**Title:** AWARENESS

**Date:** SEPT 16

### Objectives

- Being confident, thorough, and accurate in problem solving

### Key Concepts:

- Learning how to be a good, methodical problem solver is important.
- Verbally expressing ideas regardless of how crazy they seem is important.
- Getting feedback is important.
- Writing helps clarify problems.

### Objective:

1. Before:
   - I can give a definition of a problem.
   - I need to work on my ability to verbally describe mental processes used to solve problems.
   - I have never used the whimbay pair method, I feel I could be a good listener in that role.
   - I would be supportive and wouldn't interfere too much.
   - I believe I will have to be more active and methodical in verbalizing processes.

2. After:
   - I was usually able to define the problem to be solved, but sometimes unclear definitions can lead to difficulties.
   - I am slightly aware of the process used to solve problems.
   - I have always tried to do things in a logical order.
   - The whimbay pair method is a good idea. Although, being the listener was hard, it was interesting to watch someone going through the problem solving process.
   - I believe I should have been more supportive.
   - I need to develop my skills of speaking aloud when I am solving problems.

3. I was more skilled than I thought at recording information during the problem solving process. I made charts and lists which made the process clearer.

4. I solve problems by writing and I re-read the problem if confused.

5. I do need to work on my verbal communication.
<table>
<thead>
<tr>
<th>Activities</th>
<th>Discovered</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving</td>
<td>Threatening difficult to start but once got going, ok. Type of problem dictates how we use process.</td>
<td>difficult if we don't know &quot;subject topic&quot; but talking aloud helped see when we didn't know. We must go learn the material. Charts, graphs, formulas (when written down on paper) may clarify the problem.</td>
</tr>
<tr>
<td>Listening</td>
<td>Listener: hard not to jump in and ask questions. &quot;What other ways to look at it?&quot; I may be too quiet and passive. I wanted to help, but didn't want to give away the answer.</td>
<td>Difficult to help someone if our knowledge of the subject is limited.</td>
</tr>
<tr>
<td>The TAPPS process</td>
<td>Liked getting feedback</td>
<td>Assignment may take longer if all parties take turns being solver/listener. Seems like the problem solver is doing most of the work.</td>
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</tbody>
</table>
Unit 1: Awareness: Pretest

Definition:
Awareness is the ability to identify, and describe (to others) the process you use when you solve problems. You can slow the process down and do not have long periods when something just happens and you do not know what it is.

Awareness:
How aware are you of the process you use to solve problems? Use an "x" to indicate your assessment.

0 1 2 3 4 5 6 7 8 9 10

Unaware, I just do it

Aware of some

I can describe the details of how I do it

Very aware

Skill:
How would you rate your skill at being able to write out or describe verbally the process? Use an "x" to indicate your assessment.

0 1 2 3 4 5 6 7 8 9 10

Poor Fair Good Very Excellent

Comments:

Concepts Introduced - Awareness, characteristics of "good" problem solvers, advantages of becoming aware of the process, Whimsy pair method, Problem Solver, Whimsy pair method.

Exercises:
1. As a listener in the Whimsy pair method, the problem solver has missed the problem statement, has chosen an incorrect answer "b", and has said "That completes that problem". Your response is:
   a. "You have missed the problem, please read it and start again."
   b. "I'm sorry; I should have told you earlier but you have missed the problem; let's read it carefully again."
   c. "You are wrong; the right answer is C; you can do better on the next problem."
   d. "Can you check?"
   e. "Are you sure?"
   f. "OK, let's go on to the next problem."
   g. Other (provide your specific response).

2. Record in writing the first 10 minutes of the process you use to solve the following exercises:
   (exercises selected similar to those in section 1.7).

PS/EX/2-16 19 7/9/84
## Observations & Evidence from the Workshop:

### TABLE A

I was quite active in terms of written communication during this exercise. As seen, I made use of a chart to separate the main words I was looking for. Then, to double-check my answer, I drew arrows to relate the words.

During the second time as a problem solver, I also wrote down information while solving the unit problem. I was stuck, so I began writing down other equations which may have helped me solve the problem. I believe that my written communication is fair-to-good.

During one of the first problem solver exercises, I found that I rushed through reading the problem and clearly understanding it. But, second time as the problem solver was more efficient. I took time to read and re-read the problem, and I didn’t expect to find an immediate answer.

As the listener, I felt I was a little too quiet the first time. It was difficult to give the person hints, and not my own opinion as to how to solve the problem. I also found it hard to assist the person in one of the chemistry problems, since I was also unsure of terms and values.

I underestimated some of my problem-solving skills. For item 3, I thought I skimmed over the problem too quickly, while my partner felt I was fairly accurate with double checking answers. For item 6, I thought I spent too much time thinking silently. Although I did write things down, when I got stuck, I ran down ideas in my head rather than verbalizing.

<table>
<thead>
<tr>
<th>Table 1-3 Feedback Forms - Listener</th>
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<tbody>
<tr>
<td>I found the listener to provide good input, and to be supportive in coaching me and helping me to verbalize. I didn’t think I did a good job listening because I was too silent. However, my partner (Mr. Woods) found that I was attentive and unthreatening. I didn’t want to interrupt the problem solver’s train of thought, so I gave positive input when I could.</td>
</tr>
</tbody>
</table>
Salesmen who work for the Acme Wig Company are assigned to a different city each year. Henry began working for Acme in New York in 1965, and in the succeeding 4 years worked in Minneapolis, New Haven, Youngstown and Charleston, in that order. Peter worked for Acme in New Haven in 1963, and in succeeding years worked in New York, Charleston, Minneapolis and Youngstown. Fred worked for Acme in Charleston in 1967; the previous 2 years he had worked first in New Haven and then in Minneapolis. John worked in Charleston in 1968. Before that he was in New Haven, before that Youngstown, and before that New York. Which Acme salesmen were in New Haven in 1967? Which ones were in Minneapolis in 1966?

On a certain day I ate lunch at Tommy’s, took out 2 books from the library (The Sea Wolf and Martin Eden, both by Jack London), visited the museum, and had a cavity filled. Tommy’s is closed on Wednesday, the library is closed on weekends, the museum is only open Monday, Wednesday and Friday, and my dentist has office hours Tuesday, Friday and Saturday. On which day of the week did I do all these things?

Sally loaned $7.00 to Betty. But Sally borrowed $15.00 from Estella and $32.00 from Joan. Moreover, Joan owes $3.00 to Estella and $7.00 to Betty. One day the girls got together at Betty’s house to straighten out their accounts. Which girl left with $18.00 more than she came with?

Hint: On your diagram, use arrows to show which person has to return money to which other person. Show the direction in which the money must be returned.

The number of cows owned by farmer Smith is the number owned by farmer Thompson divided by the number owned by farmer Jones. Farmer Thompson, who owns 42 cows, would own 8 times as many cows as farmer Jones if he owned 14 more cows. How many cows does farmer Smith own?
Exercise 1:
The value of $g_c$ in the American Engineering System is:

a. 32.2
b. 32.2 ft lb/lb s^2

c. 32.2 ft lbf/lbm s^2

d. 32.2 ft lbm/lbf s^2

e. 32.2 ft/s^2

f. depends on the location (for example, the moon)

h. other

Exercise 2: Bernoulli's Eqn.
The following equation has the units of "ft lbf/lbm".

$$\Delta V^2 + \frac{\Delta P}{\rho} + \Delta z [/=] \frac{\text{ft lbf}}{\text{lbf}}$$

where $V$ = velocity of the fluid, ft/s
$p$ = pressure, lbf/ft^2
$\rho$ = density, lbm/ft^2
$z$ = elevation or height, ft.

Consider the term $\Delta z$:

a. since the units of $z$ are not the same as the units in the equation, it should not be included;

b. the term should be included; the units of "ft" are acceptable because the correct units are "understood".

c. consistency of units does not apply to this equation; go ahead and use the term as it is.

d. the term must be corrected by multiplying by $g/g_c$

e. other.
\[
\left( \frac{ft^2}{s^2} \right) \cdot \frac{1 \text{ lb} \cdot \text{ft}}{ft^2} = \frac{1 \text{ lb} \cdot \text{ft}}{s^2} \\
\text{ft} \times \frac{\text{ft} \cdot \text{lb}}{\text{lb} \cdot \text{ft}} = \text{ft} \cdot \text{lb} \\
\frac{\text{ft} \cdot \text{lb}}{\text{lb} \cdot \text{ft}} = 42.1 \text{ lb} \cdot \text{ft} \\
\]
TABLE 1-1: Personal Evaluation

You have had a chance to experience Whimbey's method.

Exercise 1-1:

As the Problem Solver, what have you learned about yourself and how you solve problems? (For example, because you slowed down the process, what did you see yourself doing? How often did you check yourself? Look at your worksheet; did you do a lot of things? How often did you go back and re-read the problem? Did you clearly state what you were trying to solve for? Did you "hope" that an idea worked out or did you actually check it out? Was this fun? Should you do more of this?)

I learned that I don't always solve problems systematically. I try to find out what a possible answer might be before I clearly define the problem. I found it hard to verbally express the method of problem solving used. I re-read the problem once again. I clearly stated what I was trying to solve. I checked out my answer to see if my initial thought was correct. This process was fun and helpful. I should do more of this, since it prevents me from running circles around the problem, without actually clarifying anything. I'm more clear as to the objective.

Exercise 1-2: anything. I'm more clear as to the objective.

As the Listener, was it an easy task? What was the hardest thing to do? What did you learn about the process of solving problems? What surprises did you note in the approach taken by the problem solver? If the problem solver got stuck, what did he/she do?

No, being the listener was not an easy task. The hardest thing to do was to keep my own opinion about the answer, and to let the speaker go through the thought process. I learned that solving problems is a difficult process. When obstacles are encountered, it is hard to get on the right track. During the second session, I was the listener for the chemistry problem. This was difficult because I too was working out the problem as the problem solver was. I tried to give my own input when he was stuck. When stuck, he tried to work out a simple form of the problem in order to clarify definitions stated in the problem.
TABLE 1-4: Problem Solving Style

Exercise 1-3:

During this experience, you observed someone else solving problems and you became aware of what you did when you solved problems. Here are some of the characteristics that may be observed. Without consultation with your partner, characterize yourself by putting your initials on the following scales. Then, characterize your partner.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBC</td>
<td></td>
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<tr>
<td>DRW</td>
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</table>

1. Initial response is:
   - Partner found same result
   - Oh, it's one of those problems; can't I try another one?

2. Your emphasis is on:
   - Partner found same result
   - Accuracy

3. You:
   - Partner
   - LBC

   Work quickly through the problem, sometimes assuming previous ideas are OK without checking.

4. You:
   - Same result
   - Maintain a wholistic view throughout. Solve the whole problem at once; do not consider subproblems.

5. When stuck, you:
   - Same results
   - Go back and check things through again.

6. You do all your thinking:
   - Partner
   - LBC

   In your head; spend a lot of time mulling the problem over silently in your mind.
TABLE 1-3: Feedback for the Listener

Exercise 1-4:
Attitude of Listener Toward Me as I was the PS

1. Mode of interaction:

<table>
<thead>
<tr>
<th>LBC</th>
<th>DR W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>passive way not not about little too much active</td>
<td></td>
</tr>
<tr>
<td>hardly knew not enough quite what I too much much interrupted I could</td>
<td></td>
</tr>
<tr>
<td>there he/she was enough enough wanted much much I could</td>
<td></td>
</tr>
<tr>
<td>(ignored me) hardly talk.</td>
<td></td>
</tr>
</tbody>
</table>

2. I found the listener

<table>
<thead>
<tr>
<th>LBC</th>
<th>DR W.</th>
<th>Excessively</th>
</tr>
</thead>
<tbody>
<tr>
<td>very</td>
<td>too</td>
<td>little</td>
</tr>
<tr>
<td>threat-</td>
<td>threat-</td>
<td>threat-</td>
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<td>ening</td>
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</table>

3. I would characterize the listener as

- too silent
- coach
- leader
- neutral sounding board

4. The listener's emphasis was on:
   - listening to me
   - helping me to verbalize
   - helping me to solve the problem
   - solving the problem for me

Every PS has different needs! Use this feedback as guidance!
<table>
<thead>
<tr>
<th>Observations &amp; Evidence from Application to ChE 2D4, other courses [red] and to everyday events [green].</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green sheet for the week is attached. Discussion of this evidence:</td>
</tr>
<tr>
<td>The skills learned were applicable to ChE 2D4. The few sample questions involving units got us started. Even some of these unit questions can be intimidating of the theory or basis formulas are unknown. In doing the questions I tried to write down as much information as possible and I referred back to notes and examples. Being aware of the process I was using made me feel more confident in myself.</td>
</tr>
<tr>
<td>Additional applications:</td>
</tr>
<tr>
<td>In completing my math 106 assignment and homework problems, I encountered many problems which I got stuck on shortly after attempting them. Instead of getting all nervous and thinking I just wasn't 'smart enough', I went back to the question and really tried to understand all the terms given. I drew a graph for one of the problems which helped me to understand the theory behind the problem. I also broke one of the word problems down into steps. The main thing was that I realized I could do the problem, or most of it, so I maintained my confidence.</td>
</tr>
<tr>
<td>Last week, I had an organic chemistry lab. The lab experiment seemed to be very lengthy. Instead of panicking right away about whether or not I would actually finish, I tried to get through it accurately and efficiently. I asked the T.A. questions, and I did complete the lab.</td>
</tr>
<tr>
<td>This past week, something went wrong with my computer. When I turned it on, the message &quot;Bad or missing command interpreter&quot; appeared. At first I panicked and got nervous about not being able to use the computer for the &quot;hundreds&quot; of assignments. Since worrying didn't get me anywhere, I inquired about the problem during school, and asked around for some help. I soon found out the problem was that DOS files had been deleted. I read some manuals, and before long the problem was solved. My problem solving activities in 262 helped me to tackle the problem instantly, even though I'm not very computer oriented.</td>
</tr>
</tbody>
</table>
Week 30  Course Chem Eng

What I learned about PS from the assignment exercises & problems this week. Chapter 2-2, 11, 14, 18 due Tues Sept 22.

Assignment By reviewing the assignment, it was necessary to read the entire chapter (Ch.2) and it was helpful to attempt the 'Test Yourself' problems. This allowed me to understand the questions asked, and to follow similar procedures used in previous example problems. I actively wrote down numbers, formulas and possible methods on the rough copy. After checking my own values over, I compared them to others' results. For 2 of the questions, I discussed them with another classmate.

About PS Most of the assignment questions in ChE 2D4 involved numerical calculations. I was not too comfortable with unit conversions before I began this course. By thoroughly reading the chapter and going through example problems, it became more clear on the topic. I found it useful to read through the problem slowly once, and then to go through it again, writing down all the relevant information, such as numbers & terms. Somewhere on the page I usually wrote in point form, the general question or problem asked & I was often really aware of my problem-solving skills. I was just used to quickly reading the problem & getting straight down to "What do they want to know?" and how can I get the answer? My skills have improved gradually. Now I try to take each time to plan out & really try & understand the problem. I still need to stop thinking silently - instead, I should speak aloud or write those thoughts down. I attempted two problems with a classmate. We worked on the problems together, at times I listened to her ideas, and then she listened to mine. We maintained a positive attitude and constantly checked back to confirm values and conversions. Being accurate the first time around saved a great deal of time later on!!!

Experience Factor: I learned & will memorize.
Use SI units. 1 atm. = 1.01325 x 10^5 N/m^2

| Density of water = 1000 kg/m^3 (at 4°C) |
| Absolute Zero = 0 K = -273.15°C |
| g_c = 1 kg·m/s^2 = 1.93 ft/ps^2 = 32.174 lbm·ft/s^2 |
| SI units → N dyne lbf |

1 mole of gas at STP (273K, 1 atm) occupies 22.4L.
although most of the problems referred to in this class are Chemical Engineering Problems, I feel that they can apply to everyday life. Any situation in which a decision must be made requires a thorough understanding of the facts. Maintaining confidence and being concerned with doing things properly rather than quickly is important in life.

<table>
<thead>
<tr>
<th>Conclusions:</th>
</tr>
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<tbody>
<tr>
<td>I found the Whirley pair method to be an enjoyable and interesting way of becoming aware of the skills needed in problem solving. I am more aware of the skills needed to solve problems and of the vital process used. I am constantly working on the aspect of telling myself and actually believing that I can solve most problems. I feel that thoroughly reading and understanding the question and issue is the vital first step in problem solving. I used to tend to get flustered and nervous when I couldn't find the answer to a problem within 5 minutes of reading it. Now I understand that it takes time to go through the complete process. Even though I am fairly active in writing things down, I believe I can yet improve this skill. I must also improve my verbal communication of the thought processes I am going through.</td>
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<tr>
<th>Progress in Achieving Objectives:</th>
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<tr>
<td>Date:</td>
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