah, so I don't know if that's kind of the information you were looking for, but..	I just emailed the library, and I was like, I don't know what I'm going to do. And a woman met with me, actually, and she was really nice…and then through that, I started using Endnote. And that's very, very helpful now. And it's, actually, I didn't realize how easy it was to use. And so that's, that's really, really great, because you can directly link from the library to EndNote.

Diagnosis

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult	I was not aware of my disabilities until the late age. And before that, it was like assumed that I would figure it out simply and for everything literally it was assumed that I should know that. And we know, like, especially with maths, I would study, and then nothing would stick, and that's the only problem that I found out after I was diagnosed. The problem was also to find a place to get a diagnosis as well as an adult. And after that, it was much easier	At the beginning, not at all. Um, well, I just understood why I did some things before like when my messages, why were they so poorly written, or. But I only started using the digital tools to learn in college. So, we're only started to use them now before that I just simply did not use them.	, I just understood why I did some things before like when my messages, why were they so poorly written, or. But I only started using the digital tools to learn in college. So, we're only started to use them now before that I just simply did not use them.

FA	24	Masters	Dyslexia	Adult	it was just when I started at NUI Galway.	I was diagnosed with dyslexia, by an educational psychologist. I was never diagnosed with dyscalculia, but the reason I was referred for a dyslexia diagnosis was because I was mixing up numbers. So, I identify maybe as having both, but I'm only officially diagnosed with dyslexia.	when I did my leaving cert, I can…I knew throughout secondary school. I think my mother had rung my secondary school a few times, but they just weren't very good with it, like, they just like it was kind of a disadvantaged secondary school. So, they didn't really know what to do with it.

LD	27	Bachelors	Autism	Adult	So, I got an official diagnosis when I was, like, 23. So late age diagnosis.	I found out myself, just because it was something that I kind of…kind of felt that I struggled with…and trying to find something to name my struggles, and kind of identify the best kind of treatment plan.	And then, from that exact diagnosis, because treatments that I've been trying to use before to deal with, like, my different issues weren't working because they were not designed for what my actual issue was. So, kind of interacting with different healthcare professionals, someone kind of raised the question of like, you know, it kind of feels like, “This isn't like just an emotional thing, like this seems like autism.” So, to figure out if it was autism or ADHD or something like that was going to be good to get the services that would help the most.

JN	20	Bachelors	Dyslexia	Primary	I was in second or third class, I believe, in primary school. Then, re-tested for the junior cert.	I have minor dyslexia within, reading, and then I have major dyslexia and problems with spelling, memory, and pronunciation. And then I have no real issues when it comes to maths thankfully. I took him three tests to determine my dyslexia and it kept coming back around the same around the reading, memory and writing.	In primary school, I had a tutor for until sixth class, pretty much. Just basic things. And then, in leaving, or in junior cert, I got a spelling and grammar waiver. And the same with leaving cert. I was offered, not for junior cert, but I was offered for leaving cert…I was offered a reader but I refused it. And then, yeah, I think that covers it.
GC	53	Other	Dyslexia	Adult	. I knew I had struggled, but I would have had a very bad experience in primary school, which made me believe that I was stupid. No could never learn. And, with going back to school, I thought… I have to prove I can do this. I did do it. And I think everyone is everyone's just driven differently, it depends, it depends.	And, and the assessment really highlighted I suppose to me very much…for me to hear my assessment and the results of my assessment because I knew exactly where I was, but didn't realize the extent of how bad it…how bad I actually was. And that kind of gives me encouragement…like, I've got this far without	And so that's it…that is when…I even…when I got my assessment, it was very emotional to see what was put on paper. Knowing what it says…that it was on paper and the struggles I had with the test, made me really realize I've worked really hard.

						anything. And now all of this is available to me.	
PJ	57	Other	Dyslexia	Adult	Okay, initially in 1994. It was labeled a memory disorder	I had to have at least two other reports, which found other things wrong or right depending on your way of looking at the latest one came up with dyslexia, dyscalculia, and dyspraxia, and it took me years to figure out how to say dyscalculia.	
RH	22	Bachelors	Dyslexia	Secondary	Yes. So I, I have dyslexia. So I just struggle with reading. Words are kind of hard to kind of pick up a meaning.	I was in fifth class in school. So I think I was around 12.	I was very lucky that in secondary school, I got a reader for my examinations an extra time and all. And then college, I also got supports through DSS.

AS	34	PhD	Autism	Adult	Okay, so, I was diagnosed with autism spectrum disorder. I was diagnosed as an adult, It was here in Ireland, yeah. What else can I say. I don't know, it's so general the question that I don't know.	Um, I guess, what you can divide into several different groups, like say, let's say, one very important one that is totally related to autism is social issues. Yes, or. Today my life because I already learned a lot about what doesn't mean the impairment of autism, but I still have a lot of difficulty in social situations. I have a lot of anxiety related to social situations.	Because of the difficulty that I have. So, I, I have the tendency to always go too literal…literal, of what people were saying and it is difficult for me to understand what people mean, if they don't say that directly to me, that's another thing. I get really tired from socializing very quickly and it takes a lot of energy from me. Even before because I tend to be anxious about it and during the process.

AP	32	PhD	Dyslexia	Primary	Yes, so I'm dyslexic and I have always been you know. I was diagnosed when I was very young and when I was only maybe a year or two into primary school. So, I was only maybe six or seven I think at the time and I suppose I found school like very difficult.	I struggled in school, and I suppose my parents…like at the time not a whole lot… so not so much was known about dyslexia or not so much like support was there and I recall like even going to kind of like remedial classes where I feel like it wasn't really beneficial to me in terms of the dislike dyslexia.	But my mom, my parents, like worked really hard and got me additional tuition and stuff like that even when I was in primary school. And then, when, I moved on to secondary school and I had a really good resource teacher there actually. And she kind of helped me navigate the system and see as well I suppose in short that I had a reader and spelling and grammar waiver and everything like that for the state examinations. And, also, as well, like my parents for example I put all my books on tape at the time which is it was a long time ago.

Social Support

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult	n/a		
FA	24	Masters	Dyslexia	Adult	I, like, actually don't know what the numbers are. Just say for example it was maybe more than five. But I might know, I think I know two other people in my town, that are dyslexic, and it's the kind of things like in schools where I live in would not be something that would be kept confidential or private like if somebody in my town was dyslexic everybody would know, because it's just such a small town.		

LD	27	Bachelors	Autism	Adult	But, I was like, no, I need more than just academic help. I need someone to like help me organize my car, like someone just to help me like even go through, like the different processes of planning on purchasing things and like emailing lecturers and that kind of thing. Keeping an eye on dates and times and try not to get overwhelmed. procrastinating would be the big one, I guess.	And other people might not know how to do that. And it's not very clear that it's an option you can, you can block certain words, from showing up on your feed, you can block certain topics. That's not a very clear option to people with step five digital literacy. I know that I could do this	It's education yet again, on the people who make, because I think a lot of people, any person I've talked to with a learning disability knows exactly how to use the internet, because that's their main source of accessing the world, you know, they know how to use it, it's the fact that they can't find what they want on it.

JN	20	Bachelors	Dyslexia	Primary	There's a big group chat for all, for everyone in our course that… “oh, this this thing went on” or, like, “at this time there's a new assignment ready, we can do it now, get a head start.” Or, sometimes, it’s “stop,” or “make sure you've done the assignment” or “the grades are up now” kind of stuff.	But like I guess…meeting, like…especially through societies when I was part of them…there was this disconnect between the new second years coming in, and all of us on the committee. Like, what are we doing, they're like, What are you doing, and we're like, I don't know what we do. It's just, it's complicated like it was much easier person, and online like it's hard to kind of get people to engage sometimes.	When people don't know how to use it…specifically, you really need to look into it on your own, like we only found out halfway through semester two, you could bring up a big whiteboard and have everyone write on it. Which was like…we just for our group project we just ended up using discord, because it was easier, and we knew how to use it. Where Blackboard, we could have an entire thing about teaching students how to use it in terms of usefulness sake…for like things like projects and everything.

GC	53	Other	Dyslexia	Adult	Feedback. But, I don't know how it can be done digitally. And that would be something I would have kind of struggled with, you know, not having feedback from an assignment. Because you're…you're submitting something and that's it, it's gone. Where I felt if you could send it in and look at this small change you might need to make that would bring up your marks, that would reassure people I think. I don't know I don't know it can be done through technology, I don't know whether it can or can't		
PJ	57	Other	Dyslexia	Adult	And I've heard that a lot in the community.		
RH	22	Bachelors	Dyslexia	Secondary	n/a		

AS	34	PhD	Autism	Adult	n/a		
AP	32	PhD	Dyslexia	Primary	meeting other students with disabilities is a really, really big thing and understanding like common kind of, you know, difficulties. When I was in UL, for example, we had a room in the library where everyone with a disability could go and no matter what disability I had, and like, for me, it was nearly like social support to go there more than anything else…to realize I'm not the only one stuck and they tend to have like an open access or an open office. So, the staff were like sitting around the place, and then the computers for us were in the middle. So, they were really approachable		

					and you know, that kind of thing.		

The Human Element

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult			

FA	24	Masters	Dyslexia	Adult	you know like the way every teacher, every lecturer has like a different module? Like some of them will upload lectures on there like week one, week two, some of them I'll just put them everywhere, so like that part of it can be really frustrating. I don't know if that's coming from a place of dyslexia or just not liking it	but it's more like a human thing, of where they put…like there's no there's no real clear system for it like they can put their slides anywhere they can put your grade anywhere. And then, it's like the times, as well…you never know. You have to constantly go in and check if slides were up.	I think if there was like an exact protocol like if there was a bit of like consistency, you know? Like if there was like a standard, or if the school did like focus groups or something with students with dyslexia or with other learning difficulties, and they just picked like a standard procedure like a standard, you know, system that you follow

LD	27	Bachelors	Autism	Adult	So, they print it out, and I have to come in every week. Like, they wouldn't just give you it all on one go, either… you have to come in weekly and pick it up. And I'm kind of going like I would suffer from like exhaustion and like agoraphobia and stuff, like I can't do that I. And if you don't show up that week, they might…like, they won't give it to you the next week sometimes…or there's just that anxiety of like, a bad encounter. Like, "No, I missed last week," you know, where they could have just uploaded and the notes and the slides and I would have gone there or email them to me.	People kind of not using the potential on the other side of it, as opposed to my difficulty on my side…you know, like difficulty with using Blackboard on my side. They have like, so many different ways of organizing the files. And the same with websites where some people will have learning materials on it. Lecture notes are there. But then some other people would have folders. And it's trying to figure out how each person does it differently.	and you're trying to figure out what each different person's storage style is…which is something that you know, on there, just makes it kind of exhausting to remember each and every one.

JN	20	Bachelors	Dyslexia	Primary	I guess, another hardship comes from, especially like I could definitely see a lot of problems with the maths. People saying, “Oh, the maths online was really hard,” because I can't remember the name of the thing on campus for the maths, but that was like very, it's not hard to…it's not easy to access because people might not have the same confidence online, like, I didn't go to that desk at all in second year because I was like, “I don't see the point. I don't I don't think I'll get my problem solved. So I might as well just try force it online,”…or like ask people in my course, which worked.	But it's hard to access those online resources that were in person. Because either not many people know about them or it's too complicated to get into, and you don't…well, you fear your problems will not be solved or you might not have the confidence to do it sometimes…like, you feel you might be wasting their time where they could be with someone else who need it.	and he's like, “What, what happened here?” And, I'm like Grammarly…it’s never done this before, and like these issues aren't getting solved, obviously. But, at least my lecturer understood, I was able to push forward saying, Okay, I'm just gonna mark you off the plagiarism thing we're gonna get we're getting a new one.

GC	53	Other	Dyslexia	Adult	And, and that's what I find very difficult, not being able to see that. I need someone that will proofread and highlight it because I can read it, I will try it, but it doesn't matter. And that's a big thing I suppose I would have Grammarly, but unless it has the facts, when you put something wrong down it's not going to argue with you because it doesn't know any better either.	Confidence. Nothing being confident enough, not trusting yourself. I suppose…and I suppose having all of that from a young age. Like, I suppose…because I work in childcare it has really brought to my attention that if someone tells you, you're going to be a nobody. It's very hard to change	I'm a grown adult, and I keep saying I'm going to go back to that primary school teacher, and pull him up for it because he actually destroyed my confidence.

PJ	57	Other	Dyslexia	Adult	Things like broken URLs….I mean, take them down, or fix them. I'm doing a lot of secondary research. So, you know, I could be doing productive stuff instead of going into something that looks like it makes sense, and meeting a broken URL…like, come on guys. Somebody gets paid to do these things, not me, so do them.	And, oftentimes when I do get a response…which is about 50% of the time…I get a response in jargon and clearly somebody like me doesn't do jargon well…and that's really annoying because I am banging my head against a brick wall to go forward, and they're just going, "Ah, yea…" You know? Just putting any answer at all. We know you won't understand it, you know? Box ticked. Moving on, you know, closer to their next paycheck…and not at all close to mine, you know?	That drives me particularly crazy because I have to put in so much effort to do my job properly. And then I see people who don't have the same challenges as I do, who were very casual about it and I can sort of live with that and the impacts on me and then I lose my temper.
RH	22	Bachelors	Dyslexia	Secondary	n/a		
AS	34	PhD	Autism	Adult	n/a		

AP	32	PhD	Dyslexia	Primary	But I often found like teachers didn't really understand dyslexia, like, they didn't understand why I was like intelligent or like engaging in the class but then when it came to assessment that I was I was doing like poorly for example, in the in class assessments, if I for example, didn't have assistance in reading and all that.		

T2S

Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3

33	Bachelors	Dyslexia	Adult	it could not read the text for me. And it took me a week to read it because it was in columns and it was tiny letters that were distorted. And it took me about a week to actually read it with comprehension	Then I use a website, natural reader and I upload it there, and I just put it on the headphones and listen to it. Mainly the reason I use the website as well is because, well, the reading is a better, a bit of better quality, and it, like for the text to, well, the read and write.	, I don't really like the layout of the text reader. I only used one stop and I could not figure out how to rearrange the layout of the menu. I only figured out how to take some stuff out. The quality of reading this, okay, the majority of the time. However, compared to the other pronounces words a little bit different than sometimes.
24	Masters	Dyslexia	Adult	So, I think if things were more spoken, but I know that's probably not the same for, like, I think everyone might not need that…the things that I struggle with are spelling and reading out loud, whereas I know other people would struggle with maybe talking or like other things like that pronunciation. So, I think that would help me.		
27	Bachelors	Autism	Adult			

20	Bachelors	Dyslexia	Primary	Yeah. The college also gave me, like, NUIG gave me a subscription for Texthelp for my duration of my course, but I don't like Texthelp. It's not very good, it's very not intuitive to use in that it's more of just a pain, like to set up and make work, especially just when I could just read it faster than it reads for me.	But like, I guess, online reading is difficult to find and I…trying to find like specific things I may need like documents are very hard to find. The, even though we have the stuff through college for the papers and stuff it can be very difficult to find them all drawn out perfectly. In their final form, sometimes they're broken up awkwardly and it's not very convenient.	
53	Other	Dyslexia	Adult	And with the Text 2 Talk reading it to me…that was a huge help because it would take me hours to read something, and I would forget what I've read. Whereas, now I can actually finish it. I followed what I was reading and I could hear it…it was so much better for me.	Oh, it's been huge difference to me…and huge…like to read an article. And you know what some of those articles are like, and to take and try to read it was a nightmare for me. And I just, I just couldn't read it so I was losing out straight away when I was doing assignments because I couldn't follow what I was reading.	as I said the Grammarly was brilliant and the text 2 talk which were all new to me so they were huge benefit to me.
57	Other	Dyslexia	Adult	n/a		

22	Bachelors	Dyslexia	Secondary	n/a		
34	PhD	Autism	Adult	No, no, not in this case.		
32	PhD	Dyslexia	Primary	And, also, as well, like my parents for example I put all my books on tape at the time which is it was a long time ago. And for…so like for me…is that I audio listen to everything, you know, and they put all my books on tape at the time which was a big kind of endeavor, you know, for my state examinations. And then I suppose…I like…we weren't really aware or didn't know of any kind of assistive technology when I was in school but I don't think it was really as good as it is now anyway.	Okay, so as I said before, I, um, I tend to listen to everything in audio. So, I find like reading very difficult. And so, I have, for example, actually, since joining NUIG, the person in the disability office, put me in, registered me with Bookshare. And that's it's actually for visually impaired people, but they allow people with dyslexia to use it…or they I think they categorize it as print disability, to use their services. So basically, I have access through NUIG to both the English one and the Irish one, which is unbelievable, because I can always find whatever book I'm looking for. So, in that way…I have an app on my phone that connects to the two libraries and I forget the	of what I think will be really useful for me and that maybe isn't what I don't have already…is like things that would help me read like some like physical documents so like I mean, the improvements with the types of things that can read what's on the laptop or the computer have been really great. But like, for example, if you're on the go, or in some meeting or something like that…that I would…that you would just hand out an agenda…I think it would be really helpful to have something that could enable you to read what was on it.

					name of it…let me look it up…so, it's called easy reader.	

S2T

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult	when I'm writing my essays, I do not write them. I dictate them because the way I write. It's like almost every word turns red, in Word. So I dictate them to Word.	The dictation, or like the speech to text is very bad. So, let's say, I say full stop, and it always writes “full stop” instead of putting the dot.	But I noticed the one that the lecturer was using in the lecture last week, did not have those errors, there was some kind of, there was some kind of software that was literally putting on the board whatever she was saying, and it was very correct, that one was, well, I was looking at it because I was surprised
FA	24	Masters	Dyslexia	Adult	One of the things I always thought I would like was, you know, like Audible is, but I got audible and I don't like it. Like, at all, so it was something that I did…like I was like all my family have it…and I was using it and they think it's great and I	I’m sure you've noticed…like really fast here in Donegal. And, if I listened to, like, other accents or other people speaking, it's kind of like you feel almost like it's you have like ADHD or something and you can't sit through it.	

					was like, “Oh, this will definitely be something I’ll like because I'm dyslexic.” But it's not. I’d rather read the book.		
LD	27	Bachelors	Autism	Adult	I guess transcripts of lectures would be very handy if you could get, like, a written transcript of what was actually said in the lecture and you could choose between the two, or you can read along with it, you know? I know some lecturers do Close Captions on the bottom but it also could be quite handy just to have something you can print out the exact		

					written word of the lecture.		
RH	22	Bachelors	Dyslexia	Secondary	And I've used applications like the otter software, which converts text..or, um speech to text.	Like, if lectures were recorded or anything, I would be changing them as well, so I can kind of like read along as they're speaking. But then I'd just stay at home, and I'd avoid the library.	Um, so it might be a video of just the lecturer speaking, so it there would be no captions on the video. So, I just do that to kind of read it.
AS	34	PhD	Autism	Adult	that one thing that can help is like the caption of the video. You know the caption, because sometimes I'm overloaded with the sound, and even the sound of a video,	What else, if it's video, like I told you using the caption options so I could mute the video and just read. If I'm finding that listening is too much in that situation…What's	

					like instruction in video, it's like, it's too much. So I put it on mute, and then I just read. So, it also helps me.	been, I don't know if it's part of the system	

Text Composition

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2	Example 3
EP	33	Bachelors	Dyslexia	Adult	I prefer to use Word, because it has…well, it notices the highest amount of mistakes. Compared to others I usually use. I write everything in Word and then copy paste because it just has the largest database, I guess.	I don't like web apps or web apps that don't have the possibility to copy paste. Let's say for banking, usually are the ones for banking, but some, let's say EndNote. Also it does not have that, also EndNote to put in the citations and it's when you need to copy paste a chunk of the text, it does not allow you to paste it into, then you have to input it manually and I don't like that, because I'm prone to	

						mistakes and it just takes up too much of my time.	
FA	24	Masters	Dyslexia	Adult	I would always use like Microsoft Word, you know that app, like, that…the thing that can read it out loud? So, like if ever I'm sending an email, like, I'll copy and paste that back into like Microsoft Word and read it out loud so no there's no mistakes and then send the email.	But I started using Grammarly. I think when the pandemic came to Galway, I was in maybe…not this year so the year before…I was doing a H Dip. And we got Grammarly for free then so I started using it and like it was really helpful	it's kind of helpful and annoying at the same time, because it tells you to change words that like, you don't want to change.

LD	27	Bachelors	Autism	Adult	Grammarly, the software, I use a lot to help with the just for the editing because it's a lot more than the Microsoft Word one where it's like, it even tells you the tone that you're using. You know, is the grammar is correct? But this is not an academic tone. Or the grammar is correct but, it's very academic and you're sending a personal email. So, I find that quite helpful for myself when I'm emailing lecturers to be like, “oh, what kind of tone are you going for?” It’s… because that's something I would struggle with is tone, making sure that I'm saying what I want in a message or that I’m not, like, not being too formal or too		

					informal about the email.		

JN	20	Bachelors	Dyslexia	Primary	I use Grammarly pretty much on a daily basis for spelling and grammar.	Sometimes, like, I have to make diagrams and stuff like that ,and then I'd have to write them scan them, put them onto my computer that way so I can have it all together. It would just be really handy if like there was a way I could like, draw it on my computer, and then put it straight onto the notes.	I use Grammarly pretty much all the time. Literally, any…any type of online platform…Twitter, Facebook, Instagram. I type something out, I autocorrect with Grammarly, and it feels great.

GC	53	Other	Dyslexia	Adult	With Grammarly, I have it because I was in college. Because I have left, I'm here thinking… do you buy it? Because I…my husband has his own business, and I do a lot of his paperwork. So, if I had this for myself, if I had this little spell check to keep me from…and doing things that are not very professional, but since I'm so bad a speller, there are some words that are just wrong.	. Because I had never heard of text… whatever it is…and Grammarly. Now, I wouldn't do anything now without putting into Grammarly. Because I couldn't see simple mistakes myself.	I can't see a mistake if I read something. I can't see a mistake and that…and I could read it 100 times, it can be read 200 times, I can't see a mistake. And that's what I found very hard, because even Grammarly maybe only picks up some things, and it doesn't catch everything…like, 2016 is a big year in child care. I had written 1916, and I had read that 100 times, and I didn't see that mistake.

PJ	57	Other	Dyslexia	Adult	So, I have to put my BIC and my IBAN in a computer…you know, in a large computer with people I may or may not know, standing around going, “Hurry up.” And the machine is going, “Beep, beep.” And, I’m like I wouldn't be doing this but you're forcing me to do this. And so, yeah. But the problem is I don't know about how good or bad I am at inputting information until I try. So yeah, it makes things tough…I… putting in anything. I could, I could be similar with, with words, except that I have all this lovely software that calls me, maybe, or even fixes it for me, but there isn't one like		

					that for, for that kind of information.		
RH	22	Bachelors	Dyslexia	Secondary	And I use Grammarly… I'm using Grammarly all the time as well help with text and anything like that.		

Voice Notes

Year	Primary Diagnosis	Diagnosis Age	Example 1
Bachelors	Dyslexia	Adult	

Masters	Dyslexia	Adult	My aunts always send me big, long WhatsApp messages and like it's very handy to use voice notes.
Bachelors	Autism	Adult	I know for me, what I do find very helpful, and what I tend to use like on the word a lot is…I would use a dictaphone thing to like record my own voice kind of saying things myself. I find that's handy.

Bachelors	Dyslexia	Primary	Probably the recorded sessions for people would be…like most sessions are recorded now, I think, and that is an excellent resource also to be able to go back and listen if you didn't hear something right to go back from here as you can.
Other	Dyslexia	Adult	
Other	Dyslexia	Adult	But then, you know, at the time I had the recording device, my lecturer teacher refused to let me use the recording device…A) unless I stood up in front of the group and said I'm dyslexic so I'm going to be recording you. And B) said, I couldn't do it in case, various chats would break out in the workshops, which I completely understand. But, if you're worried about them, be equally worried about me.
Bachelors	Dyslexia	Secondary	So voice notes, I would use a lot of the time, just for time, because I'm not kind of taking all that time by typing everything. Because that would be a lot, I'd be correcting all my grammar and spelling. I'm slow with that. They would help a lot. And Otter I'd use as well.

PhD	Autism	Adult	n/a
PhD	Dyslexia	Primary	But, as well, yeah, like I suppose as well in terms of like social media and that kind of thing I have started to use like voice notes on on WhatsApp a lot. I just think it's a lot easier than writing out sometimes…the text.

Work-Arounds

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2
EP	33	Bachelors	Dyslexia	Adult	available I use any search engine. The first one that comes up, basically. And usually it's Google because it's installed on anywhere but I'm not picky. As long as I just put the approximate spelling of the word after that meaning, and then it just pops out the list of and then I go to that and choose one that I'm looking for.	And now, I'm actually not trying to print. I'm trying to find it in the PDF format so it would be easier to read it.

FA	24	Masters	Dyslexia	Adult	but I think I was at the age where I'd already learned to work around it myself and I had like a good system, so like they weren't that useful but they were still there.	I'd say, I'd be more dependent on my iPhone like for just reading out words, like, constantly Googling, how to spell words.
LD	27	Bachelors	Autism	Adult	If it doesn't have like a search bar, to type in the exact word, then it can be kind of difficult.	
JN	20	Bachelors	Dyslexia	Primary	It helps sometimes but it's not very good. I just rather look up the definition on Google and then try and figure out the word aloud.	

GC	53	Other	Dyslexia	Adult	Now you'll probably have to go back and try and find other ways which I think anyone who's learning disability…they all learn how to cope differently with it. And what I will miss…I definitely would miss it….But I've had to cope with it I suppose. I've coped…I coped for the last 53 years, not even realizing I was dyslexic.	
PJ	57	Other	Dyslexia	Adult	That particularly drives me crazy because that is such a teachable moment for me. If I can go back to the second and the lecture six weeks ago, that answers my question. But then I don't have to remember because it's slotted in there, if that makes sense…but then it's not there because it's been taken down, and stuff like that…just what I sort of put in my brain and call ineptitude.	I had a lecture yesterday between half nine and one ish. Because I had computer problems I didn't join until 10 ish. And then I was all…I was up the walls and so my brain wasn't really there at all. So, today that I'm calmer, I, you know, I would really benefit from sitting there and taking notes or whatever. It's not online.
RH	22	Bachelors	Dyslexia	Secondary	Yea, so it's recorded. And then I just feed it into Otter.	

AS	34	PhD	Autism	Adult	What else I need to today, like nowadays I've already developed some coping mechanisms. So, I understand more how to interact, but it takes a lot of energy to put in practice, because it's not like second nature to me.	I couldn't find so I went to Google to search, because it wasn't easier to to set up to look at. And as a student, it took me a while to understand how kind of things work there, to, to, to find myself like there
AP	32	PhD	Dyslexia	Primary	And, also, as well, like my parents for example I put all my books on tape at the time which is it was a long time ago. And for…so like for me…is that I audio listen to everything, you know, and they put all my books on tape at the time which was a big kind of endeavor, you know, for my state examinations. And then I suppose…I like…we weren't really aware or didn't know of any kind of assistive technology when I was in school but I don't think it was really as good as it is now anyway.	

Easy to Find

Participant	Age	Year	Primary Diagnosis	Diagnosis Age	Example 1	Example 2
EP	33	Bachelors	Dyslexia	Adult	Sometimes through Web Layout is not, like, I have to literally have everything in front of my nose to notice it. And sometimes it's hard to find, like especially on the NUIG website.	It's hard to find what you're looking for, so it's easier to go to the search engine, and put in the word, or put in the keywords and find it like that, and to actually look through the website and find what you're looking for. So sometimes if I'm not used to design, and if it's very like hidden in the back like the little buttons that are on the side. I don't read like well, I read, but that's majority of the time I go according to pictures and then notice like remembers where everything is on the website so if it's out of order more different than other than I have problems.

FA	24	Masters	Dyslexia	Adult	I think it's like the dates for like when you get your card, or like your orientation like things like that. Or the dates for your exam results come out. It's like a maze of like trying to find it and there's always ones missing off the list and the dates are always wrong so it's like, I think there's…I know, there's so many students in so many courses but it's like, it's not straightforward enough.	Like I don't have any issues with online shopping, or like things like banking, because it is so straightforward because they want your money whereas like Blackboard you're paying to get an education and every, like, you know there's this sense that if you want to be here you'll work hard and you'll figure it out by yourself.

LD	27	Bachelors	Autism	Adult	I guess it would be kind of website layout, because I would have an idea of how I think about like, where a website should lead you and if you click on something. Sometimes, I'm like, this did not take me where I thought this was gonna go, because they store things in very different places. Everyone has a different…like, where they store like their contact information is down here or someone else will have it in their about section. So, it's just how the internet is very…like, everyone can make it look however they want so can be hard to find when you're going somewhere new to find the exact information you want.	Everything else is kind of hard to find or hidden in amongst a lot of information. Like I find a lot of blocks. And not a lot of like, if you don't know how to use like control find or something you'd be certain.
JN	20	Bachelors	Dyslexia	Primary	And I'd like, I guess like a nicer use of the, the, the NUIG app, more things, would it would be nice to put onto it, like, just, if you could like put your course code in there put all your lecture stuff in there. Maybe put reminders and stuff in there so for that.	

GC	53	Other	Dyslexia	Adult		
PJ	57	Other	Dyslexia	Adult	100%, absolutely, positively: written instructions. From: put your thumb under the computer to open the computer screen. The big button with the arrow on it is probably your power button. Push this once. Breathe. Wait. Instructions that basic.	just stick up an FAQ somewhere, you know? Now, and, you know…and then leave it up to the duration of the course, because if I'm frustrated, I might need to visit it again and take more from it than I did the first time. But really, that would be so stress relieving, if they just stuck up answers to questions that the idiots ask 48hrs after the, uh, whatchacallit. I mean, FAQ's for everything. I would never talk to people if I could find the answers.
RH	22	Bachelors	Dyslexia	Secondary	Kind of just similar thing. It's kind of even the way things are worded. Their wording is an awkward way sometimes it's hard to take in information.	

AS	34	PhD	Autism	Adult	Also, another thing I struggle like I told you I struggle with, like, the other meaning of things. So, if I'm using a system. If the questions not clear, or if the structure is not clear…like exactly clear what you want from me, I, I struggle with it. So, I, I spend a lot of time trying to figure out what they are trying to ask from me, if they are not clear enough so that's another point.	if the information are like in a way messy and not clear, and not like positioned in a way that you can easily find it. So, for example I wouldn't use a system that I can't, I can't even easily find something. I guess it's yes…I can't remember…I can't think of an example that I remember that oh this is really nice. Not right now.
AP	32	PhD	Dyslexia	Primary	I think like a lot more open access kind of stuff. I mean, it's great for me I'm at the university and I can get everything and you know, through that. But, I mean a lot of people aren't and I think it really would benefit their lives to be engaged in this kind of…to know what's available to them…and is well…yeah to know what's available as well as open access so that's the big thing.	And I suppose as well like just more engagement with like primary school and secondary schools in terms of like you know, ensuring that the students there have access. I think it's after improving dramatically since I was in school but for me I had no really no real like psychological support which was, as I say, a real game changer when I came to tertiary level. So I think that that's really, really important

Life-Skills LAB Coding the data - Quotes

The data coding includes identifying 'units of meaning' and clustering them - is crucial for effective lifeworld analysis. Note that coding of content is carried out on the basis of two dimensions: the manifest content – the physical or 'objective' material in an interview, focus group, report or multimedia item – and the latent content – the underlying or hidden meaning of the material. In the LIVE-IT case, coding involves an 'ex-post' interrogation of the material set against a coding frame that applies an 'a priori' set of themes and lifeworld constructs. These are shown in the Content Analysis Template below.

Theme	**Construct**	**Descriptor/Example**
The digital world – people with cognitive disabilities overall experience of the digital world	Life-world	*I use the internet everyday* *I use the internet only when I have support* *I use the internet to communicate with friends and family and to look for information I need* *I never use the internet*
	Temporality	*I specially use on the weekends and end of the day*
	Spatiality	*I use the internet on my smartphone and everywhere* *I use the internet at home on a tablet* *I use the internet in the training centre, there are computers and people that help*
	Embodiment	*It is very difficult, I get very frustrated and anxious when I have to wait… for example if I need to wait for a webpage to load, I don't want to wait so I click using the mouse several times. What happens next? Several webpages open and I get lost and confused, sometimes I block everything.* *Our vision is also limited which makes reading small letters almost impossible*
	Inter-subjectivity	All participants referred they would like to have more training that would give them competences towards their web accessibility

Theme	Construct	Descriptor/Example
Life Skills - Navigating and managing interactions with 'the system'	Life-world	I don't know how to create a password or to sign in in a platform *Almost everyday I use facebook, google, whatsapp, public transportation information from the municipality website.*
	Temporality	*It takes too long to do simple tasks like writing an email because of my difficulties in spelling*
	Spatiality	*Often when I am able to locate the website I need, I still can't use and perform the task needed by my self.*
	Embodiment	*It's difficult to understand difficult words and when the text is too long* *The font is too small* *To encounter words in English and other foreign languages makes understanding overall very difficult* *I get very tired and confused with images, advertisements and pop-ups*
	Inter-subjectivity	*Platforms, websites and services are in general very difficult to use and complex, with an excess of information that is hard to understand without help or support*. *I use Facebook everyday to make friends and meet people. Sometimes I also have boyfriends, sometimes I receive messages that I don't like but I don't know how to stop them.*
Theme	**Construct**	**Descriptor/Example**
	Life-world	*During the pandemic I searched for information and I received posts in my facebook.*

Emergencies - Getting information and support for reducing risk and increasing preparedness and resilience in emergency situations		*I booked my COVID vaccine*
	Temporality	*I booked my COVID vaccine using the National Health Service website, it was not easy, I had help. It was difficult to follow all the steps needed*
	Spatiality	*Because we had to stay home, sometimes it was more difficult to receive the help to go online we needed*
	Inter-subjectivity	*During the COVID pandemic I was extremely stressed and anxious, everyday I received in my facebook information about the situation, I thought I was going to die several times. The teachers helped understand sometimes what is true and what is not*
Theme	**Construct**	**Descriptor/Example**
Self-development - Taking advantage of the opportunities provided by digital technologies for learning, employment, personal development	Life-world	*I did a bad business online, I bought a car even without having a driver's license, now I don't have access to online banking*
	Temporality	
	Spatiality	
	Embodiment	*Most of our clients have difficulties in reading and comprehending basic information, they need support in every task they perform.*
	Inter-subjectivity	*Some of our students had to be helped because their online identity in the social media had been stolen, someone was using their profiles and sending inappropriate messages online*
Theme	**Construct**	**Descriptor/Example**
	Life-world	
	Temporality	

Help and Support- using online information and guidance systems, for example searching for and using public information tools	Spatiality	*For me it is very important to look up the information about the schedules of public transportation in the municipality website. I use it everyday*
Theme	**Construct**	**Descriptor/Example**
Technological development/innovations needed to improve digital inclusion	Inter-subjectivity	
		Create simple training modules (target group and families/carers) or use existent: *when someone explains me something, I try and it is easier to do something, sometimes I only need to learn one time, sometimes I need more time to learn* *Some of our students achieve autonomy after training, others don't, but we are here to teach everyone, and for the ones that continue to need our help we remain available* *often, it is as important to teach the student as it is the parent or carer* option to increase and decrease font size: *the font in the webpages is often small and difficult to read, I get very distracted after the first few words* text to speech and speech to text, simplification (of text and structure) of websites and platforms: *websites have very long texts and very difficult to read* use of pictograms that help to decode the meaning of sentences: *there are many words I don't understand the meaning*

		help avoiding words in foreign languages: *there are many times that we find words in other languages and we don't understand the meaning* adaptive keyboards and mouses *Our students would benefit from adaptative keyboards and mouses* *I would like to have different keyboards, it is very difficult to find the letters I need, can we have keyboards where the letters are in alphabetical order? And a Keyboard with bigger letters* possibility of having a less complex version of websites (1 with more and 1 with less information, more simple and direct *I would like websites very very simple, with one sentence at a time or just a few words, only the needed information.*

Emergencies LAB - Cognitive disability and the digital world: overview – Quotes

Lifeworld

This section details the findings on how people with cognitive disabilities in the UK experience the digital world in their everyday life. The main themes evident in the data are the opposing concepts of the digital world as a lifeline and the digital world as a barrier.

Digital world as a lifeline

Most participants were positive about the role of the digital world in supporting and facilitating different aspects of their lives, and the possibilities and opportunities it can open up. P19 (carer of husband with Parkinsons) explains how technology has opened up opportunities for social interaction both in-person (finding out information online about local groups) and online (through Zoom exercise classes) and reports that "the internet has only really helped us". Other participants describe technology as something of a lifeline: "*Without having any digital [access] they would be lost*" (P2, autism support worker).

Digital world as a barrier

At times, participants encounter multiple challenges in trying to accomplish what they want to achieve in the digital world, and it becomes a barrier and source of frustration. P1 describes how many PwCD experience the digital world: "*As a barrier, immediate barrier…when it comes to literacy, researching [and] getting personal needs met…that's when it goes pear-shaped.*" These can lead to challenges which may affect mental health and wellbeing, which is further outlined in the section below on *Embodiment*.

Temporality

This section details the findings on how 'time' affects PwCD engagement with and experience of the digital world in the UK. Three main sub-themes were extracted from the data: i) routine, structure and healthy habits; ii) distractions and negative habits; iii) memory and focus.

Routine, structure and healthy habits

There appears to be a real struggle for many people with cognitive disabilities to establish good routines and structures, with several participants across the range of impairments noting the importance of having a clear routine and structure in order to cope. Many participants reported issues with keeping track of appointments and meetings, and having difficulties remembering times and locations.

Time management seems to be an issue on a wide range of timescales, from keeping track of time on a minute-by-minute, or hour-by-hour basis, to longer-term planning and time management. For example, P2 (an autism support worker) mentions that autistic people *"need constant guidance… they can only see now, not ahead*" and that it's important to stick to routines and timetables: *"they need prompting, reminding, visual timetables, text them. Give them a way of communicating that works for them"*. Similarly, P6 (parent of autistic child), mentions that her son needs *"a calm, structured routine*" with multiple timers and "*time warnings"* to keep him on track. P15 (adult who experienced a stroke) also considers the impact of fatigue on managing time and the need to break activities down into smaller chunks of time in order to overcome this: *"I find it difficult to focus if I am trying to multitask and fatigue very quickly… I need to plan my tasks at work and break them down into time slots"*.

Issues around time management are often related to habit formation around routines, and the struggle to build positive habits. P17 (an adult participant with ADHD) reported: *"I have to work hard to build healthy habits, even if I know they will help me. I find it hard to finish tasks."*

Equally P2, discussed the need for early intervention in establishing good habits in relation to time and healthy routines for children and young adults with autism.

Digital strategies for time management

In some cases, time management is supported in a positive way by technology, for example through calendar tools and phone reminders, e.g. P4 (a young adult who suffers from dissociative seizures) finds that a good routine is essential in remembering to "do things", and has established habits around checking her watch, phone and messages first thing in the morning. P17 (adult with ADHD) reports: "*I check the time, my email and calendar first thing. I use Outlook over the course of the day. I use reminders on my calendar so as not to forget appointments.*" One participant relies on Google apps including Google Assistant, Maps and Timers to stay in control of their routine and planning, including reminders for when to eat and when to take medication.

Voice user interaction

Other participants mentioned the use of voice user interaction technologies for facilitating time management and additional daily activities. P19 (carer) uses an Amazon Alexa which is set up for her calendar, verbal reminders and for turning lights on and off, and thinks that it could also be a beneficial approach for her husband, who suffers from Parkinsons. P15 (adult with brain injury) also uses Amazon Echo Dots around the house for alarms and timers, and would consider using additional IoT devices for automating tasks in the home (eg. lights, doors and electrical items).

Challenges with digital tools for time management

However there is a sense that digital time management tools can both help and hinder. In some cases there seems to be challenges with establishing or consistently following digital habits that could support good routine and time management, for example habits around when and

how often to check or set reminders, (e.g. P4 finds it hard to remember to set reminders) and habits around acknowledging reminders when they do occur and taking the necessary actions in order to make them useful. One participant reported that they don't use digital calendars as they can't understand them (P11), and another said that they "*find digital time management quite difficult*" referring to the use of online calendars (P17). In other cases, existing tools and approaches for time management simply don't meet their needs: "*I have tried using digital assistants on my phone but I don't feel that it is quite 'there' yet for it to be useful for myself*" (P15).

Importance of non-digital tools

Some participants reported being more reliant on physical, rather than digital tools, eg. P17 reported: *"I rely heavily on a physical diary. There's something about a physical book where you can page forward to later in the year"*; and P19 uses a physical magnetic board on the fridge with the week's plans so her husband can keep track of the days. This suggests that the tactile aspect of interacting with and managing time in terms of routine and schedules may be important to some people with cognitive disabilities.

Spatiality

This section reports findings on how geographical structures and boundaries shape engagement with and experience of the digital world for people with cognitive disabilities in the UK.

Optimising the physical environment

P2 (autism support worker) stresses the importance of optimising the physical space to support the best possible environment for children with autism to engage in learning activities (both in-person and online). This includes thinking about the sensory conditions (eg. Reduce lighting, make the space calm, clear and inviting, with no distractions or clutter), the types of information displayed (clear information, visuals and widgets),

and providing activities which meet their interests (eg. Lego, playdoh or "*things they enjoy*"). Other participants also mention the need for creating a calm, minimalist environment ("*linear, task-oriented, calm*" P1); reducing sensory overload, including lighting ("*He does have certain sensory issues, bright light for example…he'll need to shut the curtains if the sun is coming in*" P3) and clutter ("*Too many things are distracting*" P1); and providing clear information relevant to needs.

Embodiment

This section outlines the key physical and mental health factors that reduce the capacity of people with cognitive disabilities to benefit from the digital economy and society. The main themes discussed are:

- Physical health factors
- Mental health factors
- Overlapping physical and mental health factors (eg. mental fatigue and energy levels)

Physical health factors that reduce engagement

The types of physical health factors which present accessibility issues and barriers to digital engagement are varied, including mobility issues, arthritis, physical tremors, fine motor skills, poor hand-eye coordination, spatial awareness and vision problems. One participant, who had previously experienced a stroke reported: "*My eye problems made it very difficult to focus on screens…and the fatigue meant that it would be difficult to read and take in written instructions*." (P15) Other participants also noted the additional challenges presented by problems with

eyesight, including double vision and visual impairments. For example, P19 (carer) relates how *"A busy screen is impossible. Everything is too small, or can be. The big button phones for the visually impaired are still not big enough*."

Overlapping physical and mental factors

Energy levels are a key factor which can reduce engagement in the digital world, and several participants talked about mental or physical fatigue preventing them from fully participating in, or having to withdraw from, online activities. P18 suggests that "*physical and mental exhaustion and needing to rest are the main barriers to benefitting from the digital economy and society"*. P15 connects managing fatigue levels with time management: "*Fatigue management' is really just customised 'time management'…I find it difficult to focus if I am trying to multitask and fatigue very quickly*".

Mental health factors that reduce engagement

Some participants reported that existing mental health issues can cause problems with engaging with the digital world. P17 "*Overwhelm couple with poor mental health makes simple things harder. For instance, complex programmes or things I haven't used before are too hard"*. Another participant struggles with the affects of seizures, a result of mental health issues with anxiety, which sometimes make it difficult for her to engage with technology.

For those users with mental health issues who don't have access to digital tools at home, going somewhere else (e.g. library, cafe, shop) to access them may present problems: "*Going to a library involves being around people and that might be hard in itself – it might be a busy and noisy journey which might be distressing and uncomfortable for people.*" (P21)

The convergence of multiple and complex needs and factors can multiply these barriers to digital engagement. P21 (social worker) states that there are "*so many*" mental and physical health factors which lead to digital inequality, for example: "*social isolation, poverty, accessibility/physical disability, feeling discriminated against, abuse/trauma.*"

Inter-subjectivity

This section examines how inter-relationships and social interactions work in digital engagement; how 'the system' works to prevent people with cognitive disabilities from fully benefiting from the digital world. The key themes evident in the data are:

- Online communities and networking
- Importance of family support (and other in-person support)
- Over-reliance on technology above face-to-face communication
- Challenges with 'the system'

Importance of family and other in-person support

Some participants discussed the importance of having help from family members, friends, or others in accessing or mediating their engagement with the digital world. This includes support with a range of activities, from finding out information online, filling out forms, helping to manage time, education and training, and connecting with others online (through Zoom classes or social media). P8 (adult with autism) reports that difficulties with digital engagement can be lessened by help from others: "You may need someone to go through it with you. Real life support from someone who understands the issues you have…real human support and a caring approach." In the early stages of post-stroke recovery, P15 often sought out help from hospital staff or family: "When I had severe impairments I would always ask a member of staff or a family

member to assist me in this [finding information online]. I have also explained over the phone to friends and colleagues what is it I want to do/say on a form and trust they do it correctly for me." This participant also reported how Occupational Therapists (OTs) are instrumental in mediating early access to technology for rehabilitation. During his time in hospital following a stroke, he explained to an OT that technology was hugely important in his life and they introduced him to a web-based game which helped in eye rehabilitation: "My eyes took a long time to get better but being able to access this app did give me confidence that I would be able to use a computer again and it did slowly get easier to play the game."

Connection and understanding

The importance of having support from others is based on the need for practical help as outlined above, but also the need for genuine connection with others. As P10 (adult who experienced stroke) "*We need humans because they can talk, read, understand each other, and empathise*". P8 (adult with autism) reports that difficulties with digital engagement can be lessened by help from others: "*You may need someone to go through it with you. Real life support from someone who understands the issues you have…real human support and a caring approach.*"

Over-reliance on technology above face-to-face communication

Given the importance of human support and connection even in digital engagement, it is unsurprising that several participants complained about the over-reliance on technology above face-to-face communication, particularly with accessing services. P9 (adult with brain injury) states *"One thing that's challenging is that there aren't any people. [With the] leisure centre you have to book everything via this app. We went to the centre and they said you have to use the app*." Similarly, P23 (adult with ADHD) states: "*I find there's too much reliance on digital… Every time you phone a service like a bank or the council, the first thing they tell you do to is to go on the website. You're phoning them for a reason and you think 'if I could've done this on the website I would've done it this on the website!'"* This suggests that sometimes digital services which are enlisted to increase efficiency actually do the opposite and risk alienating PwCD. P15 reports: *"I think there is an over reliance on digital technologies when*

a face to face interaction would probably provide a better and more efficient experience… I believe that it is often easier and quicker to interact in person anyway."

This is also evident with the increase in online classes and meetings since the start of the pandemic, with some PwCD finding it difficult to engage with online interaction in place of in-person activities. For example, P10 (young person with multiple CDs) struggles with Zoom lessons: *"I hate them. Because I can't interact with the teacher or the information does not link, they don't connect with me. I can't link with the person, and when you have to ask questions, you have to type them and I can't type.*" P17 found it difficult to work at home during the pandemic: "*I hated working from home... Covid 19 shifted us into a very virtual space in which I did not cope… I need the physical office space, routine, structure to help me work."* These findings suggest that over-reliance on technology could pose mental health risks for PwCD or lead to further digital exclusion.

However, other participants warned about the dangers of over-reliance on technology above face-to-face communication, particularly with accessing services. Set against this, some participants reported they had difficulties in engaging with 'the system' – whether online or offline. These difficulties involve problems setting up meetings and appointments; delays in getting in touch with relevant officials; decreasing level of service availability – primarily due to cuts in welfare services and the closure of key points of digital access – for example post offices.

Cognitive disability and online platforms and services

This section provides a preliminary assessment of the main practical accessibility challenges faced by PwCD in the UK, as well as the use of key types of online platforms and services from the perspective of their lifeworld and lived experience.

These are structured by the four LIVE-IT Co-Lab scenarios, i.e.:

- **Life Skills** - navigating and managing interactions with 'the system'
- **Emergencies** - getting information and support for reducing risk and increasing preparedness and resilience in emergency situations

- **Self-development** - taking advantage of the opportunities provided by digital technologies for learning, employment, personal development
- **Help and Support**- using online information and guidance systems, for example searching for and using public information tools.