Assessment Overview, 2011

FCIQ 101 and FCSC 101

Interdisciplinary Studies

College of Arts and Science, Dean Roger Yu

New York Institute of Technology

Assessment Overview, 2011

This report includes selected and summarized assessment materials that have been gathered over the past two years in the Foundations of Inquiry (FCIQ 101) and the Foundations of Scientific Process (101) courses. Both of these courses are required for all entering first-year students at the New York Institute of Technology.

These Foundation courses each serve approximately 1000 entering freshman per year. FCIQ 101 is a "blended" in-person/Blackboard course (with a Blackboard Master Shell that is customized by each instructor). FCSC 101 has also developed a rich Blackboard shell to support instructors as well as cross-campus common experiments and testing.

The complexity and scale of the two courses requires constant assessment to ensure that high-quality instruction, cutting-edge topics, technology enhancements, and clear learning outcomes are maintained. Maintaining high standards is a particular challenge because of high turnover in adjunct instructors who comprise the majority of section leaders.

Our surveys, with high return rates, indicate that students are benefiting from FCIQ 101 and FCSC 101 in a number of measurable areas such as research, critical thinking, and use of technology. Students who responded to our FCIQ 101 and FCSC 101 online surveys overwhelmingly **a**gree/strongly agree that the courses make them think, make good use of multimedia materials, helped them to develop college level research methods, and had the right mix of topics. *Detailed survey responses are on pages 4 and 5.*

The assessment process has also identified areas for improvement. Based upon the information gathered here, there have already been a number of *substantive changes* to FCIQ 101 and FCSC 101 including:

1. Revision of final projects to develop student research skills and critical thinking.

2. Revision of assigned reading, topics, and modes of content delivery.

3. Revision of information literacy (research training) delivery system to a blended model.

4. Additional instructor training and more aggressive adjunct instructor recruitment.

5. Development of indirect methods of assessment to assess learning on a semester basis.

6. Additional Hands-On Experiments and Experiential Learning Opportunities.

FCIQ 101 (Foundations of Inquiry) Online Course Survey Results Summary

Office of Planning and Assessment, Fall 2011

Reported enrollment of students in FCIQ 101, 2011, fall semester was 780 students. Total of 266 students finished the survey, leading to a 34% response rate.

76% of students agreed or strongly agreed that the instructor encouraged them to think about familiar issues in a new way

70% of students agreed or strongly agreed that Integration of multimedia materials in the FCIQ 101 Blackboard site aided their understanding of the course topics

58% of students agreed or strongly agreed that the reading in the FCIQ 101 course packet aided their understanding of the course topics

67% of students agreed or strongly agreed that the use of technology in the classroom aided their understanding of course topics

67% of students agreed or strongly agreed that the instructor helped them to gain confidence in college-level research methods

68% of students agreed or strongly agreed that the choice of the topics for the content of the course helped their learning.

70% of students agreed or strongly agreed that the instructional approach of the course helped their learning.

FCSC 101 (Foundations of Scientific Process) Online Course Survey Results

Administered by the Office of Planning and Assessment, Fall 2011

A total of 382 responded to the survey for a response rate of 61%. There were total of 382 students started the survey, and 264 completed it for a completion rate of 69%.

Course Overall Quality: Over a majority of students agreed or strongly agreed that the course overall design is great.

- 74% students strongly agreed or agree the instructional approach helped learning, while only 13% disagreed and strongly disagreed in this regard
- 69% students strongly agreed or agreed that the pace of the class helped learning, while only 12% disagreed and strongly disagreed in this regard
- 68% Students strongly agreed or agreed that the choice of the topics helped learning, while only 12% disagreed and strongly disagreed in this regard.

1. **The Course Organization:** A majority students agreed that the assignments complement the learning; class activities are well coordinated with lectures and readings; readings complement the lectures and online materials are very useful. Only less than 10% students disagreed.

2. **Assignment and class activities:** A majority of students think the assignments and class activities are designed well to help them learn in this course. Disagreement is minor.

Summer Training Assessment Summary, July 2011

Review of Group and Individual Projects by Full-time and Adjunct Instructors as well as representatives from the Office of Planning and Assessment.

Work on a common research project by 32 teams of freshman students enrolled in several different sections of the required freshman "Foundations of Inquiry" course was evaluated at a retreat for faculty using the AAC&U critical thinking rubric with respect to two criteria: "evidence" and "student's position." As expected for freshman, scores were almost uniformly low.

Based on information from this formative assessment, faculty redesigned the research project to enable students to better learn aspects of critical thinking skills including research methods and evidence by breaking the parts into smaller steps, making the project an individual rather than a group one, and requiring a final verbal presentation. The new assignment was introduced in all sections of the course in fall 2011. Further refinements were made in the project for Spring 2012.

Assessment Summary for Information Literacy, Fall 2011

Assessment Conducted by NYIT Librarians re: Academic Research Skills

Foundations of Inquiry
Topic Worksheet Rubric Analysis
FCIQ Fall 2011

Analyzed 100 Topic Worksheets out of 249 total Topic Worksheets (40%).
Highest possible score = 15

Average score	10.95
Median	11.5
Mode	12

Foundations of Inquiry
Topic Worksheet Rubric Analysis

Analyzed 70 Topic Worksheets out of 257 total Topic Worksheets (27%).
Highest possible score = 15.

Average score	9.6
Median	10
Mode	10

Sample from Foundations of Inquiry Topic Worksheet Rubric:

Identify a topic	Topic is vague/ very broad/too general. (i.e. "space").	Topic is clearly stated and can stand as a reasonable starting point for research.	Topic is clearly stated in a way that begins to define an issue or as a way to begin a search using Boolean operators.
Identify keywords to use for searching	Keywords are just a restatement of the topic.	Keywords are a slight expansion/narrowing, or related to the topic, but basically restates the topic.	Keywords are synonyms, alternate terms, words that narrow/broaden the topic, related terms. (ie. NASA, space shuttle, Apollo missions, astronauts, etc.).

Scientific Process Assessment Pilot Program and Plan Summary, 2011-2012

Dr. Vinh Pham and Dr. Joby Jacob, Adjunct Assistant Professors

As part of an ongoing assessment effort to increase the quality of the courses offered at NYIT, a pilot study was conducted to develop an instrument that could measure students' understanding and appreciation of the scientific process. The pilot study employed a pre-existing instrument developed by biologists at the University of California – Berkeley. The purpose of the pilot study was to determine both the content validity and the statistical reliability of the items on the pre-existing instrument. A total of 4 FCSC sections were used in the pilot study with a sample size of N = 98.

As a first level analysis, items were coded for difficulty based on the percentages of students who responded with the desired response. Four categories of difficulty were determined (Very easy, Easy, Difficult, and Very difficult).The most prominent result from this analysis was that items that were easy had a tendency to be positive in nature. That is, the desired response was true. Conversely, the difficult items tended to be negative in nature. About 92% of items categorized as "Very easy" were positive in nature while almost 94% of items categorized as "Easy", "Difficult", and "Very difficult" were negative in nature. In fact, 100% of items that were categorized as "Difficult" or "Very difficult" were negative in nature.

A more detailed analysis was done using Item Response Theory (IRT) to determine item parameters and generate Item Characteristic Curves (ICC). The primary use of the graphs was to determine items that could be improved using both statistical and pedagogical understanding. In specific, an attempt was made to understand why items behaved in the manner that they did. Using this understanding, changes made were based on 4 different rationales

- Leading or connotatively loaded words were removed so as to generate more neutral items that did not bias student responses towards one way or another.
- The balance between easy and difficult items was adjusted in terms of positive and negative responses. This ensures that there the instrument as a whole is not biased with only easy items that are positive and difficult items that are negative.
- Items that embodied more than one idea or principle were separated into two items. This prevents the two ideas from confounding each other and allows for a clearer examination of what students understand.
- Changes were made for grammar, readability and flow of ideas.

The revised finalized version of the instrument contains 31 items as opposed to the original 28 with what is hoped to be greater pedagogical value and statistical reliability.

Sample Questions and Data Sets from Indirect Assessment Pilot:

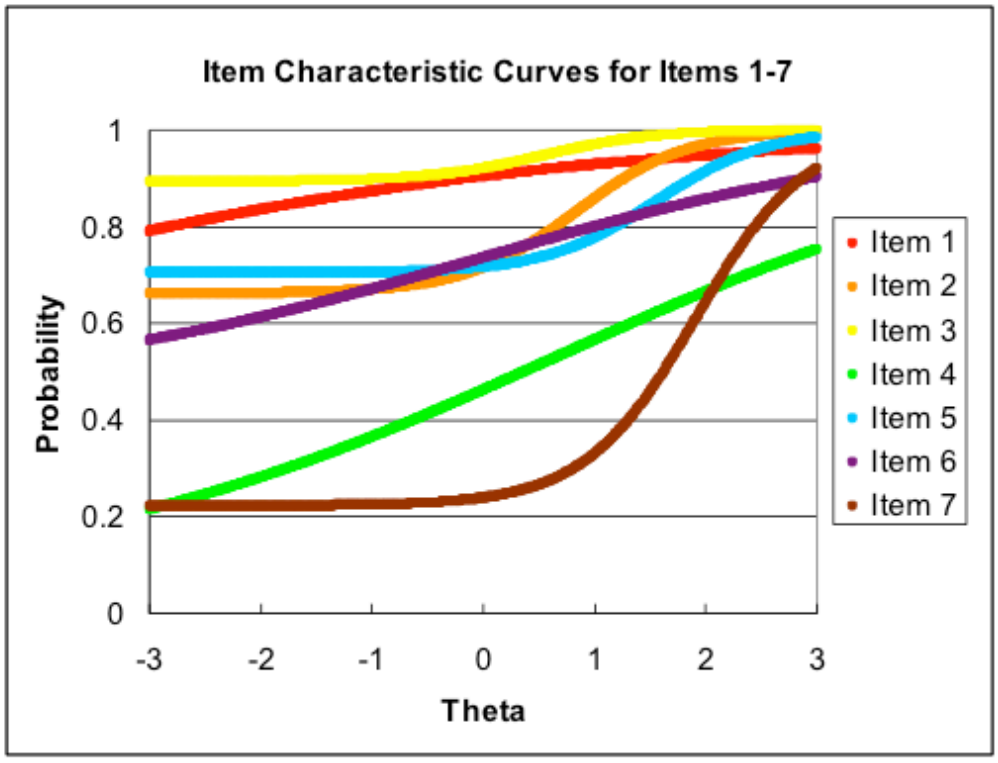
Color	Facility	Range
	Very Easy	100%≥x≥80%
	Easy	80%>x≥60%
	Hard	60%>x≥40%
	Very Hard	39%>x≥20%

Table 1. Coding system for items based on % of students with desired response

Item ID	Desired Response	Item
1	TRUE	Scientific knowledge is built through a complex process that relies, in part, on observations of nature.
2	FALSE	If an observation is made in the correct way, its meaning is straightforward and is not subject to interpretation.
3	TRUE	Scientific theories may be changed because scientists reinterpret existing observations.
4	FALSE	The process of science allows scientists to definitively prove or disprove hypotheses and theories.
5	TRUE	Even brand new hypotheses are usually based on evidence.
6	FALSE	Because they are inherently tentative, accepted scientific theories and hypotheses are unreliable.
7	FALSE	Well-supported hypotheses become theories, and well-supported theories become laws.
8	TRUE	Accepted scientific theories are well-supported explanations for a broad set of natural phenomena.
9	FALSE	All cultures conduct scientific research the same way because science is universal and independent of society and culture.
10	FALSE	Scientific research is not influenced by society and culture because scientists are trained to conduct "pure," unbiased studies.
11	TRUE	The process of science involves a system of checks and balances to ensure that work is of high quality and that evidence is interpreted in an objective way.
12	FALSE	Unlike many other professions, science is almost always a solitary endeavor.
13	TRUE	Science has had a tremendous impact on modern societies.
14	FALSE	Science is pure; scientists strive to do their work without considering its potential applications.

[Teacher Name]
[Insert Date]

Item ID	Desired Response	Percent True	Percent False	a-variable	a-SEE	b-variable	b-SEE	c-variable	c-SEE
1	TRUE	95.9	4.1	0.339	0.071	-5.000	0.930	0.377	0.301
2	FALSE	25.5	74.5	2.000	1.398	0.842	0.264	0.661	0.056
3	TRUE	92.9	7.1	2.000	2.035	0.545	0.434	0.893	0.039
4	FALSE	57.1	42.9	0.441	0.132	0.653	0.322	0.057	0.069
5	TRUE	73.5	26.5	2.000	2.142	1.559	0.455	0.703	0.049
6	FALSE	26.5	73.5	0.489	0.226	-0.066	0.444	0.461	0.087
7	FALSE	72.4	27.6	2.000	1.272	1.920	0.289	0.222	0.045
8	TRUE	84.7	15.3	0.132	0.038	-5.000	1.424	0.387	0.145
9	FALSE	63.3	36.7	0.057	0.024	5.000	2.140	0.000	0.079



- **Graph 1. Item Characteristic Curves of Items 1-7**