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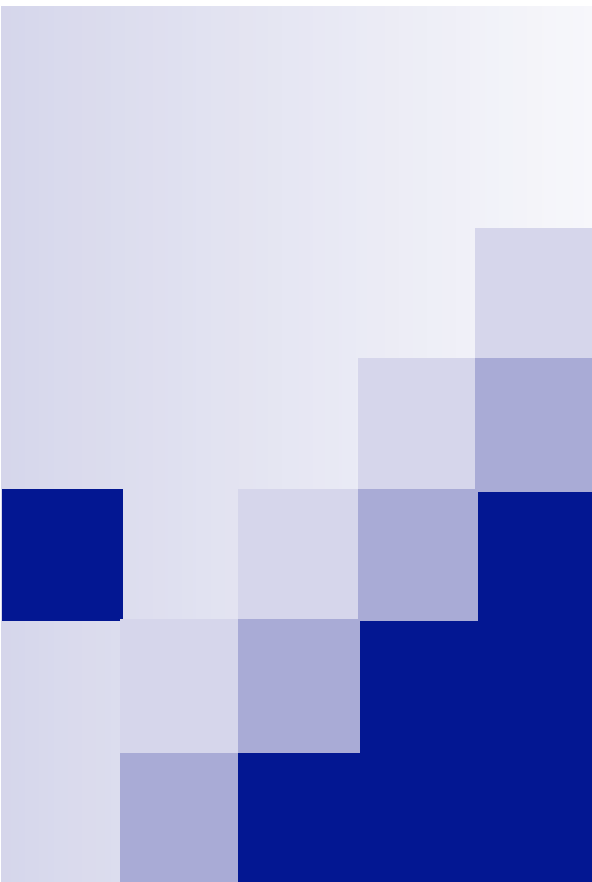
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Problem Solving Profiles

Approaching learning with
different views



Problem Solving Profiles

- Based on learning style research of the 70's
 - Learning Styles
 - Kolb, Rubin and MacIntyre
 - MacDonald
 - Personality Indicators
 - MBTI
 - Felder
 - <http://www2.ncsu.edu/unity/lockers/users/f/felder/public/ILSdir/ilsweb.html>



Attributes

- Test perception of learning, personality or problem solving
- Bi-polar scales
 - Active <-> Reflective
 - Visual <-> Verbal
 - Sequential <-> Global
- Considered to be semantic differentials



Problems

- Either a or b
- a often not the opposite of b
- Certainly not single adjective differentials
- No chance to be neutral
- Outcomes read like astrology



Possibilities

- Can relate to problem being solved
- Are mutable
- Can be refined and localized
- Have face and relational reliability



Case study

- Do teachers change learning styles when doing different experiments?
 - www.umich.edu/~cberger/psi76.html
- Yes, and the style shifts in direction of the kind of experiment.
- Evidence that you can (and possibly should) expect differing styles when teaching and learning.



Development of the PSP

- The problem solving profile was developed as the Problem Solving Survey in 1991 at the Office of Instructional Technology at the University of Michigan to find if student approaches to software being developed was related to their problem solving proclivities.
- It has become known as the PSS, PSI and the PSP

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- The latest incarnation the PSP solves some of the problems of earlier indicators in that it allows for a continuum on a semantic differential and adds scales for intensity, and consistency. It has five basic scales (Berger et al. 1999):
 - Global <-> Local
 - Alone <-> Collaboration
 - Help <-> Persistence
 - Innovation <-> Tried
 - Plan <-> Serendipity
 - The scales have been changed and modified for several other studies (Lee, W.Y. 2002)

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- In a general type of PSP, 10-14 statements of situation (either general or specific) are presented with four or five important profiles in the following Visible Human Project sample:

1. When dissecting I:

need to know the big picture first	o	o	o	o	o	need to know all the details
work till I get it right	o	o	o	o	o	get help from the Prof
follow the book	o	o	o	o	o	try a new procedure
like to do it myself	o	o	o	o	o	willing to let others help

- User selects one of five that fit most closely their perception of the profile.



Scale development

- Results for each profile are averaged across the statements and (if appropriate reversed) to provide a score for that profile.
- The research gets real murky on how the scales are interpreted. Often it's based on the scale, sometimes on a 'national population' and others on a specific group
- The most logical is to divide each profile scale into lower 33%ile, middle and upper 33%ile either on sample or full population as it grows.

The PSP may be a one page document

Student number or code_____	
University of Michigan Visible Human Project	
Problem Solving Survey Check a box on each of the five rows of each item depending on which you prefer:	Office of Instructional Technology
1. When playing chess or checkers I: like to see the whole picture... ☐ ☐ ☐ ☐ ☐ wish for a hint now and then... ☐ ☐ ☐ ☐ ☐ try new and unusual moves... ☐ ☐ ☐ ☐ ☐ follow a favorite plan... ☐ ☐ ☐ ☐ ☐ do it myself... ☐ ☐ ☐ ☐ ☐	8. When thinking about work: I like the big picture... ☐ ☐ ☐ ☐ ☐ just give me a problem, I'm a bull dog... ☐ ☐ ☐ ☐ ☐ I always want to try a new way... ☐ ☐ ☐ ☐ ☐ I like work that is planned... ☐ ☐ ☐ ☐ ☐ think alone... ☐ ☐ ☐ ☐ ☐
2. If I were solving a logical puzzle I: try to get an over-all idea... ☐ ☐ ☐ ☐ ☐ look for hints or help when stuck... ☐ ☐ ☐ ☐ ☐ try to use tried and true methods... ☐ ☐ ☐ ☐ ☐ let chance or serendipity work for me... ☐ ☐ ☐ ☐ ☐ solve alone... ☐ ☐ ☐ ☐ ☐	9. When I'm not sure what to do I: link up ideas until it makes sense... ☐ ☐ ☐ ☐ ☐ look for hints or help... ☐ ☐ ☐ ☐ ☐ try new ways of solving the problem... ☐ ☐ ☐ ☐ ☐ follow a solid plan... ☐ ☐ ☐ ☐ ☐ work alone... ☐ ☐ ☐ ☐ ☐
3. When reading a mystery I: like to figure out the next step... ☐ ☐ ☐ ☐ ☐ skip to find out 'who done it'... ☐ ☐ ☐ ☐ ☐ one of a series of similar mysteries... ☐ ☐ ☐ ☐ ☐ like ones that have chance twists... ☐ ☐ ☐ ☐ ☐ read alone... ☐ ☐ ☐ ☐ ☐	10. When working with a new computer program, I: try a part of it first... ☐ ☐ ☐ ☐ ☐ stick to it until I figure it out... ☐ ☐ ☐ ☐ ☐ follow the tutorial or guide... ☐ ☐ ☐ ☐ ☐ discover how it works by chance... ☐ ☐ ☐ ☐ ☐ work alone... ☐ ☐ ☐ ☐ ☐
4. After a good thriller movie I like to: remember how it all went together... ☐ ☐ ☐ ☐ ☐ remember the clues... ☐ ☐ ☐ ☐ ☐ like sequels... ☐ ☐ ☐ ☐ ☐ like planned plots... ☐ ☐ ☐ ☐ ☐ think about it myself... ☐ ☐ ☐ ☐ ☐	11. I'm good at: putting pieces together... ☐ ☐ ☐ ☐ ☐ persevering at problems... ☐ ☐ ☐ ☐ ☐ innovating new ideas... ☐ ☐ ☐ ☐ ☐ following tough but clear directions... ☐ ☐ ☐ ☐ ☐ working alone... ☐ ☐ ☐ ☐ ☐
5. In math class I liked it best when: we were given examples then theory... ☐ ☐ ☐ ☐ ☐ I had to figure it out for myself... ☐ ☐ ☐ ☐ ☐ we used stuff we had already learned... ☐ ☐ ☐ ☐ ☐ a lucky idea worked in a problem... ☐ ☐ ☐ ☐ ☐ worked alone... ☐ ☐ ☐ ☐ ☐	12. I'm best described as: a global thinker... ☐ ☐ ☐ ☐ ☐ a bulldog with a problem... ☐ ☐ ☐ ☐ ☐ an innovator or new idea person... ☐ ☐ ☐ ☐ ☐ a lucky but prepared worker... ☐ ☐ ☐ ☐ ☐ a loner... ☐ ☐ ☐ ☐ ☐
6. In science class I best liked: a map of the concepts... ☐ ☐ ☐ ☐ ☐ examples to help solve problems... ☐ ☐ ☐ ☐ ☐ using familiar lab techniques... ☐ ☐ ☐ ☐ ☐ a clear plan for the work of the term... ☐ ☐ ☐ ☐ ☐ work alone... ☐ ☐ ☐ ☐ ☐	13. When time is important I: quickly solve a part of the problem... ☐ ☐ ☐ ☐ ☐ look for hints or help... ☐ ☐ ☐ ☐ ☐ try an unusual shortcut... ☐ ☐ ☐ ☐ ☐ follow a careful plan... ☐ ☐ ☐ ☐ ☐ work alone... ☐ ☐ ☐ ☐ ☐
7. My decisions typically are: based on a clear map of the problem... ☐ ☐ ☐ ☐ ☐ self generated... ☐ ☐ ☐ ☐ ☐ based on successful past experience... ☐ ☐ ☐ ☐ ☐ spur of the moment but succeed... ☐ ☐ ☐ ☐ ☐ self based... ☐ ☐ ☐ ☐ ☐	14. When playing a computer gam (sims, role play, shooters) I: beat the whole game... ☐ ☐ ☐ ☐ ☐ look for hints or help... ☐ ☐ ☐ ☐ ☐ try an unusual shortcut... ☐ ☐ ☐ ☐ ☐ follow my plan... ☐ ☐ ☐ ☐ ☐ use single player mode... ☐ ☐ ☐ ☐ ☐

Or a web survey

Problem Solving Survey

Take this survey by clicking on a box to the right or left depending on how strong your agreement is with statement on the right or left. Click on a box at either end if you have strong agreement and more toward the center box if you have less strong agreement.

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When playing chess or checkers I:

1	2	3	4	5
like to see the whole picture.....work from move to move				
1	2	3	4	5
wish for a hint now and then.....like doing it all myself				
1	2	3	4	5
try new and unusual moves.....like tried and true methods				
1	2	3	4	5
follow a favorite plan.....like chance or unexpected moves				
1	2	3	4	5
do it myself.....have someone play with me				
1	2	3	4	5



Web problems

- Most free or low cost survey's don't handle semantic differential formats well.
- Some can be made to work...the best found so far is Zoomerang compared to Freeonline, Surveymonkey, or Inquisite.
- Even expensive one's may not work...check before you pay!



Results

- It's best to accumulate results in a spreadsheet. Enter raw data on a single row for each person. If you're using a 5 point scale, (allows for a neutral, modest agreement and full agreement) you can reverse a scale using the formula `=abs(c2-6)` where c2 is the cell to reverse.



Results, continued...

- Average across the similar profiles to develop the profile score. $= \text{average}(b2, \text{abs}(g2-6), \dots, bv2)$
- The consistancy score is normalized standard deviation of the individual profiles. $= \text{stdev}(b2, \text{abs}(g2-6), \dots, bv2)$ This score measures how similar the person responds to like profiles in different situations.

Presentation

- The results can be presented in many ways..
 - A chart with persons in boxes with the attributes
 - A matrix of the spread sheet with colors coding the %ile ranges.

Person	GlbILcl	HntPrsnc	InvtnTrdti	PlnSrdpt	AlnOthrs
Polly Anna	2.64	3.79	2.43	3.07	2.64
Daisy Chain	3.29	2.79	3.00	2.71	3.07
Suzy Queue	4.00	2.64	3.21	2.21	3.71
Wendy While	3.36	2.21	3.00	2.64	3.71
Charlie Chill	1.93	3.36	3.07	2.64	2.36
Wilbur Fetiscue	2.57	2.50	2.86	3.07	3.29
Mark Dwayne	1.79	2.36	3.50	2.64	2.86
Lionel Twain	2.64	3.71	2.43	2.64	2.00
James Bond	3.36	3.43	3.14	3.14	2.14
Fivish Tenner	3.79	2.71	3.00	3.43	2.86
Ruby Renn	2.07	1.79	1.64	3.50	4.14
Crystal Clear	3.00	3.21	3.36	2.36	3.07
Wilma Rubble	2.07	3.00	2.64	2.36	2.57
Stone Hinge	3.21	2.64	2.36	3.43	3.29
Diana Huntress	2.50	2.93	2.79	2.93	3.00
Wilburt Chills	2.79	2.71	2.71	3.29	2.93
Fifi LaRue	2.86	3.29	2.57	3.21	2.93
Mandy Pitonkin	2.57	2.86	2.79	2.57	2.14



The intensity score

- Some are very strong in responding (lots of 1's and 5's) while others are often neutral (lots of 3's). The intensity score reflects this as it is the average of the scores with the central score (3) converted to a 1 and the end score (5 or -5) converted to a 5. (Developing the formula to do this requires all your algebra 2 skills)



How do you use these scores

- Most research stops at this point and uses the information to show that people differ in learning or problem solving...
- Well, yes, they do but does it correlate with actual performance (measured with the EventRecorder) or perception of success (the PPI) or even achievement (measure by some really obscure quality such as grades)?
- Stay tuned for our next exciting episode.....