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Practice Report

A Master Trainer Class for Professionals in Teaching the UltraCane Electronic Travel Device

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Electronic travel devices are used to transform information about the environment that would normally be perceived through the visual sense into a form that can be perceived by people who are blind or have low vision through another sense (Blasch, Long, & Griffin-Shirley, 1989). They are divided into two broad categories: primary devices and secondary devices. A primary device is one that a person who is blind may use safely and efficiently by itself, independent of a cane or a dog guide. A secondary device is one that must be used in conjunction with a cane or a dog guide to ensure safe and efficient travel (Farmer, 1980).

Electronic travel devices are further classified according to function and design. Type 1 devices (such as the Mowat, Polaron, and Sensory 6) are single-output devices for previewing the characteristics of an object ("object preview") and are commonly referred to as "go-no-go" systems. Type 2 devices (including the Laser Cane and Wheelchair Pathfinder) have multiple outputs for previewing objects and involve the use of lasers to provide a "go-no-go" source of

information for the user. Type 3 devices (such as the Sonic Guide) provide information about both the characteristics of an object and its location. Type 4 devices offer the user object preview and artificial intelligence. The artificial intelligence component is achieved via a computer that automatically adjusts the device's range according to the speed at which the user is walking. The only device in this category is the Sonic Pathfinder (Dodds, Clark-Carter, & Howarth, 1984; Farmer & Smith, 1997; La Grow, 1999; Penrod & Simmons, 2005).

The UltraCane

The UltraCane, developed by Sound Foresight, is an example of a primary electronic travel device that does not fall neatly into the current classification system because, although it serves the same function as the Laser Cane, it does not perform this function through the use of a laser. Instead, the device uses ultrasonic waves to detect objects to the front and above the wrist while relying on the cane to detect drop-offs, stairs, and curbs using the traditional touch technique or the constant-contact technique (Hill & Ponder, 1976). The UltraCane has two forward ranges. The short-range mode allows for the detection of objects to approximately 2 meters (about 6.5 feet) beyond the cane, and the long-range mode increases the range of preview to approximately 4 meters (about 13 feet). The overhead mode remains constant, regardless of whether the device is in the short- or long-range setting; it will detect objects above the wrist at approximately 1.5 meters (about 5 feet).

This article reports on a master trainer class for 16 O&M instructors from Australia, New Zealand, the United Kingdom, and the United States, all of whom were university-

level tenure-track or adjunct faculty or others who were responsible for training direct service providers. The University of Louisville in Louisville, Kentucky, and an adjacent neighborhood were the primary training sites. The article also details the curriculum for the course that was developed by two of the authors (Corbett and Blasch).

In addition to a classroom lecture, training sessions were conducted indoors (in hallways, the aerobics room, and the gymnasium) and in a large outdoor environment that is used by the University of Louisville to teach residential travel to graduate students in orientation and mobility (O&M). This environment is an eclectic mixture of lighted and unlighted intersections; old and new sidewalks; plenty of trees that are necessary to test the device's above-the-wrist and overhead protection capability; and bus poles, street signs, intersecting walkways, retaining walls, fences, parking lots, guy wires, and all other features that are normally found in urban residential neighborhoods. Some lighted intersections were pedestrian controlled with audible and tactile pedestrian signals.

Two of the authors (Corbett and Blasch) designed specific lesson plans and suggested a sequence for teaching the UltraCane. This curriculum was used with the entire class and may be used for training both students who are blind and O&M instructors. (Readers may obtain an electronic copy of the complete curriculum from the authors by using the e-mail addresses at the end of this article.) This curriculum has two main components: indoor lessons and outdoor lessons. The curriculum and specific objectives are discussed in more detail later in this report.

Components

As is shown in Figure 1, the UltraCane has two vibrating tactile or haptic buttons on the top of the cane where the user will place his or her thumb; these are designed to alert the traveler to objects in his or her path by vibrating. Directly under the vibrating buttons is the Off/On switch. This switch also controls the short- and long-range mode selection. The device has a quick-release wrist strap that may be used when the traveler desires.

If the device detects an object to the front of the person holding the cane, the forward button will vibrate. If the device detects an object above the wrist that is within 1.5 meters (about 5 feet), the rear button will vibrate. Many forward objects will also become overhead objects when the traveler moves within 1.5 meters of the object. In this case, both the forward and overhead buttons will vibrate. The closer the user gets to the object, the stronger the "pulse" that is received through the thumb.

The UltraCane is collapsible. The shaft is attached to the ergonomic grip with a bungee cord in a typical folding-cane fashion, so the traveler may store the device in a backpack or large purse when it is not needed. Canes are ordered to specific lengths, so it is necessary for the potential user to know which cane length he or she wants or needs.

The UltraCane is powered with two AA batteries. The batteries are enclosed within the grip and are partially protected from the elements by a rubber grommet; however, the traveler should not expose the device to the elements more than is necessary. The device has a unique low-battery warning function that audibly lets the user know when there are only 45 minutes of remaining power. The user is advised to carry extra batteries.

Ranges and sonic field

During the training session, one of the authors (Corbett) demonstrated the ranges of the device by having a student hold the UltraCane in a typical fashion (stationary) while he approached from the periphery holding an object vertically away from his body and between him and the student. The instructor demonstrated to the class the approximate configuration of the device's sonar field by placing a yellow piece of paper on the floor at the exact spot he was standing when the person holding the cane indicated they felt the device's vibration; this process was repeated until the instructor was out of the device's range and had returned to the student's other side. This process was repeated for the long-range mode.

When the demonstration was over, there were two tear-shaped paper outlines originating from the person holding the cane that demonstrated both the short- and long-range fields of the device. The vertical field was demonstrated by one of the authors (Corbett) walking toward the person holding the cane horizontally at face level until the student indicated that the device had detected an overhead object. The instructor's body was out of the device's field when he performed this demonstration, which presented the device's sonar field. The demonstration approximated the manufacturer's claims regarding the device's distance range and capability.

Instructional objectives for teaching the UltraCane

Indoor lessons

For initial lessons, one should seek a large, relatively quiet place, preferably indoors. A gymnasium or large open room is ideal. Experience has shown that distracting sensory stimuli, such as traffic and other sounds, in initial lessons can increase students' difficulty in learning to use the cane, whether the students are O&M instructors or persons who are blind or visually impaired.

There are 20 instructional objectives that the authors have determined are necessary for a student to demonstrate proficiency in using the UltraCane indoors. They include becoming familiar with the sonic field and with range settings of the forward and upper channels, developing tactile and distance judgment with the device, learning to interpret the frequency of pulses in relation to distances, learning to use the device in conjunction with standard cane techniques, learning to trail or walk along a wall without contacting the wall, learning to avoid pedestrians, and learning to locate doorways and intersecting hallways.

Outdoor lessons

The suggested outdoor setting is eclectic in nature and will include features that are typically found in urban residential neighborhoods. There are seven outdoor instructional objectives. They include identifying landmarks on both the forward and upper channels; detecting landmarks and objects on the opposite side of a street while crossing; paralleling or trailing walls, fences, and tree lines while traveling; and detecting overhead obstacles and fellow pedestrians while walking.

Evaluation questionnaire

The participants in the master trainer class were asked to complete an evaluation questionnaire on the last day of the course. The data were collected using a standard Likert-scale format (from 1 = low to 5 = high). The purpose of the survey was to determine the efficacy of the training in regard to the content, sequence, and format of the lessons and to determine if the settings for the training were adequate and appropriate. The questionnaire did not attempt to measure the effectiveness of the electronic travel device.

Of the 16 participants in the class, 12 responded to the survey. The mean average of years of experience in O&M instruction for the participants was 19.6 years. Generally, the participants gave the training high ratings, with an overall mean of 4.5 and a standard deviation of 0.2 (see Table 1 for the results).

Discussion

The participants' responses to the questionnaire indicated that most of them appreciated the UltraCane curriculum. Several criticisms were based on the assumption that certain sequencing factors were done by preference (such as holding the first morning indoor training session in the gymnasium before the students attended the classroom information session that described the ultrasonic characteristics and features of the electronic travel device). In fact, however undesirable, this scheduling variation was chosen out of necessity, rather than by preference, because there was an unforeseen scheduling conflict and that was the only time the gymnasium was available for the class.

One participant thought that too much time was spent on one lesson, and not enough time was spent on another lesson.

Although this criticism was valid from the participant's view, all the lessons received high average ratings, and the majority of the participants were well satisfied with the structure, content, and sequencing of the lessons.

Conclusion

Our experiences with this group of O&M professionals indicated that they found the UltraCane master trainer class to be a valuable experience. The participants also thought that the UltraCane curriculum is a generally well-thought-out document that is suitable for direct instruction of persons who are blind or have low vision, have adequate O&M skills in using a long cane, and want the increased protection and environmental awareness that a primary electronic travel device may provide. In addition, the participants generally thought that although there are some design modifications that may improve the general utility of the device, the UltraCane is a welcome addition to the array of primary and secondary electronic travel devices that are currently available. To test the usefulness of the device, additional research needs to be conducted to measure and compare the efficacy of the UltraCane with that of the long cane and other electronic travel devices.

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