A Practical Guide to Problem-Solving Instruction in Orientation and Mobility

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Long and Guidice (2010) describe problem solving as a "hypothesis-testing activity" comprised of four stages: (1) Recognizing the presence of a problem, (2) Considering various alternatives for problem solving, (3) Selecting one of the potential alternatives, and (4) Evaluating the outcome of the selected plan. Perla and O'Donnell (2004) further break down the process into discrete steps that can be used both for assessment and instruction purposes: (1) Recognize that a problem exists, (2) Stop moving, (3) Gather information through all available senses, (4) Generate hypotheses, (5) Conceive a plan to evaluate the selected hypothesis, (6) Implement the plan to solve the problem (see Table 1).

In this article, the authors define a problem in the context of Orientation and Mobility (O&M) as an identified, unexpected event/situation that requires the traveler to consider available options and to come up with an action plan in order to accomplish their original goal.

Problem-Solving Instruction

O&M students/clients invariably fall within a problem-solving continuum of competence, depending on factors such as age, level of abilities, prior experiences, O&M skills, and complexity of their environment, among others. Below, we describe four distinct levels of proficiency/experience and provide guidelines for O&M intervention at each level. Each intervention level decreases the degree of scaffolding and support culminating in the student's ability to independently and consistently perform the skill in a variety of environments.

We focus on three key aspects of problem-solving instruction: (a) Recognizing the presence of a problem; (b) Gathering and interpreting information to form hypotheses; and (c) Developing a plan to solve the problem (see Table 2).

The New RE:view
Summer 2024, Vol. 2(1) 63-69
DOI: 10.56733/TNR.23.019

Table 1. Problem solving in O&M.

Problem Solving in O&M
1. Recognize the presence of a problem
2. Stop moving
3. Gather information through all available senses
4. Generate hypotheses
5. Conceive a plan to evaluate the selected hypothesis
6. Implement the plan to solve the problem, evaluate, and repeat steps 1–6, if necessary

A) Recognizing the Presence of a Problem

To be alerted to the presence of a problem, students must be able to consistently monitor their surroundings and use spatial updating skills (i.e., keep track of their position along a route and in relationship to objects, landmarks, and cues) so they can identify when an unexpected event has taken place (e.g., missing their destination along a hallway).

Level 1: The Student Does Not Recognize the Presence of a Problem

At this level, the student benefits from direct modeling while being guided by the instructor to eliminate the additional effort required by walking independently.

Sample Intervention. The O&M instructor guides the student along an already familiar route, modeling spatial updating by describing how they are using landmarks, sensory cues, and other strategies to keep track of their location along the route. At some point, they make a purposeful mistake (e.g., turn onto the wrong hallway) and model an appropriate response by coming to a stop and articulating why they believe something is off.

Level 2: The Student Is Inconsistent in Recognizing the Presence of a Problem or Needs Significant Prompting

At this level, the student implements the monitoring and spatial updating strategies modeled by the instructor in level 1 while being guided. As they are not responsible for walking independently yet, all their attention is directed to monitoring the environment.

Sample Intervention. The O&M instructor guides the student along an already familiar route. Before setting off, the student is made aware that the instructor may "make a mistake" along the way and that they are expected to catch it as soon as possible and call for the instructor to stop.

Table 2. Problem-solving continuum of competence.

	Problem-Solving Continuum of Competence			
Skill	Level 1	Level 2	Level 3	Level 4
Recognizing the presence of a problem	Student does not recognize the presence of a problem	Student is inconsistent in recognizing the presence of a problem or needs significant prompting	Student recognizes the presence of a problem with minimal prompting	Student consistently and independently recognizes the presence of a problem
Gathering and interpreting sensory information to form hypotheses	Student does not independently or effectively gather and interpret sensory information to generate hypotheses	Student is inconsistent, or unsystematic in the use of available sensory information to generate hypotheses or needs significant prompting	Student can gather and interpret information to form hypotheses with minimal prompting	Student consistently and independently gathers and interprets sensory information to form hypotheses
Developing a plan to solve the problem	Student does not independently or effectively develop a plan to solve the problem	Student needs prompting or is inconsistent in their ability to apply learned concepts/skills to the development of a plan to solve the problem	Student can develop a plan to solve the problem with minimal prompting	Student consistently and independently develops plans to solve problems

Level 3: The Student Recognizes the Presence of a Problem with Minimal Prompting

At this level, the student is charged with the additional task of walking independently, as they have become proficient in monitoring the environment and using spatial updating.

Sample Intervention. The student independently walks an already familiar route. The O&M instructor tells the student to stop at random times along the route and asks the student to identify whether they are on or off track. The O&M instructor strategically selects when to stop the student to ensure a variety of responses, rather than calling on them only when they are off course.

B) Gathering and Interpreting Sensory Information to Form Hypotheses

Travelers gather information through their senses. To problem solve, they must also be able to interpret that information and use it to inform their actions. For example, hearing the sounds of the parallel street farther away than expected while walking down the sidewalk might be meaningless unless the student can interpret that as a possible clue that they are veering into a driveway or open area.

Level 1: The Student Does Not Independently or Effectively Gather and Interpret Sensory Information to Generate Hypotheses

At this level, the student benefits from direct modeling while being guided by the instructor to eliminate the additional effort required by walking independently. Understanding the strengths and needs of the student is critical to provide appropriate modeling. For example, if the student tends to ignore auditory changes created by overhead structures such as awnings, the instructor may purposely stop just when they are passing under one to bring attention to that sensory cue.

Sample Intervention. The O&M instructor guides the student to a familiar but undisclosed area and models how to gather sensory information using the senses and strategies available to the student. For example, they may say, "I hear people running and jumping…I think (hypothesize) we are close to the gym," or "I notice we entered a carpeted area…I believe (hypothesize) we entered the lounge area next to the cafeteria."

Level 2: The Student Is Inconsistent or Unsystematic in the Use of Available Sensory Information to Generate Hypotheses or Needs Significant Prompting

At this level, the student implements the strategies modeled by the instructor in level 1 while being guided and with prompting as necessary. Emphasis is placed on mental mapping and not moving around without a plan.

Sample Intervention. The O&M instructor assists the student in reflecting about their knowledge of selected familiar areas and the sensory cues available to them. For example, "What may we hear as we approach the cafeteria? What have you noticed about the lighting in the main office? Where may we encounter area rugs in the building?" Students can also practice gathering information without moving around by naming as many sensory cues they can gather in one spot in 30 seconds.

Level 3: The Student Can Gather and Interpret Information to Form Hypotheses with Minimal Prompting

At this level, the student has shown the ability to gather information and generate hypotheses when prompted.

Sample Intervention. The instructor guides the student to a spot in a familiar area without disclosing the exact location and asks: "Where do you think we are (hypothesis)? What makes you think so (justification)?" Missed sensory cues may be pointed out as necessary to enrich the students' awareness.

C) Developing a Plan to Solve the Problem

The next step once a traveler has been able to generate a hypothesis is to develop a plan to try to solve the problem. This step requires students to have a repertoire of skills, tools, resources, and learned strategies, as well as a wide variety of experiences. For example, upon hearing perpendicular traffic closer than expected, a cane traveler may hypothesize that they have missed the entrance to their midblock residential destination. They must then select a strategy (e.g., use three-point touch technique to locate house entrances and assistive technology such as Aira to confirm addresses) for their new attempt. Interventions for this step in the problem-solving process will depend on the answer to these questions: Does the student have the necessary concepts/skills/tools to solve typical mobility problems? Has the student experienced a variety of situations (e.g., veering into driveways, crossing the wrong street, missing destinations, etc.) and been exposed to strategies associated with negotiating them? Does the student possess the capability of figuring out solutions to common problems independently?

Level 1: The Student Does Not Independently or Effectively Develop a Plan to Solve the Problem

At this level, the student may be lacking specific skills or techniques or may be unsure of the advantages and uses of each of the techniques they have learned. For

example, they may not have learned how to systematically scan visually to look for landmarks and cues.

Sample Intervention. The instructor provides intensive instruction in a variety of skills, tools, and techniques, making explicit connections between their use and potential problems/scenarios. For example, demonstrating how three-point touch technique can be used to identify steps parallel to one's path, or how to use assistive technology to reorient, etc.

Level 2: The Student Needs Prompting or Is Inconsistent in Their Ability to Apply Learned Concepts/Skills to the Development of a Plan to Solve the Problem

At this level, the student has learned appropriate concepts/skills but does not independently use them to develop a plan. For example, they may be aware of the location of the sun in reference to them but not have considered how it can be used to reorient themselves.

Sample Intervention. The instructor prompts and helps the student evaluate/compare potential plans that may be successful to solve the problem. For example, if the student has identified a veer into a driveway or parking lot, the instructor may ask, "Of all the techniques/strategies you know, which might be more effective for returning to the sidewalk? Why would you choose trailing instead of two-point touch?"

Level 3: The Student Requires Minimal Prompting to Develop a Plan to Solve the Problem

At this level, the student is becoming more independent in their problem-solving skills but shows a lack of confidence.

Sample Intervention. Once the learner has demonstrated emerging skills in their ability to develop a plan to solve the problem, the instructor can scale the learning and build up to a drop-off experience. The key role of the instructor at this level is to: (a) Control the level of difficulty of the drop-off to promote success, (b) Prompt the student to reflect on what worked or did not work and why, and (c) Encourage the student to make connections between the drop-off and real-life situations they may encounter.

As previously stated, Level 4 indicates the student demonstrates the ability to independently and consistently perform the specific problem-solving task. At this level, the suggested intervention is to provide the student with opportunities to practice in varied environments, familiar/unfamiliar, and indoor/outdoor to solidify proficiency. This is in line with the recently published Culturally Responsive Orientation and Mobility Standards proposing that by the end of 12th grade, students

should be able to "generalize skills in orientation, travel, problem solving, information gathering, assistance seeking at an advanced level to plan and execute safe and efficient goal directed travel" (Tellefson, 2023; Grade 12/Age 18–21, Performance Target Strand).

Conclusion

It is impossible for O&M practitioners to control or predict the types of situations their students may find themselves in while traveling independently. Therefore, a well thought out instructional plan implemented proactively can be invaluable to advance students' skills and confidence in problem-solving. Instruction in problem-solving must be based on an assessment that reflects the student's current level of performance in a continuum of competence.

This article proposes breaking down problem-solving skills into three key areas of assessment and instruction since students may be stronger in one area than another. For example, they may be at level 2 for identifying the presence of a problem, while at level 1 for gathering information and generating hypotheses.

The strategies and approaches described in this article may need to be further modified to meet the needs, abilities, and learning styles of individual students.

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Published online 22 July 2024