

**“What we can measure is by
definition uninteresting
and
what we are interested in is
by definition unmeasurable”**

R. C. Lewontin 1974

Faculty Professional Development

Teaching and assessing
critical thinking

Teaching

Two key tensions 

-> Critical thinking as a journey

Assessing

Complex -> Simple routine

Faculty Professional Development

Process themes, tools, and experience

Shortlink = bit.ly/CTMay15

Critical Thinking =

Scrutinize

- Assumptions
- Evidence
- Reasoning

**for any knowledge
claim**

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understand facts, theories, and practices by placing them *in tension with alternatives*

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Pathways to educational outcome(s)

Direct



Indirect

Process themes

- a. Participants [students] always bring a lot of knowledge about the topic, so allow that to be brought to surface and acknowledged.
- b. What you really learn from a workshop or participatory experience [or class] is what you integrate with your own history and concerns.
- c. Before you simply push ahead, clear mental and/or emotional space to allow ideas about an issue to begin to come to the surface.

Tool 1: Guided (topic-based) freewriting

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You should not take your pen off the paper. Keep writing even if you find yourself stating over and over again, "I don't know what I'm expected to say." What you write will not be shown to anyone else, so do not go back to tidy up sentences, grammar, spelling. You will probably diverge from the topic, at least for a time while you acknowledge other preoccupations. That's OK- one of the purposes of the exercise is to express what is distracting you is. However, if you keep writing and do not stop for several minutes, you should expose some thoughts about the topic that had been below the surface of your attention-that is another of the aims of the exercise.

Ref: Elbow, P. 1981. Writing with Power. NY: Oxford U. P.

Continue where this sentence leaves off:

When I think about indirect pathways to educational outcomes (e.g., to improved critical thinking as I would define that), the experiences, teachers, students, insights that come to mind include....

Tool 2: Think-Pair-Share

Compose a sentence that you are prepared to share about indirect pathways *or* direct pathways *or* indirect vs. direct pathways

Share with a neighbor

Share with the whole group

1995

In a sense subscribed to by all teachers, critical thinking means that students are bright and engaged, ask questions, and think about the course materials until they understand well-established knowledge and competing approaches.

This becomes more significant when students develop their own processes of active inquiry, which they can employ in new situations, beyond the bounds of our particular classes, indeed, beyond their time as students.

My sense of critical thinking is, however, more specific; it depends on inquiry being informed by a strong sense of how things could be otherwise. I want students to see that they understand things better when they have placed established facts, theories, and practices *in tension with alternatives*.

1995 (cont.)

Critical thinking at this level should not depend on students rejecting conventional accounts, but they do have to move through uncertainty. Their knowledge is, at least for a time, destabilized; what has been established cannot be taken for granted. Students can no longer expect that if they just wait long enough the teacher will provide complete and tidy conclusions; instead they have to take a great deal of responsibility for their own learning.

Anxieties inevitably arise for students when they have to respond to new situations knowing that the teacher will not act as the final arbiter of their success.

A high level of critical thinking is possible when students explore such anxieties and gain the confidence to face uncertainty and ambiguity.

-> 1999

Development as a critical thinker is like a personal **journey** into unfamiliar or unknown areas.

1999

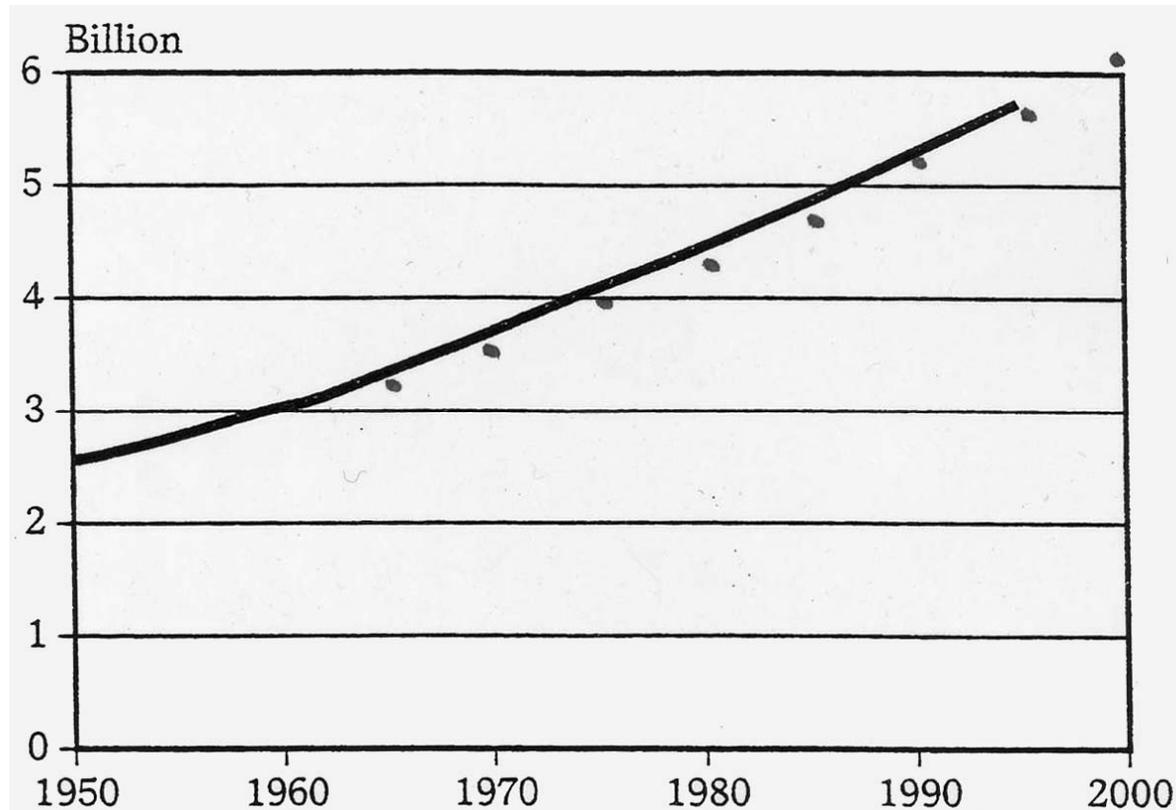
Development as a critical thinker is like a personal **journey** into unfamiliar or unknown areas. Both:

- involve risk,
- open up questions,
- create more experiences than can be integrated at first sight,
- require support,
- yield personal change...

Deficit  **Support**
incl. **Steps**

**How do we know we have
global environment problems?**

How do **we** **know** we have
global environment problems?

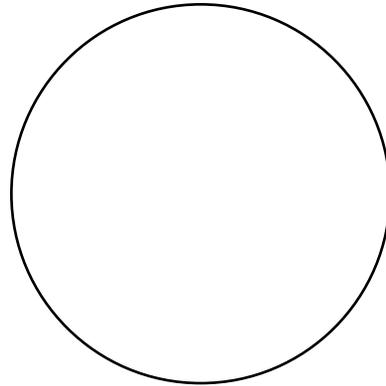


Step—Paired questions:

What would you **do** on the basis of these trends?

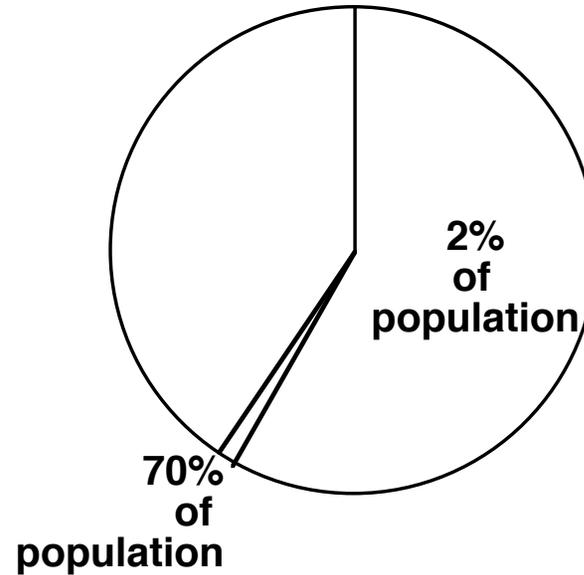
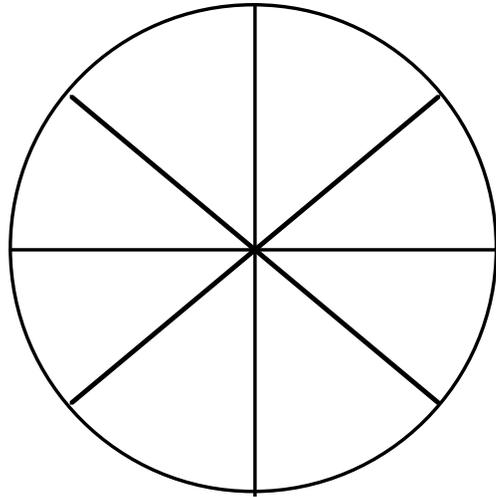
What more would you want to **know** about the trends before deciding what to do?

Step—Simple theme to open up complex issues:



Area 10,000 ha
Initial number of families 100
Population growth 3% per year

generation	0	1	2	3	4	5	6	7
area/family	100	50	25	12.5	6.2	3.1	1.6	.8



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Initial number of families 100
Population growth 3% per year

generation	0	1	2	3	4	5	6	7	8
area/rich family	3000	1500	750	375	188	94	47	23	12
area/middle family	136	68	34	17	8.5	4.2	2.1	1.1	
area/poor family	2.9	1.4	.7						

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Step—Simple theme to open up complex issues: The analysis of **causes** and the **implications** of the analysis change qualitatively if **uniform units** are replaced by **unequal units subject to further differentiation** as a result of their **linked economic, social and political dynamics**.

uniform
units



differentiated
dynamics

Step—Simple theme to open up complex issues:
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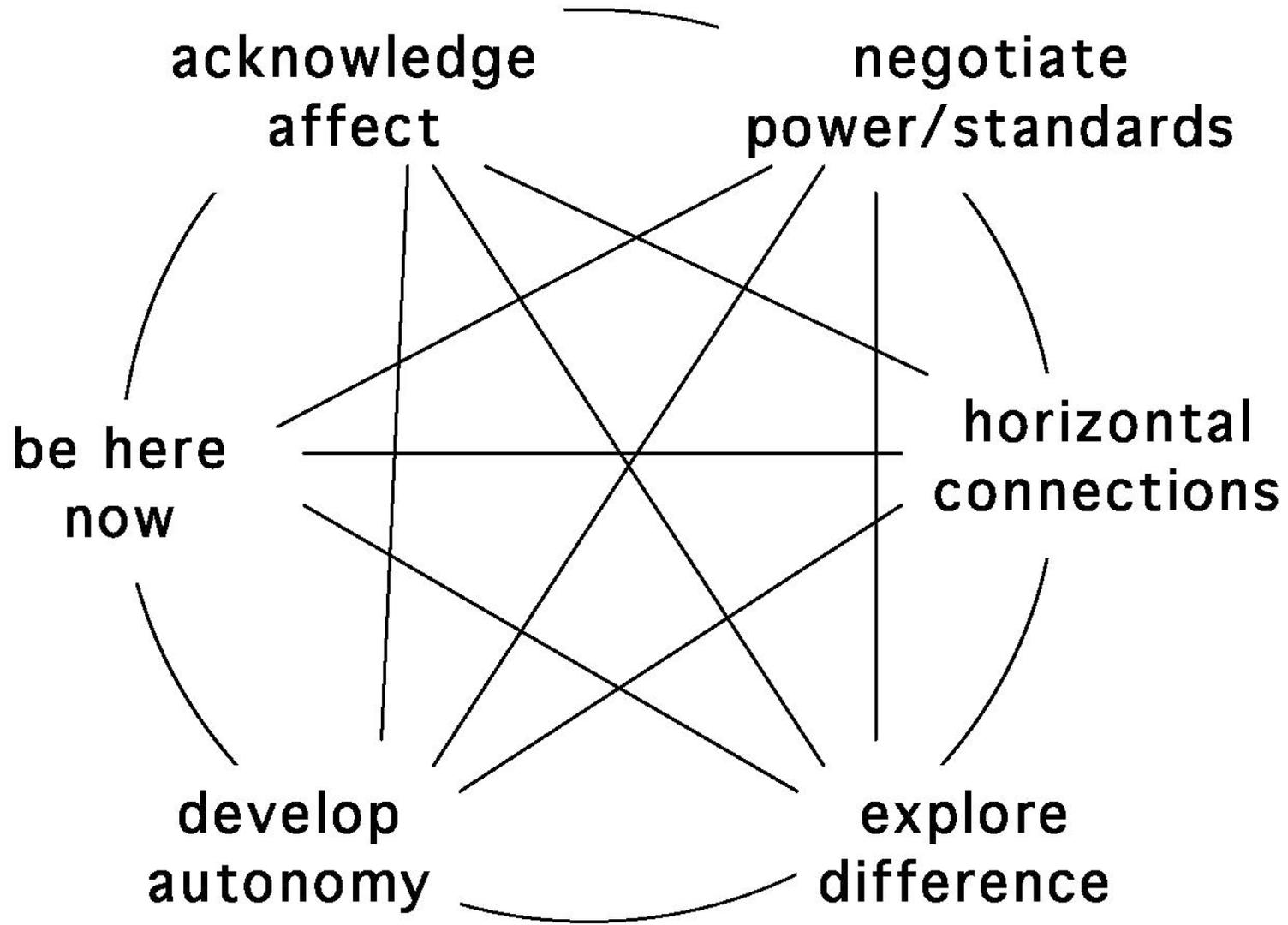
move through uncertainty...

what has been established cannot be taken for granted.

students... have to take a great deal of responsibility for their own learning

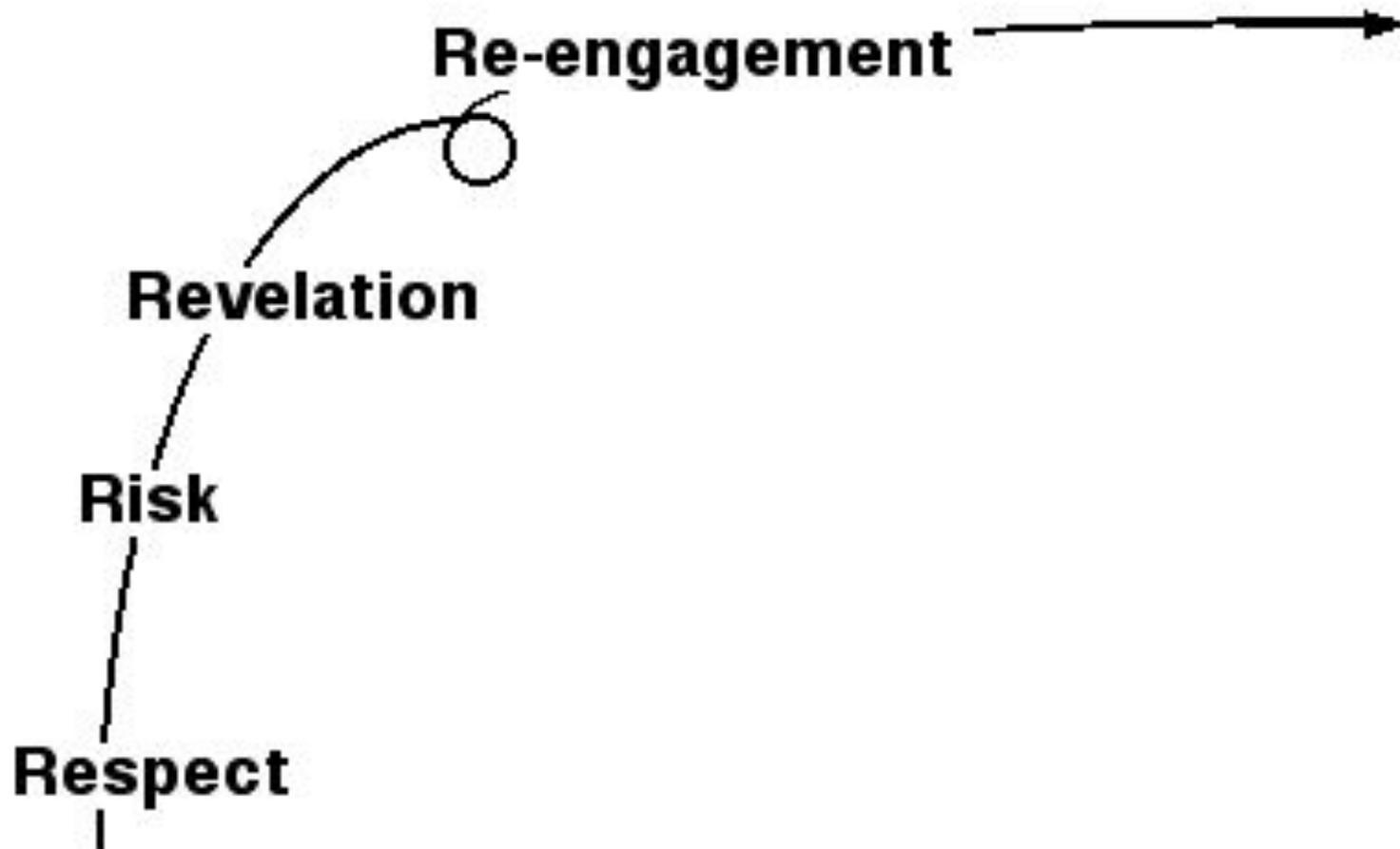
Deficit  **Support**
incl. **Schemas**

1999

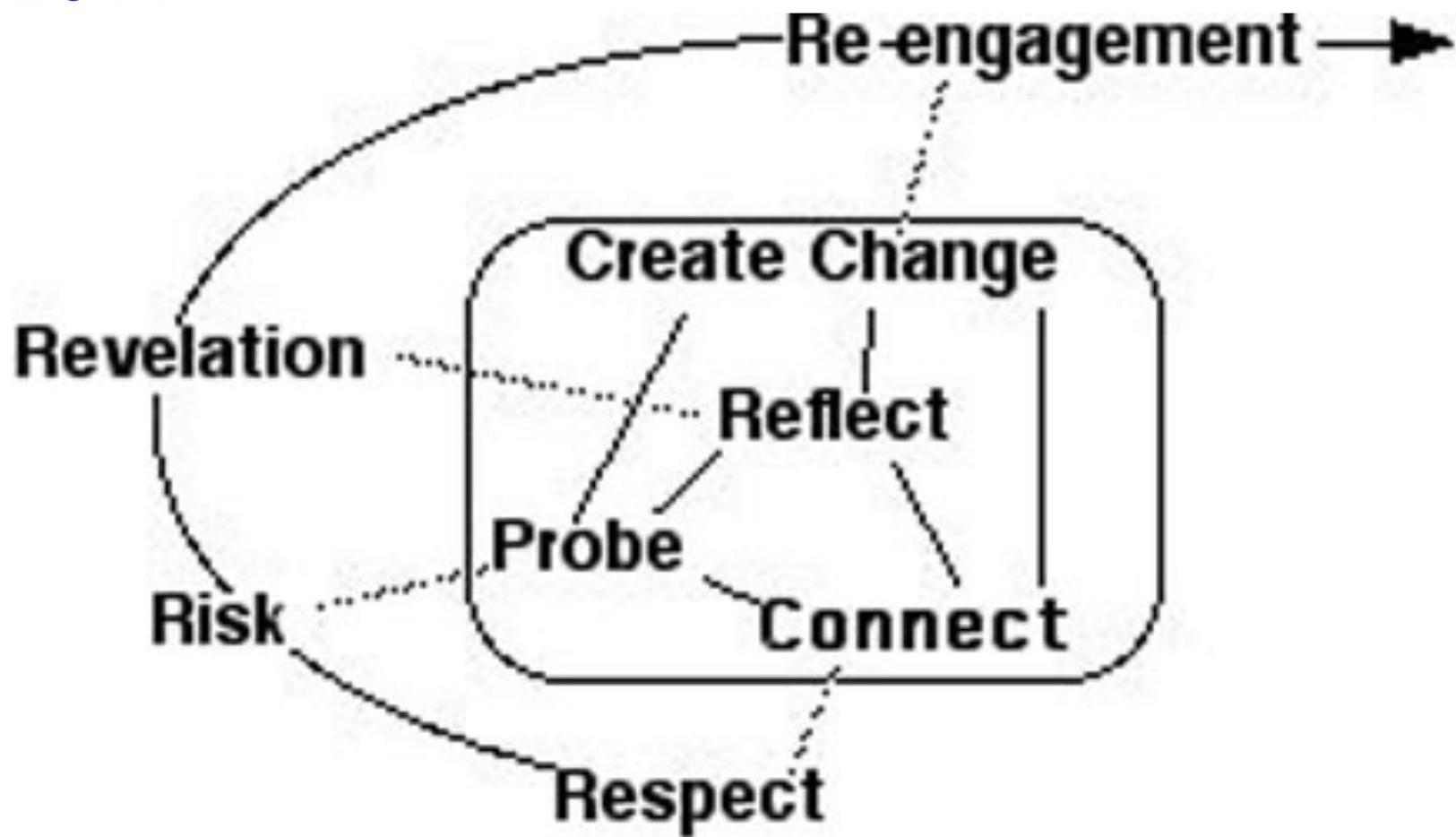


2008

Four Rs of developing as a collaborator



2011



Indirect = Help people make knowledge and practice from insights and experience that they are not prepared, at first, to acknowledge.

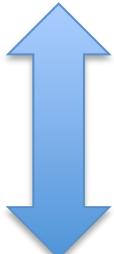
Related challenges:

- a. Help students to **generate questions** about issues they were not aware they faced.
- b. **Acknowledge and mobilize the diversity** inherent in any group.
- c. **Help students clear mental space** so that thoughts about an issue in question can emerge that had been below the surface of their attention
- d. Teach students to **listen well**.
- e. **Support students on their journeys** into unfamiliar or unknown areas.
- f. Encourage students to **take initiative in and through relationships**.
- g. **Address fear** felt by students and by oneself as their teacher.
- h. Have confidence and patience that students will become more invested in the process and the outcomes when **insights emerge from themselves**.
- i. **Raise alternatives**.
- j. Introduce and motivate **opening up themes**.
- k. Be **patient and persistent** about students taking up the alternatives.
- l. Take seriously the **creativity and capacity-building** that follows from **well-facilitated participation**.

**assessing critical
thinking??**

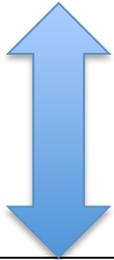
assessing critical thinking??

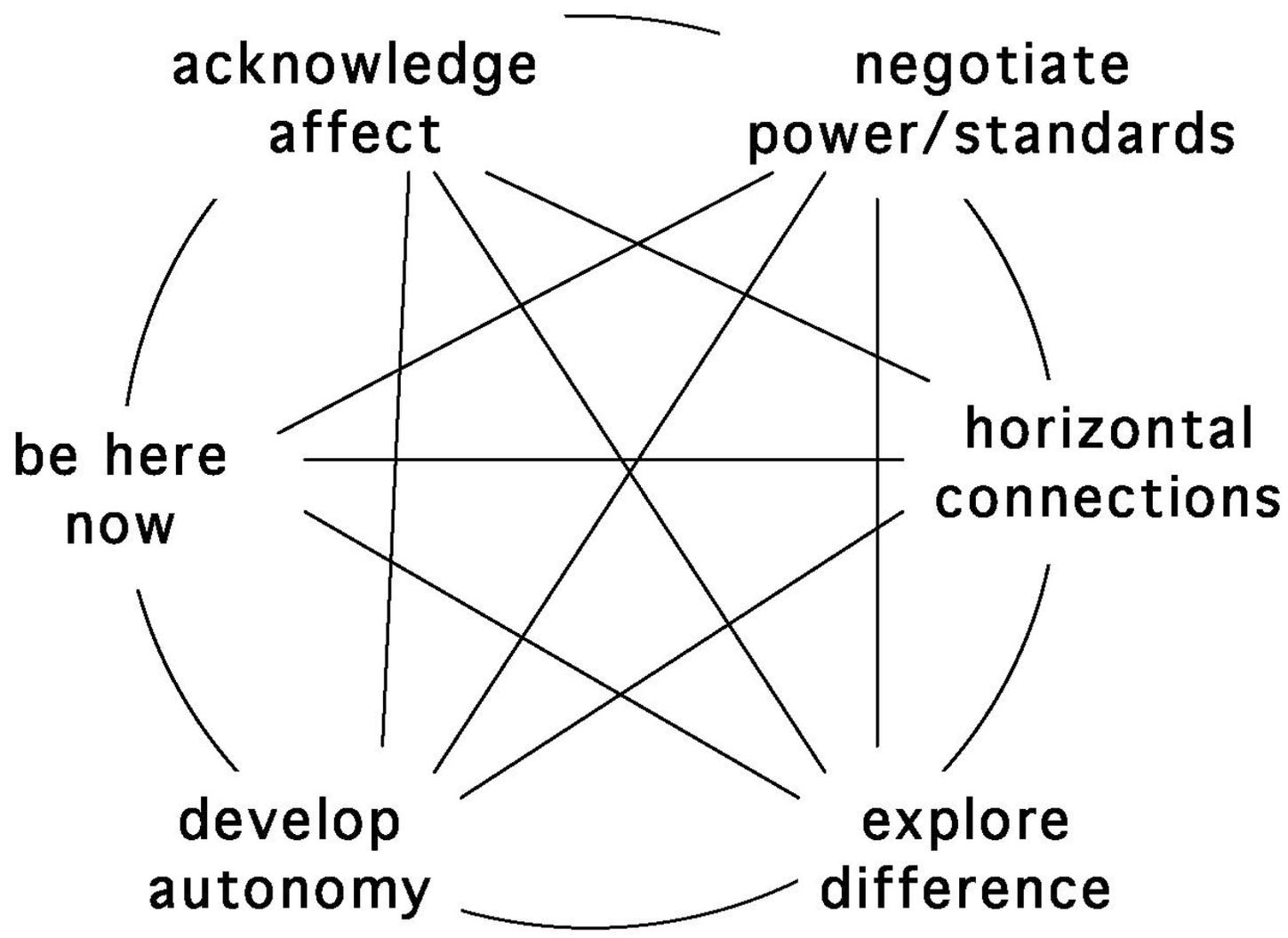
Many different assessments

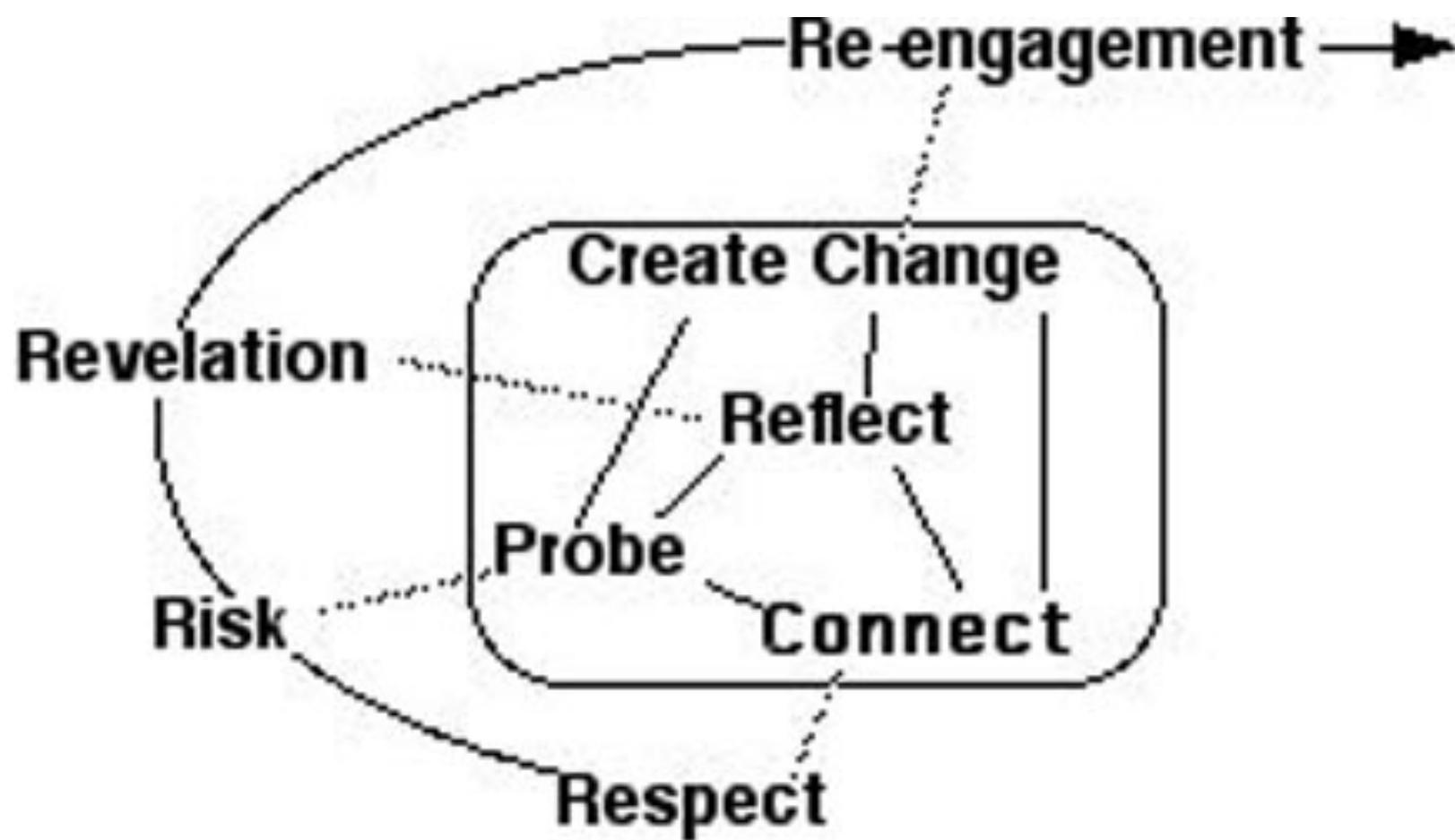
	Students
direct	focal outcome
	process themes, tools
indirect	autonomy as learner

assessing critical thinking??

Many different assessments

	Students	Teachers
direct	focal outcome	<--
	process themes, tools	<--
indirect	autonomy as learner	<--





assessing critical thinking??

Multiple and Complex
assessments

assessing critical thinking??

Multiple and Complex
assessments

-> Simple Routine

Tool 3: Plus-Delta

appreciation (*plus*)

then

suggestion for further development (*delta*)

Tool 3: Plus-Delta

Speaker Shwpi

Commenter Joe

Plus (one thing you appreciated)

Love the explanation of book knowledge and how it relates to / differs from science

Delta (one thing that could be developed further)

The large quote @ the end was kind of distracting

Speaker Jonathan

Commenter Joe

Plus (one thing you appreciated)

Connecting the Talented Tenth to historic of progress is really cool

Delta (one thing that could be developed further)

How does the Communism + Socialism stuff relate back to science? May have just missed it, I'm tired.

Speaker Heather

Commenter Joe

Plus (one thing you appreciated)

Showing different views of knowledge production + how once it's out there in the world, it can't necessarily be retracted is really cool

Delta (one thing that could be developed further)

The data on the trust slide could be explained ~~more~~ a bit more thoroughly.

Speaker Keshav

Commenter Joe

Plus (one thing you appreciated)

Really cool topic, complex ideas that I think you've narrated well

Delta (one thing that could be developed further)

Do you need to talk about Said?

Tool 3: Plus-Delta

Principle 3: Cultivate the dispositions for critical and creative thinking.

Provide comments for each...	Well done	Needs development
<p>Environment: Communicates expectations for applying thinking dispositions. <i>e.g.</i> Displays posters that promote dispositions.</p>		
<p>Behavior: Encourages and rewards displays of dispositions. <i>e.g.</i> That's very open-minded., I like the way you're seeking other opinions.</p>		
<p>Strategies: Uses activities that Call for the dispositions. <i>e.g.</i> role play, what's another way to approach this problem?</p>		

Principle 4: Use the language of thinking in your classroom.

Provide comments for each...	Well done	Needs development
<p>Environment: Conspicuously displays thinking words in classroom. <i>e.g.</i> posters, charts, webs</p>		
<p>Behavior: congratulates use And identification of thinking words. <i>e.g.</i> You used/noticed the word claim, investigate, conclude.</p>		
<p>Strategies: Uses thinking language in lessons, activities and discussions. <i>e.g.</i> Can you justify..., How would you interpret..?</p>		

Tool 3: Plus-Delta

Self-assessment by participants

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measurable?  what we are interested in

Tool 3: Plus-Delta

Self-assessment by participants

"What we can measure is by definition uninteresting and what we are interested in is by definition unmeasurable" (R. C. Lewontin 1974)

measurable?  what we are interested in

What we can measure over a semester or program of study is not as interesting—and possibly a diversion from—what we are interested in:...

Consider your teaching in relation to each of the following themes or processes, state **one thing that you have done well (+)** and **one thing to develop further (Δ)**.

1. Support indirect path(s) to desired educational outcome(s)
2. Help students understand facts, theories, and practices by placing them *in tension with alternatives*
3. Because students always bring a lot of knowledge about the topic, allow that to be brought to surface and acknowledged.
4. What students really learn from a class is what they integrate with their own history and concerns.
5. Before you simply push ahead use processes that clear mental or emotional space to allow students' ideas about an issue to begin to come to the surface.

Extensions

Shortlink = bit.ly/CTMay15

Peter J. Taylor, Univ. of Massachusetts Boston
<http://www.faculty.umb.edu/pjt>

Critical & Creative Thinking graduate program,
<http://www.cct.umb.edu>

Science in a Changing World graduate track,
<http://www.cct.umb.edu/sicw>

Handbook of tools & processes:



TAKING YOURSELF SERIOUSLY
Processes of Research and Engagement

Peter J. Taylor and Jeremy Szteiter

Plus-Delta on this Presentation

<http://bit.ly/PlusDelta>

or

use the bottom of the handout & tear off