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Forms
Regards
Learning

EVIDENCE OF STUDENT LEARNING AND CHANGE

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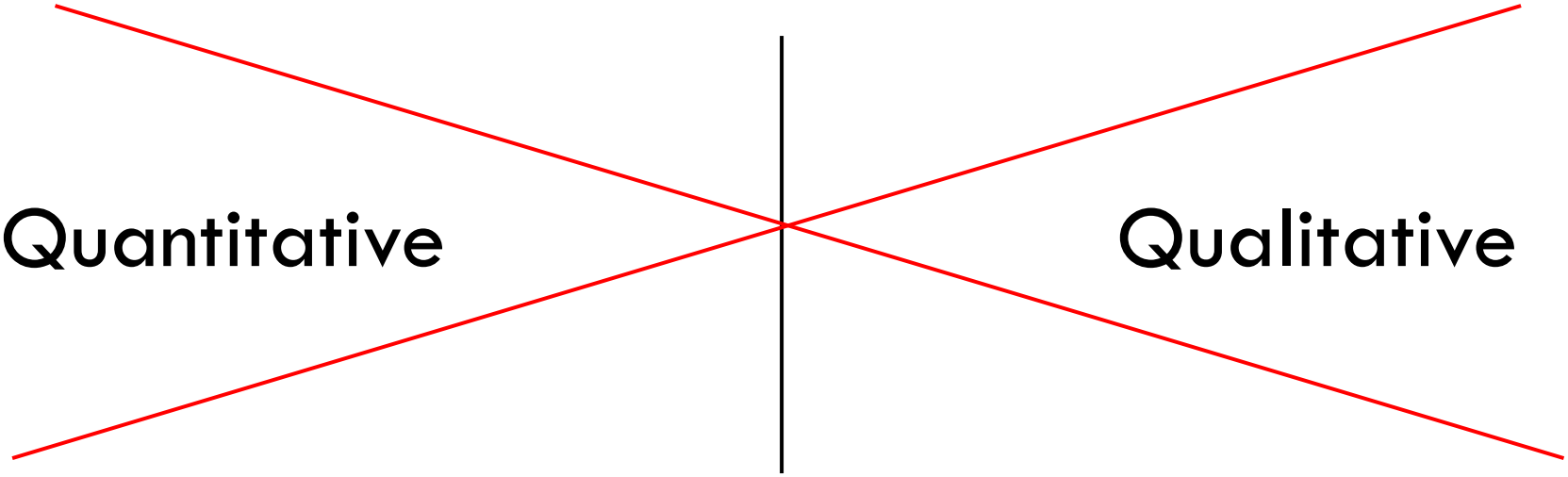
SENCER Summer Institute 2017

Some General Considerations

- Direct vs. indirect
- Quantitative vs. qualitative
- Triangulation



Quantitative

Qualitative

Some General Considerations

- Direct vs. indirect
- Quantitative vs. qualitative
- Triangulation

What are some forms of evidence that we are already familiar with?

Evidence – familiar/quantitative

Scores

- pre- and post-tests
- course work and homework assignments
- quizzes, mid-terms, or final exams
- lab reports, papers, and projects
- standardized scales and tests

Survey results

- surveys of attitudes, beliefs, or satisfaction, often using a Likert scale from Strongly Disagree to Strongly Agree
- SALG
- student ratings of teaching

Evidence – familiar/quantitative

Frequency counts or percentages

- multiple-choice test item responses
- course completion rates
- participation in class, on discussion boards, etc.
- online homework system usage
- office visits

Measures of time use

- time spent online accessing homework systems or other resources

Evidence – familiar/quantitative

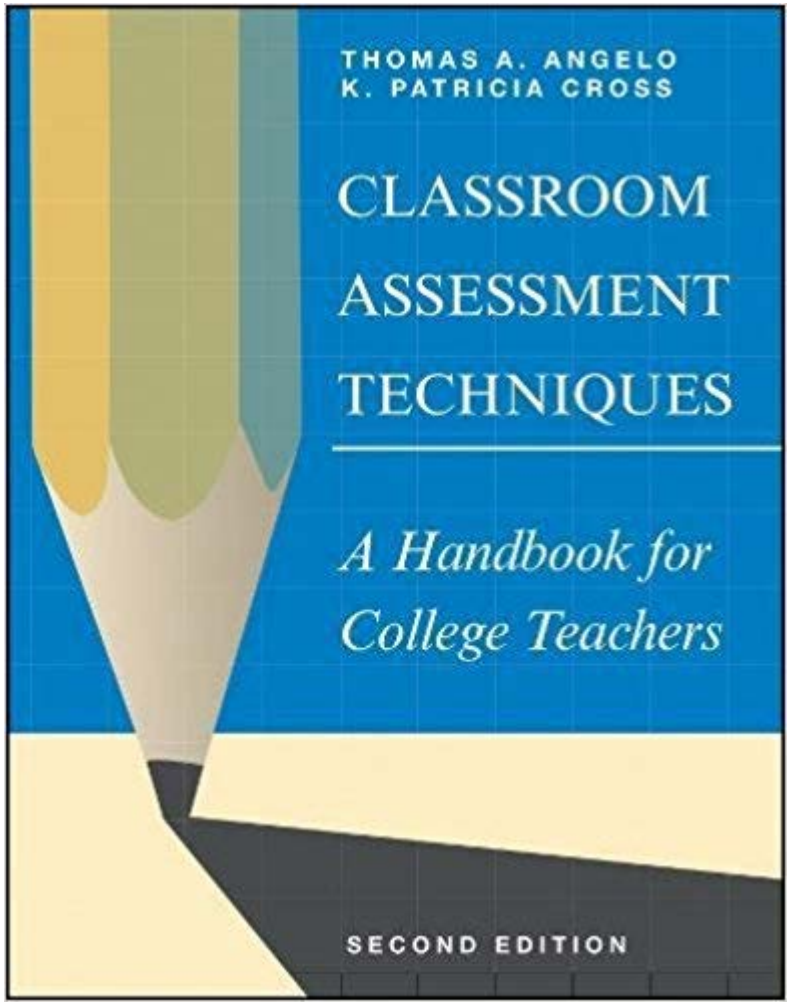
Institutional research data

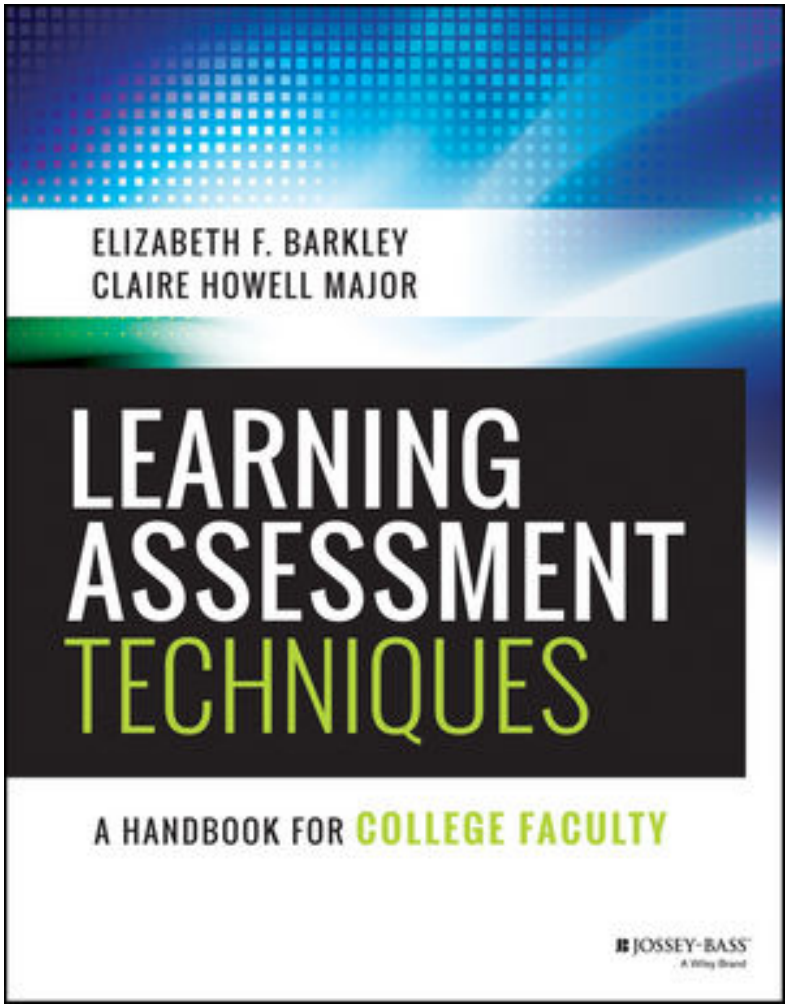
- academic transcript data (e.g., grades, GPA, admission or placement test scores)
- retention data (e.g., in course, program, major, or institution)
- enrollment in follow-up courses
- student demographics

Evidence – Less familiar forms

- Qualitative analysis of student work (rubrics, content analysis)
- Concept inventories
- Surveys designed by individual faculty members
- Interviews
- Focus Groups
- Think-alouds

CAT's and LAT's





Concept Inventories (partial list)

- Astronomy and Space Science Concept Inventory
- Biology Concept Inventory
- Calculus Concept Inventory
- Central Dogma Concept Inventory (biology)
- Chemistry Concept Inventory
- Computer Engineering Concept Inventory
- Force Concept Inventory (physics)
- Genetics Concept Inventory
- Geoscience Concept Inventory
- Precalculus Concept Inventory
- Signals and Systems Concept Inventory
- Statistical Reasoning in Biology Concept Inventory

Some More Considerations

- "You can't fix by analysis what you bungle by design."
- Not always necessary or possible to have "control" group
- Importance of Institutional Review Boards (IRB)
- Collect lots of data…but also have a strategy for analysis

Qualitative Evidence

Rubrics

Rubrics

- Guide for evaluating certain dimensions or characteristics of student work.
- For each dimension, different levels of performance are defined, labeled, and described.

AACU VALUE rubrics

VALUE (Valid Assessment of Learning in Undergraduate Education)

- Inquiry and Analysis
- Critical Thinking
- Creative Thinking
- Written Communication
- Oral Communication
- Quantitative Literacy
- Information Literacy
- Reading
- Teamwork
- Problem Solving
- Civic Knowledge and Engagement (Local and Global)
- Intercultural Knowledge & Competence
- Ethical Reasoning & Action
- Global Learning
- Foundations & Skills for Lifelong Learning
- Integrative Learning

Learning Outcome

CRITICAL THINKING VALUE RUBRIC

for more information, please contact value@aacu.org

The VALUE rubrics were developed by teams of faculty experts representing colleges and universities across the United States through a process that examined many existing campus rubrics and related documents for each learning outcome and incorporated additional feedback from faculty. The rubrics articulate fundamental criteria for each learning outcome, with performance descriptors demonstrating progressively more sophisticated levels of attainment. The rubrics are intended for institutional-level use in evaluating and discussing student learning, not for grading. The core expectations articulated in all 15 of the VALUE rubrics can and should be translated into the language of individual campuses, disc[illegible]s. The utility of the VALUE rubrics is to position learning at all undergraduate levels within a basic framework of expectations such[illegible]ing can by shared nationally through a common dialog and understanding of student success.

Definition

Definition

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Framing Language

This rubric is designed to be transdisciplinary, reflecting the recognition that success in all disciplines requires habits of inquiry and analysis that share common attributes. Further, research suggests that successful critical thinkers from all disciplines increasingly need to be able to apply those habits in various and changing situations encountered in all walks of life.

This rubric is designed for use with many different types of assignments and the suggestions here are not an exhaustive li[illegible]l thinking can be demonstrated in assignments that require students to complete analyses of text, data, or issues. Assignments that c[illegible] mode might be especially useful in some fields. If insight into the process components of critical thinking (e.g., how information s[illegible] regardless of whether they were included in the product) is important, assignments focused on student reflection might be especially illuminating.

Framing Language

Glossary

The definitions that follow were developed to clarify terms and concepts used in this rubric only.

- Ambiguity: Information that may be interpreted in more than one way.
- Assumptions: Ideas, conditions, or beliefs (often implicit or unstated) that are "taken for granted or accepted as true without proof." (quoted from www.dictionary.reference.com/browse/assumptions)
- Context: The historical, ethical. political, cultural, environmental, or circumstantial settings or conditions that influence and complicate the consideration of any issues, ideas, artifacts, and events.
- Literal meaning: Interpretation of information exactly as stated. For example, "she was green with envy" would be interpreted to mean that her skin was green.
- Metaphor: Information that is (intended to be) interpreted in a non-literal way. For example, "she was green with envy" is intended to convey an intensity of emotion, not a skin color.

Glossary

Learning Outcome

CRITICAL THINKING VALUE RUBRIC

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Definition

Definition

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

Performance Levels

Levels (4,3,2,1,0)

	Capstone	Milestones		Benchmark
	4	3	2	1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Dimensions

Performance Descriptors

ELIPSS

Enhancing Learning by Improving Process Skills in STEM (ELIPSS) is an NSF-funded project that focuses on the identification, development, and assessment of process skills (also known as professional skills, lifelong learning skills, workplace skills, transferrable skills, or soft skills) in active learning, undergraduate STEM classrooms.

Coding (Content Analysis)

Coding

Systematic way of understanding and keeping track of research data; allows researcher to focus/track certain kinds of information

Three different approaches:

1) Define clearly the activities and behaviors you want to track
2) Pull out key words that recur or illustrate some level of understanding.
3) Write categories that make sense of what you see, a student says, or a group of students describes.

Source: Visible Knowledge Project Coding Data Resource Kit

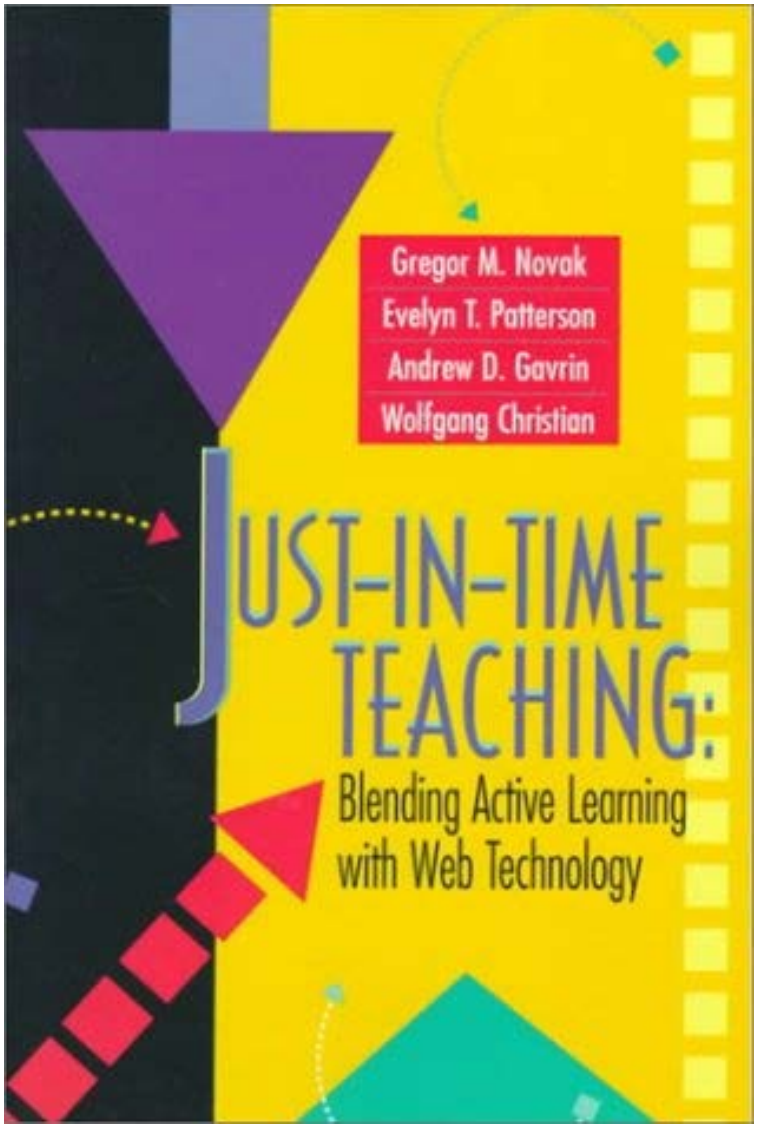
Coding

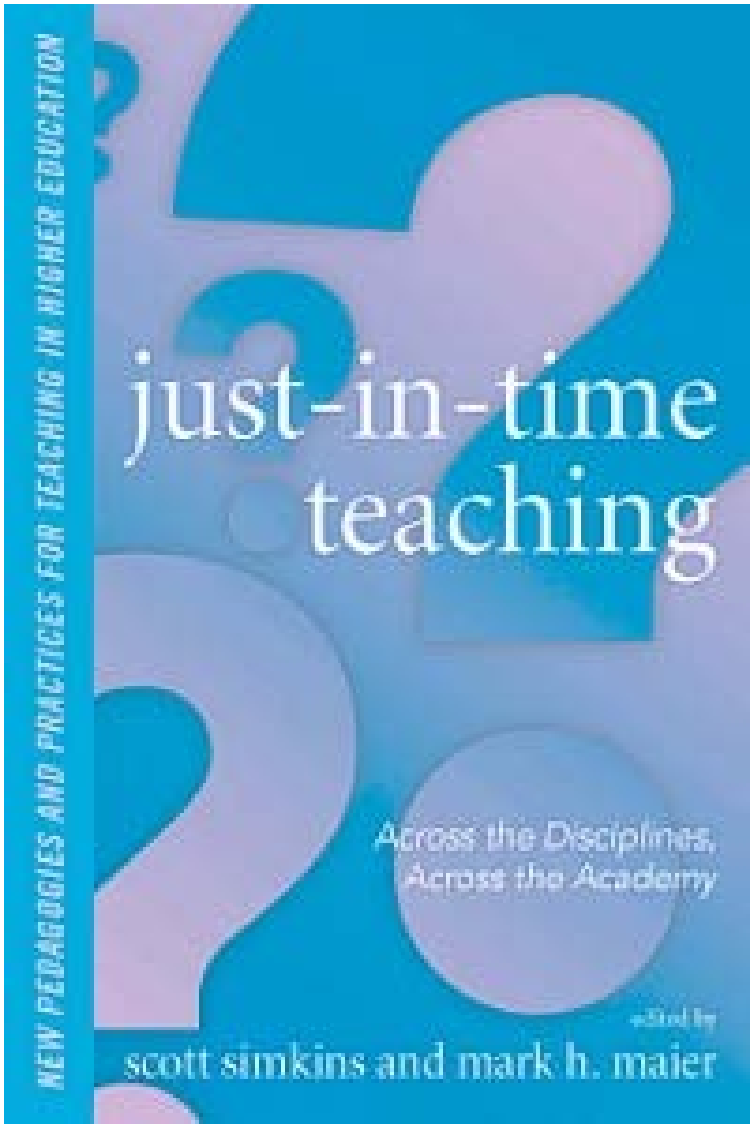
As you code, you create categories. Label these as “theoretical notes” and include any initial explanations for what you see.

After time, one category (occasionally more) emerges with high frequency of mention and is connected to many other categories. This is your "core category."

Time to experience this firsthand…

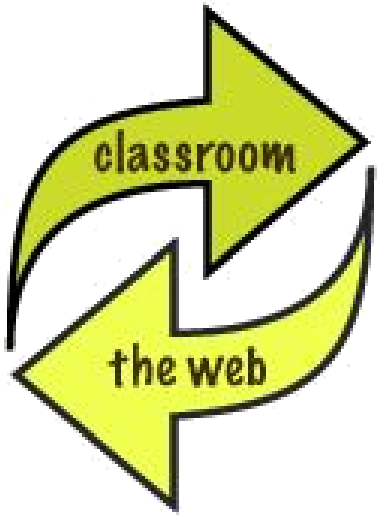
Source: Visible Knowledge Project Coding Data Resource Kit


Gregor M. Novak
Evelyn T. Patterson
Andrew D. Gavrin
Wolfgang Christian
JUST-IN-TIME TEACHING:
Blending Active Learning with Web Technology


NEW PEDAGOGIES AND PRACTICES FOR TEACHING IN HIGHER EDUCATION
just-in-time teaching
Across the Disciplines, Across the Academy
edited by
scott simkins and mark h. maier

"Just-in-Time Teaching"

- Two elements:
  - classroom activities that promote active learning
  - World Wide Web resources used to enhance the classroom component.
- Students respond electronically to web-based assignments.



Types of Questions

- Warm-ups: used at start of particular topic/concept
- Puzzles: can student apply concept, often focus on tying several concepts together
- "What is it good for?": real world applications

JiTT Design of Course

- Questions
  - made available to students through CMS
  - available until morning of day of class
  - I review responses before class and adjust what will happen in class
- Largely "graded" on effort; avoids penalizing students for wrong answer
- About 25 assignments over course of semester, less than 5% of total grade.

How JiTT Questions Were Used

- Served as a way to assess what students did and did not understand from their reading prior to class
- Served as a way to assess student understanding of a concept after it had been covered in class
- Served as a way to have students apply chemical concepts to real-world issues

Now it's your turn…

- Take the responses to question "What advantages, if any, do you see in using Just-in-Time questions as part of this course?" and spend some time coding by yourself what you see in the responses.
- At some point I'll ask you to get together with others to share what you came up with.

Coding

- For people new to coding, biggest concern is how to find **the right interpretation**.
- In practice, there can be many right interpretations.
- Essential to:
  - describe coding process that was used and
  - explain whatever resulting interpretation is put forth (textual samples are helpful)

Now it's your turn…

- Take a few minutes to respond to the prompts on the handout.
- Pair up with someone and give each other feedback on what you have written down.

Acknowledgements

- Carnegie Foundation for the Advancement of Teaching; CASTL Scholars program
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- Visible Knowledge Project

What questions do you have?

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