Module 3

Chapter 1

Disability Awareness

Access Needs of Diverse Disability Groups

In order to create fully accessible environments, it is important to understand the nature of the access requirements of diverse disability groups. For the purpose of built-environment design, there are usually four major disability groups:

(a)   Orthopedic: ambulant and non-ambulant (wheelchair users)

(b)   Sensory: visual, hearing

(c)   Cognitive: mental, developmental, learning;

(d)   Multiple: combination of any or all of the above.

High kerbs are common barriers

(a)   *Orthopedic*

People with orthopedic disabilities are generally those with loco motor disabilities, which affect mobility. This can mean impairment of the trunk, the lower limbs, or both of these. People with orthopedic disabilities may also have impairment of the lower limbs and the trunk as well as the upper limbs. People with orthopedic disabilities are divided into two subgroups, namely

(i)   *Ambulant disabled persons* are those who are able, either with or without assistance, to walk and who may walk with or without the aid of devices such as crutches, sticks, braces or walking frames.

(ii)   *People who use wheelchairs* are unable to walk, either with or without assistance, and who, except for the use of mechanized transport, depend solely on a wheelchair for mobility. They may propel themselves independently, or may require to be pushed and maneuvered by an assistant. While being unable to walk, the majority of people in this group are able to transfer to and from a wheelchair. The built environment needs to incorporate level access, ramps, lifts/elevators, handrails and grab bars, larger toilet cubicles, clear signs, sufficiently wide paths, doors, entrances, lobbies and corridors. The presence of these features would ensure wheelchair users access to buildings and to the external environment.

(b) *Sensory*

People with sensory disabilities are those who, as a consequence of visual or hearing impairment may be restricted or inconvenienced in their use of the built environment. They are divided into two subgroups:

(i) *Visually-impaired/blind persons* who rely solely on their sense of hearing, touch and smell. The built environment must therefore incorporate certain aspects of sound, texture and aroma to assist these persons in their surroundings. However some people with impaired vision can partially see. Therefore they also benefit from visual information.

(ii) *Hearing-impaired persons* who rely solely on their sense of sight and touch and need signs, color and texture to be incorporated in the built environment to assist them in moving around their surroundings. However some people can partially hear and benefit from clear audible sound information.

(c) *Cognitive*

People with cognitive disabilities are generally those with a mental illness, a developmental or a learning disability. Making a building plan, easy to understand is very important. To assist them to function in their surroundings, the built environment should incorporate a combination of cues such as those of sight, touch and sound, as well as signs, colors and texture. Standardization of information (both audio and visual) and simple interior designs, are less confusing.

(d) *Multiple*

People with multiple disabilities are generally those with a combination of orthopedic, sensory and/or cognitive disabilities. The built environment therefore must incorporate a combination of visual, tactile and olfactory cues to assist them in their use of their surroundings.

Specific Needs of Diverse Disability Groups

In the planning and design of barrier-free environments, it is essential to ensure that suitable access and facilities are provided for people with all the disabilities mentioned above. Identifying and understanding the circumstances, which create barriers for persons with disabilities and elderly people, is a fundamental requirement. A systematic review of layouts, space requirements and the use of components and component relationships may need to be undertaken to evaluate the adequacy and performance of design proposals.

(a) *Mobility-impaired people*

In terms of circulation, wheelchair movement is seen as the most critical. The spatial needs of the ambulant disabled and the sensory or cognitive disabled are unlikely to exceed the space needed to maneuver a wheelchair.

Independent wheelchair users require more generous activity space width, while assisted wheelchair movement requires greater length or depth of space and, consequently, larger overall turning space. The built environment should accommodate both independent and assisted wheelchair mobility.

The recommendations in this manual are suitable for most standard, manually propelled chairs and electric/motorized indoor wheelchairs. Electric/motorized outdoor models generally require 10 to 15 per cent more maneuvering space than standard, manually propelled chairs. However these wheelchairs are rarely used outdoors, in our country.

(b)   *Visually-impaired people*

Many blind people, including those who are registered as such, have varying degrees of residual vision.

The following recommendations pertain to people who are totally blind and those who have low vision:

(i)   *Dropped kerbs to footpaths*: Interruptions in footpath kerbs and edges are useful cues for partially sighted people. Where interruptions do occur, they should be indicated with tactile paving.

(ii)   *Stairs and ramps:* Handrails should be of a bright color, contrasting with the surroundings. They should extend a minimum distance of 300 mm beyond the top and bottom of the ramp or stairs to give a blind person a chance to feel them before encountering the hazard.

Staircases should have bright contrasting, preferably non-slip nosing. A tactile warning surface should also be incorporated into the floor at the top and bottom of the staircase or ramp.

(iii)   *Walkways:* These should be fitted with visual signs and tactile clues, e.g., Braille blocks as route finders. It is desirable to define clearly the edges of paths and routes by using different colours and textures. It is also possible to use plants to emphasize pavement edges, but care must be taken in the choice and placement of plants to avoid people tripping over. Large featureless paved areas in front of buildings should be avoided as these can cause glare problems for visually impaired persons and make it difficult for them to distinguish entrances. Patterns in the paving should be carefully thought out to guide people through routed areas or to entrances.

(iv)   *Hazards:* Windows and doors opening outwards can be very dangerous. One solution is to recess outward opening doors into a porch. Street furniture, trees, lamp posts, fire hydrants, waste bins, flower tubs, seats and other such items should be located to one side of pathways and roads used by the public. Some of these could be grouped together with a change in paving surface texture and colour to give some warning on approach. The use of contrasting colours can greatly assist visually impaired persons particularly on street signs or lampposts. A contrasting band at eye level should be incorporated onto the posts. Overhanging hoardings or signs should be positioned well above 2100 mm. Low barriers should be placed around temporary road works to enable persons using canes to detect the hazards.

(v)   *Tactile objects:* The sense of touch is vital to people with visual impairments. Objects, which are important in daily life, should be distinctive in shape, texture or size. Coins and bank notes should be so designed that the value of each may easily be identified.

(vi)   *Signs:* These should be in contrasting colours. Raised letters and characters should be used to allow blind persons to feel the signs. Where possible, universally accepted symbols and colours should be used, e.g., green for safety, yellow or amber for risk and red for danger. A clear system of signs should be used throughout a building, with a similar height and format at each change in

direction. Signs should be fixed at eye level when mounted on a wall; a suspended sign should be hung between 2100 mm. and 2400 mm. above floor level.

(vii) *Hedges and trees:* Such plants must be maintained to prevent them from encroaching onto footpaths. Low branches hanging over footpaths should be removed.

(viii) *Doors:* The use of colour to distinguish doors from surrounding walls is very useful. A colour contrast between a door and a doorframe, with the door handle in a distinct tone, can be of great benefit to people with visual impairments. Glass doors must have a bright coloured band or motif at eye level to avoid partially sighted persons from walking into them.

(ix) *Corridors and circulation:* All appliances and fittings should be recessed where possible.

(x) *Lifts:* Raised numbers with tactile indications on landings should be used to indicate the floor. Buttons in the lift car should be marked with raised numbers and Braille (on control buttons). A voice synthesizer is the most important addition to any lift serving more than two floors and can give visually-impaired persons important information, such as, doors closing/opening; lift going up/down; lift free and floor level.

(xi) *Summary recommendations for visually-impaired people*:

(1) The use of guiding path and warning strip should be promoted and installed in public facilities, including train stations, shopping centers and bus terminals.

(2) Glare should be reduced from windows by using net curtains, solar reflective glass, or external/internal blinds.
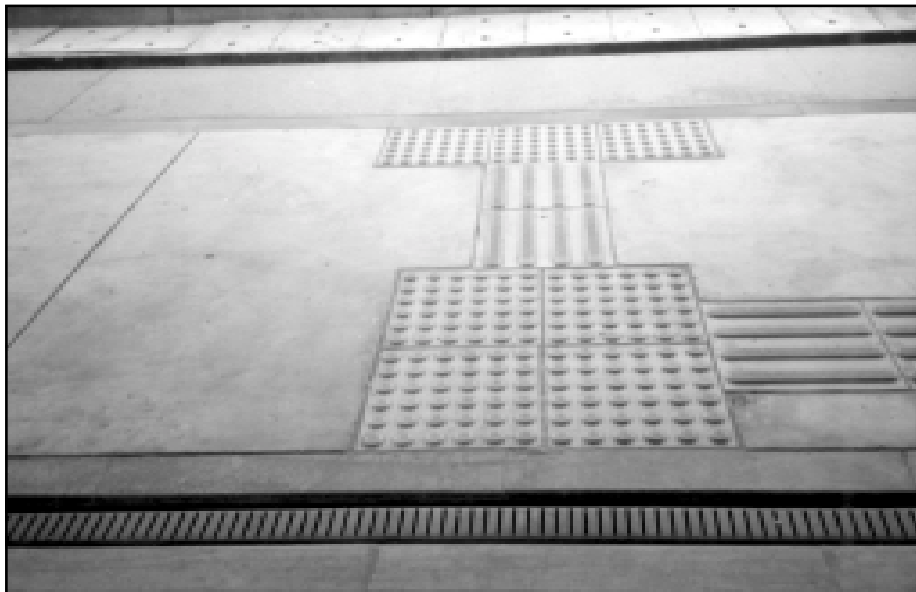
Guiding path and warning strip at Delhi Metro Rail Station.

(3) Contrasts should be reduced between the outside and inside of buildings. Windows should not be positioned to cause silhouetting in corridors and circulation areas unless the possibility of glare is reduced by one of the above measures or by other means.

(4) Changes in colour and texture should be used to warn of differences in floor level and to indicate door handles, light switches and other fixtures.

(5) Green and blue tones being hard to differentiate, for example, green carpets and blue walls can appear as one to a visually-impaired person), they should be avoided. The red colour range causes the least difficulty in this respect.

(6) Patterns should be used to indicate direction warning. A contrasting band of colour on walls can be very helpful, e.g., a line of contrasting tiles in a tiled toilet area can help to define walls to visually impaired persons.

(c) *Hearing-impaired people*

(i) *Lifts*: It is important for the emergency call button in lifts to have an acknowledgement light adjoining it. This provides both visual and auditory notification that someone is in trouble in the lift and that someone is dealing with the problems.

(ii) *Fire evacuation*: It is most important that it is widely understood that a person with a hearing impairment will react a lot more slowly than someone without this difficulty.

(iii) *Visual signs*: These must be very clear and accurate. A flashing light unaccompanied by a message can be confusing, e.g., a flashing fire exit sign would be preferable to a flashing red light; it gets the message across much more quickly. Flashing exit signs in public buildings are preferable to permanently lit exit notices in emergency situations. These will be activated only when alarms sound during an emergency.

(iv) Signs in all facilities frequented by members of the public, including shopping and entertainment areas, should be improved. Electric and flashing information signs to indicate stops should be installed on trains and buses to enable deaf persons to use public transportation independently.

(v) *Fire or emergency alarms and other important environmental sounds:* Substitute visual or tactile alert mechanisms for the traditional audible signal. (Remember to place visual alert systems away from windows where sunlight might overwhelm the signal). Use a vibrating pager system, or provide alarms with lights. Bedrooms used by people with disabilities and elderly persons should be provided with flashing lights activated by alarm systems to alert them in the event of an emergency. Vibrating pillows linked to an alarm clock or an alarm system is a further possibility for awakening hearing-impaired persons.

(vi) *Good lighting and prevention of glare*: These are as important for people with hearing impairment, who focus on facial expression, as for those with visual impairment. Many people lip-read.

(vii) *Hearing aids*: Wherever possible, e.g., in foyers, meeting rooms, interview rooms, courts, theatres, training venues, booking offices and cash desks an induction loop system should be installed.

(viii) *Background noise*: It is most important to reduce any background noise internally and externally.

(ix) *Acoustics*: Care should be taken to provide good acoustic conditions in all building interiors. Sound absorbent surfaces should be utilized to minimize reverberation, which could seriously

affect the hearing of a hearing-impaired person. In areas where there is fixed seating, such as, lecture theatres, the lecturer's position should not be in front of a window or the light source, which may create, glare and cause difficulty in lip reading.

Audio Alerts

Many sounds that provide auditory cues can be replaced with an alternative.

- **Computer alerts:** substitute screen or cursor flashes for the auditory cues that alert a user to errors, that e-mail has been received, or when there is a problem with the equipment.

- **To replace a buzzer,** telephone ring, doorbell, alarm clock, or equipment malfunction indication, use visual or tactile signals. For example, you can hardwire a light to a sound source for a visual cue, use a monitor/signaling device, or provide a vibrating signal. (The advantage of vibration is it alerts deaf or hard-of-hearing persons with minimal distraction to others.)

- **A specially trained hearing dog:** If the person with hearing impairment has a hearing dog, the animal can indicate telephone rings, a person entering the room, or abnormal machinery sounds. (Hearing dogs do not—and should not—socialize in the work environment).

Other Useful Tools and Tips

Dealing with extraneous noise:

- **Use sound-absorbing products** such as carpeting, ceiling baffles, wall panels or cubicles.

- **Don't allow the use of personal stereos** in shared spaces.

- **Provide a workspace free from extraneous sounds** such as copy machines, faxes and printers.

Hearing protection: Some people might benefit from wearing electronic hearing protection, which allows the frequency of the human voice to be heard but filters out unwanted noise. (Certain sounds can also be amplified with an adjustable volume control, if desired.)

One-to-One Communication (In Person)

To communicate with a deaf or hard-of-hearing person when you are in the same location, there are many possible solutions. You might use:

- **Handwritten notes.**

- **E-mail messages**.

- **A computer termina**l (take turns typing at the same computer).

- **Assistive listening devices** (ALDS, as these devices are known, operate on FM frequencies or use infrared or induction loop technology; the speaker uses a microphone or transmitter and the listener uses either a hearing aid switch or wears a companion receiver).

- **Interpreters**.

- **A communication board** connected to two TTYs (text-telephone devices) minus telephones.

- **Sign language**: Some people may choose to learn basic sign language as a means of communicating with a colleague.

On the Phone Communication

There are five general means of enabling telephone communication, depending on the type of hearing loss.

- **Amplification technology:** If the individual benefits from sound amplification, a wide range of options is available. Amplification can be provided through the handset, headset, in-line, portable additions and complete phone systems.

- **T-coil technology:** Some individuals who wear T-coil ready hearing aids may be able to use a T-coil, which pairs the hearing aid with a compatible telephone.

- **Clarification:** For some people, the problem is not that they need sounds to be louder—they need them to be clearer. Clarity can be achieved by adjusting the frequency of the incoming voice when listening on the telephone. A number of complete telephone systems and in-line devices allow the user to adjust voice frequency.

- **Text telephone equipment:** A teletypewriter or TTY (also known as a TDD, or telecommunications device for the deaf) is used when amplifying speech is not enough. The TTY consists of a keyboard and electronic display; it converts typed messages into electronic tones, which are sent over a standard phone line, much like a fax machine. Communication is direct with anyone who has a similar device, or the Telecommunications Relay System can be used as a medium for communication. Some computers with modems can be used to communicate with some of the most recent TTY units.

- **Pagers or beepers in text format** can alert a deaf or hard-of-hearing person to the need for telephone communication.

Also, **some deaf or hard-of-hearing persons may be able to use a cellular phone** with the earpiece or receiver attached to the hearing aid behind the ear. (However, some wireless phones are designed in such as way that the earpiece cannot reach behind the ear while allowing the mouthpiece to remain close to the mouth).

Dealing with People with Speech Impairments

Many of the suggested accommodations above also apply to people who have speech impairments. One basic rule to keep in mind: if the impairment is aggravated by oral communication in a group, try to avoid unnecessary group settings. Minimize distractions and extraneous conversations. In addition, there are a variety of helpful tools available: **electronic "speaking machines"** may benefit certain speech difficulties.

- **Voice amplification devices** will help people who cannot speak at sufficient volume to be understood.

- **Voice synthesis devices** can be added to computers to enhance communication.

- **Delayed auditory feedback devices,** which slow the arrival of information to a speed at which it can be processed, may provide benefits for stutterers.

Communication in Formal Situations

Provide agendas or text materials prior to meetings or training courses to allow additional preparation time. After each meeting, distribute written meeting minutes. Consider environmental factors in-group communication situations, and try to be aware of background noise, lighting, seating and positioning. Ensure accessibility of information on all videos used.

- **Noise considerations:** Hold meetings in a room that is carpeted, free of office machines and away from paths of heavy traffic (people and vehicles).

- **Sightlines:** Use a round table (rather than square or rectangular) to open up sightlines for people who might lip-read.

- **Distance issues:** Allow the deaf or hard-of-hearing person to sit where they are comfortable, depending on their needs and the position of the interpreter or speaker.

- **Video:** All videos used should be captioned; preferably using open captioning that appears onscreen and does not require special viewing equipment.

You may also provide interpretive assistance through interpreters or interpretive devices, including:

- **Assistive listening devices (ALDs):** There are a variety of ALDs, with some operating on an FM radio frequency and other using infrared or induction loop technologies. In all systems, the presenter speaks into a microphone or transmitter, and the listener either uses a T-switch on their hearing aid or wears a receiver designed to work with the assistive listening device chosen.

- **Sign language interpreters:** A qualified language interpreter is one who can both *sign* what is said to the individual and *voice* to the hearing person what is signed. The communication must be conveyed in an accurate, effective, impartial manner. In addition, qualified interpreters must be familiar with any specialized vocabulary used during communication. (For best results, make sure the interpreter is positioned against a dark, solid-colour background with adequate lighting.)

- **Computer-assisted note taking (CAN)** involves using a personal computer (and possibly a projector). A clerical support person sits in on the group activity, typing summaries of the communication-taking place. The deaf or hard-of-hearing person can either watch the computer monitor or view text projected on a wall. (The drawback with CAN is that information provided is not word for word.)

Chapter 2

Guide to Conduct Disability Simulation Exercise

1.   What is Simulation Exercise?

This is an exercise that can be used, to give participants an understanding of what it is like to be elderly and disabled. It is most effective if the exercise can span an overnight period, as many normal acts of daily living, such as going to the toilet, walking, eating and dressing, can be experienced.

2.   When to Use the Simulation Exercise?

It is best used in a workshop situation. It can be used for small groups of five or six people or a large group of up to 30, which is divided into smaller sub-groups.

Paraplegia, stroke, arthritis, being an amputee, having a broken leg, cataract, tunnel vision, blindness, hearing loss, heart/chest conditions can all be simulated. Equipment and materials required for simulation exercise per group of ten participants:

One self-propelled wheelchair, two pairs of adjustable crutches, one adjustable walking frame, one adjustable tripod walker, one camera jacket (with several pockets), sunglasses (lenses smeared tissue paper), sunglasses (adapted for tunnel vision), one set of industrial protective earmuffs, two sets of shin protective guards, one set of elbow protective guards, one set of wrist weights (1 kg), one set of wrist weights (2 kg), one set of ankle weights (1.5 kg), one set of ankle weights (2.5 kg), two crepe bandages, cotton wool, one set of thin surgical gloves, safety pins, and talcum powder.

3.   Briefing on Disability

It is important that a short briefing is given on each disability, its causes, effects and limitations. This will help to improve understanding and involvement in the role-play situation. If blindness is being simulated, then a demonstration of how to lead a blind person must be given by someone who is familiar with the correct way of doing this.

Emphasize that the purpose of the simulation exercise is to help participants understand the mismatch between the diverse levels of physical and sensory functioning and the existing physical environment. Clarify that it is not the purpose of the simulation exercise to test the limits of the participants' abilities.

4.   Demonstration on Use of Devices

A demonstration is given of how to measure the correct height of the walking devices, to adjust them and to ensure their safe use on steps/stairs and outside in negotiating kerbs. It may be useful to have a physiotherapist take part in this exercise.

5.   Medical Conditions

There are various medical conditions that could be aggravated by simulating some of the disabilities. Advise the whole group about this. Check with the group if anyone has a heart condition, chest condition or arthritis and avoid allocating them a "disability" that may be detrimental to their health.

6.   How to Simulate Different Disabilities

There are a number of different physical and sensory impairments that can be simulated in this exercise by using the equipment listed above.

(a)   *Paraplegia:* Use the wheelchair. Check that the person can use the wheelchair correctly, knows the procedure for both kerbs and steps, and is comfortable. Check that the person can use the walking device correctly, knows the procedure for steps/stairs, and is comfortable. Someone with a heart or chest condition or arthritis should not try simulation of paraplegia.

(b)   *Heart condition/chest condition*: Use the camera jacket. Put weights into the various pockets around the jacket. Judge the total weight according to the size of the person. Small woman: 5 kg; large man: 8 kg.

Someone with a heart condition, chest condition or arthritis of the spine should not participate in this simulation exercise.

(c)   *Cataract:* Use sunglasses, the lenses of which have been thickly smeared with soap. As an alternative, the lenses may be covered by semi-opaque plastic/tissue paper. Check that the glasses are comfortable.

(d)   *Tunnel Vision*: Use sunglasses that have had cone-shaped tubes of cardboard attached to the lenses and the sides screened off. Two sections of an egg box could also be used. Ensure that the centers of the cones are aligned. Alternatively, blacked-out spectacles with pinholes to simulate tunnel vision may be used. Check that the glasses are comfortable and that the person is aware of the necessity of turning her/his head from side to side to compensate for the narrow field of vision.

(e) *Blindness:*Use a crepe bandage tied around the head to cut out all vision. A sleeping mask or sunglasses that have had the side screened off and the lenses blacked out may be used. Check that the blindfold is comfortable.

(f) *Deafness:* Use a set of industrial ear protectors (ear muffs) with cotton wool tightly packed inside them. Have enough cotton wool to replace it for each participant; if someone has an ear or skin infection this will avoid it being passed on. An alternative to the ear protectors is to use wads of cotton wool over the ears, held securely in place by a crepe bandage, but this does not cut out sound as effectively as the ear protectors.

7.   How to Conduct the Simulation Exercise

(a) *Pre-preparation:* Assemble the various "devices" that will be required in the exercise. Be sure to have enough for the whole group. Work out an itinerary of places and activities for each group, i.e., four or five places could be visited in sequence. Examples could be: a public toilet; a bedroom with attached bathroom; a bus stop; a post office (to buy and post stamps); a lift to go from one floor to another in a building; a shop to purchase some items on sale; a kitchen to make afternoon tea for the group, and so on.

Each group will encounter various barriers in everyday life. If the workshop is residential then having a meal together can be a good idea. The sequence should be different for each group so they do not all try and visit the same place at the same time.

Decide beforehand the duration of the exercise, e.g., half a day or 24-hour period. A separate itinerary should be prepared for each group, with a list of the activities that they should undertake in each location.

(b) *The Simulation Exercise:*Briefly explain what is to happen during the exercise and its duration.

➢   Give a short briefing on each disability.

Simulation of a narrow corridor

➢   Check with the participants for any contraindicated medical conditions.

➢   Demonstrate how to measure and adjust the walking devices for correct height and confirm that this is understood.

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- ➢ Demonstrate the correct use of the various devices and ask for a return demonstration.

- ➢ Demonstrate the correct method of guiding a blind person.

- ➢ Outline the itinerary and what is to be done at each location.

- ➢ Divide the large group into smaller groups and allocate "disabilities", ensuring that no participant in that group already has a medical condition that could be aggravated by the assigned simulated disability. If so, reallocate a "disability" that is safe for the individual. Each group member should have a different "disability". Advise the group members to change "disabilities" after a specified time depending on the duration of the simulation exercise. Check that each person is comfortable and knows how to use the devices correctly. Inform the group at what time it is to meet together again. If the exercise is to span overnight, allow each participant to select a different "disability" when the group meets again.

Important Tips:

- ➢ Do not force simulation exercise on any body.

- ➢ Make every body understand that this is a fun exercise in a controlled atmosphere.

- ➢ This exercise is not to highlight the disability or shortcomings of PwDs and elderly people; but to sensitize the participants about the inconvenience caused by the exiting barriers (both attitudinal & architectural) in the built environment.

8. Routes/Itinerary of the Simulation Exercise

The number of the places to be visited should be decided accordingly to the expected number of groups. Accordingly, select the number of places for the simulation exercise. Inform the authorities and obtain cooperation and agreement for the exercise. The sequence should be different for each group so that the groups do not crowd the same place at the same side. For example: sidewalk, approach to and from a building, entrance or exit of a building, registration/information counter, staircase, toilet, corridor, lift, public telephone booth, drinking water fountain etc.

9. At the End of the Exercise

It is important that the whole group comes together and discards its disabilities and the participants discuss their own feelings and attitudes as well as those of people they met in the course of the exercise. They may also be encouraged to discuss ways of removing the barriers that they had encountered. (Sample questionnaire on page 30).

10. Question for Discussion at the End of the Exercise

(a) How did you feel when you simulated persons with diverse disabilities?

(b) How did the different levels of audio and visual interaction affect your ability to understand the environment and move in it?

(c) What barriers (psychological & physical) did you experience in the simulation exercise? What can you suggest to remove the barriers that you experienced in the exercise?

Sample Questionnaire

"What are barriers?"
(To be completed by all participants)

1. What does the term "attitudinal barriers" means to you?

2. What does the term "physical barriers" means to you?

3. Your position

    Area of your work responsibility:

    Name of your department:

Signature: Date: