

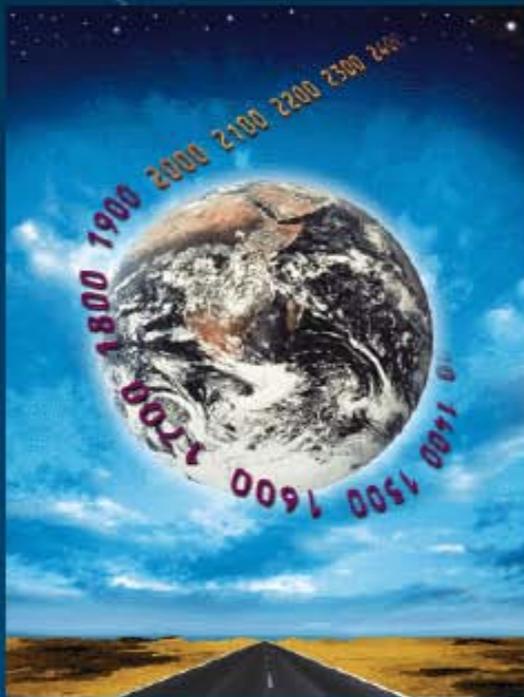
# Considerations when combining information from multiple and innovative item formats for inferences about students

Kathleen Scalise, University of Oregon, RILS

Sept. 22, 2011

## The Assessment and Teaching of 21<sup>st</sup> Century Skills project

### Sampling, data and validation



Most Constrained

Least Constrained

Fully Selected

Intermediate Constraint Item Types

Fully Constructed

Less Complex



More Complex

	1. Multiple Choice	2. Selection/ Identification	3. Reordering/ Rearrangement	4. Substitution/ Correction	5. Completion	6. Construction	7. Presentation
1A. True/False	2A. Multiple True/False	3A. Matching	4A. Interlinear	5A. Single Numerical Constructed	6A. Open-Ended Multiple Choice	7A. Project	
1B. Alternate Choice	2B. Yes/No with Explanation	3B. Categorizing	4B. Sore-Finger	5B. Short-Answer and Sentence Completion	6B. Figural Constructed Response	7B. Demonstration, Experiment, Performance	
1C. Conventional Multiple Choice	2C. Multiple Answer	3C. Ranking and Sequencing	4C. Limited Figural Drawing	5C. Cloze-Procedure	6C. Concept Map	7C. Discussion, Interview	
1D. Multiple Choice with New Media Distractors	2D. Complex Multiple Choice	3D. Assembling Proof	4D. Bug/Fault Correction	5D. Matrix Completion	6D. Essay and Automated Editing	7D. Diagnosis, Teaching	

Intermediate Constraint Taxonomy available at: <http://pages.uoregon.edu/kscalise/>

# Intermediate Constraint Taxonomy



Representation above  
downloaded from  
human clock example,  
see citation.

Available with all open source at:  
<http://pages.uoregon.edu/kscalise/>

# Intermediate Constraint Taxonomy

Most Constrained  Least Constrained

Less  
Complex



More  
Complex

1. Multiple Choice	2. Selection/ Identification	3. Reordering/ Rearrangement	4. Substitution/ Correction	5. Completion	6. Construction	7. Presentation/ Portfolio
1A. True/False	2A. Multiple True/False	3A. Matching	4A. Interlinear	4C. Single Limited Figural Drawing 5B. Answer & Sentence Completion	6A. Open-Ended Multiple Choice	7A. Project
1B. Alternate Choice	2B. Yes/No with Explanation	3B. Categorizing	4B. Sore-Finger		6B. Figural Constructed Response	7B. Demonstration, Experiment, Performance
1C. Conventional or Standard Multiple Choice	2C. Multiple Answer	3C. Ranking & Sequencing	4C. Limited Figural Drawing	5C. Cloze-Procedure	6C. Concept Map	7C. Discussion, Interview
1D. Multiple Choice with New Media Distractors	2D. Complex Multiple Choice	3D. Assembling Proof	4D. Bug/Fault Correction	5D. Matrix Completion	6D. Essay & Automated Editing	D. Diagnosis, Teaching

# KEYS for Multiple Innovative Measures

- [ Inference Argument is Strongly Linked to Framework (**Get-There 1: Three-Level Framework**)
- [ Framework then is Empirically\* Modeled Iteratively with Data, to explore and validate the “space” (**Get-There 2: Empirically Modeled**)
- [ Expert AND Empirical Studies Build Strong Theory (**Get-There 3: Building Strong Theory so we can make and test inferences**)

\* We are using a Latent Trait Model, some projects use Latent Categorical, and efforts just beginning on hybrids.

# Goal of the ATC 21st Century Project

— [ Empowering students to succeed with the skills essential for the 21st-century workplace.

250 researchers across 60 institutions worldwide categorized 21st-century skills into four broad categories:

— [ **Ways of thinking.** Creativity, critical thinking, problem-solving, decision-making and learning

— [ **Ways of working.** Communication and collaboration

— [ **Tools for working.** Information and communications technology (ICT) and information literacy

— [ **Skills for living in the world.** Citizenship, life and career, and personal and social responsibility

The ATC21S project has now moved from conceptual to practical, working with two skills from the four categories:

— **Collaborative problem-solving.** Working together to solve a common challenge, which involves the contribution and exchange of ideas, knowledge or resources to achieve the goal. (CPS adopted for Pisa 2015)

— **ICT literacy — learning in digital networks.** Learning through digital means, such as social networking, ICT literacy, technological awareness and simulation. Each of these elements enables individuals to function in social networks and contribute to the development of social and intellectual capital.

## Demonstration Countries

Four founder countries are working closely with ATC21S to ensure the project meets the needs of governments: educational assessment for 21st-century skills.

- Australia
- Costa Rica
- Finland
- Netherlands
- Singapore
- United States



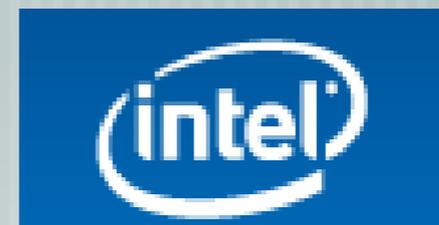
# Sponsors and Advisory Panel

Three international companies with a vested interest in building a skilled workforce for the future.

Cisco, Intel, Microsoft



OECD, IEA,  
UNESCO, World  
Bank, Inter American  
Development Bank,  
U.S. National  
Academy of Sciences



# ATC21S White Papers

ATC21S' foundational research, written by more than 60 of the world's top education researchers.

<http://atc21s.org/index.php/resources/white-papers/>

- [ 21st-Century Skills
- [ Methodological Issues
- [ Technological Issues
- [ Custom Learning Environments and Formative Evaluation
- [ Policy Frameworks for New Assessments

# UC Berkeley & University of Oregon Participation

UNIVERSITY OF CALIFORNIA  
**BERKELEY** Graduate School of **Education**

- google search site
- last, first find people
- admissions programs
- people courses
- giving research
- news administration
- publications resources

- prospective students
- alumni & visitors
- current students
- faculty & staff

- subscribe to news
- news contact
- gse-bulletin
- connected magazine (pdf)
- gse in the media
- publications
- media resources
- gse events calendar
- ucb events calendar
- ucb news center

gsE-news

January 2009 > Faculty > G

## Wilson to Lead Inter



A white paper drafted with in need of an overhaul and

"Many previous, well-meaning attempts designed for last century's efforts have assessed what important to measure."

UNIVERSITY OF OREGON | UO Home | COE Home

## College of Education

Kathleen Scalise  
 Associate Professor, Educational Methodology, Policy, and Leadership

Students | Faculty | Alumni | Guests | Prospective Students

Most Constrained Fully Selected	Intermediate Constraint Item Types					Least Constrained Fully Constructed
1. Multiple Choice	2. Selection/ Identification	3. Reordering/ Rearrangement	4. Substitution/ Correction	5. Completion	6. Construction	7. Presentation
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Less Complex (top) / More Complex (bottom)

ology, Policy, and  
 east wing)  
 ea of e-learning  
 nalysis of student  
 models,  
 ssment, dynamic

# Three Tasks and Assignments to assess ICT Literacy

— [ Webspiration (Graphic Organizers, Creating and Listening to Audio and video)

— [ Arctic Trek  
(Collaborative Notebook, Information Foraging)

— [ 2 Language Chat (Chat-room, Spreadsheet)



# Ambitious, Real-World Requirements

— [ Rich Information. Real resources out on the web.

— [ Real Tools. Cloud-tools.

— [ Real Environment. Not walled gardens.

— [ Networks of People. Not the person next to you.

# What We Want To know.

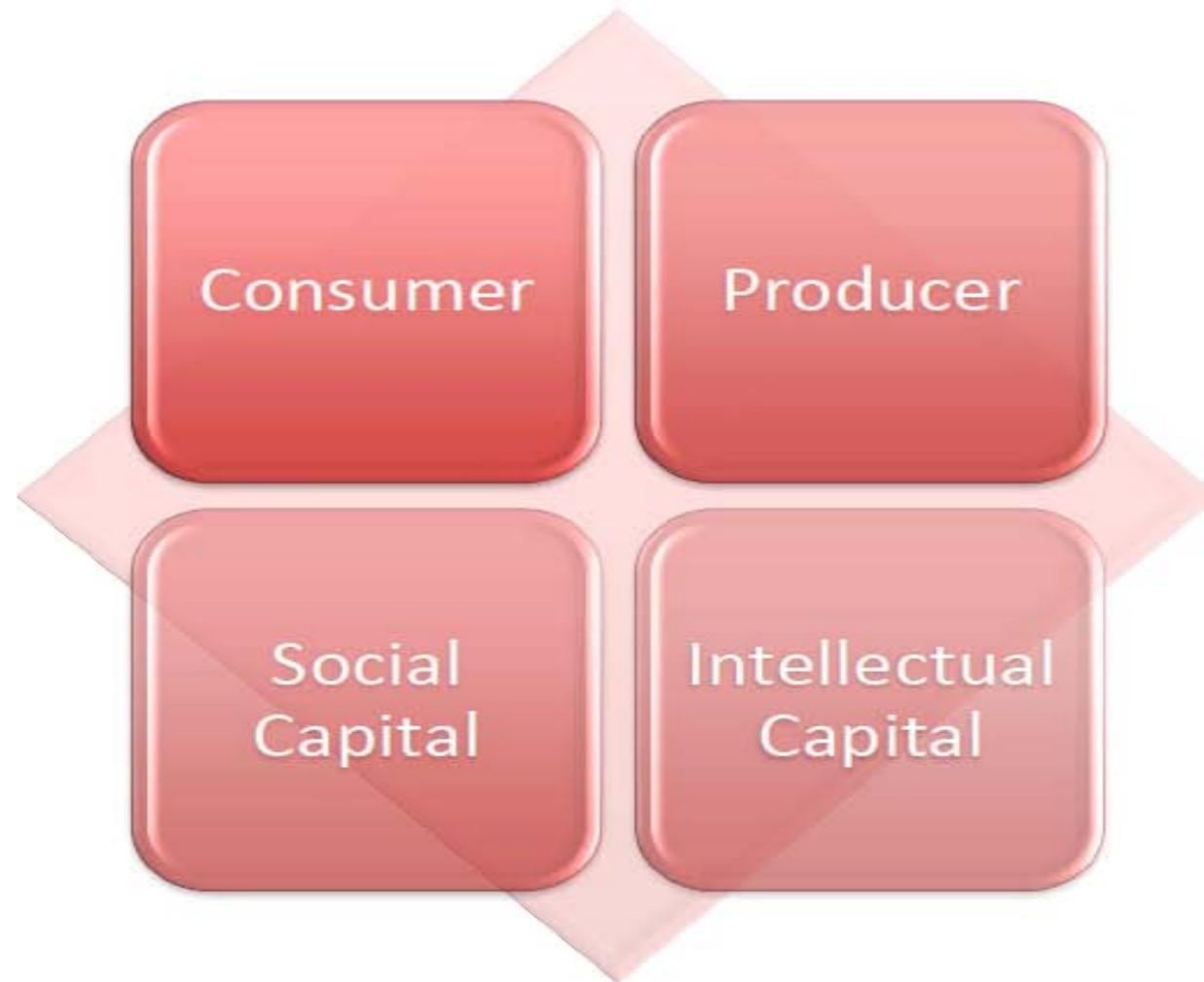
How did the students perform?

Why is this relevant to student futures?

Are the Assessments Valid & Reliable?



# How Did The Students Perform?



# Producer in Networks

## Creative producer

Team situational awareness in process  
Optimize assembly of distributed contribution to products  
Extending advanced models (e.g. business models)  
Producing attractive digital products using multiple technologies / tools  
Choosing among technological options for producing digital products

## Functional producer

Establishing and managing networks & communities  
Awareness of planning for building attractive websites, blogs, games  
Organizing communication within social networks  
Developing models based on established knowledge  
Developing creative, expressive or complex content artifacts  
Awareness of security & safety issues (ethical and legal aspects)  
Using networking tools and styles for communication among people

## Emerging producer

Produce simple representations from templates  
Start an identity  
Use a computer interface  
Post an artifact





## Directions

You will work with a group online to think about a poem. Read poem: Way of the Water Hyacinth.

Information: [VIDEO COLLECTION](#) [POEM TEXT](#) [TERMS](#) [AUTHORS](#) [DICTIONARY](#) [BASICS](#)



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**1** 2 3 4 5 6 7 8 9

# Use in Teaching & Learning, as described by a teacher:

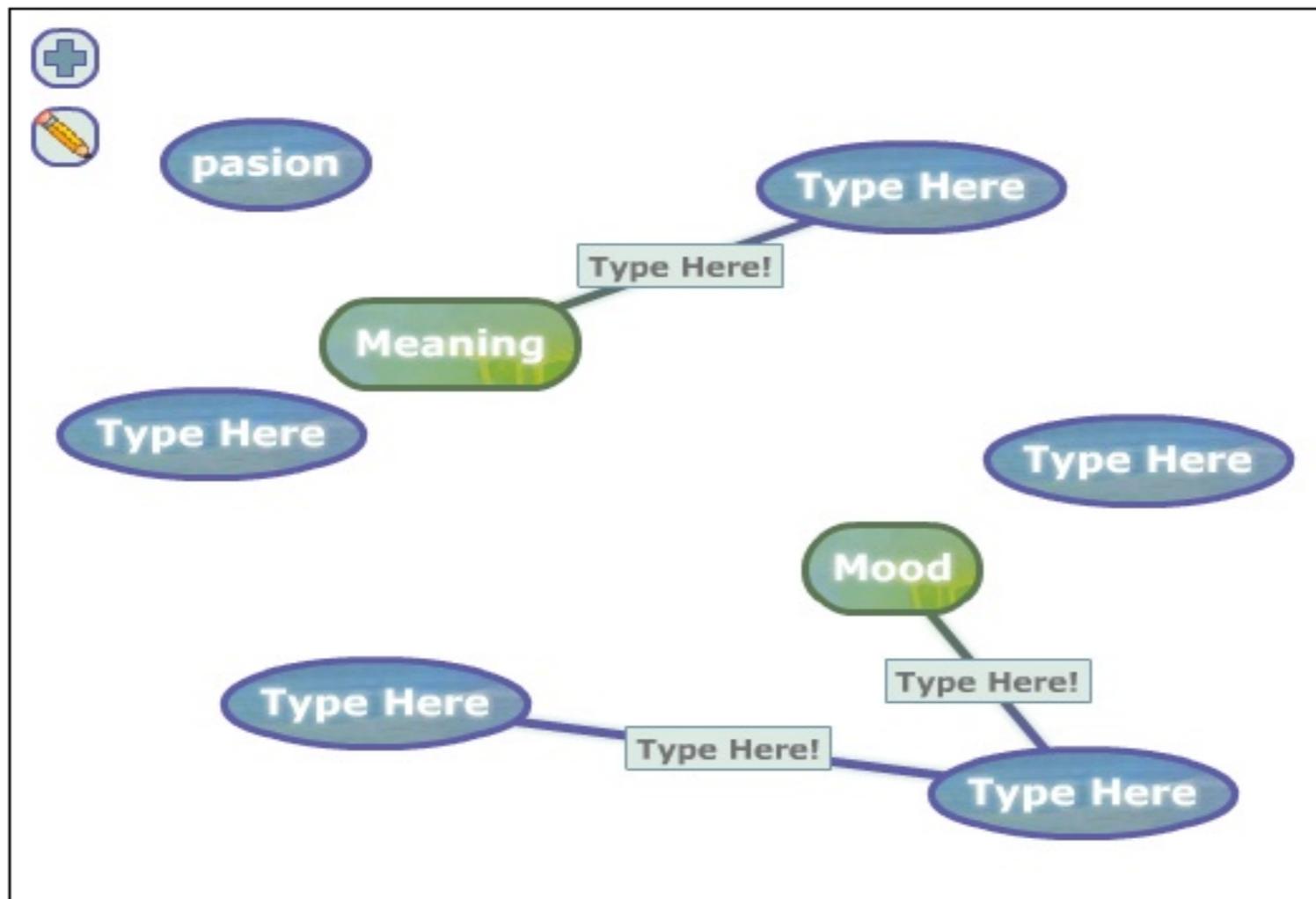
"An eighth grade language arts teacher is in the midst of a unit on poetry. As part of their work for the unit, **students read and analyze the language, mood, and meaning of various well-known poems**. The teacher has noticed that students are having difficulty articulating the moods and meanings of some of the poems. **They tend to wait to hear what the teacher has to say**, and then agree with that assumption.

"In order to **help students formulate their own ideas** on the poems read as a class, the teacher has decided to create a Webspiration page. She will direct the class to use Webspiration to collaboratively create an idea map analyzing each poem that they read. Students can submit their own ideas or build off of classmates' thoughts."

# My Poem Graphic Organizer

Can you think of some ideas about this poem's Mood and Meaning?

Type into BLUE BUBBLES, and connect with the  PENCIL TOOL



## Your Pasted Poem:

Paste Poem Text Here.  
by Zawgee

Bobbing on the breeze blown  
waves  
Bowing to the tide  
Hyacinth rises and falls

Falling but not felled  
By flotsam, twigs, leaves  
She ducks, bobs and weaves.

Ducks, ducks by the score  
Jolting, quacking and more  
She spins through?

Spinning, swamped, slimed,  
sunk  
She rises, resolute  
Still crowned by petals.

*Time to Create!*

*Make Audio*

Find a poem you like online.

What is the title of the poem you selected?

Paste a web address to your poem here.

Without help, can you find a way to record a ONE-MINUTE audio commentary describing why you like the poem?

Yes

No



# ACT21S Assessment Blueprint

## *Assessment Blueprint ATC21S Demonstration Tasks: ICT Literacy*

Levels (Progressive)	ICT Literacy – Learning in digital communities CONSTRUCT/Learning Outcomes				Total
	Consumer	Producer	Social Capital	Intellectual Capital	
Level 4	N/A	N/A	Web 0 Arctic 1 2LChat 0	Web 0 Arctic 0 2LChat 0	Web: 0 Arctic: 1 2LChat: 0
Level 3	Web 0 Arctic 2 2LChat 0	Web 0 Arctic 2 2LChat 0	Web 0 Arctic 6 2LChat 1	Web 10 Arctic 2 2LChat 1	Web: 10 Arctic: 12 2LChat: 2
Level 2	Web 8 Arctic 6 2LChat 0	Web 4 Arctic 16 2LChat 8	Web 7 Arctic 0 2LChat 6	Web 6 Arctic 7 2LChat 0	Web: 25 Arctic: 29 2LChat: 14
Level 1	Web 2 Arctic 2 2LChat 2	Web 4 Arctic 0 2LChat 6	Web 1 Arctic 0 2LChat 6	Web 2 Arctic 2 2LChat 0	Web: 9 Arctic: 4 2LChat: 14
Total	Web: 10 Arctic: 10 2LChat: 2	Web: 8 Arctic: 18 2LChat: 14	Web: 8 Arctic: 7 2LChat: 13	Web: 18 Arctic: 11 2LChat: 1	<b>120 per age group plus PU/FP/HUE, Practice, &amp; Covariates</b>

\*Some CR items (Constructed Response) will measure *up through* the listed level (listed level is top score).

# “Explain how your ideas about the poem changed after sharing:”

— [ Age 11 (The Sloth): Singapore: “All the small ideas from the group will become one big idea.”

— [ Age 13 (Way of the Water Hyacinth): U.S.: “Because once I read it again and saw what other people were saying, it made sense to me on what they were saying.”

— [ Age 15 (Sonnet 29): Singapore: “After sharing, I feel that others have the same thoughts as me. I have understood the poem better.”



Logout

2. GLOBAL COLLABORATION CONTEST 2011



# ARCTIC TREK

Track down the answers  
*Over the ice*

[ATC21S](#) [Companies](#) [Countries](#) [Developers](#)

[Back](#)

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# Opportunities: Most Recent Teacher Feedback before Berlin Meetings (USA)

“Overall the students were engaged and enjoyed the session.”

“Students wanted to know if they can download the Kudo game. Some students asked how they can chat?”

“The students seemed frustrated during the first session because they could not ask me questions, but they were much more comfortable the second session.”

“Most students had a positive experience and preferred this assignment to paper /pencil assignments.”

“Students preferred Arctic Trek, maybe due to topic, maybe due to comfort level since it was the second session.”

“If I administer this in my class, I would want to monitor student computers by using a program such as NetOps. This would allow me to deter and minimize unproductive chatting. “

# Are the Assessments Valid & Reliable?

- [ Do Assessments Measure What Was Intended?
- [ Are Assessments Reproducible?

# Are the Assessments Valid?

- [Do Assessments Measure What Was Intended?
- [Construct Does the data set match the construct?
- [Content Is the content sample reasonable?
- [Criterion Can conclusions be compared to another data source?
- [Consequential Are the consequences of using assessment acceptable?



# Are the Assessments Reliable?

- [Are Results Reproducible?
- [Inter-Rater (Do 2 raters come up with the same results?)
- [Test / Retest (Do same results occur on multiple tests?)
- [Alternate Forms (Do 2 different tests yield same results)
- [Split Halves (Does splitting test it into 2 pieces yield same results)

# How is Inference Argument Made?

Remember prior slide:

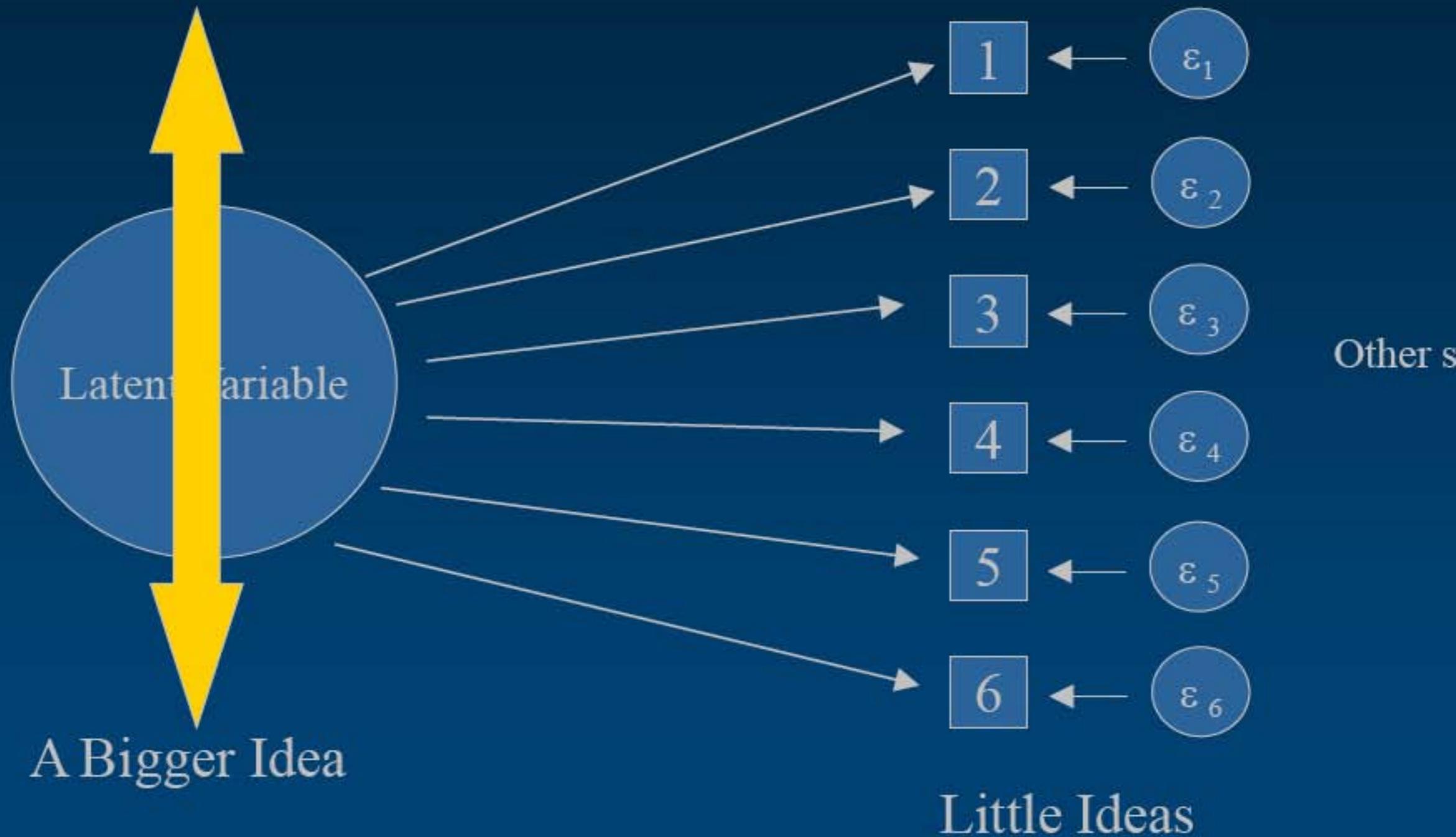
— [ Get-There 1: 3-Level Framework

— [ Get-There 2: Empirically Modeled

— [ Get-There 3: Building Strong Theory



# Latent Variables, Manifest Variables and a Sense of Direction



# Data-Driven Inference Process

Ask yourself: What do we mean in measurement by  
“Latent Trait”?

Obtaining Data:  
Cognitive Labs  
Pilots  
Trials

# 3-Level Assessment Blueprint Process

Task Title*	Task Segment	BP3_Code	Strand	Level	Auto	Hand	Descriptor	Item Name	Item Desc	Task Id	Dir
Screen01-Sc01	Opener						Opening screen		none	42	Sc
Screen03-Sc01v2	WebA Preorganizer						Read the poem text			165	Sc
		A1L	FP	1	1			1 Item	External Info Links		
		A2	C	1	1			WebA2	In-page link: poem text		
Screen07b-Sc01							Find poem video			132	Sc
		C1	C	2	FTA?	1		WebC1	CR: What speaker likes poe		
		C1L	FP		1			WebC1_Links	External Info Links		
		C1P	C	1	1			WebC1_PageLinks	In-page links: Poem video p		
ConceptMapTester5							Preorganizer concept map			45	Sc
		A8L	FP		1			WebA8_Links	External Info Links		
		A8P	FP		1			WebA8_PageLinks	In-page links: Mood and M		
		A8	P	2	LDA?	1		WebA8	Concept Map jpg		
		CX1	P	1	1			ConceptMapTester5	Text and position of nodes		



# More Information

Kathleen Scalise, [kscalise@uoregon.edu](mailto:kscalise@uoregon.edu)

Intermediate Constraint Taxonomy:  
<http://pages.uoregon.edu/kscalise/>

ATC21S project:  
<http://atc21s.org/>