On March 28, 2002, as part of our assessment symposium, participants joined one of nine roundtable discussions on critical skill areas. Each table had a moderator and a spokesperson who summarized results for the group as a whole. The pages that follow provide a summary of the discussion at each table. Each discussion addressed the following questions:

1) How do the skills in question develop?
2) How are they being assessed?
3) How can assessment results be shared?

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Critical Thinking

1. How do critical thinking skills develop?
The discussion centered on an understanding of critical thinking based on research by King, Kitchener, & Fischer\(^1\), who suggested that young people move through several stages as they build critical thinking competencies. Their five steps of critical thinking are (more information can be found at [http://www.wolcottlynch.com](http://www.wolcottlynch.com)):

   0 - Entering - facts, correct answer
   1 - Freshman/Sophomore - conclusion jumper, stack evidence
   2 - Junior/Senior - detached/balanced, prioritize
   3 - Master's - viable alternatives
   4 - Ph.D. - Construct knowledge (integrate, refine)

Most college students begin at level 0 or 1. At stage 1, students simply repeat facts they have learned or jump to conclusions, stacking the evidence in favor of their conclusion. Students progress through the steps until they reach step 4 or 5, when they have learned the ability to construct, integrate, and refine knowledge.

2. How are critical thinking skills being assessed?
The group suggested using embedded course assignments and essays to assess skill levels. They also suggested developing examples of each skill level, so students and faculty can understand the differences. Instructors should let students know what is expected so students have something to strive toward. Some further ideas for assessment and assessment issues are:

   - Embedded course assignments/essays to assign skill level
   - Multi-leveled skill assignments
   - Group work can assist - but how to evaluate?
   - Use a model (rubric) in grading - teach it to students
   - Students are likely to have different skill levels in different areas
   - Articulate a shared process that crosses disciplines/curricula
   - Gen Ed courses share skills/process, less emphasis on content shared

3. How can assessment results be shared?
To share results, there must be shared vocabulary regarding critical thinking. Departments could be encouraged to report how students are moving through the steps in APR's and Annual Reports. They could also share information online via the Assessment Initiative website and the Gen Ed website.

   - Define “shared process” / “shared vocabulary” so students can recognize critical thinking
   - Use APR and Annual Reports to describe progress
   - Embedded assignments in portfolios continued from Gen ED to the major
   - Online sharing - Assessment Initiative Website
   - Enhance motivation - capstone, portfolios, etc. /
   - Use assessment samples and results as a recruitment tool

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Global and Cultural Awareness

1. How do global and cultural awareness skills develop?
Global and cultural awareness has both a knowledge/content dimension and an affective dimension which includes developing empathy and respect for other cultures. Incoming students range from “zero to infinity” in their knowledge, empathy and respect for other cultures. Much of what they “know” involves stereotypes (mainly derived from the media) that have not been examined or digested. Students must begin by understanding themselves in their cultural context(s) and their own definition(s) of culture. By understanding that their own background represents a culture, they can begin to understand that other cultures exist. Once students have a strong sense of self and a strong informational basis on which to make comparisons, they can think clearly about differing cultures. Ideally, a course on cultures will have set up all those steps of moving them from understanding their own culture to understanding a new set of contexts to being able to compare and make some conclusions about the two.

2. How are global and cultural awareness skills being assessed?
We rely on tests to assess the knowledge component of global and cultural awareness. However, we are not assessing the affective domain, which can be done in a variety of ways. A statistical analysis can look across the university for participation in experiential situations such as exchange and study abroad programs, as well as attendance at cultural fairs and other cultural events on campus. We could also look at how students make shifts in their choices of majors and minors. Questions can also be embedded in department exit surveys and interviews. Open-ended questions could be asked, such as: What courses raised your level of cultural or global awareness? What do you wish you could have taken but didn’t because of time constraints or major requirements? What courses do you wish had existed? We could also ask students more personal questions, such as: How comfortable or interested would you be to have a roommate of a different culture? Did you ever have a roommate of a different culture? If not, do you regret not having one?

3. How can assessment results be shared?
Faculty should work with Student Affairs organizations to share information about what students are doing.
4. How do information literacy skills develop?
Information literacy skills include locating and evaluating information sources and using them effectively in communication as well as having an understanding of social and legal factors involved in using information. The discussants at this roundtable found that students develop very few of these skills in high school. Even at UA, there is no course or program that specifically targets information literacy skills, largely because expertise in information literacy is largely held by librarians, who do not teach regular academic courses. To better understand how information literacy develops in order to teach and assess information skills, librarians must collaborate with faculty to integrate information literacy skills into research projects. Many faculty members are unaware of the services offered by the library. In fact, they should be collaborating with faculty from the very beginning to set learning objectives and make the information requirements of assignments explicit. This could be followed by an information session for students, at the library, regarding the research project. The information session must be required, since librarians have learned that students do not come when the sessions are optional.

5. How are information literacy skills being assessed?
Since the teaching of information literacy skills tends to be ad hoc and informal, it is difficult to say how those skills are being assessed. But we can talk about how the skills should be assessed. Most information literacy assessment should be built into the grading of specific research projects at the course level. The UA Library Infolit Team has been working to adapt and present national standards in a faculty-friendly way along with numerous suggestions for assessment at the course level. Information literacy assessment can also be done at the cohort level by developing an information literacy “pretest” as a diagnostic for incoming students, incorporating an information literacy component into the midcareer writing assessment (UDWPE), and working with faculty teaching capstone courses to ensure assessment of graduating seniors. National standards for information literacy competencies can be found at http://www.ala.org/acrl/ilcomstan.html.

6. How can assessment results be shared?
Discussing results with other faculty members is a good way to share them. Faculty working with librarians can let colleagues know how valuable the collaboration is, emphasizing that the result is better papers and better assignments. Students will have fewer frustrations if assignments are well-designed and target specific information competencies. To be successful, projects must: (1) be required, (2) include participation of the faculty member, (3) set objectives for student learning, and (4) provide practice in the skills students need to successfully meet the objectives.
Numeracy

1. How do quantitative skills develop?
In general, students do not understand how important quantitative skills are. They somehow need to comprehend that numeracy is required everywhere. One way to help them see this is to situate numeracy skills in areas the students perceive to be relevant or familiar rather than having them do abstract problems. Examples of real-life quantitative problems involve sports, winning at gambling, understanding what grade inflation means, and learning why they have to pay so much when they get a mortgage.

- Put skills to use in solving familiar or relevant problems (sports, gambling, grade inflation, mortgages)
- Find a way to communicate to students how important these skills are

2. How are quantitative skills being assessed?
The UA assesses quantitative skills before students begin as freshmen. About 35% of entering freshmen are unable to place into the entry-level math course, so they are behind from the start. People who teach lower-level courses, especially General Education natural sciences courses, feel pressured to reduce the quantitative content of the course to an absolute minimum in order to keep students engaged. Except to a limited extent in the ETS critical thinking test piloted in spring 2001, there has been no assessment of quantitative skills beyond the proficiency exam administered to incoming students and course-level assessments. To enable the NATS courses to reinforce numeracy skills, it would be necessary to create a math requirement that would be a prerequisite for taking a NATS course.

- 35% of UA freshmen place below college algebra
- There is pressure to reduce quantitative content to a minimum in NATS courses
- There is nothing beyond course-level assessments
- The ETS critical thinking test includes a limited assessment of quantitative skills
- Perhaps math foundation requirement is needed, maybe as a prerequisite for NATS courses

3. How can assessment results be shared?
Skills such as reading graphs or interpreting statistical results can be included in almost all courses in one form or another. One idea is to have campus-wide quantitative questions that could be tailored to any particular course and embedded into exams. The same graph could be used, but the labels on the X and Y axes would change. This data could be pooled across the campus. This way, we would be able to assess what skills need to be developed.

- Embed campus-wide quantitative questions into exams
- Share pooled data
Presentations

1. **How do presentation skills develop?**
   In General Education classes, oral presentation skills are subsumed under the term “interactive learning.” Oral presentation should be acknowledged as a specific expertise with specific subskills. Development of such skills tends to be secondary to learning content in most courses. In the majors, presentations are embedded in the curriculum and prior experience is often expected of students. One issue is whether teaching students presentation skills belongs in the majors or General Education (or whether the students should have developed them in high school). General Education courses tend to be limited in presentation skill practice because of their size. However, students could do oral presentation in break-out sessions.

   - Encourage students to practice oral skills as part of “interactive learning”
   - Acknowledge presentation skills as requiring specific expertise
   - Problem of overlapping the skill as secondary to content of course
   - Should students develop these skills in high school, General Education classes, or majors?

2. **How are presentation skills being assessed?**
   Ideally, oral presentation skills are developed in the classroom first through instruction, then through practice. A critique of students’ presentation skills should follow. Oral and visual elements need to be coordinated in effective presenting. Faculty are lack knowledge of presentation skills so General Education instructors could be provided with information and suggestions (as in *A Short Guide to Improving Student Speaking and Writing*).

   - Instruction, practice, critique, assessment
   - Oral and visual elements must be addressed
   - Faculty development to help instructors with ideas

3. **How can assessment results be shared?**
   Students can generate artifacts in visual portfolios, videotapes or webcasts of oral presentations. These can be made a part of larger portfolio. Samples of these should be professionally evaluated in addition to the evaluation that is done in classes.

   - Visual portfolio
   - Videotape or webcasting
   - Part of larger portfolio
Problem Solving

1. How do problem-solving skills develop?
This discussion centered on what types of real-world problems students encounter outside of the science and engineering disciplines. In Gen Ed classes, students face not only homework problems, but much more practical problems such as time management. Students have difficulty juggling assignments from four or five courses, and instructors have no way of knowing what other instructors are assigning at what times. Students also have problems handling freedom and setting limits both in their personal lives and in approaching their coursework. They are often at a loss when they are not given a page limit, topic, or format. Students encounter many problems daily that they lack the skills to solve, including:

- Time Management
- Freedom
- Professionalism
- Knowing that they have a problem
- Seeing problem-solving as a process

Finding information resources
- Posing good questions
- Getting help
- Organizing a solution

A variety of skills are needed for solving these types of problems. One way students learn is by critically reading instructions. They can also develop problem solving skills through practicing pattern recognition or exploring correlations. Students should learn skills for assessing their own progress and the value of their efforts. For example, they might compare the amount of time they spend studying for a class with the grade they receive in the class. Working their way through real-life problems, students may eventually begin to make interdisciplinary connections in their work. Some suggestions for faculty:

- Force students to critically read directions
- Provide pattern recognition/correlation tasks
- Model pride/professionalism
- Emphasize the value of external validation
- Encourage students to take risks
- Encourage students to synthesize and make interdisciplinary connections
- Get students to help other students

2. How are skills being assessed?
Such tools as portfolios, grading rubrics, and properly constructed tests can help students identify what is important and apply problem-solving skills. Concept mapping and revisions of writing are frequently used strategies. Self and peer reviews can also be used in assessing problem-solving skills. Holding exit interviews and creating opportunities for oral interviews can also be useful. Through talking to students, we can find out in detail how they think, what their study habits are, and what problems they face.

3. How can results be shared?
At UA, the General Education community is dispersed. We suggest that faculty teaching General Education courses get together regularly to discuss things that work in their classrooms. Also, CCIT is developing an on-line interactive tool that will connect faculty to procedures and lessons that could be used in the context of problem-solving and other skills.
Teamwork

1. How do teamwork skills develop?
Entering students have a wide range of teamwork skills, yet in general, they are less well developed than those of upper division students and more intervention is needed. Because student skills are often undeveloped, it is difficult to use teams in large classes with high populations of first-year students. Students with less developed skills typically think in an “individual” mode and fail to participate fully or produce their share of the work. A considerable amount of time must be devoted to discussing team practices and breaking down projects. As students develop teamwork skills, there is less need to cover elements of team projects step-by-step. Students can determine the process themselves, and they tolerate more openness and uncertainty. Students with more developed teamwork skills work synergistically, achieving greater results as a whole. Problem with non-participants diminish because students are more focused. One way to develop teamwork skills is to form teams composed of students with more developed skills who can mentor students with less developed skills.

2. How are teamwork skills being assessed?
Instructors should lay out the expectations of the teams early in the course and describe how the teams and the students individually will be assessed. Ideally, assessing teamwork skills should lead to improvement in these skills. Skills can be assessed by surveying students on how each individual performed as a member of the team. Students should also be surveyed on aggregate elements of teamwork, such as how the team worked together. In each case, there are issues of whether individuals fill out the surveys independently or as a group, and how results are shared (hopefully in a positive and supportive manner). Another assessment approach is for the instructor to observe the teams and work individually with teams having problems.

3. How can assessment results be shared?
One idea for assessment is to have a portfolio on display so others can view it. Another idea is to have a mentoring program in which new instructors, especially of General Education classes, meet with instructors with more teamwork experience. Or, a single person could be designated as a resource person for new faculty. A third idea is to have a colloquium or forum frequently to discuss teamwork so there is a dialogue to share experiences. Finally, a workshop or workshop series could be designed to teach faculty specific skills in using teams.
Writing

1. How do writing skills develop?
For writing skills to develop, students must take ownership of the writing process. This is most likely to happen in a non-confrontational environment. Remarks that were once made on student papers will not work in today’s climate. We must be more supportive in what we say. There is no short way to learn how to write - developing skills takes practice, revision, and review; practice, revision, and review. Peer reviews are a good idea even though the reviewer may not be qualified to judge someone else’s work. In looking at the work of others, reviewers may see their own problems and deficiencies. Writing should be taught in small group sessions, the smaller the better. Not all writing assignments need to be graded: having students write just for the sake of writing will help develop skills. Developing writing skills is hard work for everyone. It is hard for the students, and it is hard work for the faculty. Key ideas:

- provide a non-confrontational environment
- no way to get around practice, revision, review
- use peer review in small group sessions
- use ungraded assignments to increase the amount of writing students do

2. How are writing skills being assessed?
The most common assessment of writing comes in the grading of assignments, where standards vary from instructor to instructor and the quality of the writing may be valued differently in different courses. Beyond that, the Upper Division Writing Proficiency Exam (UDWPE) is a key part of writing assessment at UA, though many feel that it does not work as well as it might. There are some other organized assessment efforts as well. For instance, the College of Business and Public Administration has an individual charged with developing and implementing a writing and assessment program. Many units have capstones where writing proficiency (among other outcomes) is assessed, while other units require portfolios of their majors. Because portfolios typically contain assignments written over time, people can use the portfolios to ascertain how students have developed their writing skills.

- UDWPE
- Grades for writing assignments
- Organized efforts (i.e. Business Communication)
- Some units have capstone courses or required portfolios

3. How can assessment results be shared?
Descriptions of successful approaches could be put on a website so that interested parties will have access to the information. There could also be a database available with names of people who are running active programs in writing skill development and assessment. This way, each person attempting to assess writing skills does not have to reinvent the wheel.

- Case studies available on websites
- Database of names, programs willing to share experiences