

Project Deliverable H - Prototype III and Customer Feedback

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Introduction

In the previous deliverable, the project team developed the second prototype for this project with the objective of creating a detailed task list of the experience, developing the user interface (UI) for the entirety of the experience, and implementing tasks in Unity. The progress made and feedback received from this prototype was presented to the professor and other students in the class during the project presentations on March 21st, where the project team had the opportunity to get more feedback that will inform our future design choices and improve our concepts.

The focus of this deliverable is to develop the third prototype, document the test plan, gather and analyze user feedback, and update the target specifications, detailed design, and BOM based on these results. The main objectives of this third prototype are to write an updated script of the experience, record all dialogue, implement the dialogue in Unity, create the user interface (UI) designed in the second prototype in Unity, implement the distraction mechanics, and complete the office scene. Once most of the work on this prototype was completed, feedback was again received from potential clients and users, which will allow us to make any final changes before design day presentations.

Prototype

The primary objectives of this prototype are to write an updated script of the experience, record all dialogue, implement the dialogue in Unity, create the UI for the guided reflection questions in Unity, implement the distraction mechanics, and complete the office scene. Therefore, the critical components of this prototype can be split into 4 general areas: experience script, office sequence, distraction mechanics, and user interface.

Experience Script

The purpose of this portion of the prototype was to add dialogue and inner monologue to the experience. This will make the main portion of the experience, the office scene, more engaging and realistic to users. Once the office sequence and tasks were finalized, it was time to create the script for the office scene of the experience and record all the lines for the inner monologue, the main character's dialogue, the co-worker's dialogue, and the boss' dialogue. Then, the voice recordings were compiled and implemented in Unity.

Moreover, the text of the report was written, which will serve as the main task users are trying to complete in the experience. The project team decided that the report would be on invisible disabilities in the workplace. This will serve to further educate the user on the topic of invisible disabilities in general, not just ADHD.

The full script of the experience and the text in the report is provided in the appendices section of this deliverable.

Office Sequence

For this prototype all the core functionality of the office sequence was implemented. All the tasks have been added to the experience, including all the backend required to detect completion and direct the player towards completion. A report asset was created that is readable by the player when it is interacted with. Coworkers were animated and programmed for interaction with the player. This includes a co-worker who speaks to the player and gives them an instruction, and the boss with whom the player has a conversation at the end of the experience. Audio was also added to the sequence. The flow of tasks is as follows:

- The player is brought to the office and must go to the job board in the manager's office to get their task for the day.
- Once they have read their task, they go to their desk to read a report.



Figure 1: Report on the Player's Desk

- Shortly after they start reading the report, they are distracted by a cup of coffee on their desk and are tasked with going to fetch another from the kitchen.



Figure 2: Coffee Cups in the Kitchen

- Once they have grabbed a cup, their character notices that the kitchen is messy and feels the need to clean it. The player will then have to place 5 dirty dishes into the sink.

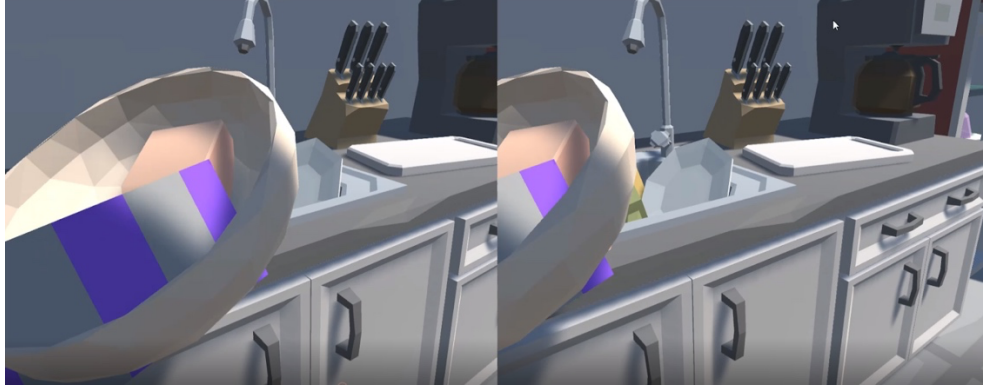


Figure 3: Player tidying up the kitchen by putting dishes in the sink

- Once they've cleaned the kitchen, the player will return to their desk to continue reading their report.
- Shortly after returning to their desk, a co-worker approaches them and engages them in conversation. In this conversation, the co-worker provides instructions to the player. These instructions however are missed due to the distractions present (see below).



Figure 4: Co-worker talking to player

- After the co-worker is finished, they leave, and the player returns to their report.
- The player is then distracted again, remembering they left their coffee in the kitchen. The player will have to go fetch it.
- Finally, the player will be given some time to read the report. Unfortunately, the end of day is fast approaching, and they will soon after have to go report their progress to their supervisor.
- The player will move to the manager's office, where they will find the manager waiting for them. A conversation will ensue, and then the experience will end.



Figure 5: Boss talking to player

Distraction Mechanics

In this prototype, the distraction mechanics were added to the experience. The first of these mechanics is a set of variable intensity and color lights that are activated when the player is engaged in focus-intensive activities. These lights are not jarring, or sickening, but certainly pull attention away from the matters at hand.

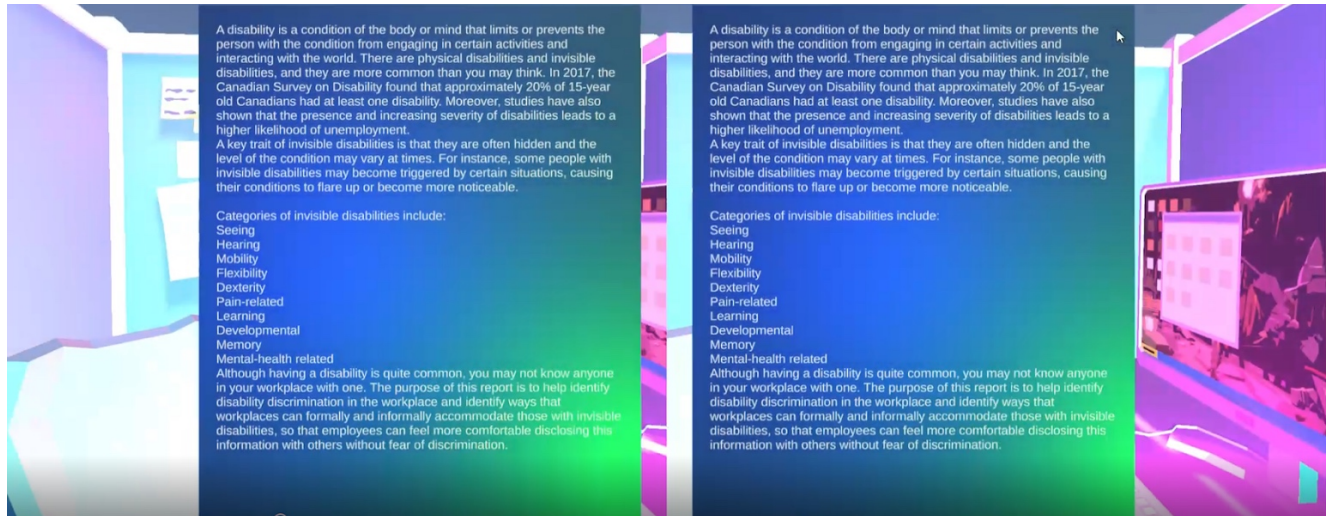


Figure 6: Variable colour and intensity lights when the player reads the report

The second distraction mechanic is a distracting audio clip that is played during these same focus-intensive activities. These mechanics are employed specifically whenever the user tries to read the report, and when they are engaged in conversation with their co-worker. The inner monologue was also added. Throughout the experience the player's character's inner thoughts are voiced through audio files played at various points throughout the experience. These audio files distract the player during tasks, guide the player to the next objective, and provide emotional education.

User Interface - Guided Reflection Questions

After creating the UI design drawings in the last prototype, the main menu, guided reflection questions, resources, and ending screens were successfully implemented in Unity. This will allow for users to seamlessly navigate the experience, reflect on their actions made during the office scene of the experience and be aware of mental health crisis lines, uOttawa mental health resources, and more information about the invisible disability covered, ADHD.

The first scene in the guided reflection module of the experience is shown in the figure below. When the user clicks the "continue" button, a script has been written that will allow for the users to transition between the different questions. Then, the resources module will be shown, and finally, the experience will come to an end.

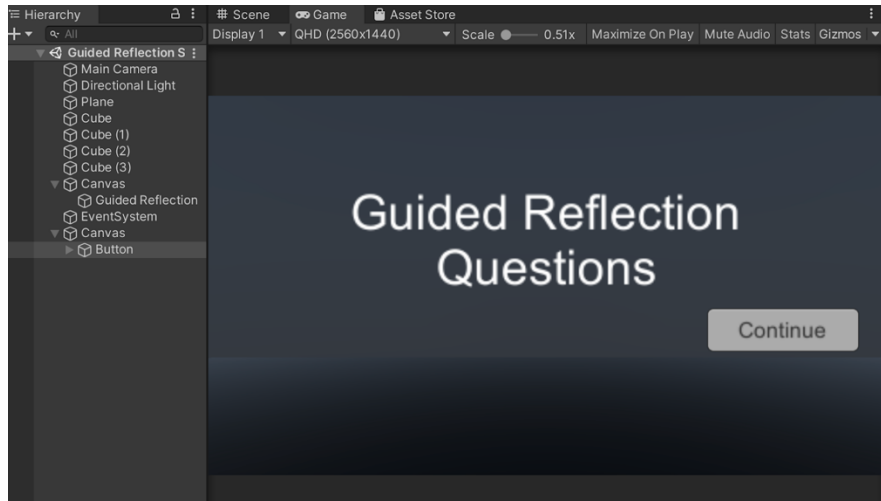


Figure 7: Guided Reflection Module in Unity

Now, all that is left for the UI is to implement VR controls (ie. allowing for the user to click the buttons with the controller) and connect the UI to the home and office scenes.

Justification of Prototype

The main purpose of this prototype was to complete or almost complete our VR experience so that only improvements based on feedback and final details would be left to do. After the first and second prototypes, we had created a more specific storyline that was almost ready to be added to Unity, unfortunately, we had to make a few adjustments because of time constraints. On the other hand, a lot of the changes were just the order of the tasks and how distractions would be implemented so the details and our ideas have not completely changed. We were able to make a sequence that will be easier to implement in Unity and that we believe will make the VR experience easier for our users so that they are able to focus on the learning instead of the gameplay.

One of the main goals for this prototype was to add all the tasks into unity for VR and then to focus on the distraction mechanics: constant audio and visual distraction as well as the inner monologue. After the first prototype, the framework had been set up and had been able to get used to using the unity software so that adding the tasks during this prototype was easier. We were also able to get feedback on our almost finished experience to be able to improve based on potential users' comments. Working on this last prototype during the last two weeks has assured us that we will get a final experience that will help solve the issue addressed by the client.

User Feedback

On March 21st, the project team had the opportunity to present our project and prototype work to the class and the professor and gather feedback. The feedback for this portion of the experience was primarily positive; however, our peers and professor had some valuable insights that affected the development of this prototype. Firstly, we were praised on the cohesiveness of the art style of the

experience and the prioritization of previous feedback we have received. Some constructive feedback that we received was that we should ensure that there is a disclaimer about flashing lights or other visual distractions, and that we should also include a disclaimer in the introduction reminding users to not self-diagnose based on this experience. We were also asked whether we were planning to match the gender presentation of the character to the user's gender, which is something that we considered but since we are allowing the user to select a character and we are limited in the number of voices we have; we are just using a female voice for the user and the co-worker and a male voice for the boss. Finally, the professor commented that we should try to make the user aware of the ease of getting tasks done in the introduction module without distractions compared to the difficulty when placed in the office scene, which is something that we will focus on to make users elicit more empathy since they are aware of the differences the distractions make in the experience.

After the client presentations, more work was done for this prototype and thus feedback was again collected based on the UI, script, and office scene in Unity. To do this, members of the project team showed these elements of our experience to friends and family and asked them for written feedback. The results were primarily positive, with potential users stating that they especially liked the art style and thought that the voice acting of the character, co-worker, and boss made the experience more immersive. Moreover, the feedback stated that the implementation of an inner monologue voice helped distract the user and portray the symptoms of ADHD.

Before design day, we are hoping to get potential users to try out our experience using a VR headset so we can collect more data on the ease of use of the experience.

Prototype 3 Test Plan and Results

After tests were performed and potential user and client feedback was received, the test plan for this prototype from the last deliverable was modified to reflect the true objectives and results of this prototype.

Table 1: Test Plan for Prototype 3

Test ID	Test Objective (Why?)	Description of Prototype used and of Basic Test Method (What?)	Description of Results to be Recorded and how these results will be used (How?)	Estimated Test Duration and Planned Start Date (When?)	Test Results
1	<p>Measure the level of performance and empathy elicitation: To gauge the success of our prototype, the user's subjective and objective feelings and behavior states will be recorded. To ensure the product is effective in eliciting</p>	A high-fidelity prototype will be created and tested with potential users and clients.	We will find potential users to test the entirety of our VR experience and provide feedback.	This test will be conducted after the main experience, all the UI, and the voiceovers are implemented in Unity. It will be the last thing needed	After all the modules of the project were prepared, the feedback from potential users showed that it was a good experience and was successful in eliciting empathy. Before design day, we will gather more feedback and make any final changes required.

	empathy in users, we will need to select appropriate measurement indicators and optimize products in each measurement.			to be done for this prototype.	
2	Completion of the Main Experience: This is the most important piece of the prototype. It will focus on putting the user in the shoes of someone who has ADHD.	A high-fidelity prototype will be created and tested with potential users and clients.	We will find potential users to test this module of the VR experience and provide feedback.	After the introductory scene is complete, work will begin on the main experience.	The office scene of the experience is complete, and feedback from potential users in VR was positive.
3	Addition of all User Interfaces: All the user interfaces outlined and sketched in prototype 2 will be implemented in Unity. This will give users access to modules such as accessibility options, guided reflection questions, and additional resources if they need.	A high-fidelity prototype will be created and tested with potential users and clients.	We will find potential users to test the effectiveness and ease-of-use of the UI and provide feedback.	This test will be conducted at the same time as test ID 1, but the addition of all UI can be implemented as soon as possible (it does not require the main experience to be implemented).	The UI in Unity was shown to potential users, and the feedback has been positive; however, since it has not been implemented for VR controls or connected to the home and office scenes, users were not able to test it yet. This will happen before design day.
4	Empathy - Inner monologue: How does it make the user (without the disability) feel? Do those feelings match the feelings of people with ADHD? Does it generate empathy from the user? One of the main client's needs was to generate empathy from the user in this training tool, to accomplish this, we need to assure that the user feels the same way people with the disability do.	A focused analytical prototype to follow the storyline and tasks that the user would face will be created.	We will gather feedback from potential users with and without ADHD to gauge the accuracy of the script to real experiences of the invisible disabilities and the level of empathy elicitation.	This will be done independently from the VR environment and involves creating a script and gathering feedback from potential users and clients.	The user feedback collected on the script was positive, which makes the project team firmly believe that it can greatly improve the degree of empathy.
5	Voice Recording: For the experience to feel as realistic and immersive as possible, voiced lines for all characters will be provided.	Focused analytical prototype that will involve voicing the inner	We will gather feedback from potential users and clients to gauge the effectiveness of the voice acting and	This will be done independently from the VR environment and voicing the lines created in the	The voice recordings have been found to make the experience more immersive, and effectively play the role of interference (through

		monologue of the user, and the dialogue from the user, coworkers(s), and boss in the main experience.	the level of empathy elicitation.	script (test ID 4) and gathering feedback from potential users and clients.	distractions) and guidance (by reminding users of the task at hand).
6	Functional Failures: Functional failures contain testing all functions of the experience and verifying specific functions in extreme cases. This will help us improve the overall performance of the system and ensure that users do not experience any software glitches during use.	Some special conditions will be tested in Unity to test the operating conditions of the system and ensure that glitches or error messages do not appear for potential users or clients during use.	These results will be recorded by the project team exhaustively testing the product in Unity to see if any errors occur that can be fixed before the project is shown on design day.	This will be done after all planned features have been implemented in Unity.	We have not found any issues or error messages under extreme operating conditions, and we will continue to test for these as we make any final changes before design day.

Conclusion

The objectives of this prototype were to complete the main experience, implement the inner monologue and character dialogue, and add all the UI to the experience. Thus, the third prototype was created by writing the script of the office scene, voice recording all required lines, and implementing the office scene sequence, distraction mechanics, and UI in Unity. Tests were then performed to assess the distraction mechanics and chances of success, and feedback from potential users and clients was gathered based on the work presented during the class presentations, the script, and the work completed in VR thus far. The project team was able to use this feedback to make any final changes before design day and improve the overall quality of our product.

Appendices

Appendix A - Target Specifications (No update since Deliverable G)

Table 2: Target Specifications

Design Specification	Relation (=, < or >)	Ideal Value	Acceptable Value	Units	Verification Method
Functional Requirements					
Level of Interactivity	=	Significant amount of meaningful user interaction	Fair amount of meaningful user interaction	N/A	Analysis

Relatability to marginalized groups	=	Experience meaningfully addresses challenges universally faced by all marginalized groups	Experience meaningfully addresses challenges faced by one marginalized group	N/A	Analysis
Effectiveness of fostering diversity and inclusion	<	User leaves the experience with a thorough understanding and respect for the challenges experienced by marginalized groups and can empathize with their struggles	User leaves the experience with a respect for the challenges faced by marginalized groups	N/A	Analysis
Effectiveness of empathy elicitation	<	Users leave the experience able to identify many of the challenges faced by marginalized groups, meet those challenges with empathy, and are committed to positive change	Users leave the experience able to identify several of the challenges faced by marginalized groups and meet those challenges with empathy	N/A	Analysis
Change in POV	<	Yes	Yes	N/A	Test
Conveyance of otherness	>	User feels that they are different, feels marginalized as a result, and experiences significant challenges due to their otherness	User recognizes they are different and experiences minor challenges due to their otherness	N/A	Analysis
Opportunities for reflection	=	Experience is designed with thoughtful reflection in mind, and user is prompted to reflect multiple times within the experience	User is prompted to reflect at the end of the experience	N/A	Analysis
Level of immersion	=	User feels completely immersed in the virtual world and their new identity	User feels immersed in the virtual world, and takes to their newly assigned identity; user is keenly aware of the limitations of their virtual world	N/A	Test
Ease of use	<	Experience controls are intuitive, and users require no facilitator training to complete the experience. Within a few seconds the user is acclimated to the unfamiliar environment and its controls. Nausea is not induced in users.	Experience controls are unintuitive, but users only require minimal training from the facilitator to complete the experience. Users are acclimated to the unfamiliar environment in less than 5 minutes. Nausea is induced in those new to VR.	N/A	Test
Level of user engagement	>	Experience captures the attention and focus of the users and never loses it	Experience captures the attention of the user, but user's attention and focus wanders occasionally.	N/A	Estimate, check
Accessibility	>	100% Accessible	Accessible to most	N/A	Test
Constraints					

Cost	=	No more than \$50	\$70-\$80	\$CAD	Estimate, check
Incorporation of VR	=	Yes	Yes	N/A	Final check
Non-Functional Requirements					
Ease of deployment	>	Users can easily access the device	Most users can easily access the device	N/A	Test

Appendix B - BOM (No update since Deliverable G)

Table 3: Bill of Materials

Name	Description	Cost	Link
Low Poly Cartoon House Interiors	Low poly house-themed asset pack including a demo house scene	\$9.99	https://assetstore.unity.com/packages/3d/props/interior/low-poly-cartoon-house-interiors-167425
POLYGON Office	Low poly office-themed asset pack including character models, objects, and office demo scene	\$39.99	https://assetstore.unity.com/packages/3d/props/interior/polygon-office-low-poly-3d-art-by-synty-159492
Universal Sound Effects	2305 general purpose sound effects and ambient environment noises	\$7.00	https://assetstore.unity.com/packages/audio/sound-fx/universal-sound-effects-206856
Total Cost		\$56.98	

Appendix C - Task Plan and Wrike Snapshot

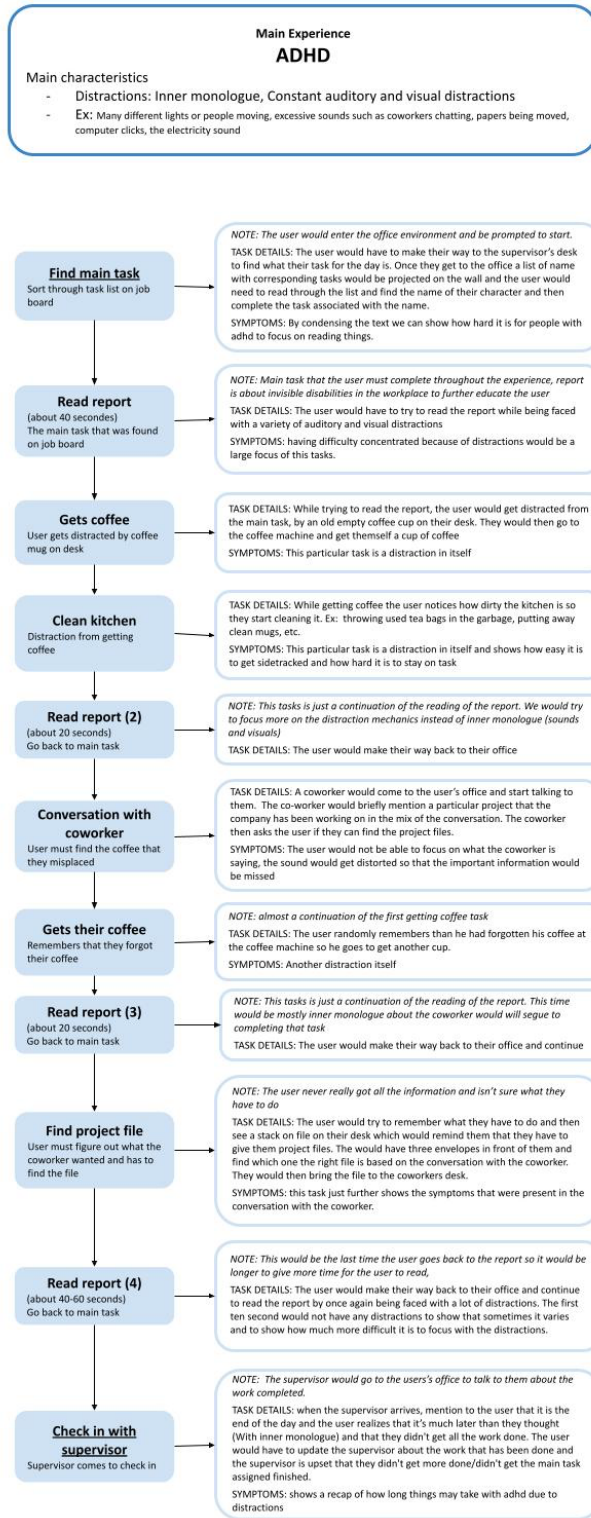
For the next two weeks we will be focusing on the client presentation for design day as well as the User manual for the VR experience. All the allocated tasks and details have already been added to the Wrike plan and therefore in the following link:

<https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=HOWUjM76P4bi7wrDyYv6Li5AaLPAaeQC%7CIE2DSNZVHA2DELSTGIYA>

For the first week (until design day) we will be focusing on the client presentation and trying to finish small details of our experience based on feedback. We will create a presentation visual, practice our pitch and predict potential questions to help us prepare.

After design day, we will create our user manual based on all our deliverables and project work so far. The document has already been divided into sections because of the template we need to fill in so the work has been divided according to that which can be seen in the Wrike snapshot above.

Appendix D - Updated Task Sequence



Appendix E - Script of the Experience

HOME SCENE

Front door is opened

"Alright, time to start the day."

OFFICE SCENE

Upon entry

"I wonder what my boss has on the job board for me today."

Walk to job board, read through list

"Oh, what has Claire been up to lately! Haven't talked to her since she left for maternity leave."

"I guess I have to read the report about managing invisible disabilities in the workplace today"

Walk to office

"I wonder how Claire's been handling coming back to work now that she has a kid to take care of"

In office - report is sitting on desk (read for about 40 seconds)

"Okay, let's get this reading out of the way... What's this for again?... Hmm... right the boss has an HR meeting tomorrow morning so i really need to get this done... Oh yeah, did I remember to take my meds this morning?"

Notices empty coffee cup on the desk

"Ooh, coffee! That's a good idea. Maybe I'll grab a cup to help me out with this work."

Walks to get coffee

"I hope the coffee machine is back up and running. Last week everyone was so tired since it was broken. Even Chris fell asleep during the project alpha meeting."

While getting coffee

"Thank god it's working again"

Notices area is dirty

"I should really clean this up. I don't know how it always gets this dirty and it's only the beginning of the day "

While cleaning

"Why do people always leave their used tea bags. Is it really that hard to throw them out?"

Goes back to office (forgets coffee)

"Ok, now that the kitchen's in order, let's get back to work"

Starts reading report again (2) (~20 seconds)

"Let's try this again"

Mostly use distraction mechanics (sounds, visuals) instead of inner monologue

Coworker enters

[Shannon] "Hey Alex! How's your morning going? Mine's been all over the place. Kid, son, and child were unable to get out of bed and since Eric is away for work, I had to get them up and ready all by myself. On top of that, Child was sick, and I couldn't stay home today cause of the preparations for the big meeting tomorrow you know? By the way, do you still have the envelope with all the project beta documents? Anyways, yeah so i had to try to find a last-minute babysitter which Eric's sister usually babysits but she was unavailable so luckily my neighbor was home and offered to help. And after that i had to drive the other two to school, which of course is two schools now that kid is in high school, so a lot of back and forth but I'm finally here so hopefully the day will just get better you know what i mean? But yeah, if you still have the documents and could drop them on my desk so I can read them over this afternoon, that would be a great help! Well, I'm already late to this meeting so I've gotta run, see ya!"

[Alex] "Yeah sure, I'll try to get that done"

[Alex (inner monologue)] "I have no idea what she just asked me to do."

Remembers coffee

"Oh wait, I think I left my coffee in the kitchen."

Goes back and gets coffee

"There it is"

Gets back to office

[Alex] "I should probably get back to reading that report now. I haven't read much"

Reads report (3) (~20 seconds)

"Ugh, Shannon is always nattering on about her day and is only interested in herself.

Oh right, I really need to get that thing to her. Not really sure what she wants, but I'm sure if I look around, I can figure it out. I hope she won't be there when I drop it off."

Looks around office, sees stack of envelope and then suddenly remembers

"Oh yeah that's right. I needed to bring her the important documents for the meeting later. I better do that quickly; they're really going to need it. Which project was it that they're working on again? Maybe I should just give them all the envelopes so that they definitely have what they need, but then Shannon might get mad cause she's going to know that it's because I forgot which papers she needed like last time. I have the envelopes for project alpha, beta, and zeta, which one was it that she mentioned?"

User must pick out the right envelope (The right envelope would be mentioned in the reflection/conclusion of the experience)

"Well hopefully this is the right one and she'll have everything she needs for the meeting"

Walks to coworker's area

"Ok good. She's not here right now so I don't have to answer any more questions or listen to her ramble again."

Puts the envelope on the desk

Goes back to read report

"Okay, now let's get back to this report."

Reads report (4) (longer - give more time to let the user read, then use auditory and visual distractions, maybe could have the first like 10 seconds have like little to no distractions but then they just add)

Boss comes in

[Boss] "Hey, Alex. Just wanted to check in before I go home for the day. Were you able to give that report on invisible disabilities a read?"

[Alex (inner monologue)] "oh shoot, it's already 5!? I can't believe i didn't finish reading the report"

[Alex] "I'm so sorry, I had to get the documents to Shannon for the project meeting and didn't have time to finish reading it. From what I've read, there are a few interesting insights worth sharing that i can definitely highlight but i have not been able to get to the end yet"

[Boss] "I was really hoping that you would have it done by now. It's really important for it to be done for tomorrow's HR meeting"

[Alex] "I know, I'm sorry. I'll have it done for tomorrow morning"

[Boss] "Okay, but in the future, I really need you to try harder to work on the task I've assigned to you on the job board. Have a good night, Alex."

Boss leaves

"Oh shoot, I didn't realize it was already time to go. I guess I'll just have to read through the rest of this report tonight at home so I'm ready for tomorrow"

Screen fades to black and reflection questions appear

Appendix F - Report Text: Invisible Disabilities in the Workplace

Section 1 - What are Invisible Disabilities?

A disability is a condition of the body or mind that limits or prevents the person with the condition from engaging in certain activities and interacting with the world. There are physical disabilities and invisible disabilities, and they are more common than you may think. In 2017, the Canadian Survey on Disability found that approximately 20% of 15-year-old Canadians had at least one disability. Moreover, studies have also shown that the presence and increasing severity of disabilities leads to a higher likelihood of unemployment.

A key trait of invisible disabilities is that they are often hidden, and the level of the condition may vary at times. For instance, some people with invisible disabilities may become triggered by certain situations, causing their conditions to flare up or become more noticeable.

Categories of invisible disabilities include:

- Seeing
- Hearing
- Mobility

- Flexibility
- Dexterity
- Pain-related
- Learning
- Developmental
- Memory
- Mental health related

Although having a disability is quite common, you may not know anyone in your workplace with one. The purpose of this report is to help identify disability discrimination in the workplace and identify ways that workplaces can formally and informally accommodate those with invisible disabilities, so that employees can feel more comfortable disclosing this information with others without fear of discrimination.

Section 2 - What does disability discrimination look like in the workplace?

Often, disability discrimination in the workplace looks different than discrimination in public spaces.

In the workplace, discrimination often takes place in the form of "jokes", rude nicknames, intrusive questioning, excessive remarks, exclusion, and providing information about someone's disability.

Moreover, because invisible disabilities are often harder to diagnose and discover, many individuals are left suffering in silence, and may not even seek further treatment because they don't want to be the subject of prejudice from colleagues, even if they would be protected by law.

Section 3 - How can workplaces accommodate invisible disabilities?

Workplaces should ensure that all individuals are given the opportunity to reach their full potential, and accommodations should help celebrate the skills they bring to the workplace rather than making them feel like a burden to others.

To receive formal accommodations, the invisible disability must be formally disclosed to the employer. This is a personal choice that must be taken seriously by the individual and is dependent on their work situation. Often, those with invisible disabilities find ways to work around and conceal their disability; however, an unexpected event can easily occur where these workarounds no longer work, causing stress and impacting the individual's health and well-being.

Once an employer is formally disclosed of the disability and accommodations have been requested, they are legally obligated to provide reasonable requirements if the individual is meeting the requirements of the job. Other people and departments that may be involved in this process include managers, human resources (HR), labour relations, and legal services.

Moreover, reducing the stigma surrounding invisible disabilities, removing barriers, providing alternative ways of communication, and demonstrating inclusiveness when conversing with colleagues are just a few ways that workplaces can provide informal accommodations for people with invisible disabilities.

SOURCE:

<https://canadianequality.ca/invisible-disabilities-in-the-workplace/>