Using Technology to Help People with Brain Injury Travel on Public Transportation

A training program for people with acquired brain injury implemented by caregivers

PART ONE: Caregiver Information

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Disclaimer

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INTRODUCTION

Being a part of the community is important for the health and happiness of everyone. A community is where we make friends, work at jobs, and enjoy free time. It is also where we take care of everyday business like shopping or going to a doctor's appointment. Those with acquired brain injury (ABI) sometimes have trouble going places in the community on their own. This is because of problems with memory, attention, problem solving, safety awareness, and decision making.[1,2,3] Technology can be used to help people with brain injury travel safely on public transportation. It can also improve the person's ability to get around in the community on their own.[4]

With this manual caregivers will be able to help people with ABI choose a technology that fits their public transportation needs. Caregivers will also teach the person with ABI how to contact local, Seattle, Washington, organizations that will continue to support them with their public transportation needs.

Important Note

You **should not** expect participants to be able to complete this course and ride the bus alone. It is also necessary for you to read and finish all quizzes and worksheets before taking the person with brain injury on public transportation. In the rest of this manual, the person with a brain injury that you will be teaching will be called "participant".

This manual will help you support a person with brain injury to be more independent. After finishing this program your participant will be more capable of traveling on public transportation.

Community Organizations Participating

KING COUNTY METRO

King County Metro Transit (KCMT) offers travel training on how to use public transportation.[5] This program is for people with disabilities and senior citizens. The name of the program is "Transit Instruction." People with disabilities who use the Transit Instruction program get one -on-one training with an instructor. Support is provided until the participant is safe while riding the bus or light/rail in King County alone. Phone: (206) 553-3000

BRAIN INJURY ALLIANCE OF WASHINGTON

Brain Injury Alliance of Washington (BIAWA) is a nonprofit organization that provides free services to people with brain injury in Washington State.[6] People with brain injury and their families can use these services at any time to gain new knowledge or help with a current problem. Phone: (206) 467-4800

Some of BIAWA services include[6]:

- Scholarships for school.
- Advice on laws that supports the rights of people with brain injury.
- Social gatherings and support groups for people with brain injury.
- The Washington Traumatic Brain Injury Resource Center.
- Working with other organizations to support people with brain injury.
- Being involved in the community and improving public knowledge of brain injury.

HEAD STRONG FOR LIFE

Headstrong for Life (Headstrong) is an organization that supports young people with traumatic brain injury (TBI).[7] They provide programs that support young people in recovering after a brain injury. They also support parents with information related to TBI and advocacy.
Phone: (360) 220-1422

What You Need to Know Before Starting the Training

How will people with brain injury benefit from this training?

People with brain injury sometimes have difficulty with day to day life tasks. This may be due to complications of their injury that involve complex thinking.[8] Examples of tasks that involve complex thinking are: planning for a trip to the grocery store or deciding to get off at the correct bus stop. Safely getting back out into the community requires those skills. Trouble with complex thinking tasks will most likely lead to trouble navigating in the community. People with brain injury need more support in community navigation to be successful.[8] Helping people with brain injury learn to ride public transportation will help them be more involved in the community. It will also help their overall health and well-being.[9] This training provides you, the caregiver of a person with a brain injury, a step-by-step course. This course will show you how to teach a person with brain injury to use technology for navigating the community.

Why public transportation?

Public transportation is a perfect alternative for people with brain injury who can no longer drive.[10] These people may still want to be independent in getting around in the community. But riding public transportation can be scary. Getting lost, getting off at the wrong stop, not knowing the bus fare or interacting with strangers are common fears for anyone new to public transportation.[11] As a caregiver, you may also be concerned for the safety of the person you care for on public transportation. This course will walk you through the process of how a person with brain injury can safely ride public transportation. It will also connect you with King County Metro's Transit Instruction program. This program provides one-on-one individualized instruction to people with disabilities on using public transportation.

How can a caregiver help a person with brain injury be more successful at using public transportation?

You already hold a very valuable role as the caregiver. You know the skills and abilities of the person with brain injury better than anyone. This training will provide you with different ways to help a person with brain injury be successful in public transportation. Some of the skills you will teach the person with brain injury include:

- Technology use, specifically for navigation
- Safety awareness
- Trip planning
- Problem solving
- Communication
- Appropriate behaviors
- Self-awareness

Technology is an important tool to help people with brain injury. Everyday technologies, like cell phones, are easy to obtain.[12,13] This technology can be used to compensate for some of the difficulties the person with brain injury might have with complex thought.

Why use technology to help?

Every person with a brain injury is unique with varying abilities. Some may have little to no problems with complex thought. Others will have a great deal of difficulty. Depending on those abilities, they might need more or less support to access public transportation. Technology has been successfully used to help people with brain injury in their navigation needs.[10,14] It can provide the extra support needed to assist in independence. Caregivers know their participants best and can help select a device that will work best for those with brain injury. The person with brain injury may still need a caregiver to accompany him/her during travel. However, technology can help the person with brain injury be more self-aware and give him/her a feeling of power over his/her own choices.

Definitions

Acquired Brain Injury (ABI)

An injury to the brain, which is not hereditary, congenital, degenerative, or induced by birth trauma. An acquired brain injury is an injury to the brain that has occurred after birth.[15]

Traumatic Brain Injury (TBI)

TBI is defined as a permanent alteration in brain function, or other evidence of brain pathology, caused by an external force, such as blunt force to the head from motor vehicle accidents or falls.[15]

Mild Traumatic Brain Injury

An injury to the head as a result of blunt trauma or acceleration or deceleration forces that result in one or more of the following conditions: transient confusion, disorientation, impaired consciousness, dysfunction of memory around the time of injury, loss of consciousness lasting less than 30 minutes. Mild traumatic brain injury is considered to result in permanent alteration of brain function.[16,17]

Concussion

Biomechanically induced alteration of brain function typically affecting memory and orientation, which may or may not involve loss of consciousness. Concussion is considered to result in temporary alteration of brain function.[18,17]

Cognition

Thinking skills, including language use, calculation, perception, memory, awareness, reasoning, judgment, learning, intellect, social skills, and imagination.[1]

Attention

Attention is divided into several categories: divided, sustained, selective and alternating. Cognitive abilities associated with attention include: focusing on a task, issue, or object, being able to identify relevant/irrelevant information, switching between one stimulus to another, and ability to attend to more than one thing at a time. [19]

Memory

Ability to register, retain, and recall past experience, knowledge, and sensation.[19]

Executive Functioning

Cognitive process that encompasses the skills of concept formation, categorization, schemas, problem-solving, decision-making, and metacognition.[1]

Problem-solving

The process of finding solutions to difficult or complex issues.[20]

Decision-making

The action or process of choosing one option from a variety of options available.[21]

Navigation

A spatial problem-solving process that requires awareness, decision-making, planning and ongoing monitoring for error detection and correction. Community mobility skills related to navigation include: knowing left from right, recognizing landmarks, and recognizing and correcting an error made during route finding.[14]

Everyday technology

Technology designed for use by the general population such as home computers, the Internet, palmtops, mobile telephones and, more recently, the potentially useful global navigational hardware.[22]

Assistive Technology

Any item, piece of equipment, or product system, whether acquired commercially, modified or customized that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.[23]

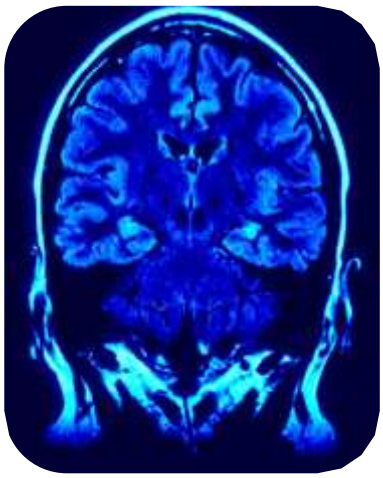
Brain Injury Facts

1. An estimated 1.7 million people get a TBI every year and of those people: 52,000 die, 275,000 are hospitalized, and 1.365 million are treated and released from an emergency department.[16]
2. The leading causes of TBI, in order of most prevalent to least prevalent, are: falls, motor vehicle or traffic accidents, collisions with or against objects, and assault.[16]
3. TBI is most commonly caused by falls and fall rates are highest for children age zero to four and adults aged 75 and older.[16]
4. Falls result in the greatest number of TBI-related emergency department visits and hospitalizations.[16]
5. The most likely populations to sustain a TBI are: males of all ages, children age zero to four years, adolescents age 15 to 19 years, and adults age 65 and older.[16]
6. 473,947 emergency department visits for TBI are made annually by children aged 0 to 14 years.[16]
7. Motor vehicle-traffic injury is the leading cause of TBI related death, highest rates in adults aged 20 to 24 years old.[16]
8. Approximately 71.0% of all sports and recreation related TBI emergency department visits were among males and 70.5% were among persons aged 10 to 19 years.[24]

Categories of Brain Injury

Brain Injury Association of America describes brain injury as having several categories. These categories are based on severity.[25] The common terms used going from least to most severe are:

- Concussion
- Mild brain injury
- Moderate brain injury
- Severe brain injury



Each category of brain injury varies depending upon what happened following the injury[26]:

- Whether the person was unconscious
- How long he/she was unconscious
- The length of the amnesia (inability to remember a past event)
- The resulting cognitive, behavioral and physical problems
- The recovery

This training program will focus on the consequences of brain injury such as cognitive and behavioral problems. When you are working with a person with brain injury it is important to consider the initial severity of injury. It is also important to consider how that injury impacts his/her ability to function. When looking at this program specifically you will consider how these problems might affect your participant's ability to navigate public transportation.

To help you understand this training we will be using the story of Joe. Joe is a made-up story of a TBI survivor. Joe's story will help show you how brain injury affects the skills required to navigate the community. Joe's difficulties will be used as examples to show you problems you may come across. This manual will describe strategies to manage these possible problems. Look at the example boxes for Joe's story.

Meet Joe

Joe is a 29 year old man who sustained a TBI in a car accident two years ago. He is married and has a 3 year old son. Before his accident, Joe worked in a real estate office. He also enjoyed reading, biking, watching movies, and playing with his son. Joe has no problems with simple personal tasks like dressing and brushing his teeth. He has difficulty with problem solving and decision making. He also finds himself forgetting things. Joe can no longer process information fast enough to drive safely. He has never used public transportation but he would like to be able to get out of the house without his wife's help. Joe wants to be able to get to the grocery store and the library. He also hopes to one day be able to use public transportation to return to work.

QUIZ #1

Matching – Match the letter of the correct response to each statement.

1. _____ A permanent alteration of brain function caused by an external force.
2. _____ The process of finding solutions to difficult or complex issues.
3. _____ A temporary alteration of brain function caused by an external force. It may also include loss of consciousness, problems with memory, and problems with orientation.
4. _____ Technology designed for use by the general population such as home computers, the Internet, palmtops, mobile telephones and, more recently, the potentially useful global navigational hardware.
5. _____ Thinking skills, including language use, calculation, perception, memory, awareness, reasoning, judgment, learning, intellect, social skills, and imagination.
6. _____ A spatial problem-solving process that requires awareness, decision-making, planning and ongoing monitoring for error detection and correction.

A. Cognition

B. Navigation

C. Concussion

D. Problem-solving

E. Traumatic brain injury

F. Everyday Technology

True or False

_____ The leading cause of TBI is assault.

_____ After going through this training the person with brain injury will be able to ride a bus alone.

_____ Men are more likely to have a TBI.

_____ 70.5% of all sports and recreation related TBI are among males ages 25-30 years old.

_____ Brain injury could influence a person's ability to complete everyday tasks due to difficulty with complex thinking.

Short Answer

Describe one way that this training can benefit people with brain injury.

List the brain injury categories from least to most severe.

List two skills you will be working on with your participant during this training.

TEACHING PEOPLE WITH BRAIN INJURY

Cognitive Impairments

Many individuals with TBI have difficulty with complex cognition. For example, one study found that 286 survivors of TBI had significant problems with memory tasks and processing speed.[8] These difficulties often come from a disruption to the frontal-subcortical area of the brain, located behind the forehead.[27] This area of the brain is considered to be the center for executive function. Executive functioning encompasses many of the skills involved with complex thinking. Some of these skills include[1]:

- Concept formation
- Categorization
- Schemas (learned patterns of behavior)
- Problem-solving
- Decision-making
- Metacognition (understanding your own thinking process)

These skills are necessary for navigating in the community safely. Below are some ways that you can help a person who has problems with executive functioning. become more self-sufficient while using public transportation.

To raise awareness caregivers can guide a person with brain injury in identifying his/her challenges and strengths.

Developing Awareness

Awareness is the ability to anticipate challenges. It is also the ability to identify strengths and weaknesses.[19] People with brain injury often have a hard time knowing what could be a challenge for them. They may also have a hard time anticipating situations where problems might happen. To raise awareness caregivers can guide a person with brain injury in identifying his/her challenges and strengths. Conversations about awareness include reflecting. The person with brain injury can predict before a task on how well he/she will do. Once the person has finished the task he/she can reflect back and determine if his/her assessment was accurate. Here are some ideas for having a conversation about awareness[28]:

- Ask the person to describe what he/she thinks will be difficult about a task.
- Ask the person to think about how earlier experiences relate to new tasks.
- Collaborate to plan how he/she would handle new situations.
- Ask the person to evaluate and describe how well or poorly he/she did on a task.
- Ask the person how he/she could do better by changing how he/she does the task.
- Tell the person what difficulties you observed him/her having in a task.

Some specific questions that you can ask to help a person with brain injury increase awareness of his/her challenges and strengths are:

- How difficult do you think this task will be?
- What kind of obstacles do you think you might encounter?
- How well do you think you will do with this task?

To encourage a person with brain injury to maintain self-awareness, the caregiver can encourage self-reflection with these questions[29]:

- Do you understand the problem?
- Are you getting distracted by things that aren't important right now?
- Do you need more information?
- Are you getting stuck?

Joe: Awareness

Joe's wife has noticed that Joe forgets simple items. He forgets to put both socks on before he puts his shoes on. He also often puts his house keys in unusual places such as the refrigerator. He has difficulty remembering the steps for making simple meals like sandwiches. When she asked him if he is having trouble remembering things, Joe says that his memory is fine. Joe's wife is afraid that he will not be able to remember bus routes and numbers well enough to ride the bus without her. In order to increase his awareness of things that are difficult for him, Joe's wife should ask him what parts of riding the bus will be most difficult. When they ride the bus together for the first time, she should also ask him how hard it actually is. When Joe rides does things related to riding the bus like plan a trip, wait at a bus stop, or pay fare, Joe's wife could also ask him how he thinks he's doing. If he runs into challenges, she could ask him what he thinks he could do differently. All of these questions will help Joe identify what is hard for him and what he does well. If Joe can recognize his weaknesses and strengths he may be able to anticipate and deal with potential problems and challenges more easily.

Changing the Amount of Support

People with brain injury must be challenged enough to gain new skills but supported enough to be successful. There are ways that you can help your participant have a balance between challenge and support. This way the task won't be so hard that he/she quits or so easy that he/she is not encouraged to use new skills.

To help a person with a brain injury become more independent, you can increase or decrease the amount of support that you give. Support may include verbal assistance, such as "Make sure you look both ways when you cross this street." It can also include physical assistance, such as physically helping someone move a computer mouse to find something on a computer screen.

You can also increase or decrease the expectations you have for successful completion of a task. An unreasonable expectation of a participant might be remembering all the rules of appropriate bus behavior on his/her first trip. This process of increasing and decreasing supports is called grading.[30] Below are two ways to be conscious of how you are grading some of the tasks required for riding public transportation.

Cueing

Cues are hints or suggestions to help the individual with brain injury move forward in a task.[31] Cues can be increased, decreased, or changed to suit the learning needs of the person with brain injury. Remember that you want your participant to be challenged at the right level. Depending on the situation you may use very specific or general cues. Over time you may decrease the number of cues that you give to the participant. You may also change the type of cue.

There are several types of cues that can be provided depending on how much support is needed[29]:

- Check and verify answer – ex: Are you sure you have the correct route number? This is used when a participant needs occasional reminders, but is capable of doing most navigation tasks on his/her own.
- General feedback – ex: There are still several stops before we get off the bus. Can you see the stops on the map? This is used when a participant needs more information to correct an error.

- Specific feedback – ex: There is still one stop before we get off the bus. We have to wait until after this next stop. This is used when the participant is having trouble with general cues and needs a specific instruction.

Fading

Giving progressively fewer cues to increase the challenge and facilitate learning is called fading.[30] You should always maintain a balance of encouraging independence while maintaining safety at all times. If a person with brain injury demonstrates that he/she can safely board a bus and pay a fare without cues, the caregiver should withdraw cues for that task. However, if the person with brain injury appears to need assistance, the caregiver should provide the appropriate support.

Shaping

With shaping, behaviors that are similar to a desired behavior or action are positively reinforced.[31] In other words, praise and/or positive feedback is given when a person with brain injury demonstrates a behavior that is close to the end goal behaviors. For example, a caregiver asks a person with brain injury to look up a route number using an internet search. The participant successfully navigates to the correct search engine, but does not complete the search. Positive feedback should be given for successfully completing that first step.

Transfer of Learning from One Situation to Another

Transfer of learning occurs when a person applies what he/she has learned during one task to another, similar task.[3] For example, learning to read directions from a box of brownie mix and learning to read directions on a box of laundry soap are similar tasks but occur in a different environment. One task occurs in the kitchen and the other the laundry room. The boxes with the directions are also different, but reading the directions is the same. People with brain injury may have difficulty transferring learning. This is because they are unable to recognize when one situation is similar to another. Transfer of learning happens when a person recognizes similarities between a present and past situation.[3]

Described below are several types of transfers. The easiest is a near transfer and the most difficult is a very far transfer. To encourage transfer of learning it is important to start training with near transfer tasks and move into far transfer situations.

Near transfer

The new task is similar to one previously encountered.[3] An example of this would be pouring milk from a half gallon container into a glass and pouring orange juice from a half gallon container into a glass. In this case, everything is the same with the exception of the type of fluid.

Intermediate transfer

The new task shares some similarities with the one previously encountered but these similarities are less obvious.[3] An example of this would be pouring coffee from a carafe into a mug which has several similarities to the tasks of pouring milk or orange juice from half gallon containers into glasses but these similarities may be less obvious.

Far transfer

The new task shares conceptual traits but the surface characteristics may be very different.[3] An example of this would be watering a potted plant. The conceptual trait of pouring a liquid into a container is the same but all of the other attributes are different.

Very far transfer

This involves using skills learned previously with other completely different tasks to help with the completion of another task.[3] For example, if someone used a checklist to make a sandwich, they might also use a checklist for all the steps necessary to get from work to home on the bus.

REMEMBER

Being able to generalize learning to a variety of situations is important when teaching new skills to individuals with brain injury. The best way for generalization to occur is by practicing a task in different places under different circumstances.

Joe: Changing Support and Transfer of Learning

Joe wants to be able to get to the grocery store and the library on his own. In order for Joe to be successful in these goals, he will need to begin with outside support and reasonable expectations. His wife might accompany him on trips as he is learning how to navigate public transportation. As he becomes more confident Joe's wife will provide less support. This is an example of decreasing external supports to grade the task up. Grading the task up increases the challenge. It also increases Joe's learning potential and ultimately his independence. To encourage transfer of learning Joe's wife might use a simple checklist to assist Joe in remembering his morning routine. She might than use a checklist, with the same number of items, for his night time routine (near transfer). For an intermediate transfer she might have Joe create a checklist for another routine, not related to sleep. As a far transfer Joe might use a check list for other household tasks. For a very far transfer Joe would use a checklist for grocery shopping.

QUIZ #2

Matching – Match the letter of the correct response to each statement.

1. _____ This type of cueing is used to help an individual evaluate their actions.
2. _____ This type of cueing gives specific instructions to an individual to progress a task.
3. _____ This type of cueing involves asking open ended questions.

A. Check and verify answer

B. General feedback

C. Specific feedback

True or False

_____ Fading is a technique of increasing feedback in order to help an individual learn a new skill.

_____ Transfer of learning happens when an individual uses previously learned strategies in a new situation.

_____ In near transfer, the new task shares only conceptual traits with the original task.

_____ In very far transfer, the new task shares little or no characteristics with previous tasks but the individual completing the task uses previously learned strategies to complete the task

_____ Individuals with brain injuries have no more difficulty than other people in generalizing skills to different contexts.

Short Answer

A participant has successfully found a correct bus route number and schedule with his smart phone app. He appears unsure of what to do with that information. What kind of cue could a caregiver use to progress him to the next step of selecting an appropriate time to get to the bus stop?

What is one way a caregiver can increase the challenge to a participant while route finding to a bus stop, while still maintaining safety?

What is one way that a caregiver can increase support for a participant trying to locate a bus stop on his/her navigation device, while still encouraging learning?

TEACHING NAVIGATION

Navigation for ABI

Driving is an important way for people to get to their day-to-day activities.[32] However, it may not be possible for people with ABI to return to driving. Driving is a complex task that requires many physical and cognitive skills.[33] Studies have found that people with brain injury have a higher risk of being involved in traffic accidents. People with brain injury are also slower to respond to traffic hazards then those with no history of brain injury.[34] This research shows that brain injury can have a negative impact on driving performance. Driving after with brain injury is also associated with increased chances of getting into traffic accidents.

Unfortunately, 52% of individuals with mild TBI reported that they would not reduce their driving at all after their injury.[35] If people with brain injury are found to be unsafe to drive, another alternative for community mobility is necessary. Public transportation can be that alternative. However, to use public transportation people with brain injury may need to use other supports like technology.

Joe: Driving

After Joe came home from the inpatient rehab center, he was eager to return to driving. His wife reluctantly agreed to go with him on a short trip to a friend's house. Joe immediately became disoriented and was unable to find his way to the destination. He turned left without checking for traffic coming from the right and an oncoming vehicle had to slam on the breaks to avoid hitting him. Since then, Joe has insisted that his driving is fine and "that car came out of nowhere." His wife has had to hide his car keys to keep Joe from driving. She is eager to present public transportation as an alternative to driving.

Possible Barriers to Public Transportation

As discussed previously public transportation is a safer alternative to driving. But there are concerns for people with ABI and executive dysfunction accessing public transit. Below are some examples of possible barriers listed in Rideconnection's Travel Instruction Guide[36]:

- Complexity of the walking route from the person's originating location to the bus stop.
- Length of the trip to the destination.
- Number of transfers from starting destination to final destination during the trip.
- Environmental barriers such as construction sites or other obstacles that might cause confusion, particularly if these barriers interfere with the pre-planned route.
- Physical barriers such as stamina or other health concerns.
- Social barriers such as inability of person with brain injury to maintain appropriate social norms. Riding public transit at busy times increases the number of people on the bus and the number of social interactions.

Research on Navigation and Cognitive Dysfunction

- People with TBI needed more support in tasks such as[8]:
  - ◊ Money management
  - ◊ Getting to places out of walking distance
- A high level of assistance was needed during trips for adults with chronic cognitive impairments.[11]
- The most frequently reported problems for adults with chronic cognitive impairments were[11]:
  - ◊ Forgetting to begin the trip
  - ◊ Forgetting the destination while en route
  - ◊ Trouble deciphering written directions
- Common challenges for adults with cognitive impairment and community navigation include[11]:
  - ◊ Fear of asking strangers for help
  - ◊ Getting separated from companion
  - ◊ Forgetting destination or purpose for travel
- If a person with chronic cognitive impairments took trips unaccompanied, the most likely form of travel was walking or the bus.[11]

Some examples of difficulties that a person with ABI and executive dysfunction might experience related to navigating public transportation are:

- Accessing information about public transportation.
- Remembering bus routes, numbers, times, and rules of behavior
- Planning a bus route to and from appropriate destinations
- Recognizing appropriate bus at bus stop
- Recognizing emergency signs and symbols
- Missing appropriate bus stop
- Providing correct fare to bus driver
- Being self-aware of behavior

These barriers indicate a need for this type of training program to help people with ABI with community mobility. The following will describe how to you can help your participant overcome some of the above described barriers.

Navigating Public Transportation Basics

Basic Skills Necessary to Ride Public Transit Independently

Rideconnection Travel Instruction Guide identified the following skills as necessary for someone to travel independently **without** assistance[36]:

- Crosses streets safely
- Identifies and boards correct bus
- Problem solves
- Demonstrates decision making skills
- Follows directions
- Initiates action
- Maintains appropriate behavior
- Interacts appropriately with strangers
- Handles unexpected situations and problems
- Recognizes and avoids dangerous situations and obstacles
- Asks for assistance and requests help from an appropriate source

Not all of these skills can be achieved during this training program. At the end of this training you will set up an appointment with your participant and the King County Transit Instruction Program. The King County Transit Instruction Program can provide additional assistance and training in riding public transportation. If you are not comfortable taking your participant on the bus alone, contact the King County Transit Instruction Program ahead of time and they can assist you with the latter part of this training.

WITH YOUR ASSISTANCE

Participant will learn about:

- Crossing streets safely.
- Identifying and boarding correct bus with one or fewer verbal cues.
- Maintaining appropriate behavior with one or fewer verbal cues.
- Recognizing and avoiding dangerous situations and obstacles.
- Asking for assistance and requesting help from caregiver or (preferably) the bus driver.
- Successfully using the technology as instructed on training day with use of verbal and physical cues less than 50% of the time.

Before going on the trip with your participant you should consider doing the following[36]:

- Plan a trip using the chosen technology of your participant ahead of time.
- Ride the entire route yourself.
- Look for any of the barriers discussed in "Possible Barriers to Public Transportation" section (p. 24).

Navigation Skills Addressed on Training Days One and Two

Behavior

During this training you will go over the behavioral expectations and rules specific to traveling on King County Metro. You will also talk about possible consequences of not meeting those expectations. You will describe specific social situations that your participant might encounter and the appropriate response to those situations, and you will role play to allow your participant to practice skills

Self-Advocacy

Being able to speak up for him/herself when necessary is the most important skill your participant will learn during this training. You will define self-advocacy for the participant, ask the participant to identify moments where self-advocacy is necessary, and identify specific situations on public transportation where the participant might need to ask for help.

How to Navigate

There are several ways to navigate, some better than others. You will discuss how to use landmarks, look for signage, and make the most of the chosen technology. Practice, practice, practice!

Safety

You will go over basic safety precautions while traveling on public transportation.

King County Metro Basics

You will discuss the basic procedures for recognizing the correct bus, bus fares, and transferring to a different bus.

REMEMBER

If in doubt your participant should remember these 3 things:

1. Look for signs and landmarks
2. Double check your technology!
3. Ask for help!

Joe: Navigation Skills and Planning

Joe's wife knows that riding public transportation will be difficult for him. Joe often has trouble remembering things and is easily distracted in crowds. He also has difficulty with planning trips ahead of time, making quick decisions, and problem solving. Joe's wife knows that she will have to give him a lot of support, especially on the first trip riding the bus. Joe's wife describes the rules of the bus and goes through the process of planning a trip with him. Before taking him on the route she goes on the bus route alone. She identifies that there is a construction zone close to the nearest bus stop. She decides that it will be best to take Joe to the second closest bus stop instead. She also knows that peak hours, with more people on the bus, are in the early morning and late afternoon. So she plans the trip at 10:00am.

QUIZ #3

Check all that Apply

What navigation skills will you address during the training days?

___ Crosses streets safely
___ Initiates action
___ Maintains appropriate behavior
___ Handles unexpected situations
___ Uses technology
___ Demonstrates decision making
___ Identifies and boards correct bus
___ Follows directions
___ Asks for assistance
___ Recognizes/avoids dangerous situations

True or False

_____ People with brain injury are at higher risk for traffic accidents.

_____ Very little assistance was required for people with chronic cognitive impairments during trips.

_____ Adults with chronic cognitive impairments reported forgetting to start a trip as a problem.

Short Answer

What five areas will be addressed on training day?

What three things should you do before attempting to go on a trip with your participant?

List the three things your participant should remember while navigating public transportation.

TEACHING TECHNOLOGY

Technology Basics

Technology is becoming more common in our daily lives. Technology can help us:

- Learn new facts
- Look up information
- Communicate
- Remember appointments
- Navigate

Every piece of technology varies in its function and usability. The key to getting the most out of a technology device is understanding needs of the person using that device. It is also important that the user feel comfortable with the device in his/her daily life. Technology can be either "high tech," "medium tech," or "low tech."[23] Examples of "high tech" devices would be smart phones, flip phones, GPS devices, and tablets. Examples of "medium tech" would be simple talking devices and computer internet searches. Examples of "low tech" devices would be pencil and paper checklists or a printed map. Please see Appendix A for possible technology options for your participant (p. 44).

The key to getting the most out of a technology device is understanding the needs of the person using that device.

Navigation Technology Basics

There are currently countless devices and applications on the market designed specifically for navigation. These devices and applications may be designed for motor vehicle navigation, walking navigation, and/or public transit navigation.

Dedicated GPS device

These devices use satellite reception to locate users and give directions to help them reach their destination. GPS devices are often found in motor vehicles, but there are models that provide turn by turn directions for city walking. One example of this technology is the Garmin CityXplorer Add-on. This software add-on makes a Garmin vehicle navigation device into a hand-held device that can be used to navigate city streets.

Smartphone Application

There are currently many applications available for the iPhone, Android, and Windows Phones that can be used to navigate in a motor vehicle, walking, or using public transportation.

Internet Search

Internet search engines can be used in a variety of ways to assist in navigation. Any commercial search engine can be used to look up an address of a desired destination. Transit websites can be used to look up route maps, bus stops, and bus schedules. King County Metro's website at http://metro.kingcounty.gov/ has trip planning and route search options. Some programs such as Google maps can be used to find a location and to generate directions to reach that destination.

Available Features

Different technologies also vary in their features and it is important to consider what features are useful and necessary for community navigation.

- User interface – How do you use it? Are the instructions and steps to use the technology intuitive?
- Directions – Are they written? Verbal? Does the device or program provide maps? If so can you change the perspective on the maps?
- Type of navigation – Driving? Walking? Buses?
- Portability – Can the device or program be taken with users as they navigate to their chosen destination?

Matching Person to Technology

Choosing technology that is best for the individual is an ongoing process that involves assessment of the individual's current needs and contexts. The Wisconsin Assistive Technology Initiative identified and classified five essential steps to selecting appropriate technology and evaluating its effectiveness.[37] These steps are as follows:

1. Problem Identification: The identification and definition of a specific problem
2. Solution Generation: The suggestion of possible solutions
3. Solution Selection: The evaluation of suggestions and choosing of a solution to create an action plan
4. Implementation: The carrying out of the plan
5. Follow up: Meeting again to evaluate the solution

Choosing technology to aid in community navigation is a process of trial and error. You will assist your participant in trying different devices and programs that might work for him/her. You can also help him/her identify which features work best and which ones interfere with his/her success with the device.

Joe: Choosing a Technology

Joe is working with his wife to decide whether he would benefit from using a smart phone to help him get around the community. Currently, Joe is unable to remember route or bus numbers. He also gets lost beyond a two block radius around his house. Joe will need a device that can display the route number, bus number, and bus schedule. He will also need a device that can give him turn by turn directions and/or visual maps to help him navigate to the correct bus stop. The smartphone app One Bus Away will display route schedules with bus and route numbers. This app also provides detailed maps that can help Joe find the correct bus stop. Joe downloaded the free app. He and his wife are currently experimenting with the app to determine if it will work for him. After using the app on several outings, Joe and his wife will have to determine if it is a plausible solution for his navigation difficulties.

Resources for Instructions and Troubleshooting

Learning how to use a device as well as how to deal with unexpected problems can be very challenging for people with brain injury. Technology can be extremely helpful, but sometimes unexpected problems with the technology happen. Or more knowledge about the technology is needed to use it more efficiently. Below are several resources to turn to for help for instruction and troubleshooting.

- Manufacturer manual/instructions – paper or online (manualsonline.com)
- Online forums – Ask.com, Google.com
- Manufacturers' websites
- Video instructions – youtube.com

Things to Consider

1. Select the simplest piece of technology that will be effective in providing the desired support.[38]
2. Establish routines around using the technology consistently. This may include using it every time the caregiver and participant take a trip or practicing planning a trip with it once a week.[38]
3. Caregiver and participant decide under what circumstances the technology should be used. For example, the person with brain injury uses the technology every time he/she plans a trip to the grocery store.[38]
4. Provide support, but fade that support gradually to prevent over-dependence on outside help to use the technology. The goal is to increase independence.[38]
5. Teach the technology to other people who spend time with the participant, like a parent, sibling, or friend. If these people have a basic idea of how the technology works, they can help the participant explore the technology and troubleshoot when unexpected problems arise.[38]
6. Check in on a regular basis to evaluate how well the technology is working for the participant. Also ensure that the technology is actually helping increase independence.[38]

QUIZ #4

Matching

High vs. Low tech: Place an ‘H’ beside high tech devices, ’M’ beside medium tech devices, and an ‘L’ beside low tech devices.

___ iPhone ___ Internet Search ___ Tablet

___ Pencil and paper ___ GPS Device ___ Flip phone

Short Answer

Name one resource for technology troubleshooting.

What are two things that are important to consider when teaching technology?

What is the first step in matching a person to the right technology?

What is the last step in matching a person to the right technology?

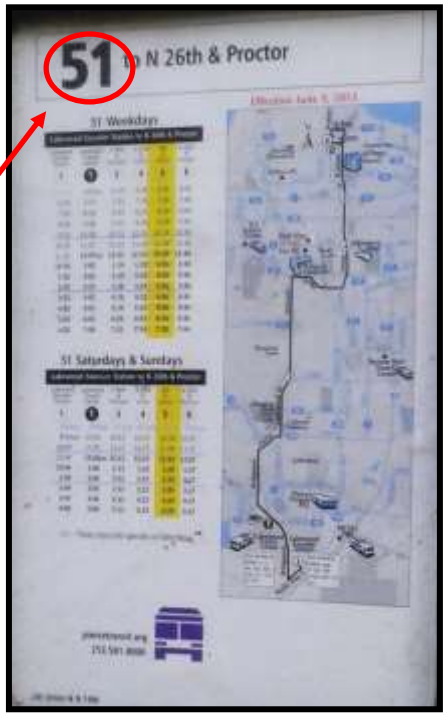
Walkthroughs of Two Navigation Technology Options

One Bus Away

One Bus Away is a free service available on several different devices. It provides information on bus routes, stops, and real time arrival information. One Bus Away can be used by texting with a standard cell phone. It can also be used via an interactive app available on all smart phone operating systems.

One Bus Away: Standard Cell Phone Texting

This option is most useful for finding out arrival times once you have already arrived at your bus stop or you already have the stop number.



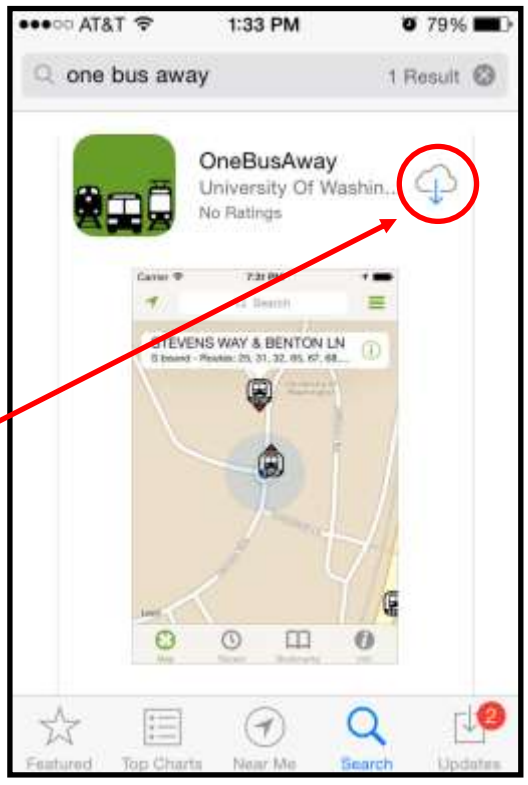
1. Find your stop number. If you are already at your bus stop, the stop number can be found on the bus stop sign. Sometimes it's written under "stop no." indicating that that number is the stop number. Sometimes the stop number is a little less obvious. It can be located on the bus shelter or on the pole holding the bus stop sign.
2. Open the texting feature on your phone. This will vary based on the model of your phone.
3. Text "onebus stop #" to the number 41411. For example, if your stop number is 75414, you would text "onebus 75414" to the number 41411.
4. Wait for arrival information to be texted back to your phone. You will receive information about arrival times for all the routes that go to that bus stop. You may want to narrow this information down a bit.

5. To specify which route you want information on, text “onebus stop# route#” to 41411. For example, if your stop number is 75414 and you want information on the number 16 route, text “onebus 75414 16” to 41411. You can get information for more than one route at a particular stop by texting several route numbers separated by a comma. For example, if you want information about routes 15 and 16 at stop number 75414, you would text “one bus 75414 15,16” to 41411.

<u>One Bus Away: Smart Phone Application</u>

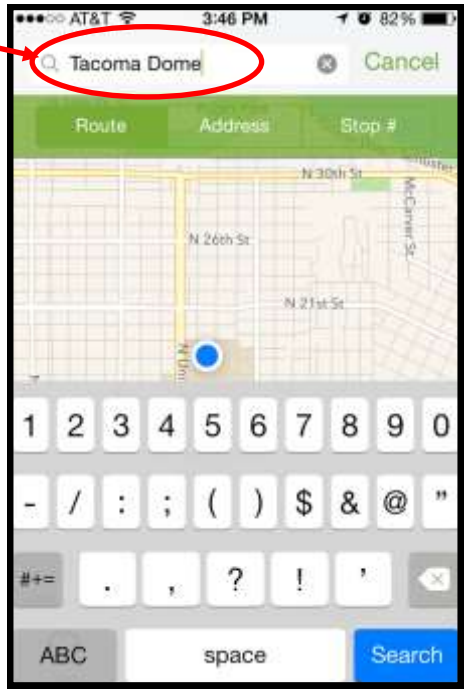
This app may look different on different phones, but it shares all of the following features:

- Real-time arrival information for public transit.
- Map display of stops and routes
- Bookmarks and recent stop history
- Search for stops by route, address, and stop number



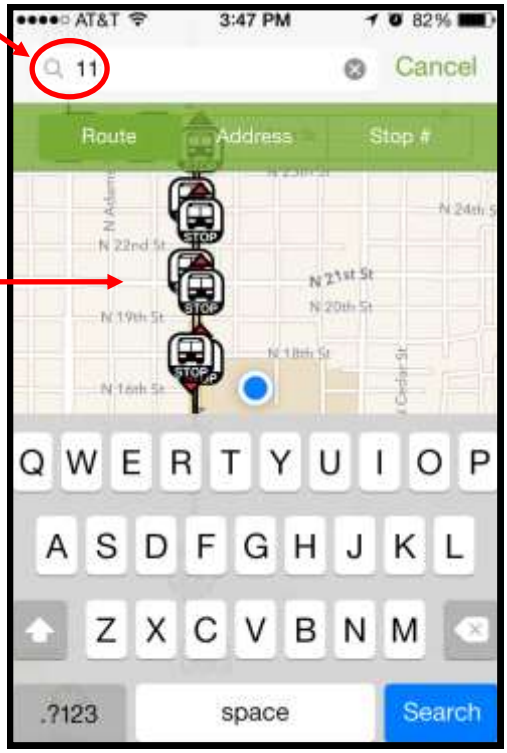
1. Download the app. It’s free! The One Bus Away app can be found at the Apple iTunes store, the Android marketplace, and the Windows store.
2. Look at nearby routes and stops. Your phone will share your location with the app so it automatically shows routes and stops in your area. If you already know where you’re going, you may be able to select one of these routes or stops to get more information about arrival times.

3. Search. You can search by route number, stop number, location, or address to find out information about your desired route and/or destination.



4. If you want to search for a location, like the Tacoma Dome, the search will bring up a map with icons denoting all the stops in the area of the location you searched for. You can tap a particular stop to get quick information stating the routes that stop at that stop and which direction the buses are going. If you tap the stop again, a list of routes will appear on your screen with arrival times stating when that bus will be at that particular stop.

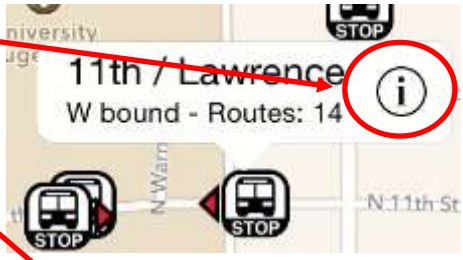
5. You can also search for a route number, like 11. This will bring you to a list of routes that match that number. There may be more than one route from different transit services. For example, searching for route 11 brings up "Downtown Seattle via E Madison St." and "Madison Park via E Madison St." from Metro Transit. The search results also show "Downtown Tacoma" and "Point Defiance" from Pierce Transit. You must select the route that best describes the area where you want to go. Tapping on any of the routes listed will bring up a map with stops. When you tap on a particular stop, you will see information about when the next bus from that route will be arriving at that stop.

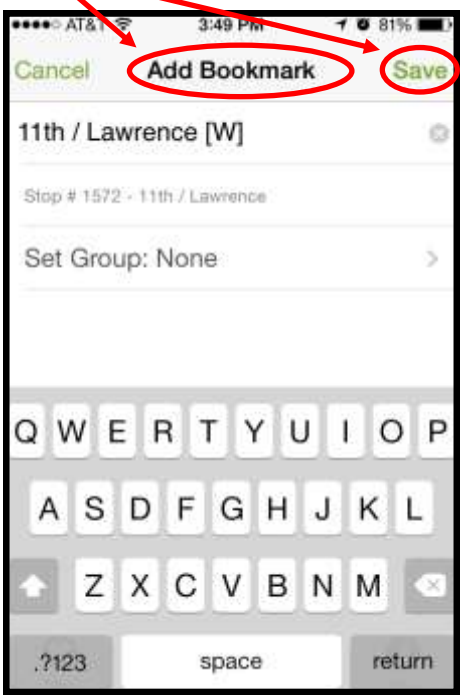


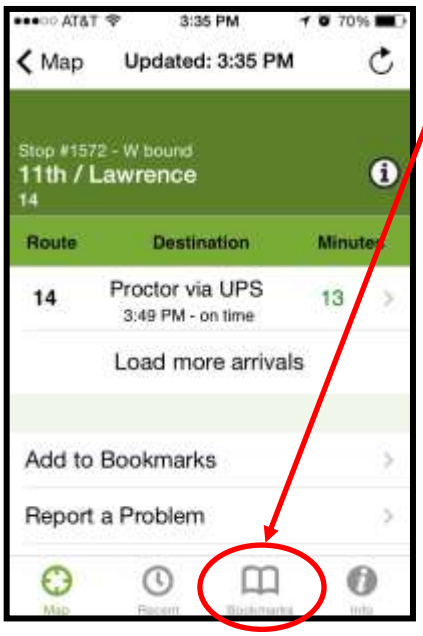
6. You can also search for an address. Once again, this will bring up a map displaying

the stops surrounding that address. Tapping on each stop will bring up quick information about the routes that stop at that stop and which direction they are going. Tapping again will bring up more detailed information about arrival times for the different bus routes that stop at that stop.

7. You may want to bookmark certain stops or routes that you use frequently so that you can easily get information about these stops quickly. You can do this by saving stops and routes to your "bookmarks." To bookmark a stop and save it to your "bookmarks" you simply tap the "information" icon when you're looking at information for a particular route or stop. Then tap on "add bookmark" and "save." To find these bookmarked stops and routes later on, you simply tap on the "bookmark" icon to see your bookmarked stops and routes.





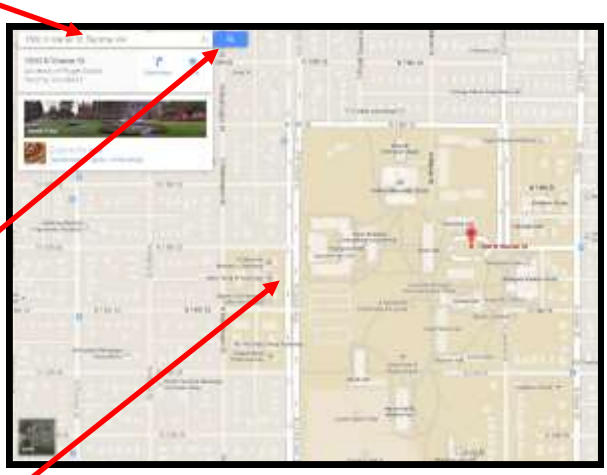


Google Maps

Introduce google maps to the participant on a computer. Have the participant sit in front of the computer. Instruct participant in the steps listed in learning google maps to access public transportation. If he/she does not understand a step, know how to use a feature of the computer, or asks for help, provide support. However, make sure to let him/her navigate the mouse. If necessary, you can provide hand-over-hand assistance on the mouse to point out the location of any features you would like him/her to use. King County Metro has a similar website for trip planning. You can adjust the above instructions for that website. Go to: tripplanner.kingcounty.gov to access this site.

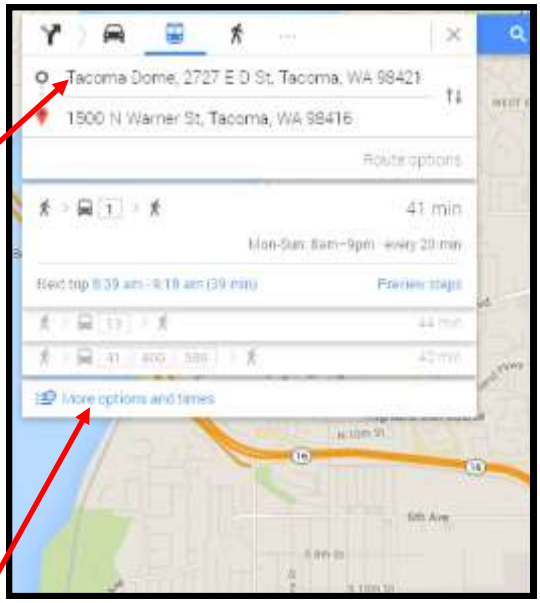
1. Log into a computer with a working attached printer.
2. Access a web browser. Common web browsers include: Internet Explorer, Firefox, and Google Chrome.
3. Type the following web address into the web browsers address bar: maps.google.com

4. Explain:
    a. Using the search bar at top left of web page you can find different locations like shopping centers, movie theaters, hospital or other things you are looking for.
    b. The button with the magnifying glass icon in the top left corner of the screen is where you will type in the address of the location that you would like to travel to.
    c. The central area of the web page is where the map will always be. Once you type in an address for a physical location, the map will show you where it is in the local area.



5. Click inside the text box next to the blue magnifying glass button and type in your home address.
6. Press the blue magnifying glass button.
7. Press the blue "Directions" button.
8. Explain the three symbols the appear next to this button:
    a. The symbol of the CAR will tell you the driving route to your destination.
    b. The symbol of the BUS will tell you the walking route to the nearest bus stop and the transit buses you will need to take to get to your destination.
    c. The symbol of the MAN will tell you the walking route to your destination.

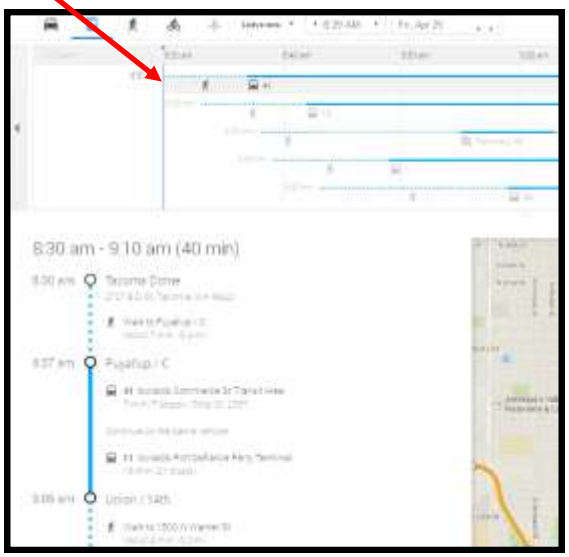
8. Click on the symbol of a BUS.
9. Below this symbol there are two text fields. Your home address should already be in the lower text box. Type in your destination address in the text box above your home address.
    a. See if the participant can type the address in the correct text field. If he/she has difficulty, remember to cue based on the instructions provided in the section titled "Teaching People with Brain Injury" (p. 14). Point out the corresponding route display on the map.
10. Click on the blue text "More options and times."



11. A list of "Suggested routes" will appear. The optimal route will be listed first, and directions will be populated below the suggested route that you choose.

    a. When choosing the route for your participant remember that it is best to select a route that has the fewest transfers to and from different buses and the shortest walking distance from your participant's home.

    b. Have the participant look at the route on the map using the zoom feature. The zoom feature is on the right hand side of the map. It is sliding bar with a "+" at the top and a "-" at the bottom. The "+" zooms in and the "-" zooms out.

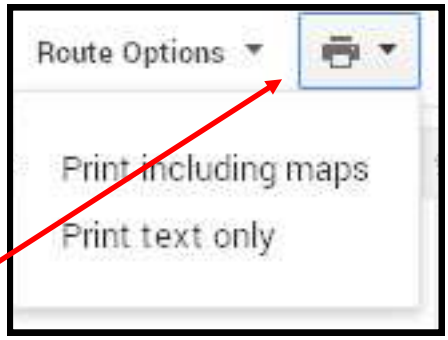


12. Work with your participant on selecting the most appropriate route to his/her destination. Once again use the cueing suggestions from in the section titled "Teaching People with Brain Injury" (p. 14).

13. After a route has been chosen, the participant should print the instructions. A small gray button with the symbol of a printer is located at the top right of the web page near a drop down menu title "Route Options."

14. Click on the GRAY PRINTER symbol button.

15. A drop down menu will appear with the options for printing with maps or text only. Choose your desired printing option and print.



16. Repeat these instructions but for the return trip home. It's important that the participant remembers that getting home is just as important as getting to his/her destination.
17. Remember on your actual trip you will be taking the printed sheets for **both** your outgoing and return trips.

Conclusion

This is the final portion of Part One of the manual that will assist you in completing Part Two of the manual. Part Two has a detailed lesson plan for two training days that you will conduct with your participant. Please see the Appendix A for technology options for your participant.

APPENDIX A

Technology Options for Navigation

Below is a list of devices and websites that can help individuals with ABI compensate for executive dysfunction. These resources range from low to high tech.[23] High tech options may have more features and versatility, however lower tech options generally require less cognitive demand to use. Some examples of high tech devices are: smart phones, flip phones, GPS devices, and tablets. Some examples of medium tech items are: simple talking devices and computer Internet searches. Low tech options include: pencil and paper and printed maps. A list of search words will be provided for each type of technology. If one of the devices you are looking for is no longer available, you can search using those words to find another technology like it.

Digital Memory Device: Talking Reminder Technology

Several digital memory devices are available for sale online and in local stores. Digital memory devices come in several shapes and sizes, and vary on cost. Below are four such devices that assist with memory and planning.

Search words: "digital memory device" "memory aid device" "digital reminder"

Key Chain Talker

Cost: Up to $12.00

Description: The Key Chain Talker is a handheld, palm-sized, memory device.

Features: Play button, play/record switch, and LED light when recording.

Tech Level: Medium

How to Use for Navigation:

- Record reminder detailing where user's intended destination is
- Record step by step directions to destination

TimeCue

Cost: $16.00

Description: TimeCue is a single message speech output device that links to a digital clock. A picture can also be added as a cue.

Features: Digital clock, slide switch, and location for picture cue

Tech Level: Medium

How to Use for Navigation:

- Record a reminder to begin a trip and set the device to play it back at a specific time

Olympus VN-5000/5200

Cost: $24.00-$60.00

Description: The Olympus VN-5000/5200 are digital voice recorders that record up to 330 hours.

Features: Built in flash memory, 3 recording modes, microphone, speaker, earphone jack, and microphone jack

Tech Level: Medium

How to Use for Navigation:

- Record reminder detailing where user's intended destination is
- Record step by step directions to destination

MEM-X

Cost: $144.00-$154.00

Description: Digital voice recorder, pre-set reminder recordings for specific date and times can be entered. Reminders can be 10 seconds long and 90 messages can be held in the device. Recordings can be reviewed and deleted.

Features: Large, easily accessible record button, settings for time and date as well as how many times a message should be repeated

Tech Level: Medium

How to Use for Navigation:

- Record reminders
- Recorded reminders will play back at predetermined set times such as at the start of trip, during trip, and when it's time to return home
- Record reminder detailing where user's intended destination is
- Record step by step directions to destination

Personal Global Positioning Systems

Personal GPS devices can be used to navigate in cities and on outdoor trails. Some devices can also be used to track the user's location. These devices vary widely in price and available features.

Search words: "personal gps device" "Garmin" "GPS tracker"

Garmin City Navigator

Cost: $79.99 (plus the cost of the device on which to upload the software)

Description: Software includes city maps and points of interest. These must be uploaded to a compatible Garmin device.

Features: Points of interest including restaurants, hotels, parking, entertainment, fuel, and shopping can be found. Trip planning software to plan trips on computer and transfer them to a Garmin device.

Tech Level: High

How to Use for Navigation:

- Plan a trip and upload directions onto Garmin device
- Search for points of interest while navigating unfamiliar areas

Personal GPS Trackers

Cost: $319.20

Description: Small, wearable pendant that tracks the wearer's location.

Features: SOS button to push when wearer is lost and needs help, two way calling, microphone

Tech Level: Medium

How to Use for Navigation:

- Caregiver monitors user's location
- User can press the SOS button if he/she gets lost

Online Mapping Programs: Used to print out directions

There are several different online mapping programs available online. These programs have different features and different ways to use them. You will need a computer with internet access to use these programs. Make sure a printer is attached so you can print out maps and directions to your destination.

Google Maps (maps.google.com)

Cost: Free

Description: Find a map of a location or get directions from point A to point B. This online mapping program is available to anyone with Internet access. Input an address for your starting point and your ending point to get step by step directions.

Features: Can save preferred locations under "my places." Directions by car, bus, walking, or biking are available. Lists mileage and estimated travel times.

Tech Level: Medium

How to Use for Navigation:

- Plan trips in advance
- Refer to directions while navigating to destination
- Plan when to begin trip based upon estimated travel times

MapQuest (mapquest.com)

Cost: Free

Description: An online tool for searching for nearby features such as hotels and restaurants and for finding step by step driving directions from point A to point B.

Features: Search for hotels, restaurants, travel services, shopping, activities, and local services, choose a nearby feature and get directions from your location, input starting and ending addresses to get directions, mileages, and estimated travel times.

Tech Level: Medium

How to Use for Navigation:

- Plan trips in advance
- Refer to directions while navigating to destination
- Plan when to begin trip based upon estimated travel times

Smartphone Apps: Tools for Organization and Navigation

There are several Apps for smartphones that are designed to help with organization and getting around in the community. These apps offer a range of features and methods for use. Below are four different smartphone apps to aid in navigation and organization.

Search words: "organizational apps" "navigation apps" "reminder apps"

BrainAid PEAT

Cost: $49.95. Available for Android only

Description: An application designed specifically to help people with executive function problems (planning, organizing, problem-solving, etc). This app provides reminders and cues for schedules and to complete tasks.

Features: Reminders to start and stop activities, schedule reminders, notes feature

Tech Level: High

How to Use for Navigation:

- Remind user to begin a trip
- Write notes for directions, destinations, and familiar landmarks

Evernote

Cost: Free. Available for Windows phone, iPhone, Android, Blackberry

Description: An app designed to help people remember things by taking notes as they are out and about.

Features: take pictures and record audio reminders to go with the picture, create to-do lists, organize notes into different notebooks

Tech Level: High

How to Use for Navigation:

- Pair picture of landmarks with recording detailing landmark location
- Remind user to begin a trip

Roadify

Cost: Free Available for iPhone only

Description: An app that gives the user access to scheduling information for a variety of transit agencies.

Features: information for buses, trains, ferries, official transit schedules from transit agencies, users can add their own comments about delays, etc.

Tech Level: High

How to Use for Navigation:

- Identify bus routes and stops for intended destinations
- Identify times that buses arrive at stops and plan trips accordingly
- Look for potential delays

Nokia Here Maps

Cost: Free. Available for Windows phone only

Description: This app gives turn by turn directions for walking around the city.

Features: works even when there is no cell signal, shows visual representation of where you are on the map, voice guided navigation

Tech Level: High

How to Use for Navigation:

- Walking navigation
- Help user find their way back to a familiar location if they become lost in a city

APPENDIX B

Quiz Answers

Below you will find the answers to the quizzes from this manual.

QUIZ #1

Matching

1=E, 2=D, 3=C, 4=F, 5=A, 6=A

True/False

The leading cause of TBI is assault – False

After going through this training the person with brain injury will be able to ride the bus alone – False

Men are more likely to have a TBI – True

70.5% of all sports and recreation related TBI are among males ages 25-30 years old – False

Brain injury could influence a person's ability to complete everyday tasks due to difficulty with complex thinking – True

Short Answer

Describe one way that this training can benefit people with brain injury:

This program can benefit people with brain injury by teaching them how to use technology to use public transportation.

List the brain injury categories from least to most severe:

Concussion, mild brain injury, moderate brain injury, severe brain injury

List two skills you will be working on with your participant during this training:

Technology use, safety awareness, trip planning, problem-solving, communication, appropriate behaviors, self-awareness

QUIZ #2

Matching

1=A, 2=C, 3=B

True/False

Fading is a technique of increasing feedback in order to help an individual learn a new skill – False

Transfer of learning happens when an individual uses previously learned strategies in a new situation – True

In near transfer, the new task shares only conceptual traits with the original task – False

In very far transfer, the new task shares little or no characteristics with the previous tasks but the individual completing the task uses previously learned strategies to complete the task – True

Individuals with brain injuries have no more difficulty than other people in generalizing skills to different contexts – False

Short Answer

A participant has successfully found a correct bus route number and schedule with his smart phone app. He appears unsure of what to do with this information. What kind of cue could a caregiver use to progress him to the next step of selecting an appropriate time to get to the bus stop?

Either general or specific feedback depending on the needs of the participant

What is one way that a caregiver can increase the challenge posed to a participant while route finding to a bus stop, while still maintaining safety?

They could decrease the number of cues or provide only general feedback given to the participant while they are route finding. Cues and/or specific feedback should be provided if the participant is about to place themselves in a dangerous situation, ie. walk across a street without checking for traffic.

What is one way that a caregiver can increase support for a participant trying to locate a bus stop on his/her navigation device, while still encouraging learning.

They could provide general feedback to guide the participant without explicitly telling the participant how to use his/her navigation device.

QUIZ #3

Check All That Apply

Cross streets safely, maintain appropriate behavior, use technology, identify and board correct bus, ask for assistance, recognize/avoid dangerous situations

True/False

People with brain injury are at higher risk for traffic accidents – True

Very little assistance was required for people with chronic cognitive impairments during trips – False

Adults with chronic cognitive impairments reported forgetting to start a trip as a problem – True

Short Answer

What five areas will be addressed on training day?

Behavior, self-advocacy, how to navigate, safety, King County Metro Basics

What three things should you do before attempting to go on a trip with your participant?

1. Plan a trip using the chosen technology of your participant ahead of time
2. Ride the entire route yourself
3. Look for any of the barriers discussed in "Possible Barriers to Public Transportation" section (p. 24)

List three things your participant should remember while navigating public transportation.

1. Look for signs and landmarks
2. Double check your technology
3. Ask for help

QUIZ #4

Matching

iPhone=H, internet search=M, Tablet=H, Pencil and paper=L, GPS Device=H

Short Answer

Name one resource for technology troubleshooting.

Manufacturers' manual/website, online forums, video instructions

What are two things that are important to consider when teaching technology?

- Select the simplest technology that will provide the desired support
- Establish routines around using the technology
- Decide what the technology will be used for
- Provide support but fade that support to gradually increase independence
- Teach the technology to people who spend time with the participant
- Check in on a regular basis

What is the first step in matching a person to the right technology?

Problem identification

What is the last step in matching a person to the right technology?

Follow up

REFERENCES

1. Brown, C. (2011). Cognitive skills. In C. Brown & V. C. Stoffel (Eds.), *Occupational Therapy in Mental Health: A Vision for Participation* (pp. 241-261). Philadelphia: F. A. Davis Company.
2. Toglia, J., Goverover, Y, Johnston, M. V., & Dain, B. (2011). Application of the multicontextual approach in promoting learning and transfer of strategy use in an individual with TBI and executive dysfunction. *OTJR: Occupation, Participation and Health, 31*, S53-S59.
3. Toglia, J. P. (1991). Generalization of treatment: A multicontext approach to cognitive perceptual impairments in adults with brain injury. *American Journal of Occupational Therapy, 45*, 505-516.
4. Sohlberg, M. M., Todis, B., Fickas, S., Hung, P.-F., & Lemoncello, R. (2005). A profile of community navigation in adults with chronic cognitive impairments. *Brain Injury, 20,*1249-1259. doi: 10.1080/02699050500309510
5. King County Metro Transit. (2013). Transit instruction. Retrieved from http://metro.kingcounty.gov/tops/accessible/transitinstruction.html
6. Brain Injury Alliance of Washington. (2012). Our history and mission. Retrieved from http://www.biawa.org/about.php
7. Headstrong. (2013). Mission. Retrieved from www.headstrong4life.org/mission
8. Colantonio, A., Ratcliff, G., Chase, S., Kelsey, S., Escobar, M., & Vernich, L. (2004). Long-term outcomes after moderate to severe brain injury. *Disability and Rehabilitation, 26,* 253-261. doi:10.1080/09638280310001639722
9. Huebner, R. A., Johnson, K., Miller-Bennett, C., & Schneck, C. (2003). Community participation and quality of life outcomes after adult traumatic brain injury. *American Journal of Occupational Therapy, 57,* 177-185.
10. Sohlberg, M. M., Fickas, S., Hung, P.-F., & Fortier, A. (2007). A comparison of four prompt modes for route finding for community travellers with severe cognitive impairments. *Brain Injury, 21*(5), 531-538.
11. Sohlberg, M. M., Todis, B., Fickas, S., Hung, P.-F., & Lemoncello, R. (2005). A profile of community navigation in adults with chronic cognitive impairments. *Brain Injury, 20,*1249-1259. doi: 10.1080/02699050500309510
12. Brownlow, M. (2012). Smartphone statistics and market share. *Email Marketing Reports*. Retrieved from http://www.email-marketing-reports.com/wireless-mobile/smartphone-statistics.htm
13. Lindén, A., Lexell, J., & Larsson Lund, M. (2011). Improvements of task

performance in daily life after acquired brain injury using commonly available everyday technology. *Disability and Rehabilitation: Assistive Technology, 6*, 214-224. doi: 10.3109/17483107.2010.528142

14. Lemoncello, R., Sohlberg, M. M., & Fickas, S. (2010). When directions fail: Investigation of getting lost behaviour in adults with acquired brain injury. *Brain Injury, 24,* 550-559. doi:10.3109/02699050903446807 2010a
15. Brain Injury Association of America. (2012a). Brain injury statistics fact sheet. Retrieved from www.biausa.org/LiteratureRetrieve.aspx?ID=104992
16. Centers for Disease Control and Prevention. (2013). Traumatic brain injury. Retrieved from http://www.cdc.gov/traumaticbraininjury/pdf/blue_book.pdf
17. Segalowitz, S. J., Mahaney, P., Santesso, D. L., MacGregor, L., Dywan, J., & Willer, B. (2007). Retest reliability in adolescents of a computerized neuropsychological battery used to assess recovery from concussion. *NeuroRehabilitation, 22,* 243-251.
18. American Academy of Neurology. (2013). Summary of evidence-based guideline update: Evaluation and management of concussion in sports. Retrieved from: https:// www.aan.comuploadedFilesWebsite_Library_AssetsDocuments/3PraPract_Management/5Patient_Resources/1For_Your_Patient/6_Sports_ConcuConcu_Toolkit/guidelines.pdf
19. Toglia, J. P., Glisz, K. M., & Goverover, Y. (2009). Evaluation and intervention for cognitive perceptual impairments. In E. B. Crepeau, E. S. Cohn, & B. A. B. Schell (Eds.), *Willard and Spackman's occupational therapy* (pp. 739-776). Philadelphia: Lippincott Williams & Wilkins.
20. Problem-solving. (2014). In *Oxford Dictionaries*. Retrieved from http:// www.oxforddictionaries.com/definition/english/problem-solving?q=problem-solving
21. Decision-making. (2014). In *Oxford Dictionaries*. Retrieved from http:// www.oxforddictionaries.com/definition/english/decision-making?q=decision-making
22. Gartland, D. (2004). Considerations in the selection and use of technology with people who have cognitive deficits following acquired brain injury. *Neuropsychological Rehabilitation, 14*, 61-75. doi:10.1080/09602010343000165
23. Georgia Tech: Tools for Life. (n.d.) What is assistive technology. Retrieved from

http://gatfl.gatech.edu/assistive.php
24. Gilchrist, J., Thomas, K. E., Xu, L., McGuire, L. C., & Coronado, V. (2011). Nonfatal traumatic brain injuries related to sports and recreation activities among persons aged less than or equal to 19 years: United States, 2001-2009. *Morbidity and Mortality Weekly Report, 60 (39)*. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6039a1.htm
25. Brain Injury Association of America. (2012b). About brain injury. Retrieved from http://www.biausa.org/about-brain-injury.htm
26. Brain Injury Association of America. (2012c). Mild brain injury. Retrieved from http://www.biausa.org/mild-brain-injury.htm
27. McDonald, B. C., Flashman, L. A. & Saykin, A. J. (2002). Executive dysfunction following traumatic brain injury: Neural substrates and treatment strategies. *NeuroRehabilitation, 17,* 333-344.
28. Tham, K., Ginsburg, E., Fisher, A.G, & Tegnér, R. (2001) Training to improve awareness of disabilities in clients with unilateral neglect, *American Journal of Occupational Therapy*, 55: 46-54.
29. Toglia, J. (1998) A dynamic interactional model to cognitive rehabilitation. In N. Katz (Ed.) *Cognition and occupation in rehabilitation* (p. 37). Bethesda, MD: American Occupational Therapy Association Inc.
30. Crepeau, E. B., & Boyt Schell, B. A. (2009). Analyzing occupations and activity. In E. B. Crepeau, E. S. Cohn, & B. A. B. Schell (Eds.), *Willard and Spackman's occupational therapy* (pp. 739-776). Philadelphia: Lippincott Williams & Wilkins.
31. Bruce, M. A. G., & Borg, B. (2002). *Psychosocial Frames of Reference: Core for occupation-based practice* (3rd ed.). Thorofare, NJ: SLACK Incorporated.
32. American Occupational Therapy Association. (2010). Driving and community mobility. *American Journal of Occupational Therapy, 64*, S112-S124.
33. Preece, M. H. W., Horswill, M. S., & Geffen, G. M. (2010). Driving after concussion: The acute effect of mild traumatic brain injury on drivers' hazard perception. *Neuropsychology, 24,* 493-503. doi: 10.1037/a0018903
34. Formisano, R., Bivona, U., Brunelli, S., Giustini, M., Longo, E., & Taggi, F. (2005). A preliminary investigation of road traffic accident rate after severe brain injury. *Brain Injury, 19,* 159-163. doi: 10.1080/02699050400017163
35. Preece, M. H. W., Geffen, G. M., & Horswill, M. S. (2013). Return-to-driving expectations following mild traumatic brain injury. *Brain Injury, 27,* 83-91. doi: 10.3109/02699052.2012.722260
36. Ride Connection. (2009). A guide to travel training. Retrieved from http://

www.rideconnection.org/ride/LinkClick.aspx?fileticket=dwrbjbCP7_o%3D&tabid=69

37. Wisconsin Assistive Technology Initiative. (2009). Assessing students' needs for assistive technology. Retrieved from http://www.wati.org/content/supports/free/pdf/Ch1-ATAssessment.pdf
38. University of Oregon: The Center on Brain Injury, Research, and Training. (2014). Assistive technology for students with TBI. Retrieved from http://cbirt.org/tbi-education/assistive-technology/assistive-technology-students-tbi