Have you ever wondered how a skill, such as playing the piano, typing, swimming, or playing a video game, is learned and becomes nearly automatic? In this activity you’ll practice tying a knot that may be new to you, and then you’ll investigate the roles practice and sleep play in learning and improving your knot-tying ability.

**Procedure**

1. With your partner, choose one knot on your “Knot Tying with a Twist” handout for both of you to learn to tie. Circle the knot you chose.
2. Use the illustrations and follow the knot directions to help you learn the steps. Your teacher or another adult can demonstrate.
3. Once you and your partner have learned how to tie the knot, each of you should accurately tie your own knot 5 times.
4. Next, you and your partner will take turns timing and scoring (simultaneously) each other’s knot tying. Use the timer to find the time it takes to tie the knot. To score, give one point for each tying step accurately accomplished; then total the points. A perfect score for each knot equals five points. Now record your own total time (to the nearest second) and score for Trial 1.

   **Trial 1:** Time: ___________ Score: _______

   If you are unable to complete the knot, note the time when you realize you are stuck and record this time.

5. Do not practice tying your knot again until you retest yourself right before going to bed that same evening. Have someone time you. Record your time and score for Trial 2.

   **Trial 2:** Time: ___________ Score: _______

6. The next morning, retest your knot-tying ability. (Your teacher will tell you if this test is to be performed before class or during class.) Record this time and score for Trial 3.

   **Trial 3:** Time: ___________ Score: _______

**Questions**

*Write your answers on a separate sheet of paper.*

1. About how many hours did you sleep last night?
2. Check one of the following statements:
   - I slept well, and I am well rested.
   - I slept somewhere in between well and poorly, and I’m somewhat rested.
   - I slept poorly, and I am tired.
3. Put your three knot-tying times and scores in order, from least to greatest.
4. Consider whether the times and scores suggest that sleep played a role in learning in relation to your knot-tying ability. What factors other than sleep may have influenced results?
5. Describe the role that practice played in helping you master your knot. While practicing tying your knot, what sorts of questions did you ask yourself? What thoughts did you have that may have helped you be successful?
6. Analyze the activity and suggest controls that could be included to improve the reliability of results. Then, propose an experiment with additional controls that would increase the accuracy of the results.
Knot Tying with a Twist

How to Tie a Square Knot
1. Take the ends of the rope and make an “X” with the left end of the rope placed over the right.
2. Cross the “new” right end around the rope to make an overhand knot.
3. Take the right and left ends and put the right end over the left.
4. Tie a second overhand knot.
5. Pull the ends tightly so that they make a neat, square knot.

How to Tie a Bowline Knot
1. Hold the two ends of your rope together, then lay your rope flat on a table.
2. Take the left half of the rope and make a small loop about halfway down. (This loop is sometimes called the hole.)
3. Take the right end of the rope (the tag end), and bring it up through the hole.
4. Pass the tag end under and around the left strand of the rope.
5. Then bring the tag end back down through the hole and pull the knot tight.

How to Tie a Sheepshank Knot
1. Lay the rope on a table and make an “S” with rope.
2. Make a loop at the bottom left.
3. Pass the top part of the S through the bottom loop.
4. Make a small loop at the top right.
5. Pass the bottom part of the S loop through the top loop and tighten so that the looped ends on the left and right are about the same size.