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The VR4ALL Trainer's Guide

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Material for Training: Specific methods for delivering lessons based on the VR4ALL 3D environments

Didactic Objectives of lessons to be conducted

Are to

- equip design trainers with a deep understanding of the VR4ALL - 3D environments (simulation tools) and their functionalities.
- develop trainers' ability to effectively integrate VR4ALL 3D environments into their design curriculum.
- enhance trainers' capacity to guide students in creating inclusive and accessible designs.

Structure of the lessons to be conducted

1. Introduction to 3D Simulation Tools and Disability Simulationequip design
2. Integrating 3D Simulations into Design Curriculum
3. Advanced Topics and Best Practices

Introduction to 3D Simulation Tools and Disability Simulationequip design

Introduction:

- Overview of the project and its goals
- Introduction to the concept of universal design and inclusive design
- Deep dive into the 3D simulation tools: functionalities, capabilities, and limitations
- Hands-on...
- Understanding different types of disabilities and their impact on daily life
- See Contribution of Masaryk University
- Hands-on experience with disability simulations within the 3D environments
- Provide practical experience

- Group discussion: e.g. Challenges and opportunities in using 3D simulations for design education.

Integrating 3D Simulations into Design Curriculum

- Objectives and strategies:
    - Developing learning objectives and outcomes for using 3D simulations
    - Creating engaging and interactive learning activities
    - Designing assessment strategies for student learning
- Employ VR4ALL-project provided Self-assessment quizzes w/solutions
- Lesson development...
- Objectives and strategies...
- Lesson development:
    - Developing lesson plans incorporating 3D simulations
        - Employ the VR4ALL-project provided
          set of practical exercises that are based on Design Thinking and the environments and can be implemented in the classroom
    - Peer review and feedback on lesson plans
    - Strategies for addressing diverse learning styles and needs

Advanced Topics and Best Practices

- Specific problems:
    - Collaborative design projects using 3D simulations
        - Integrating user-centered design principles
        - Addressing ethical considerations in using disability simulations
- Next steps and brush up:
        - Provide a professional development plan
        - Building a supportive learning community

        - Q&A and open discussion
- Specific problems:
    - Collaborative design projects using 3D simulations
        - Integrating user-centered design principles
        - Addressing ethical considerations in using disability simulations
- Next steps and brush up:
        - Provide a professional development plan
        - Building a supportive learning community
        - Q&A and open discussion

Didactic Training Methods and Concepts

Lessons will employ

- a blended learning approach,
- combining theoretical input, practical exercises, and collaborative learning.

Key didactic elements should include:

- Experiential Learning
- Collaborative Learning
- Problem-Based Learning
- Reflective Practice

Key didactic elements

- Experiential Learning
    - Hands-on activities with the VR4ALL 3D tools, allowing designers to personally experience the tools and their capabilities.
- Collaborative Learning
    - Group work & peer feedback to foster knowledge sharing and development of best practices.

- Problem-Based Learning
- Reflective Practice
- Experiential Learning…
- Collaborative Learning…
- Problem-Based Learning
    - Real-world scenarios and challenges to stimulate critical thinking and problem-solving skills.
- Reflective Practice
    - Opportunities for students to reflect on their learning and practice, leading to continuous improvement.

Additional Considerations

- Trainer Selection:
    - Select trainers with a strong background in design and a passion for inclusive design.
- Tool Proficiency:
    - Ensure trainers have sufficient technical skills to operate the VR4ALL 3D tools independently.
- Accessibility…
- Follow-up Support…
- Trainer Selection…
- Tool Proficiency…
- Accessibility
    - Make the lessons accessible to trainers/students with disabilities by providing appropriate accommodations.
- Follow-up Support
    - Offer ongoing support and resources to students after the lessons.

Structure of lessons

By following this didactic lesson structure and incorporating the outlined didactic elements, we can effectively equip design trainers to utilize the VR4ALL 3D simulation tools and create inclusive and accessible design learning experiences!

Specific didactic issues

- How to …
    - Develop didactic learning objectives and outcomes when using 3D simulations?
    - Create engaging and interactive learning activities?
    - Design didactic assessment strategies for students?
    - Develop a lesson plan incorporating 3D simulation?
    - Develop strategies for addressing diverse learning styles and needs?
    - Develop a lesson plans including incorporation of 3D simulations?
    - Setup collaborative design projects using 3D simulations?
    - Integrate user-centred design principles in to lessons?
    - Address ethical considerations when using disability simulations?

How to develop didactic learning objectives and outcomes when using 3D simulations?

- Identify target audience and learning needs
- Align with learning theories
- Develop clear and measurable learning objectives
- Create a variety of learning activities
- Evaluate learning outcomes
- Identify target audience and learning needs:
    - Clearly define the specific roles of design trainers and their prior knowledge to tailor the training accordingly.

- Analyze the knowledge gap and identify essential competencies required for effective 3D simulation integration.

Align with learning theories:

- Incorporate established learning theories (e.g., constructivism, experiential learning) to create engaging and effective learning experiences.
- To enhance knowledge retention emphasize
  - hands-on practice,
  - problem-solving,
  - collaborative learning.

Develop clear and measurable learning objectives:

- Construct specific, observable, and measurable learning objectives that outline the desired outcomes of the training.
- Focus on both knowledge acquisition (understanding of disability simulations) and skill development (effective integration of simulations into design process).

Create a variety of learning activities:

- Design a diverse range of learning activities that lead to different learning styles.
- Include theoretical input, practical exercises, case studies, and group work to foster comprehensive understanding and skill development.

Evaluate learning outcomes:

- Develop assessment methods to measure the effectiveness of the training and the achievement of learning objectives.
- Utilize a combination of formative and summative assessments, such as quizzes, practical demonstrations, and participant feedback.

How to create engaging and interactive learning activities?

- Hands-on Experience

- Scenario-Based Learning
- Collaborative Problem-Solving
- Feedback and Iteration
- Technology Integration

Hands-on Experience:

- Provide trainers with extensive hands-on experience
- Motivate to employ the 3D simulation tools
    - to deeply understand their functionalities and limitations.

Scenario-Based Learning:

- Develop realistic design challenges that simulate real-world situations, allowing trainers to practice applying tools to solve specific problems.

Collaborative Problem-Solving:

- Encourage group work and peer-to-peer learning through collaborative design projects, fostering knowledge sharing and creative solutions.

Feedback and Iteration:

- Implement a structured feedback mechanism to continuously improve training materials and delivery methods based on trainer and participant input.

Technology Integration:

- Utilize interactive elements such as VR4ALL-virtual reality in order to enhance the learning experience and provide immersive simulations of disability challenges.

How to design didactic assessment strategies for students?

- Understand the target group
- Develop assessment criteria
- Design diverse assessment methods

- Provide feedback strategies

- Equip trainers with knowledge concerning design students about their
- specific needs,
- learning styles,
- consider their prior knowledge and skill levels.

Develop assessment criteria:

- Guide trainers in creating clear and measurable assessment criteria
- Criteria
  - to be aligned with learning objectives,
  - emphasizing the application of 3D simulation tools for inclusive design.

Design diverse assessment methods:

- In order to comprehensively evaluate student learning teach trainers to employ a variety of assessment methods, including
  - practical exercises,
    - portfolios,
    - group projects,
    - presentations

Provide feedback strategies:

- Train trainers on effective feedback techniques to support student growth,
- within the context of inclusive design focus on
  - constructive criticism,
  - goal setting,

- self-reflection

How to develop a lesson plan incorporating 3D simulation?

- Understand the target audience
- Develop engaging learning objectives
- Create hands-on exercises
- Provide pedagogical guidance
- Understand the target audience
    - Identify concerning the designers who will be using the 3D simulation tools, their
        - specific needs
        - skill levels.
    - This will inform the depth and complexity of the lesson plan.

Develop engaging learning objectives:

- Clearly define the desired outcomes of the training, such as
    - understanding disability simulations,
    - applying simulation to design processes,
    - evaluating design solutions based on simulated experiences.

Create hands-on exercises:

- Incorporate practical activities that allow trainers to experience the 3D simulation.
- This will enhance their ability to guide designers
- Provide pedagogical guidance:
- Offer strategies for effective teaching and learning, including group work, case studies, and feedback mechanisms.

How to develop strategies for addressing diverse learning styles and needs?

- Understand Diverse Learning Styles
- Tailored Training Approaches
- Inclusive Learning Environment
- Continuous Assessment and Adaptation
- Understand Diverse Learning Styles:

Equip trainers with knowledge of

    - different learning styles (visual, auditory, kinesthetic, etc.)
    - how to identify these preferences in participants.

Tailored Training Approaches

- In order to accommodate various learning styles teach trainers how to adapt
    - teaching methods
    - Materials.
- Make sure that this information is accessible to everyone.

Inclusive Learning Environment

- Guide trainers in creating a supportive and inclusive atmosphere
- Participants should feel comfortable
    - asking questions,
    - sharing experiences,
    - receiving feedback.

Continuous Assessment and Adaptation

- Emphasize the
    - importance of ongoing evaluation of training effectiveness

- willingness to modify approaches based on participant feedback and performance.

How to integrate user-centred design principles into lessons?

- Emphasize user research
- Promote iterative design
- Introduce accessibility standards
- Develop empathy and collaboration

Emphasize user research

- Train design trainers to conduct thorough research on disabled users'
  - specific needs
  - limitations
- Make sure, that perspectives are central to the design process.

Promote iterative design

- Teach trainers to foster a design culture that encourages continuous
  - Testing,
  - Evaluation,
  - Refinement.
- Culture to be based on user feedback
- This should lead to more inclusive and effective outcomes.

Introduce accessibility standards

- In order to integrate them into design education and practice equip trainers with knowledge of relevant
  - accessibility guidelines
  - Standards.

Develop empathy and collaboration

- Foster a learning environment that

- cultivates empathy for users with disabilities
- promotes collaboration between designers and users throughout the design process.

How to address ethical considerations when using disability simulations?

- Emphasize the importance of respectful and accurate representation of disabilities, avoiding stereotypes and oversimplifications.
- Train trainers to foster empathy and understanding of the challenges faced by people with disabilities, encouraging a user-centered design approach.
- Highlight the ethical obligation to protect user privacy and data security when utilizing disability simulations.
- Equip trainers to identify and address potential biases in the design process, promoting inclusivity and accessibility.

Immersive VR technologies as a means to empathizing disabled users in the design-for-all process

What is Design Thinking?

Design thinking is a method that is used by teams to identify the users, explore the context, build a point of view, converge on a solution, and test it through prototypes.

It involves five phases:

Empathize

- Understand the needs, thoughts, emotions, and motivations of the users.

Define

- Clearly articulate the problem that needs to be solved.

Ideate

- Build tangible representations for a subset of ideas.

Test

Evaluate the prototypes to learn more about the users and the problems.

Example of Design Thinking use in Healthcare

- **Empathize**: Interview patients and healthcare providers to understand their experiences and challenges.
- **Define**: Identify issues such as long wait times and unclear communication.
- **Ideate**: Brainstorm solutions like a mobile app for appointment scheduling and real-time updates.
- **Prototype**: Create wireframes of the app interface.
- **Test**: Conduct usability testing with patients and providers, gather feedback, and iterate on the design.

Example of Design Thinking use in Retail

- **Empathize**: Interview customers to understand their shopping behaviors and preferences.
- **Define**: Identify pain points such as difficulty in finding products and lack of personalized recommendations.
- **Ideate**: Brainstorm solutions like an in-store navigation app and personalized shopping assistants.
- **Prototype**: Create a prototype of the navigation app.
- **Test**: Test the app with customers in a pilot store, gather feedback, and make improvements.

Example of Design Thinking use in Education

- **Empathize**: Observe and interview students and teachers to understand their needs and frustrations.
- **Define**: Define the problem of disengagement in online learning environments.
- **Ideate**: Generate ideas such as gamified learning modules and interactive virtual classrooms.
- **Prototype**: Develop a basic version of the gamified module.
- **Test**: Test the module with a small group of students, gather feedback, and refine the design.

Do's of Design Thinking

- **Embrace Empathy**: Spend time understanding your users' needs, emotions, and experiences. Use interviews, observations, and immersive experiences.
- **Encourage Collaboration**: Foster a collaborative environment where diverse perspectives are welcomed and valued.
- **Iterate Continuously**: Be prepared to iterate on your ideas and prototypes based on user feedback.
- **Stay User-Centered**: Always keep the user's needs and experiences at the forefront of your design process.
- **Prototype Early and Often**: Build early prototypes to visualize ideas and gather feedback quickly.

Dont's of Design Thinking

- **Don't Rush the Empathy Phase**: Skipping or rushing this phase can lead to solutions that do not truly address user needs.
- **Don't Be Afraid to Fail**: Failure is an essential part of the design thinking process. Learn from it and iterate.
- **Don't Ignore Feedback**: User feedback is crucial for refining and improving your designs. Take it seriously and incorporate it into your iterations.
- **Don't Work in Silos**: Design Thinking thrives on collaboration. Avoid working in isolation and seek input from others.
- **Don't Stick to One Idea**: Be open to exploring multiple ideas and solutions. Avoid becoming too attached to a single concept.

Applying Design Thinking in Education

Workshop for Product Design Teachers

1. **Introduction to Design Thinking (20 minutes)**

- Explain the principles and phases of Design Thinking.
- Highlight the importance of empathy and iteration.

2. **Empathy (40 minutes)**

- Activity: User Interviews

- Pair students and have them interview each other to uncover problems or needs related to a specific theme, such as accessibility in everyday environments.
- Emphasize active listening and note-taking.

3. **Define (30 minutes)**

- Activity: Problem Statement
- Each pair synthesizes their findings to create a clear problem statement.
- Encourage students to focus on the user's perspective.

4. **Ideate (40 minutes)**

- Activity: Brainstorming Session
- Students form small groups and brainstorm solutions to their problem statements.
- Encourage a free flow of ideas without judgment.
- Use techniques like mind mapping or SCAMPER to stimulate creativity.

5. **Prototype (60 minutes)**

- Activity: Low-Fidelity Prototyping
- Provide materials like paper, markers, and craft supplies.
- Each group creates simple prototypes of their best ideas.
- Emphasize speed and simplicity.

6. **Test (60 minutes)**

- Activity: User Testing
- Groups test their prototypes with peers, gathering feedback.
- Focus on understanding user interactions and identifying areas for improvement.

7. **Reflection and Iteration (30 minutes)**

- Activity: Group Discussion

- Discuss feedback and potential iterations.
- Highlight the iterative nature of Design Thinking.

Materials needed

1. Sticky notes
2. Markers
3. Paper
4. Tape
5. Scissors
6. Craft supplies (e.g., pipe cleaners, cardboard, etc.)

Tips for Success

1. Foster an open, supportive environment.
2. Encourage active participation and collaboration.
3. Emphasize the importance of user-centered design.

Applying Design Thinking in PROFESSIONAL PRACTICE

Use Design Thinking to develop innovative, user-centered products

Empathize

- Conduct user research through interviews, observations, and surveys.
- Use empathy maps to capture user experiences and emotions.
- Immerse yourself in the user's environment, if possible.

Define

- Analyze research findings to identify core user needs and problems.
- Create a clear and concise problem statement.
- Use tools like affinity diagrams or journey maps to organize insights.

Ideate

- Hold brainstorming sessions with diverse team members.
- Encourage wild ideas and lateral thinking.
- Use ideation techniques such as mind mapping, SCAMPER, or brainwriting.

Prototype

- Develop low-fidelity prototypes quickly to visualize ideas.
- Use materials like paper, cardboard, or digital tools.
- Build multiple prototypes to explore different aspects of the solution.

Test

- Conduct user testing sessions to gather feedback.
- Observe how users interact with the prototypes.
- Iterate on the prototypes based on feedback, focusing on refining and improving the design.

Case Study: Implementing Design Thinking in a VR Accessibility Project

Empathize

- Research: Conduct in-depth interviews with individuals with mobility and visual impairments.
- Immersion: Use VR environments to experience the challenges firsthand.

Define

Problem Statement: "How might we design everyday objects in a way that they are accessible and easy to use for people with mobility and visual impairments?"

Ideate

- Brainstorming: Generate a wide range of solutions, such as tactile interfaces, voice-activated controls, and adjustable designs.
- Selection: Choose the most promising ideas for prototyping.

Prototype

- Low-Fidelity Prototyping: Create simple models of the proposed solutions using accessible materials.
- Simulation: Use VR to simulate the prototypes in different scenarios.

Test

- User Testing: Conduct tests with individuals from the target user group.
- Feedback: Gather detailed feedback and observe user interactions.
- Iteration: Refine the prototypes based on the feedback, ensuring continuous improvement.

Conclusion

Design Thinking is a versatile and powerful approach that can significantly enhance product design education and practice.

By fostering empathy, creativity, and a user-centered mindset, both educators and professionals can develop innovative solutions that truly meet user needs.

Embracing Design Thinking in your teaching and professional practice will not only lead to better products but also create more meaningful and impactful design experiences.

Tips and tricks on the technical aspects of the VR4ALL tools

Introduction

This module focuses on the Oculus Quest 2 capabilities as well as the VR4ALL app. Today we want to tell you about one of the best VR headsets, Oculus Quest 2, and show how to start the VR4ALL app. You will be introduced to different kinds of VR scenes, how to interact with virtual objects, and filters, and how to perform actual use cases in the context of VR4ALL.

This session will try to demonstrate how these tools can supplement learning, training and activities in virtual reality.

Contents

1. Introduction to Oculus Quest 2
2. Install & Launch the VR4ALL Application
3. Navigation & Interaction
4. VR4ALL Scenarios demonstration
5. Use the VR4ALL application filters
6. Execute VR4ALL use cases

Introduction to Oculus Quest 2

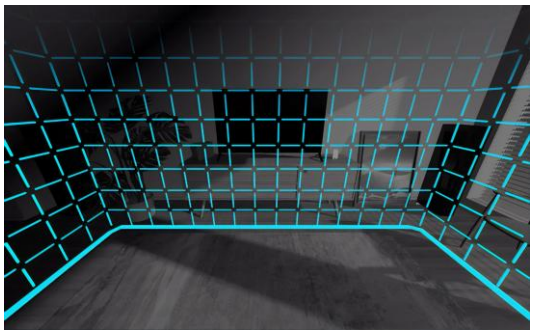
Oculus Quest 2?

- Developed by META.

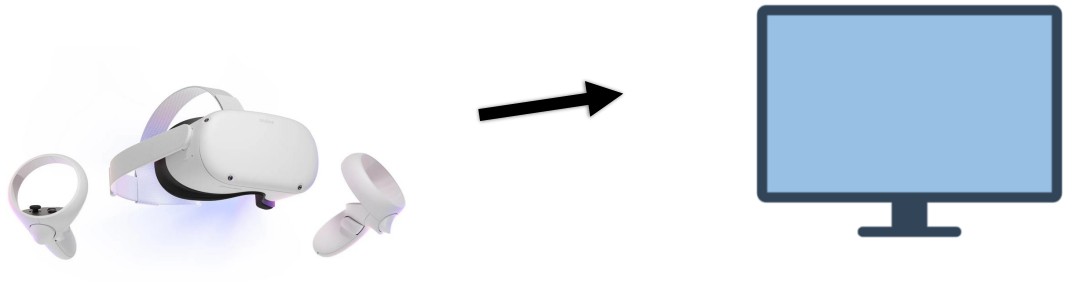
- The most popular Head-Mounted Display on the Market.
- Works almost everywhere!

Requires a simple installation process.

- Based on Inside – Out Tracking.
- Smart Play Area Setup.



- Login with your Meta account to a browser.
- Visit https://www.oculus.com/casting/
- Choose the cast option from the Oculus Quest 2 menu.



2. Install VR4ALL Application

- Follow Oculus Quest 2 Setup Process as prepared by META.

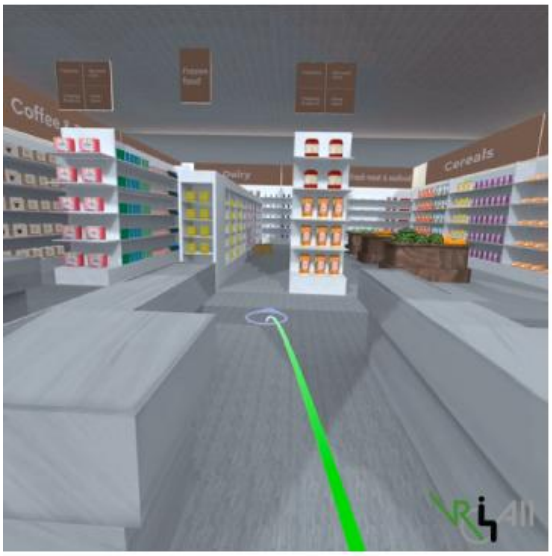
- Installing the VR application requires the third-party Mobile VR Station application and the VR4ALL Android Application File.

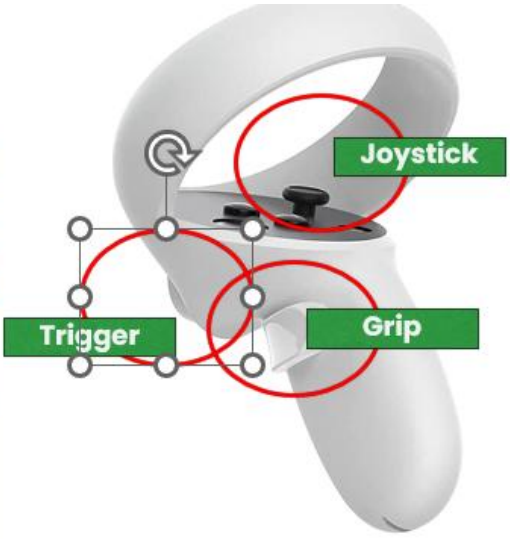
3.Launch the VR4ALL Application

- Use the «Unknown Sources» menu to launch the VR4ALL application.

Navigate through the VR4ALL environments

- Main menu and teleport navigation.





Interact with objects

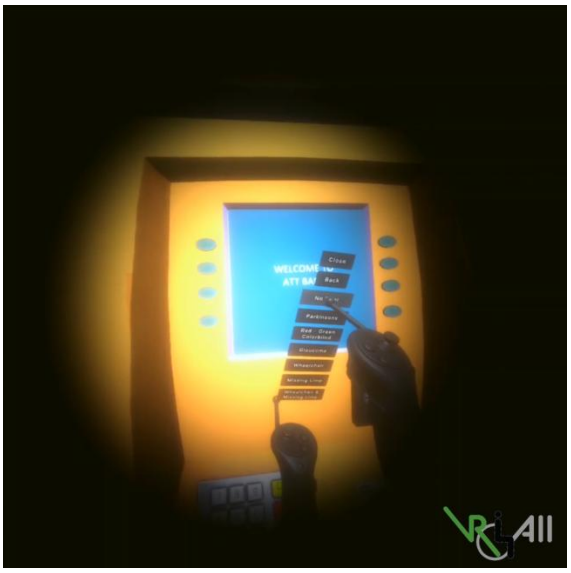
- **Object interaction**

VR4all Scenarios demonstration

- VR4ALL Scenarios demonstration

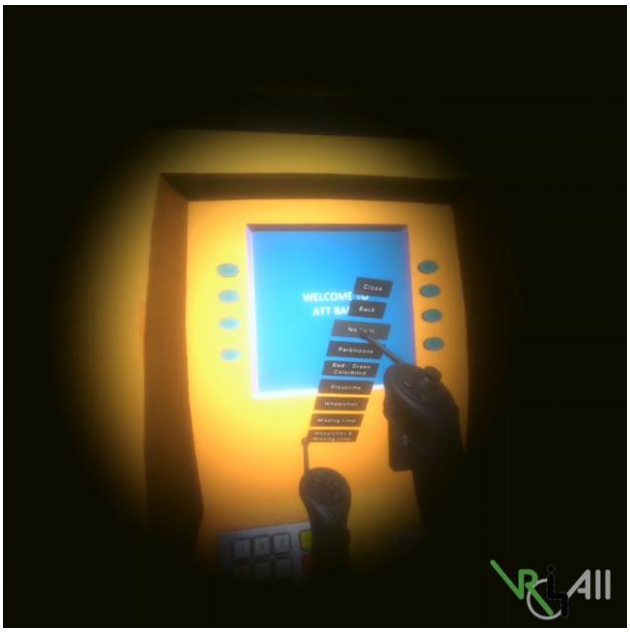
Use the VR4ALL application filters

- **Scenarios demonstration**

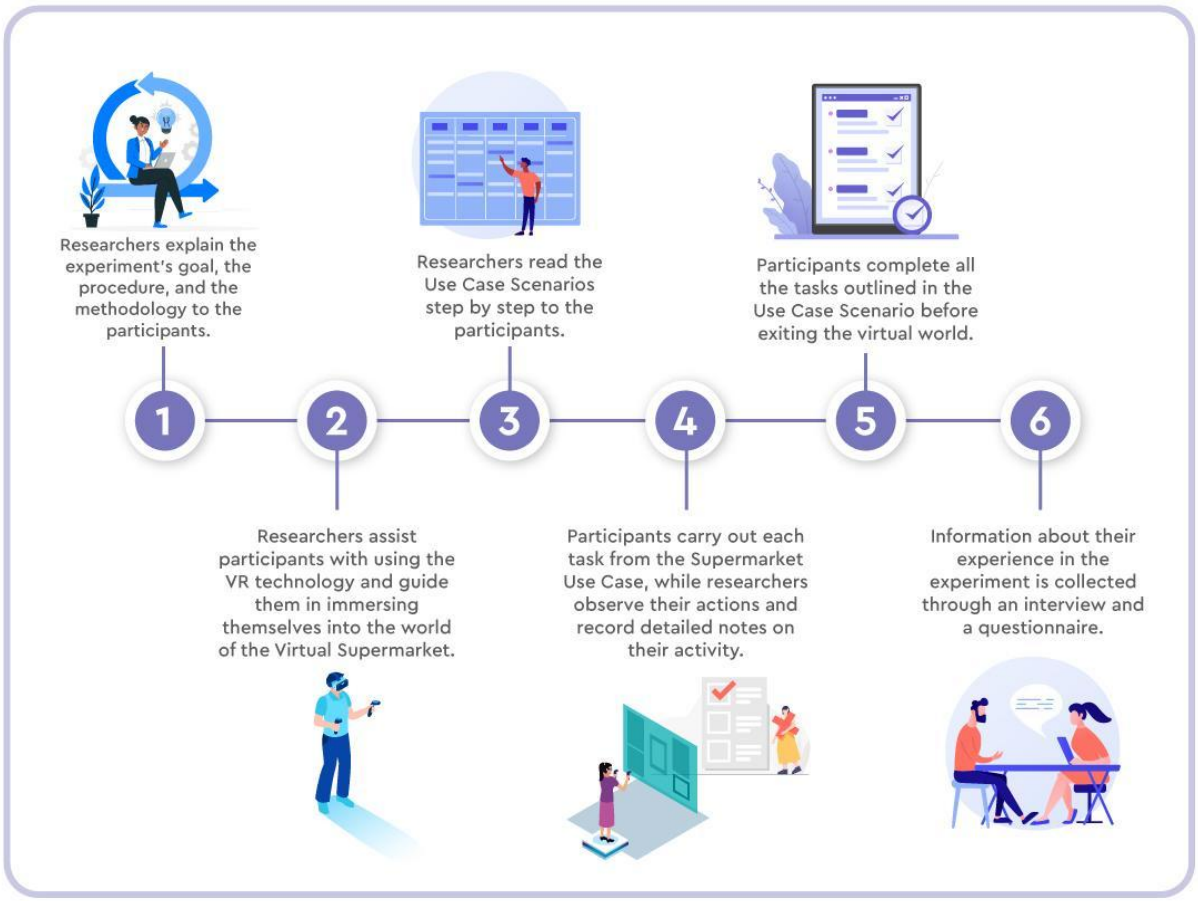


Execute the vr4all use cases

- VR4ALL Scenarios demonstration



Experiments execution



Additional Tips & Tricks

1. Find a proper chair for Wheelchair filter.
2. Use Room scale room setup.
3. Do not change room setup during the experience.
4. You can always reset the scene by selecting the same or another filter is something goes wrong.

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Do's and Don'ts within a Classroom Setting to Interact More Effectively with Students and Handle Teaching Time Effectively

Introduction:

In this document we will explore essential strategies for interacting effectively with students, preparing a successful, well-designed lecture and managing teaching time efficiently. Effective classroom interaction, teacher's preparation and time management are crucial components of a successful learning environment. By adhering to best practices, educators can create an inclusive, engaging, and productive atmosphere that promotes learning and development for all students.

The document is divided into three crucial parts – preparation, effective classroom interaction and time management. Each of the part will provide you with a number of recommendations that might be useful for educators regardless of the educational domain, however with emphasis on using VR environments for familiarization of product design teachers with the needs and challenges of people with disabilities. Some of the recommendations are complemented with practical examples, suggestions or ideas that you might use during your lectures.

Objectives:

After studying this document, you will be able to:

- Set learning goals and objectives for your lectures
- Prepare a suitable lesson plan, activities and materials
- Create an inclusive and welcoming learning environment
- Understand strategies how to improve your teaching skills
- Ensure that all technical equipment is well prepared for the lecture.
- Efficiently initiate the lecture and keep a good and balanced relationship with your students
- Create a friendly and respectful classroom environment
- Educate your students as effectively as possible
- Encourage collaboration within the classroom environment
- Use educational technology to enhance the learning experience
- Manage the time within the classroom environment

-

a) Lesson planning and objectives

- **Set goals and learning objectives.** While preparing a training course, it is necessary to know the objectives and goals of the educational event. Crucial steps you should take in consideration include:
  1. Identify the purpose – understand why the student should or want to participate in the course. What will it bring to them and why should they join?
  2. Be specific – set the goals clearly and as detailed as possible, e.g. instead of saying *"The purpose of this course is to familiarize teachers of product design with the needs of people with disabilities,"* say *" The purpose of this course is to increase students' (product design teachers') empathy by application of design thinking in product design through practical use of 3D environments and their VR assets."*
  3. Make the goals measurable – e.g. *after the first session students will be able to …*
  4. Make the goals achievable – ensure the goals are realistic considering the given current skills of the students, resources, dedicated time etc. Don't set unrealistic goals that would prevent students from reaching them.
  5. Break down larger goals into sections and set deadlines to each goal – this will help you with making the goals more measurable and manageable. It may also help with the preparation of a lesson plan.
  6. Reflect on the goals and objectives – incorporate feedback and evaluation into your further development. Adjust the future lectures if needed, while prioritizing the most important objectives of the lecture.
- **Choose the right teaching methods**. Work with the materials provided regarding recommended teaching methods and choose those that most suit you and your students. Feel free to modify or combine various methods.
- **Prepare the learning materials.** Research what materials are available and choose the materials that most suit your needs. Feel free to combine traditional sources such as textbooks with materials available online. Encourage students to use different sources and media, engaging all

senses and provoking creativity. Make the lessons as practical as possible. If necessary, feel free to develop your own customized materials.

- **Prepare structured lesson plans**. Work with the set goals and objectives, methods and available materials and develop clear, effective and measurable lesson plans.[1]
- **Learn about your students and customize the lecture according to their needs and study goals**. Listen to their feedback. Take their previous experience, age, amount and background into account.
- **Prepare suitable engagement strategies**. Those may include techniques like questioning, interactive activities, and collaborative projects.
- **Create inclusive environment.** Promote inclusivity by respecting diversity and encouraging all students to participate. Here are some tips how to create an inclusive environment:
    1. Learn about the students' special needs or disabilities beforehand and consider this information when preparing your lesson plans, study materials, engagement strategies and activities.
    2. Request students with disabilities or special needs to share relevant medical records or assessments.
    3. Encourage students with special needs to use their assistive technology or offer help with providing accessible solutions. [2]
    4. Apply reasonable organizational, spatial and technical accommodations. [3]
    5. Speak to an expert if you need help with making the learning environment more inclusive and accessible. [4]
    6. Prevent discrimination of any forms and treat all students equally.

Imagine a student with epilepsy experiencing frequent seizures wants to participate in your class. What measures would you take to create a fully inclusive environment for this student?

[1] Read more about how to create an effective lesson plan: https://www.prodigygame.com/main-en/blog/how-to-write-a-lesson-plan/

[2] Products, equipment and systems that enhance working, learning and daily living for people with disabilities. More e.g. here: https://www.atia.org/home/at-resources/what-is-at/

[3] An adjustment made in systém to accomodate or make fair the same systém for an individual based on proven need, e.g. a disability. More e.g. here: https://adata.org/faq/what-reasonable-accommodation

[4] Creating a (digital) environment so that i tis usable for people with disabilities. More e.g. here: https://www.w3.org/WAI/fundamentals/accessibility-intro/

- **Use the principles of universal design for learning (UDL).** Universal Design for Learning (UDL) is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn.[5]

Personal development and skills of the lecturer:

- **Make sure that you are well educated in the taught subject**. If you feel that you need some additional education, familiarize yourself with the taught topic as thoroughly as possible, e.g. study the provided course materials, watch educational videos or look up current information and development in the chosen field.

Imagine you are an expert in product design thinking and use of VR but you lack some knowledge in the field of disabilities. Try to bridge that gap by studying the provided course materials, go through provided links, try to talk to real people with disabilities and ask them about their specific experience or read articles or watch videos about specific disabilities or awareness-raising content created by experts with disabilities.

- **Observe other teachers and develop your own teaching style**. If you are unsure about the choice of suitable teaching style for your specific course, try to find resources that would focus on the same or similar topic or research if similar courses have already taken place and could give you useful hints. Think about which approaches you valued the most and which you consider rather unsuitable. Reflect on your own past experience as a student and imagine how your students may perceive your prepared lecture.

Imagine you are an experienced lecturer but you have never worked with VR headsets during your classes. Try to look up similar courses and connect with people who already have experience in this field. Do your research, get inspired and develop your own techniques and approaches.

Technical preparation

- **Familiarize yourself thoroughly with the technology or software you are going to demonstrate or use**, being it the technology facilitating the

[5] Read more about UDL: https://www.cast.org/impact/universal-design-for-learning-udl

teaching / learning process (projectors, smartboards, learning applications) or specific technology that is the subject of the lecture (VR headsets etc.)

- **Make sure that the needed technology** (e.g. VR headsets) **is ready**. This may include steps like: making sure that the devices are charged, actualized and operating, checking if the software is running without issues, customizing the setting of the devices etc.
- **Provide onsite technical support** that will be available if a technical issue with the used technology occurs.
- Provide onsite chargers
- **Familiarize yourself with the room where the lecture is going to take place and with its technical specifications.** Make sure that all technical equipment (such as laptops, tablets, projector, whiteboard etc.) needed for the lecture is available and working. If not, provide necessary equipment yourself or ask the technical support beforehand.
- **Download your presentations or other learning materials** that you will be presenting to the computer available in the classroom so you don't have to waste time during the lecture.
- **Make sure that stable, high-speed internet connection is available** in the classroom and all students have access to it, e.g. connect all devices students will be using to the available wi-fi so they don't have to waste time logging in during the lecture.
- If appliable, **make the log in process as simple and clear as possible**. Provide students with necessary data such as username or password beforehand in an accessible format. Offer help or provide technical support that will be ready to help students with the log in process.
- **Provide all materials beforehand.** Print out the learning materials or provide it to students in advance in the preferred format. Send out all digital learning materials beforehand and encourage students to download it before the start of the lecture. If downloading a specific application or software is required, give the students clear instructions how to do so.

2. Effective Classroom Interaction

In the beginning of the lesson:

- **Be outgoing, friendly and build a relationship with the students**. Introduce yourself and let the students introduce themselves. Encourage

the students to be creative with their introductions. Connect the introductions with the topic of the lecture, e.g. focus on their experience with people with disabilities or with VR.

- **Use ice-breaking activities to get to know each other better.** See an example below:

Empathy map creation: *Divide students into small groups and let them pick a specific disability and product. Provide each group with a large sheet of paper and sticky notes. Encourage the students to brainstorm and fill out the map with insights about what the person with disability might thing, do, feel or say when interacting with a chosen product. This will initiate conversation among the students in the small groups as well as sensibilize them for the topic. After finishing, discuss and reflect on the results with all students*

- **Establish rules early.** This helps to create a respectful and orderly environment where students understand the standards of conduct, e.g. raising your hand when you want to speak, apologizing specific time in advance if not being able to participate, apologizing when leaving the classroom, leaving the phones turned off etc.
- **Explain the learning goals and objectives to the students** in the beginning of each lecture or course so that they can track their progress more effectively.

b) During the course:

- **Communicate clearly**. Give clear, concise instructions and feedback. Use positive reinforcement. Encourage the students to do the same.
- **Encourage collaboration**. Emphasize the importance of mutual collaboration. Let the students share their insights, work on specific tasks and help each other.

Imagine the students are working in small groups of 3 with one VR headset available for each group. While one student is using the headset, encourage others to take notes of the user's reactions, thoughts and challenges or keep track of the time. Let the students in the small group help each other if a problem occurs. Later, let all students share and discuss their observations and possible solutions.

- **Be consistent with rules, expectations, learning goals**. If any changes should occur, inform the students in advance.

- **Listen to the students´ needs and seek their feedback**. Regular surveys or discussions can help you identify and address problems early.

At the end of the lecture, let the students anonymously write down their feedback, including both positives and negatives. Let them suggest an improvement. After the lecture, evaluate the feedback and take it into account when preparing a next lecture.

- **Be flexible.** Prepare for the possibility that the lesson might be modified or influenced by unexpected factors such as non-functional technology, change of the classroom, absent students etc.
- **Avoid negative behaviors.** Discuss behaviors that hinder interaction, such as sarcasm or dismissiveness. Set clear rules when it comes to dealing with those situations.
- **Don't overwhelm students with Information**. Overwhelming students with too much information at once may have a negative impact on the amount and quality of the learned information.
- **Stick to your lesson plan and time dedicated to each of the activities**. If it is impossible to do all of the activities, consider rather leaving out one of them completely than doing all of them with no measurable results.
- **Avoid too much teacher centered learning** and combine it rather with other teaching methods more focused on student interaction.
- **Don't judge students or dedicate time only to one student while ignoring others. Don't treat students unfairly.**

While one student is using the VR headset, assign specific observation tasks to the other group members. This ensures that each student remains actively involved even when not directly interacting with the VR headset.

When groups present their findings and thoughts, ensure that each member of the group has a role in the presentation. This could be dividing the presentation into parts where each student speaks about a different aspect of the project (e.g., challenges identified, proposed solutions, prototype design).

Provide constructive feedback to all groups, acknowledging each student's contributions to avoid any feeling of bias or favoritism.

- **Form groups ensuring diversity in skills and perspectives**. Encourage mixed-ability groups so that each student can contribute uniquely and learn from one another.

- **Be prepared to mediate conflicts or disagreements** among students in a constructive manner. Encourage open communication to resolve issues.
- **Use educational technology to save time and enhance the learning experience.**

Provide students with pre-class materials and instructions via an online learning platform (e.g., Google Classroom, Moodle). Share tutorial videos on how to use VR headsets and brief readings on accessibility in product design.

Use digital tools like Miro or Google Jamboard for brainstorming or mapping and collaboration. These platforms allow students to work together in real-time, even from their own devices, saving time on distributing and collecting physical materials.

Utilize apps like Time Timer or Google Calendar to manage and display time for each activity phase. This ensures that transitions are smooth and that students remain aware of time constraints.

Set up discussion boards or forums on platforms like Google docs or Blackboard where students can post their observations and ideas before and after the lecture. This facilitates asynchronous collaboration and idea sharing.

Encourage the use of digital note-taking apps (e.g., Microsoft OneNote, Evernote) and document sharing platforms (e.g., Google Drive) to keep track of observations and ideas. This helps in organizing thoughts and makes it easy to share with the group.

Time Management:

- **Emphasize lesson planning**. Prepare well-structured lesson plans with clear objectives and time allocations. Set the right length of the lessons according to the students and objectives. Learn more about lesson plans in the “preparation” chapter.
- **Prioritize tasks**. Give priorities to classroom activities and focus on essential tasks. This will avoid overloading students with too much information at once and also improve your flexibility.
- **Allocate enough time for each of the students during discussions**

During group discussions, use a round-robin format to ensure every student has the opportunity to voice their observations and ideas without interruption. This

can be managed by appointing a timekeeper or using a timer to allocate equal speaking time for each member.

- **Dedicate the same time to each group during team work.**

As the teacher, circulate among the groups to provide support and answer questions. Be mindful to distribute your time evenly among all groups. Use a timer if necessary to ensure you spend equal amounts of time with each group.

- **Develop strategies for minimizing downtime during transitions between activities.**

Prepare and distribute all necessary materials (VR headsets, notebooks, pens, empathy maps, etc.) before the class begins. This prevents delays in gathering materials during the activity.

Plan transitions sequentially so that students move smoothly from one activity to the next. For example, move from VR simulation to discussion without needing to rearrange seating or materials significantly.

If there are unavoidable downtimes, use them productively. For instance, while some students are using the VR headsets, others can start brainstorming or preparing for a discussion.

After each activity phase, conduct a quick debrief (1-2 minutes) to summarize what was accomplished and provide instructions for the next step. This helps students stay focused and understand what's coming next.

- **Assign the role of a timekeeper**. If students are working in a group, one of the students can be given the role of a timekeeper to make sure everyone is provided the same time for using the VR headset. This will help with time management as well as with engaging all students during the class.
- **Don't overschedule**. Set the right length of the lessons according to the students and objectives.
- **Be adaptable and prepared for unexpected changes or disruptions.**

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Visual impairments and movement disorders in practice

Introduction:

The goal of this handbook is to provide readers with basic information about disabilities, especially visual impairment and movement disorders, their characteristics as well as about barriers people with the following disabilities encounter in their daily lives and solutions that help them overcome the barriers. The theoretical information is complemented with real-life examples of users with various disabilities dealing with the online world.

Objectives:

After studying this handbook, you will be able to:

- Distinguish between various forms of visual impairments and movement disorders.
- Identify the biggest barriers and challenges people with those disabilities encounter.
- Identify the most effective strategies people with those disabilities use when overcoming the barriers and challenges in every-day life and in the digital world.
- Understand the real-life experience of people with disabilities demonstrated in the practical examples.

Visual impairment

Basic information

Visual disabilities are sensory disabilities that include:

- some amount of vision loss
- loss of visual acuity (sharpness)
- increased or decreased sensitivity to specific or bright colors
- complete or uncorrectable loss of vision in either or both eyes.

Blindness

Definition: Blindness is a sensory disability involving some vision loss, nearly complete vision loss, and complete vision loss.

Characteristics: Some people are completely blind, so cannot see anything. Others can perceive light versus dark or general shapes of large objects but cannot read text or recognize people by sight.

Color Vision Deficiency

Definition: Color vision deficiency is a sensory disability where a person may not be able to distinguish certain color combinations.

Characteristics: The most common form of color vision deficiency affects a person's ability to distinguish reds and greens. Other colors may also be affected. Red-green color vision defects are the most common form of color vision deficiency.

Low Vision

Low vision is uncorrectable vision loss that interferes with daily activities. It is better defined in terms of function, rather than numerical test results. In other words, low vision is "not enough vision to do whatever it is you need to do," which can vary from person to person. Most eye care professionals prefer to use the term "low vision" to describe permanently reduced vision that cannot be corrected with regular glasses, contact lenses, medicine, or surgery.

Characteristics: A person with low vision will typically need magnification to read or discern other details. Some people with low vision experience low contrast so benefit from high contrast text and graphics.

Barriers for People with Visual Disabilities

- Materials, such as books, restaurant menus, and navigation aids are not available in alternate formats such as digital files or braille
- People who do not adequately describe navigation steps or visual information
- Inadequate lighting
- Sounds masking informative sounds like directional cues
- Non-tactile signs
- Objects in travel paths that become obstacles
- In websites and other technologies: images, controls, and other meaningful elements that do not have text alternatives
- Text, images, and page layouts that cannot be resized or lose information when resized
- Missing visual and non-visual orientation cues, page structure, and other navigational aids
- Video content that does not have text or audio alternatives, or an audio description track

- Inconsistent, unpredictable, or overly complicated navigation mechanisms and page functions
- Text and images with insufficient color contrast between foreground and background
- Websites, web browsers, and authoring tools that do not enable users to set up custom color combinations
- Websites, web browsers, and authoring tools that do not work fully when using a keyboard

Solutions for People with Visual Disabilities

Accessibility – Physical Environment:

- Use raised tiles on the ground to indicate the edge of a platform, a pathway along a sidewalk, the beginning of a staircase, etc.
- Eliminate low-hanging architectural features that a blind person could bump into.
- Clear obstructions in hallways and on sidewalks.
- Information in Braille on signs and controls (e.g. elevator buttons, code locks)
- Tactile controls on flat devices such as microwaves and dishwashers

Accessibility – ICT Environment:

- Provide text alternatives for non-text information.
- Make sure graphical design allows for magnification.
- Use color combinations with high contrast.
- Do not rely on color alone to convey meaning or information.
- Standard, consistent positioning and visual presentation of objects

Assistive Technologies:

- Screen readers convert the text and structural information of interfaces and content to speech.
- Audio description is an additional audio track that describes and gives context for essential visual information.
- Screen magnification
- Large print
- GPS-based navigation instructions with an audio interface, either automated or via a remote human navigator

- Mobile apps that provide audio descriptions of photographed objects or people
- Mobile apps that scan barcodes or QR codes and speak product information aloud
- Software to customize color contrast, color filters, and color themes
- Canes help people feel their surroundings as they walk.
- Service animals help people navigate.

Practical example: Get to know Lexie:

Lexie is an older adult who loves online shopping and fantasy football. Lexie cannot see all colors equally well. Websites and apps that rely on colors alone present barriers for Lexie. Using color alone to highlight text and to indicate areas in a chart also present barriers for Lexie but fortunately her work colleagues have learned ways for using other visual markers in addition to color.

Sometimes completing the check out process is tricky because if I overlook a mandatory field, I get an error or warning message in red and it's hard for me to see the message.

Lexie was born with deuteranopia and protanopia (often called "color blindness") and has difficulty distinguishing among items that are red, green, orange, and brown, all of which appear to her as kind of murky brown.

Lexie discovered that shopping for clothes online is actually an advantage over going to physical stores. In addition to just showing pictures of items in the various colors offered, her favorite sites include color labels, making coordinating what goes together much easier. Sometimes when checking out though, the required fields and error messages are notated with a red outline and Lexie has to pay special attention to identify them. She noticed lately, however, that a lot of sites are getting better about using a secondary notation like an asterisk for required fields and bold text or an arrow pointing to errors. This really helps a lot.

Much to people's surprise, Lexie is also a big football fan and has been playing fantasy football with family and workmates for years. Sometimes there can be problems with the way these sites use color to differentiate between teams, player positions, and whether or not players are selected for her team. As a result, she tends to prefer certain fantasy football apps that don't use color as

the only way to indicate information that is important to playing. This means she has to try and convince friends to play using the same app.

Along with her fun, Lexie still stays connected to the latest news and happenings. This is made easier when charts and graphs related to the articles show data with other visual techniques than just color. For instance, if a pie chart also has patterns and text labels she can more easily and quickly read the information without getting frustrated or being left out completely.

Barrier examples

Using color only

Barrier: "When I select a color choice there is nothing to help me differentiate between the colors."

Works well: "Color choices are shown with a descriptive name. The good sites have a link to a slightly longer description of the color."

Color only used for errors

Barrier: "When filling out a form online, required fields and errors are marked with a red outline."

Works well: "In addition to color, an asterisk or words are used to identify required fields and errors."

Color only in games

Barrier: "When I play an online game, enemies are marked with a red circle and friends marked with a green circle and I can't tell the difference."

Works well: "Enemies are also marked with a symbol or use a red triangle so I can easily identify them."

Chart labels

Barrier: "When I am reading news articles with data charts, I can't understand the charts as the columns aren't labelled clearly."

Works well: "The columns are directly labelled or use a texture as well as color."

Read more about Lexie and how to design a product for her needs: https://www.w3.org/WAI/people-use-web/user-stories/story-four/

Practical example 2: Get to know Lakshmi

Lakshmi is a senior accountant who is blind. She relies on a screen reader to announce the content in the software she uses at work and she uses a standard keyboard to enter commands to navigate and enter information. Recently Lakshmi's company migrated from desktop software to online applications, some of which present barriers for Lakshmi, such as when images don't include alternative text or short-cut keys conflict with the screen reader commands. Other sources of frustration include multiple levels of navigation (e.g., nested menus), forms that don't make it clear to the screen reader what the fields are meant to contain, and visual CAPTCHA with either no or a poor auditory alternative. Lakshmi really likes using her mobile phone and tablet because of the built-in screen reader functionality, plus their portability. When away from home, Lakshmi can find directions, pay for things, and keep up with her family and friends via email and text.

My mobile phone is so convenient - the accessibility features on it are so easy to use. Shame I can't access our corporate systems with it!

Lakshmi is blind. She is a senior accountant at an insurance company that uses web-based documents and forms over a corporate intranet. Lakshmi's work computer has a screen reader which provides her with information on the state and content of applications on her computer in a speech output form. Because of her job, Lakshmi spends a lot of time working with spreadsheets, presentations and documents. Her company moved from using desktop applications to everything being stored online. Lakshmi was concerned that the change would make things worse for her.

Complex web applications are often challenging for Lakshmi. Many have multiple layers of navigation and require users to cross-reference content. This is more difficult to do with a screen reader which reads back content in a linear fashion. Sometimes they use short-cut keys that are the same as the quick keys used by the screen reader software. So far everything seems to work well though and it is the usual problems of colleagues not creating their documents with accessibility in mind, for example, presentations that don't include text alternatives for images.

Part of Lakshmi's role is to provide training to employees. Most of this is conducted online as staff are spread out geographically. Lakshmi and her staff

evaluated a number of training tools, such as video conferencing apps, before finding an effective application with accessibility features that meet the needs of a diverse staff with diverse abilities. One of the biggest challenges Lakshmi faced with these tools was the chat function. Many of the tools don't work with Lakshmi's screen reader. She would miss messages during meetings because the software didn't make her aware when a new message was delivered.

Outside of work, Lakshmi enjoys cooking, knitting, and travel, and she uses the web to find recipes, knitting patterns, and to book travel. She has found that online communities help her generate ideas that support all of her hobbies. Generally these are great but some of them use a visual CAPTCHA as part of the login process, making it impossible for her to access the forums without someone to assist her.

When she can, Lakshmi uses her mobile phone or tablet more than she uses her laptop or desktop computer. The phone and tablet have built-in screen readers that make them much easier for her to use. Using her mobile while travelling is fantastic as she can check location details and find directions.

Barrier examples

Good use of headings

Barrier: "I can't easily scan a page to find things that might be of interest to me."

Works well: "When sites are laid out using properly marked up headings and paragraphs, I can use hot keys in my screen reader to quickly jump from one heading or paragraph to another, stopping at anything that sounds interesting."

Keyboard navigation

Barrier: "Sometimes I can't control things on websites such as buttons and links. I can hear they are there but I can't press them."

Works well: "When I can use the keyboard to navigate to things and press return to select them without having to get someone to help me."

Consistent layout

Barrier: "I need to create a mental image of how a website is laid out. If that changes from page to page then it really slows me down."

Works well: “When website pages are consistent. The links are all in the same place and things that sound the same in my screen reader behave the same on different pages.”

Clear error messages

Barrier: “Sometimes when I fill in a form on a website it won’t let me submit it and it isn’t clear why not.”

Works well: “Sites which have clear error messages and instructions on how to correct my mistake.”

Changes elsewhere on a page

Barrier: “There are times when content on a website changes but I don’t always know about it.”

Works well: “It’s great when my screen reader alerts me to changes on the page that I’m visiting.”

Keyboard trap

Barrier: “Some sites have modal windows that I can get stuck in because I can’t seem to find anyway to close it.”

Works well: “Modal windows include a close and/or cancel button that can be accessed with the keyboard.”

Mobility, Flexibility, and Body Structure Disabilities

Mobility impairment includes:

- people with upper or lower limb loss or disability
- challenges with manual dexterity
- disability in co-ordination with different organs of the body
- a broken skeletal structure.

Physical and mobility impairments limit independent, purposeful physical movement of the body or of one or more limbs. Impact to a person’s mobility may be temporary or permanent. Mobility disabilities can be present at birth, acquired with age, or be the result of disease.

Manual Dexterity/Fine Motor Control

Definition: Fine motor skills are intricate hand and wrist movements needed to manipulate, control, and use objects, produce neat, legible handwriting, and

dress independently. Fine motor skills involve coordinated efforts of the brain and muscles and are built on gross motor skills involved in making bigger movements. Disability may be temporary, recurring, or permanent.

Characteristics: Examples include:

- difficulty tying shoelaces
- inability to do up buttons or zippers
- scribbly drawing
- difficulty using a keyboard
- poor handwriting
- taking a long time to pick up small objects, manipulating objects in hand, or using both hands at the same time.

Persons who may have issues with fine motor control include older adults, people with Autism or ADHD, and persons with ataxia (the loss of fine motor skills resulting from neurological damage or disorder e.g. stroke, cerebral palsy, or Multiple Sclerosis).

Ambulation

Definition: The ability to walk from place to place independently with or without an assistive device.

Characteristics: A person's ability to walk may be impacted by congenital conditions, disease, or injury, such as cerebral palsy, neuromuscular disorders, amputation, arthritis, and back injuries.

Muscle Fatigue

Definition: Muscle fatigue is a common non-specific symptom experienced by many people and is associated with many health conditions. It is often defined as an overwhelming sense of tiredness, lack of energy and feeling of exhaustion, and it relates to a difficulty in performing voluntary tasks.

Characteristics: Muscle fatigue can occur anywhere on the body. An initial sign of this condition is muscle weakness. Other symptoms associated with muscle fatigue include soreness, localized pain, shortness of breath, muscle twitching, trembling, a weak grip, muscle cramps.

Body Size or Shape

Definition: Body size or shape disabilities are disabilities caused by disorders that affect a person's stature, proportions or shape. Examples include acromegaly, dwarfism, rheumatoid arthritis, and obesity.

Characteristics: Characteristics depend on the specific disability. Orthopedic conditions such as arthritis and joint mobility are frequently associated with the underlying cause. Other examples of co-occurring conditions include muscle weakness and fatigue, hearing loss, vision loss, cardiopulmonary disorders, and diabetes.

Barriers for People with Mobility, Flexibility, and Body Structure Disabilities

Physical Environment

- Seating that is too small, or at the wrong height.
- Appliances and controls that are out of reach or require touch instead of voice commands.
- Narrow walkways, doorways, passages, or aisles
- Tasks that require fine motor skills, like small or round door handles
- Tasks that require accuracy, like small buttons, switches, or dials
- Tasks that require strength, like heavy doors
- High shelves or high counters
- Tables without knee and toe clearance
- Products and equipment that require a standing position or are difficult to reach or manipulate such as automatic teller machines (ATMs), health care or workplace equipment that is not accessible.
- Steps, thresholds, and other obstacles to gaining entry to a space.
- Body shaming and social discrimination.

Digital Environment:

- Digital interfaces that require interaction via a specific interface such as keyboard or mouse
- Digital interfaces with small and / or tightly grouped touch targets that are hard to hit accurately

Solutions for People with Mobility, Flexibility, and Body Structure Disabilities

Accessibility

- Universally designed entrances to buildings (level access, wide entrances)
- Clearly defined, wide and unobstructed paths of travel
- Ensuring that clickable areas on a website/app are big enough to hit
- Not placing interactive elements on a website/app too close to each other
- Ensuring that objects in the physical environment provides enough space and size for reach and use regardless of the user's body size, posture or mobility

Assistive Technologies in the Physical Environment

- Walkers, canes, crutches
- Manual and electric wheelchairs, motorized scooters
- Stair lifts, elevators
- Exoskeletons
- Stepladders
- Grab / rail / handlebars
- Reachers
- Touch or voice operated light fixtures

Assistive Technologies in ICT

- Switch devices replacing keyboards or mouses (e.g. sip and puff devices)
- Adaptive or customizable keyboards
- Voice control
- Eye tracking
- Speech-to-text software
- Head wand
- Oversized mouse or trackball
- Adjustable position displays

Example 3: Get to know Ade:

Ade is a reporter who has limited use of his arms. He has several strategies for navigating websites, including using his palm to operate a joystick, using one finger to press keys on the keyboard, which allows him to move up and down the page and tab from link to link, and more recently, using speech recognition. All

of these methods, however, have drawbacks. When using the joystick, it is hard to click on small targets such as placing the cursor between words or at the end of a sentence. When using the keyboard, it's sometimes hard to know which page element has focus, plus the order of links often doesn't match what he sees when looking at the page. Speech recognition has promise but it involves a whole new way of working to someone who is used to typing. So that Ade can switch from one method to another, it is important to make sure links and other page elements have visual focus indicators and match the order that they appear on the page and that content flows correctly when the site is zoomed to make everything appear larger.

It's not like I can't use a keyboard or pointer, I just can't use them for long periods because it is tiring.

Ade was involved in a accident which caused a spinal cord injury. This left him with limited use of his arms and no movement or sensation in his legs. He has worked as a reporter for many years. Ade sometimes uses a keyboard with larger keys to help him more easily hit the correct key and a joystick instead of a mouse. However, using these for extended periods can be tiring so he has started using speech recognition software for some tasks, such as dictating long pieces.

Rather than using his fingers, Ade uses the palm of his hand to operate a joystick that has an enlarged lever. This can be inaccurate to use, particularly when pointing to and clicking on small areas. When this happens, he sometimes switches to using the keyboard for navigation. He can use the tab key to move through links and form elements. When using the keyboard, Ade has found that on some sites he couldn't see which field or link had focus. He also found that sometimes the links weren't in a logical order, which made it hard to find the element he was interested in. He could always use his joystick but that can interrupt his flow and slow him down. Sites often include good visual styling when you hover over a link but sometimes don't include this when the link has keyboard focus. For Ade, it is important that websites clearly show which link has the current focus and to navigate through links in a logical order, that is, following the visual order of links on the page.

When using a keyboard, Ade has found some features which really help. For example, a skip link that moves focus past all the navigation on the page is a big

help. Ade tries to avoid sites that don't have this feature. However, it limits his research sources a bit.

Ade has started using speech control software which helps him to avoid having to use the joystick and keyboard. The software allows him to select and 'click' on links by speaking but only when the links are clear and coded correctly. The software also has a speech-to-text dictation feature. As someone who has spent years typing out his articles, Ade is having to train himself in a new way of working. He would still prefer to type as he thinks he is much slower with dictation but he is hopeful that his speed will improve.

Outside of work, Ade finds his mobile device easier to use than the computer because there is limited navigation and no pointer device. Since it is hand-held, he has more options to place it in a position that he is comfortable with. He wishes his employer would create a mobile-friendly or responsive site that he could use for his job.

Barrier examples

Focus styling barrier

Barrier: "When I tab through links and form fields there is no visual styling to show me which element I am on."

Works well: "There is clear and strong visual styling for links and form fields when they receive focus."

Process time outs barrier

Barrier: "I usually take much longer to complete long forms or processes and often get timed out."

Works well: "At the start of a long form or process, I am told that there is a time out and given the option to set it to be slightly longer."

Saving progress barrier

Barrier: "Completing long forms with no way to save progress and take a break can be tiring."

Works well: "I have an option to save progress and take a break when completing long, multi-step forms like when I have to get a code in email or text and type it in."

Popup windows barrier

Barrier: “When a window opens and I can’t close it using only the keyboard it can be difficult.”

Works well: “New windows have a close icon that I can access using the keyboard and some include the option to press the escape key to close them.”

Read more about Ade and how to design a product for his needs: https://www.w3.org/WAI/people-use-web/user-stories/story-one/

Example 4: Meet Elias

Elias is an 85-year-old retired architect. Over the years, Elias has experienced a decrease in vision, hearing, and short-term memory and he has a slight hand tremor. He uses digital technology for all sorts of activities including staying in touch with family, reading the news and architecture articles, and ordering groceries. However, using technology can be difficult when he can’t use the adjustments he needs, like when sites and apps don’t allow increased text size, require clicking small areas of the page, and make him type information with each visit rather than store it.

I love all this new technology. It is great to see my grandchildren. It takes me a bit to find all the controls and sometimes they are a bit on the small side, but I get there in the end.

Elias is hard of hearing and has low vision, hand tremor, and short term memory loss. Elias had a long and successful career as an architect. He delayed retirement until he was in his 70’s because as the senior architect in his firm, he was often sought after to mentor the new hires and guest lecture at local universities. Elias has macular degeneration that blurs his vision and makes reading more difficult. Over time, the demands of the close-up work necessary to render architectural drawings strained his eyes to the point that he could only work a couple of hours at a time. He finally had to stop work when he developed a mild hand tremor and found it too difficult to maintain the precision required for his work.

Currently, at age 85, Elias’s family has started to notice some short term memory loss. Even so, Elias maintains an active interest in the history of architecture and is part of a small group of people who share his passion and write about it online. His blog has an active following and helps ensure he is still able to contribute to the field.

Like many older people, Elias has difficulty reading small text. He subscribes to an online rather than physical version of the newspaper because he is able to increase the size of the text, making it easier to read. However, on some sites this does not work as well because either the text gets cut off or the larger text doesn't flow to the next line and he has to scroll horizontally off screen. His tremor makes it difficult to scroll across in a straight line. While this is easier than managing the large pages of a print newspaper, the best instance is when the text resizes and reflows properly.

For all of the benefits of using a computer to read the news and stay active in his field, Elias often has difficulty with the security on some websites. On sites that use CAPTCHA, it is sometimes hard for him to identify the distorted text or identify the images in photos because they are usually not clearly rendered. On sites that send a security code, Elias has to interrupt what he is doing to look on his phone and copy a code, and sometimes the codes are long and hard to transcribe correctly. When using a site that requires CAPTCHA, Elias finds it much simpler if the text or images are easy to identify. If a security code is required, a short group of numbers or letters makes it easier to read and transcribe.

Barrier examples

Inaccessible CAPTCHA

Barrier: "When I login to my online banking I need to complete a CAPTCHA but I can't really read it well."

Works well: "My banking login sends me a text with a simple code to confirm it is me."

Text doesn't reflow

Barrier: "When I resize a website using my browser some of the text disappears or is cut short and sometimes I have to scroll across the screen as well as down."

Works well: "When I resize a website using my browser the text is all still available and is presented in a longer thinner column that doesn't need to be scrolled sideways."

Distracting animations

Barrier: "When my screen is magnified, animations are very distracting because I don't get the full context of what is going on."

Works well: “Allow me to stop any animation on the screen so I can concentrate on what I’m looking at.”

Tables don’t zoom well

Barrier: “Online tables sometimes have a lot of space between the columns and when I’m zoomed it, I have to scroll from left to right to see all of the content and I often miss the association from one column to the next.”

Works well: “When I zoom the tables change from lots of columns to being presented more like a list with each row being shown as a list item.”

Breadcrumb

Barrier: “I often lose my place on websites. Sometimes I follow several links and it’s not what I’m looking for. I can use the back button to go back page by page but I still get lost.”

Works well: “A breadcrumb at the top of each page that shows my path through the site keeps me on track, plus it helps me get back to the home page really quickly.”

Login page

Barrier: “I have accounts with so many different websites that sometimes I forget my password.”

Works well: “An option to remember my password for this site and a means of resetting my password if I need to.”

Saved information

Barrier: “When I place an order, I have trouble remembering things, like telephone number, address, and credit card details.”

Works well: “This store remembers from before, so I only need to select right address in the text field, rather than need typing each time.”

Read more about Elias and how to design a product suitable for his needs: https://www.w3.org/WAI/people-use-web/user-stories/story-nine/

Sources and further reading:

https://www.w3.org/WAI/people-use-web/user-stories/

https://inclusive.microsoft.design/

https://www.accessibilityassociation.org/resource/CPACC_BoK_Oct2023

Attachments

1. Design Thinking Challenge: VR4ALL Accessibility Solutions

1.1 Introduction

This 90-minute classroom exercise leverages VR4ALL environments to introduce students to Design Thinking and apply it to creating solutions that improve accessibility for people with mobility and visual impairments.

1.2 Materials

- Whiteboard or Projector
- Markers/Pens
- Sticky notes
- Paper
- Scissors
- Tape
- Craft supplies (optional)
- Access to VR4ALL environments simulating various situations (Virtual Supermarket, Virtual Kitchen, Tourist Attraction, Graphical User Interface)

1.3 Structure

1.3.1 Introduction to Design Thinking (10 minutes)

1.3.1.1 Welcome and Introduction (2 minutes): Briefly introduce the concept of Design Thinking and its focus on user-centered problem-solving.

Design Thinking is a creative problem-solving process that designers use to come up with innovative solutions. It's not just about creating something visually appealing, but about understanding the needs of the people who will use it.

The key aspect of Design Thinking is its focus on users. Unlike traditional problem-solving methods that might start with a technical solution and look for a use case, Design Thinking puts the user at the center. We start by understanding their needs, challenges, and desires.

By focusing on users, we can create solutions that are not only functional but also desirable and truly meet their needs. This can lead to more successful products, services, or experiences.

Imagine designing a new app. Traditionally, you might think about the features you want to include or the technology you want to use. But with Design Thinking, you'd start by talking to people who might use the app. What are their frustrations? What problems do they face? By understanding their needs, you can design an app that is truly helpful and user-friendly.

1.3.1.2 The Design Thinking Process (5 minutes): Explain the five stages of Design Thinking and briefly explain the purpose of each stage.

Design Thinking is an iterative process with five key stages that work together to solve problems in a user-centered way. Throughout these stages, empathy, creativity, and iteration are crucial for success. Here's a breakdown of each stage and its purpose:

Stage 1. Empathize: understand user needs

This stage is all about developing a deep understanding of the people you're designing for. Here, empathy is key. You'll use techniques like VR simulation, user interviews, observations, and research to gather insights into their needs, frustrations, and behaviors.

Stage 2. Define: frame the problem

Based on your findings from the Empathize stage, you'll define the core problem you're trying to solve. This involves synthesizing the information you gathered and formulating a clear problem statement that focuses on the user's perspective.

Stage 3. Ideate: generate creative solutions

Now it's time to unleash your creativity! This stage is all about brainstorming a wide range of potential solutions to the defined problem. Think outside the box and encourage wild ideas. Remember, the more ideas you generate, the greater the chance of finding a truly innovative solution.

Stage 4. Prototype: build low-fidelity models

Here, you'll create quick and simple representations of your most promising ideas. These prototypes can be sketches, paper models, or basic simulations. The goal isn't to create a finished product, but to test the core concepts and get early user feedback.

Stage 5. Test: gather feedback and iterate

This stage is about putting your prototypes in front of real users and gathering their feedback. Observe how they interact with your prototype, listen to their comments, and identify any areas for improvement. This feedback loop is crucial for iterating on your design and making it better.

Importance of Empathy, Creativity, and Iteration:

Throughout the process, it's important to maintain empathy for the user. Keep their needs and perspective at the forefront of your mind.

Don't be afraid to think outside the box! Embrace wild ideas during the Ideate stage, as they can lead to unexpected breakthroughs.

Design Thinking is not a linear process. Be prepared to revisit earlier stages based on the feedback you receive during testing. Iteration allows you to refine your ideas and create a solution that truly works for your users.

1.3.1.3 Activity Preview (3 minutes): Briefly introduce the challenge: students will use VR4ALL environments to understand the challenges faced by individuals with mobility/visual impairments in various situations. They will then use Design Thinking to develop solutions that improve accessibility.

Here's a way to briefly introduce the design challenge and highlight the importance of accessibility in design:

Introducing the Challenge:

"Today's challenge is to put yourselves in the shoes of people with mobility and visual impairments. Imagine the everyday tasks or situations they might

encounter that can be challenging due to limitations in movement or sight. We'll be using the Design Thinking process to develop creative solutions that can make their lives easier and more accessible."

Highlighting Accessibility:

"Accessibility is a crucial aspect of design. When we design products, spaces, or experiences, it's important to consider everyone who might use them. This includes people with disabilities. By incorporating accessibility features, we can create a more inclusive and user-friendly world for everyone."

Quick example to illustrate the point:

"Think about a simple task like crossing the street. Curb cuts and audible pedestrian signals make this easier for people with mobility or visual impairments. Today, we'll be focusing on similar challenges and exploring solutions that promote accessibility."

1.3.2 Empathy and Define (20 minutes)

1.3.2.1 VR Experience Selection (2 minutes): Briefly explain the different VR4ALL environments available (Virtual Supermarket, Virtual Kitchen, Tourist Attraction, Graphical User Interface). Allow students to choose which environment they'd like to experience first.

1.3.2.2 VR Experience (8 minutes): Divide the class into pairs. Each pair experiences their chosen VR4ALL environment, taking turns navigating the simulation from the perspective of someone with mobility or visual impairments.

1.3.2.3 Partner Interview (5 minutes): After the VR experience, each person interviews their partner for 5 minutes. Encourage them to ask open-ended questions like:

- "What challenges did you encounter while navigating the environment?"
- "How did the limitations of mobility/visual impairment affect your experience?"
- "What would have made this task easier?"

1.3.2.4 Problem Statement (5 minutes): Each pair writes a concise problem statement based on their VR experience and interview discussion. This statement

should focus on a specific challenge faced by users with mobility/visual impairments in the chosen environment.

1.3.3. Ideation (20 minutes)

1.3.3.1 **Regroup into Teams** (2 minutes): Instruct learners to reform into teams of 4-5 members.

1.3.3.2 **Brainstorm Solutions** (10 minutes): Encourage teams to brainstorm solutions for their problem statement using a technique like "Crazy 8s" (each person sketches 8 ideas in 8 minutes) or traditional brainstorming. Remind them to aim for at least 5 ideas.

1.3.3.3 **Top Ideas** (8 minutes): Have each team discuss and vote on their top 2-3 ideas to focus on.

1.3.4. Prototyping (30 minutes)

1.3.4.1 **Introduce Prototyping** (2 minutes): Explain that teams will create simple, low-fidelity prototypes of their chosen ideas. Emphasize the purpose is to quickly represent their ideas, not create finished products.

1.3.4.2 **Materials Distribution** (2 minutes): Distribute the provided materials (paper, markers, etc.) and allow students to explore them creatively.

1.3.4.3 **Prototyping Time** (20 minutes): Teams have 20 minutes to create prototypes of their chosen ideas. This can be sketches, paper models, or a brief representation that communicates the core functionalities of their solution for improving accessibility in the chosen situation.

1.3.5. Testing and Feedback (20 minutes)

1.3.5.1 **Team Matching** (2 minutes): Have teams pair up with another team who worked on a different VR environment (and thus, a different problem statement).

1.3.5.2 **Presentations and Feedback** (10 minutes each round): Each team presents their prototype to their partnered team, explaining the solution and how it addresses the challenges identified in their VR experience. Encourage the receiving team to ask questions and provide constructive

feedback on the prototype's clarity, feasibility, and effectiveness in improving accessibility in the specific environment. Give each team 10 minutes for presentation and feedback.

1.3.6. Reflection and Iteration (10 minutes)

Instruct teams to discuss the feedback received from their peers. Encourage them to consider how they would improve or iterate on their prototypes based on the feedback. This can be a quick discussion focusing on key takeaways and potential next steps for improvement, taking into account the limitations of a low-fidelity prototype.

1.4 Wrap-Up (5 minutes)

- Hold a short class discussion to highlight the learnings from the exercise.
- Briefly review the Design Thinking process and its benefits.
- Encourage

2. Design Thinking Challenge: Navigating Everyday Spaces with VR4ALL

2.1 Introduction

This is a 60-minute classroom exercise designed to introduce students to user-centered design through the lens of accessibility. Students will leverage VR4ALL environments to understand the challenges faced by individuals with mobility or visual impairments and brainstorm solutions for navigating supermarket aisles and kitchens.

2.2 Materials

- Whiteboard or Projector
- Markers/Pens
- Sticky notes
- Paper
- Scissors
- Tape
- Craft supplies (optional)
- Access to Virtual Supermarket and Virtual Kitchen VR4ALL environments

2.3 Structure

2.3.1. Empathy and Define (20 minutes)

- **Introduction (2 minutes):** Briefly introduce the concept of Design Thinking and its focus on user-centered problem solving. Highlight the importance of empathy in understanding user needs.
- **VR Experience (10 minutes)**
    - Divide the class into small groups of 4-5.
    - Each group will experience a VR4ALL environment, simulating either navigating a supermarket or performing tasks in a kitchen, from the perspective of someone with mobility or visual impairments.
- **Empathy Mapping (10 minutes):**
    - After the VR experience, each group gathers to discuss and map out the user's feelings, thoughts, and challenges encountered in tasks like picking up products from a supermarket shelf or cutting a lemon in the kitchen.
    - Consider using a large sticky note or chart paper as your "empathy map".
    - Divide the map into sections focusing on:
        - **Says:** Words or phrases the user might say during their experience.
        - **Does:** Actions the user takes while navigating the environment.
        - **Thinks:** User's thoughts and feelings throughout the experience.
        - **Feels:** User's emotional state during different parts of the experience (e.g., frustration, confusion, satisfaction).

Empathy maps help teams see things from the user's point of view and empathize with user's needs. By understanding what users feel, think, say and do, teams gain valuable insights into user motivations and develop empathy for their challenges.

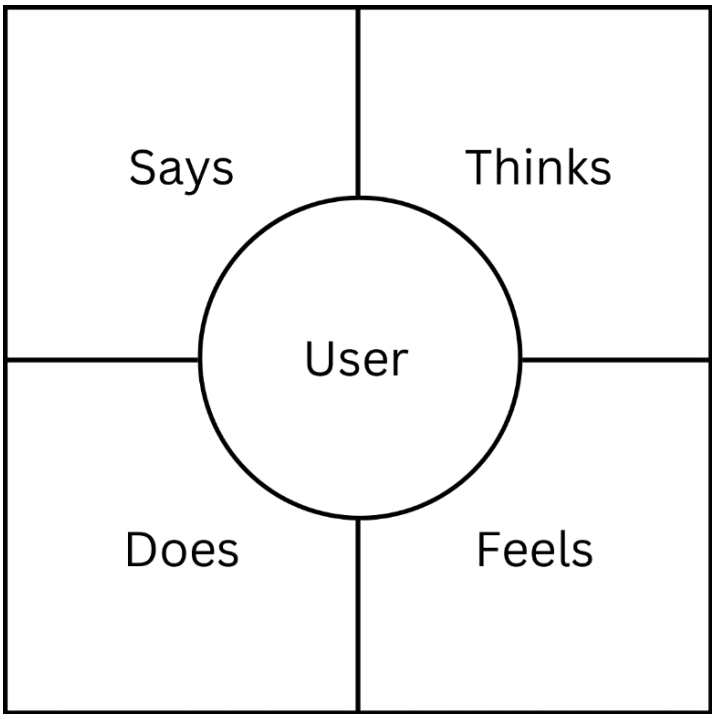

Figure 1 - Empathy map

2.3.2. Ideation (20 minutes)

- **"How Might We" Questions (10 minutes):**
  - Based on the empathy map, have each group formulate questions that begin with "How Might We..." These questions should address specific challenges identified in the VR experience.
  - Encourage generating at least 5 "How Might We" questions that focus on improving accessibility.
- **Brainstorming Solutions (10 minutes):**
  - Now, each group brainstorms solutions to their "How Might We" questions. Encourage wild ideas and a focus on innovative ways to address the accessibility challenges.
  - Aim for at least 5 solutions per question.

2.3.3. Prototyping (30 minutes)

- **Prototype Selection (2 minutes):**
  - Each group selects one or two of their most promising brainstormed solutions to focus on for prototyping.
- **Low-Fidelity Prototyping (20 minutes):**

    - Provide materials like paper, markers, sticky notes, tape and craft supplies if needed.
    - Each group creates a simple, low-fidelity prototype that communicates their chosen solution (one or two of their brainstormed ideas).
    - This can be a sketch, a paper model, or a basic representation that showcases the core functionality.
- **Focus on Communication:** The prototype should be clear enough to explain how it addresses the user's challenges.

2.3.4. Testing and Feedback (20 minutes)

- **Team Matching (2 minutes):**
    - Have groups pair up with another group who worked on different challenges.
- **Role-Playing and Feedback (10 minutes each round):**
    - Each group presents their prototype to their partner group. Explain how the prototype addresses the challenge and its intended benefits for users with mobility/visual impairments.
    - The receiving group role-plays users with the discussed impairments and provides feedback on the prototype's clarity, user-friendliness, and effectiveness in improving accessibility.
    - Allow 10 minutes for presentation and feedback, then switch roles for the second 10 minutes.

2.3.5. Reflection and Iteration (10 minutes)

- **Group Discussion (10 minutes):**
    - Each group gathers to discuss the feedback received from their peers.
    - Identify key areas for improvement and brainstorm how they would iterate on their prototype based on the feedback.
    - This is a quick discussion to identify how to move forward with their ideas.

2.4 Wrap-Up (5 minutes)

- Hold a short class discussion to highlight the learnings from the exercise.
- Briefly review the Design Thinking process and its benefits.
- Encourage students to reflect on the importance of empathy and user-centered design in creating solutions for a more inclusive world.

References

- Interaction Design Foundation - IxDF. “What is Design Thinking (DT)?” Interaction Design Foundation - IxDF. https://www.interaction-design.org/literature/topics/design-thinking (accessed Jun. 13, 2024).

Quizzes

Part 1 – Methods for Delivering VR4All

MULTIPLE CHOICE QUESTIONS

1. **What is this course unit meant for?**

a) Develop general pedagogical approaches for student engagement
b) Train students to design lecture plans using VR assets
c) Equip design trainers with an understanding of VR4All 3D environments
d) Teach programming for VR

2. **Which of the following is a key didactic objective of this course unit?**

a) Guiding trainers to create inclusive designs
b) Enhancing trainers' programming skills
c) Encouraging trainers to include gamification to promote empathy
d) Raising awareness to the VR potential for engaging students

3. **Which of these methods is NOT addressed at this course unit?**

a) Introduction to 3D simulation tools
b) Advanced topics and best practices
c) Introduction to programming VR simulators
d) Integrating 3D simulations into the design curriculum

4. **What does the document suggest trainers should use to enhance their lessons?**

a) Simulation programming environments
b) Standard textbooks on design assisted by VR simulation scenarios
c) External guest speakers with expertise in design thinking
d) VR4All-project provided practical exercises

5. **What is a key feature of Experiential Learning in the VR4All context?**

a) Conducting theoretical lectures
b) Assigning research papers on VR4All similar initiatives
c) Watching videos of design processes based on VR simulation
d) Hands-on activities with VR4All 3D tools

6. **Collaborative Learning in the VR4All context involves:**

a) Solo work on large design projects
b) Group work and peer feedback
c) Competitive challenges
d) Personal reflection only

7. **What is the primary focus of Problem-Based Learning?**

a) Real-world scenarios to stimulate critical thinking
b) Case study to memorizing design terms
c) Practicing standardized quizzes and discussing on the topics covered
d) Watching demonstrations and replicating them

8. **Which of the following is a best practice to support training with VR4All assets?**

a) Learning to use online software applications
b) Introduction to running VR simulations and analysing experimental results
c) Basic colour theory for design
d) Collaborative design projects using 3D simulations

9. **What is emphasized in the development of lesson plans using 3D simulations?**

a) Adopting traditional lecture formats
b) Including practical exercises based on Design Thinking
c) Incorporating theoretical lectures only
d) Focusing on the programming of VR simulators

10. **How are different types of disabilities addressed in the lesson plans?**

a) Hands-on simulations within the 3D environment
b) Presenting theoretical aspect and group discussion
c) Short videos on disability awareness
d) Reading assignments about disabilities

11. **What kind of feedback mechanism is emphasized in the course?**

a) Structured feedback from both trainers and participants
b) The instructor will require feedback from trainees when it is deemed necessary
c) Simple surveys at the end of lessons
d) Weekly emails with feedback

12. **In addressing diverse learning styles, which approach is suggested?**

a) One-size-fits-all teaching method
b) Focusing on visual learners
c) Tailored training approaches for various learning styles
d) Assigning group projects

13. **How should user-centred design principles be incorporated into lessons?**

a) Only theoretical discussions
b) Focusing solely on colour choices
c) Emphasizing software usage
d) Conducting thorough research on users' needs

14. **What should trainers prioritize when using disability simulations?**

a) Respectful and accurate representation of disabilities
b) Focusing on entertainment value
c) Minimizing the importance of disability challenges
d) Creating abstract simulations

15. **Which learning theory is emphasized in creating learning objectives?**

a) Cognitive dissonance theory
b) Behaviourism
c) Operant conditioning
d) Constructivism and experiential learning

16. **What is a key element of Reflective Practice in the VR4All method?**

a) Ignoring mistakes
b) Reflecting on learning and practice for continuous improvement
c) Testing and memorization
d) Instant success in all activities

17. **What is one strategy for making lessons accessible?**

a) Providing appropriate accommodations for students with disabilities
b) Give more time for assignments
c) Focusing on text-based materials that are easily accessible
d) When using complex tools, provide comprehensive explanations

18. **Which of these is not part of developing didactic assessment strategies?**

a) Creating clear and measurable assessment criteria
b) Designing diverse assessment methods
c) Offering feedback strategies
d) Focusing solely on theoretical exams

19. **What ethical consideration is highlighted in using disability simulations?**

a) Ensuring participants enjoy the simulation
b) Focusing on physical disabilities
c) Avoiding stereotypes and oversimplifications
d) Making the simulation difficult to use

20. **What is one way to foster empathy in design training?**

a) Emphasizing the technical aspects only
b) Do not consider all details of user feedback which might lead to biased views
c) Isolating design students from users
d) Cultivating empathy through collaboration with users

OPEN-ENDED QUESTIONS

1. Explain the importance of hands-on activities in VR4All-based activities.

Topic to address: Experiential Learning, understanding of disabilities through simulation, practical exercises.

2. Discuss how trainers can create inclusive learning environments in design education.

Topic to address: Inclusive teaching strategies, addressing diverse learning styles, and accessibility.

3. How can trainers integrate ethical considerations into their use of disability simulations?

Topic to address: Respectful representation of disabilities, avoiding stereotypes, fostering empathy.

4. Describe the steps involved in developing lesson plans that incorporate 3D simulations.

Topic to address: Understanding audience needs, creating engaging objectives, hands-on exercises, peer review.

5. What are the challenges and opportunities in using 3D simulations for design education?

Topic to address: Technical limitations, enhancing engagement, real-world application, fostering creativity.

Part 2 – Design Thinking for Product Design Applications

MULTIPLE CHOICE QUESTIONS

1. **What is the focus of Design Thinking?**

a) Human-centred problem solving
b) Maximizing profits
c) Minimizing costs
d) Standardizing products for all users

2. **Which phase of Design Thinking focuses on understanding the users' needs, thoughts, emotions, and motivations?**

a) Define
b) Ideate
c) Empathize
d) Prototype

3. **Which of the following is NOT one of the five phases of Design Thinking?**

a) Test
b) Develop
c) Ideate
d) Prototype

4. **In the Define phase, the main goal is to:**

a) Clearly articulate the problem that needs to be solved
b) Generate ideas
c) Build a prototype
d) Test the prototype

5. **Which of these methods is used during the Ideate phase of Design Thinking?**

a) Testing prototypes with users
b) Brainstorming solutions
c) Interviewing users
d) Defining the problem
e) Brainstorming solutions

6. **What is an example of the use of Design Thinking in healthcare, as mentioned in the presentation?**

a) Creating a financial model for hospitals
b) Designing advertisements for hospitals
c) Writing healthcare manuals
d) Developing a mobile app for appointment scheduling

7. **In the prototype phase, the goal is to:**

a) Analyze the users' needs
b) Define the problem
c) Finalize the product
d) Build tangible representations of ideas

8. **What is one of the Do's of Design Thinking?**

a) Embrace empathy and understand user needs
b) Work in isolation
c) Rush the empathy phase
d) Stick to one idea

9. **One of the Don'ts of Design Thinking is:**

a) Ignore user feedback
b) Encourage collaboration
c) Iterate continuously
d) Stay user-centred

10. **Which tool is mentioned as useful for organizing insights during the Define phase?**

a) Journey maps
b) Data analysis software
c) Sales charts
d) Marketing reports

11. **In retail, which problem was identified using Design Thinking?**

a) Issues with customer service
b) Difficulty in finding products
c) Declining product quality
d) Poor branding

12. **What does the Empathy phase involve in education applications of Design Thinking?**

a) Creating lesson plans
b) Observing and interviewing students and teachers
c) Grading exams
d) Running focus groups with administrators

13. **Which material is NOT typically used in low-fidelity prototyping?**

a) Paper
b) Pipe cleaners
c) Scissors
d) Metal parts

14. **What should you focus on during user testing?**

a) Finalizing the product
b) Improving user interactions
c) Ignoring feedback
d) Increasing the cost of the prototype

15. **Which phase encourages generating a wide range of ideas without judgment?**

a) Test
b) Define
c) Empathize
d) Ideate

16. **In the example of Design Thinking in education, one of the solutions generated was:**

a) Physical textbooks
b) Printed posters
c) Student surveys
d) Gamified learning modules

17. **One important aspect of Design Thinking is to:**

a) Stick to one concept
b) Avoid collaboration
c) Avoid testing prototypes
d) Encourage wild ideas and lateral thinking

18. **Which phase of Design Thinking involves using empathy maps?**

a) Empathize
b) Define
c) Ideate
d) Prototype

19. **The role of immersion in Design Thinking is to:**

a) Quickly develop products
b) Create final solutions
c) Focus on technical specifications only
d) Immerse yourself in the user's environment to fully understand their experience

20. **Which of the following is a key principle of Design Thinking in the VR4ALL context?**

a) Avoid empathy exercises
b) Ignore user input in design
c) Foster creativity and empathy in product development
d) Focus solely on profit maximization

Open-Ended Questions (5)

1. **Explain the five phases of Design Thinking and how they contribute to the design process.**

Topics to address: Empathize, Define, Ideate, Prototype, Test.

2. **How does Design Thinking foster empathy, and why is it crucial for product design?**

Topics to address: Importance of empathy, methods to understand user needs, impact on design outcomes.

3. **Describe a real-world example of how Design Thinking can be applied in a retail environment.**

Topics to address: User interviews, problem identification, ideation of solutions, prototyping, testing.

4. **Discuss the importance of iteration in Design Thinking and how it leads to better outcomes.**

Topics to address: Continuous feedback, improving prototypes, refining solutions based on user interactions.

5. What are the key challenges and opportunities in applying Design Thinking in education?

Topics to address: Empathy in understanding student needs, prototyping educational tools, testing learning models, fostering creativity.

Part 3 – VR4All Tools: Tips & Tricks

MULTIPLE CHOICE QUESTIONS

1. **Which VR headset is highlighted in this module for its use with VR4All tools?**

a) Oculus Quest 2
b) HTC Vive
c) PlayStation VR
d) Google Cardboard

2. **Who developed the Oculus Quest 2?**

a) Apple
b) META
c) Google
d) Microsoft

3. **What type of tracking does the Oculus Quest 2 use?**

a) Outside-In Tracking
b) Camera-Based Tracking
c) Inside-Out Tracking
d) Sensor-Based Tracking

4. **To cast from Oculus Quest 2, which website should users visit?**

a) www.meta.com/vr
b) www.vr4all.com
c) www.oculusquest.com
d) www.oculus.com/casting

5. **Which menu is used to launch the VR4All application on Oculus Quest 2?**

a) Library
b) Main Menu
c) Settings
d) Unknown Sources

6. **Which third-party application is required to install the VR4All app on Oculus Quest 2?**

a) Mobile VR Station
b) Meta Store
c) SteamVR
d) Oculus Link

7. **What kind of navigation is used in the VR4All environment?**

a) Walking manually
b) Joystick and teleportation navigation
c) Touchpad navigation
d) Point-and-click navigation

8. **Which control element is NOT part of object interaction in VR4All?**

a) Slider
b) Joystick
c) Trigger
d) Grip

9. **Which of the following is a tip for using the wheelchair filter in VR4All?**

a) Use a moving chair
b) Use a stationary room setup
c) Reset the room setup during the experience
d) Change the scene often

10. **Which feature allows users to reset the scene if something goes wrong?**

a) Select the same or another filter
b) Restart the Oculus
c) Turn off the app
d) Call technical support

11. **The VR4All tool is primarily used to:**

a) Simulate different environments for learning and training
b) Play games
c) Edit videos
d) Create 3D movies

12. **Which of the following is needed to execute VR4All use cases?**

a) VR filters and scenes
b) External monitors
c) Advanced programming skills
d) Game controllers

13. **What is the primary purpose of using immersive VR technologies in VR4All?**

a) Designing games
b) Empathizing with disabled users
c) Analysing data
d) Creating 3D animations

14. **What is the first step to begin using the Oculus Quest 2 for VR4All?**

a) Installing a game
b) Connecting to a computer
c) Setting up the play area
d) Downloading the Oculus browser

15. **How can users interact with objects in the VR4All environment?**

a) Via joystick and trigger controls
b) Using voice commands
c) By tapping on the screen
d) With a keyboard and mouse

16. **Which application is used alongside VR4All for installing the app?**

a) Mobile VR Station
b) Play Store
c) App Store
d) Steam

17. **What is a scenario demonstration in VR4All used for?**

a) Testing VR tools
b) Playing simulations
c) Teaching programming skills
d) Demonstrating practical VR use cases for training

18. **The “filters” in VR4All help users to:**

a) Change the colours of the interface
b) Improve VR performance
c) Increase immersion by adding sound effects
d) Experience different accessibility needs

19. **What happens if the VR4All app experience encounters an issue?**

a) The app closes automatically
b) The Oculus reboots
c) The scene must be restarted manually
d) You can reset the scene by reapplying filters

20. **How can users modify their experience in the VR4All application?**

a) By selecting different virtual objects
b) By adjusting VR4All filters
c) By recalibrating the sensors
d) By changing hardware settings

OPEN-ENDED QUESTIONS

1. **Explain the process of installing and launching the VR4All app on the Oculus Quest 2.**

Topics to address: Oculus setup, use of third-party apps, accessing "Unknown Sources," launching the VR4All app.

2. **Discuss how VR4All tools can enhance learning and training in virtual reality.**

Topics to address: Use of immersive technologies, scenarios, and use cases in educational contexts.

3. **What is the role of filters in the VR4All tool, and how do they contribute to user experience?**

Topics to address: Explanation of filters, customization of user experience, and accessibility.

4. **Describe how navigation and object interaction are implemented in the VR4All environment.**

Topics to address: Joystick and teleport navigation, object interaction with trigger and grip controls.

5. **What are the key tips and tricks for ensuring a smooth experience when using the VR4All tools?**

Topics to address: Stationary room setup, resetting scenes with filters, and interaction with virtual objects.

Part 4 – Do's and Dont's for Effective Interaction in the Classroom

MULTIPLE CHOICE QUESTIONS

1. **What is the primary focus of the handbook?**

a) Interaction with students and time management
b) Managing technology in classrooms
c) Advanced teaching methods
d) Organizing educational materials

2. **What should be included when setting learning goals?**

a) Unrealistic expectations
b) Generic objectives
c) Measurable and achievable goals
d) Focus on quantity of material

3. **Which of the following is NOT recommended for preparing a successful lecture?**

a) Break down goals into smaller sections
b) Use a single source for learning materials
c) Customize the lecture based on students' needs
d) Prepare engagement strategies

4. **What is a key characteristic of an inclusive classroom environment?**

a) Strict rules and minimal student interaction
b) Relying solely on technology
c) Respecting diversity and encouraging participation
d) Avoiding collaboration

5. **Which teaching method promotes creativity in students?**

a) Memorization
b) Lecturing
c) Standardized tests
d) Engaging multiple senses and media

6. **When preparing technical equipment, what should be done beforehand?**

a) Use the equipment without prior checks
b) Prepare the lesson without the need for technology
c) Only focus on software
d) Make sure all devices are charged and updated

7. **What is the purpose of setting deadlines for smaller goals?**

a) To add pressure on students
b) To complicate the lesson plan
c) To reduce flexibility
d) To make goals measurable and manageable

8. **How should instructors handle students with disabilities?**

a) Apply reasonable accommodations
b) Ignore their needs to treat them equally
c) Avoid technology
d) Allow them to miss activities

9. **What strategy can improve classroom interaction?**

a) Encouraging collaboration and communication
b) Limiting student participation
c) Overloading students with information
d) Avoiding feedback from students

10. **Which of the following best describes Universal Design for Learning (UDL)?**

a) A method to reduce diversity in classrooms
b) A framework to optimize teaching for all learners
c) A focus on standardized exams
d) Technology-focused teaching

11. **Why is it important to research your students before preparing a lecture?**

a) To predict their performance
b) To adjust the lesson according to their needs
c) To reduce preparation time
d) To avoid interaction

12. **What is an effective way to start a lesson according to the handbook?**

a) Begin with a lecture immediately
b) Focus on individual tasks from the start
c) Ignore student introductions
d) Use an ice-breaking activity

13. **Which tool is suggested for promoting time management in classrooms?**

a) Whiteboard markers
b) Printed textbooks
c) Pen and paper
d) Google Calendar

14. **What is NOT a suggested classroom rule?**

a) Interrupting others during discussions
b) Apologizing for being late
c) Turning off phones
d) Raising hands to speak

15. **What should instructors do if technical issues arise during class?**

a) Cancel the lecture
b) Be flexible and have support available
c) Ignore the issue
d) Continue without the necessary tools

16. **What is a benefit of collaborative group work in VR-based learning?**

a) Decreases student engagement
b) Allows students to share insights and solve problems
c) Encourages independent work only
d) Limits teacher involvement

17. **What is a key time management strategy during group work?**

a) Focus only on one group
b) Let groups manage time independently
c) Skip group work to save time
d) Assign a timekeeper to manage equal time for tasks

18. **Which tool is suggested for brainstorming in a VR classroom?**

a) Whiteboard
b) Paper and pencil
c) Chalkboard
d) Miro or Google Jamboard

18. **What should be avoided during classroom interaction?**

a) Using sarcasm
b) Encouraging student participation
c) Providing clear instructions
d) Giving feedback

19. How should feedback be collected from students?

a) Only in group discussions
b) Ignore feedback altogether
c) By directly questioning students during class
d) Through anonymous feedback forms

OPEN-ENDED QUESTIONS

1. Describe the key elements of preparing an inclusive classroom environment.

Topics to address: Diversity, special needs accommodations, assistive technology, universal design for learning.

2. Explain the steps involved in setting effective learning goals and objectives.

Topics to address: Identifying purpose, making goals specific and measurable, breaking down larger goals.

3. What are the strategies for maintaining effective classroom interaction?

Topics to address: Communication, collaboration, clear rules, feedback.

4. How can technology, such as VR, be effectively integrated into classroom learning?

Topics to address: Technical preparation, group work strategies, collaboration tools.

5. Outline the key principles of time management in a teaching environment.

Topics to address: Prioritizing tasks, lesson planning, managing transitions, group work timing.

Part 5 – Disabilities and Solutions

MULTIPLE CHOICE QUESTIONS

1. **What type of disabilities does the handbook primarily focus on?**

a) Hearing impairments and cognitive disabilities
b) Movement disorders and cognitive impairments
c) Visual impairments and hearing loss
d) Visual impairments and movement disorders

2. **Which of the following is NOT considered a visual impairment?**

a) Colour vision deficiency
b) Loss of visual acuity
c) Complete vision loss
d) A loss of vision that is fully correctable by glasses.

3. **What is the most common form of colour vision deficiency?**

a) Blue-yellow colour blindness
b) Total colour blindness
c) Inability to distinguish between purple and orange
d) Red-green colour blindness

4. **Which assistive technology is used to convert text into speech for visually impaired users?**

a) Screen readers
b) Screen magnification
c) Eye tracking software
d) Voice control

5. **What type of mobility impairment is described as difficulty in performing fine motor tasks like buttoning a shirt or typing?**

a) Ambulation
b) Fine motor control impairment

c) Body size and shape disability
d) Muscle fatigue

6. **What is a common barrier faced by individuals with low vision?**

a) Difficulty hearing audio descriptions
b) Visual aids not being available in audio format
c) Lack of sign language interpretation
d) Text and images with insufficient colour contrast

7. **Which solution helps visually impaired individuals navigate their physical environment?**

a) Braille signs on elevator buttons
b) Closed captions
c) QR codes that provide descriptive information on how to get oriented in the environment.
d) Voice-operated microwaves

8. **What does Lexie struggle with when using websites for online shopping?**

a) Distinguishing between audio cues
b) Identifying error messages highlighted only in red
c) Using speech-to-text software
d) Navigating with keyboard shortcuts

9. **What solution is recommended for someone with manual dexterity issues when navigating websites?**

a) Screen magnifiers
b) Raised floor tiles
c) Eye-tracking software
d) Larger clickable areas and proper focus styling

10. **How does Lakshmi, who is blind, primarily navigate her work software?**

    a) Using a screen reader
    b) Using a joystick
    c) Using a voice command system
    d) With a braille keyboard

11. **What is a common accessibility barrier for people using screen readers on websites?**

    a) No ability to adjust font size
    b) No support for multiple languages
    c) Too many audio-instructions
    d) Lack of text descriptions for images

12. **Which assistive technology is most useful for someone like Ade, who has limited use of their arms?**

    a) Screen readers
    b) Audio descriptions
    c) High contrast text
    d) Speech recognition software

13. **When people with visual impairments navigate websites with multiple colours, what solution helps them the most?**

    a) Using colour only for navigation
    b) Low-contrast colour combinations
    c) Increasing the brightness of the display
    d) D) Providing descriptive text labels for colours

14. **Which disability can be described as a temporary or permanent limitation in walking independently?**

    a) Ambulatory impairment
    b) Fine motor control impairment

c) Colour vision deficiency
d) Muscle fatigue

15. **What does Elias, who has low vision, struggle with when reading online?**

a) Enlarging images
b) Resizing text that gets cut off or doesn't reflow properly
c) Understanding CAPTCHA codes
d) Identifying voice instructions

16. **Which assistive technology helps people with mobility impairments who have difficulty with small buttons?**

a) Screen readers
b) Screen magnifiers
c) Voice-operated devices
d) Exoskeletons

17. **Which of the following is a barrier related to muscle fatigue?**

a) Inability to distinguish colour contrasts
b) Poor hand-eye coordination
c) Increased sensitivity to bright lights
d) Difficulty performing voluntary tasks due to exhaustion

18. **What is a key feature of an accessible website for individuals with manual dexterity disabilities?**

a) Large clickable areas
b) Use of CAPTCHA
c) Small interactive elements
d) Timed tasks without warning

19. **What type of barrier is experienced by Ade when website links do not follow a logical order?**

    a) Ambulation impairment
    b) Inconsistent link focus
    c) Colour vision deficiency
    d) Screen magnifier failure

20. **What is a recommended solution for websites to assist users like Elias, who has hand tremors?**

    a) Voice-activated CAPTCHA
    b) Small clickable areas
    c) Bright background colours
    d) Allowing text to reflow when resized

OPEN-ENDED QUESTIONS

1. **Explain the barriers faced by individuals with colour vision deficiencies in digital environments and the solutions to overcome them.**

Topics to address: Use of colour alone, error message highlighting, descriptive text labels, alternative visual markers.

2. **Describe the assistive technologies used by individuals with visual impairments to navigate both physical and digital environments.**

Topics to address: Screen readers, audio descriptions, raised tiles, Braille, screen magnification.

3. **What are the challenges individuals with mobility impairments face in using digital technologies, and what solutions are available to address these challenges?**

Topics to address: Difficulty with small touch targets, voice control, adaptive keyboards, switch devices.

4. **Discuss the impact of muscle fatigue on individuals' ability to perform tasks and the technological solutions that help them.**

Topics to address: Muscle fatigue symptoms, assistive technologies like voice commands, extended time for tasks, ergonomic tools.

5. **How can websites be made more accessible for users like Ade, who has limited use of his arms?**

Topics to address: Consistent layout, focus styling, speech recognition, logical tab navigation.

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