AC 2011-656: GUIDED REFLECTION

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Using Guided Reflection to Assess Student
Growth in Communication Skills

Abstract

Global Systems: Economics, Engineering and the Environment is a course about globalization and its impact on our students as professionals and as citizens. The three core student learning objectives for this course are: (1) to increase each student's awareness and understanding of the complex process of globalization, (2) to increase each student's ability to communicate orally to professional groups, and (3) to increase each student's motivation to become more involved professionally and personally with sustainability issues.

The focus in this paper is on assessing the impact of the course experience with respect to growth in communication skills. To that end each student was asked to reflect on his or her experience and to submit a guided self-assessment report at the end of the course. To provide data on which to base a documented claim of growth in communication skills, all student presentations were video-recorded and made available to students for self-review. We chose guided reflection and self-assessment to provide an opportunity for students to recognize the growth they made, to feel positive about it, and to strengthen their resolve to continue growing after the course has ended. We used such a self-assessment tool to reinforce the initial message to the students that they should focus on maximizing their individual growth in the course, rather than concern themselves with competitive peer comparisons.

The self-assessment report data provided documented evidence of significant growth in oral communication skills for almost every student. Furthermore, the data provided insight into ways for the instructors to improve the students' experiences in subsequent course offerings.

Introduction: course context and goals for student learning

The recent impetus to rethink our national policy for engineering education originated with the National Academy for Engineering report *Educating the Engineer of 2020*.[1] As Redish and Smith expressed it: "The increasing importance of technology in our modern economic system and the increased globalization of scientific and technological ideas, development, and production have focused national attention on the education of scientists and engineers."[2] Their work focused on skill development. The focus of this report is on a particular skill that is critical for a working engineer: effective oral communication. In the last decade ABET has emphasized the importance of developing engineering students' "professional" skills to complement the more traditional teaching of "hard" engineering facts and problem-solution methods, long recognized in the engineering disciplines as the main challenge. These professional skills are categorized by Shuman, Besterfield-Sacre and McGourty [3] as:

Professional process skills
- an ability to function on multi-disciplinary teams;
- an understanding of professional and ethical responsibility; and
- an ability to communicate effectively.

Professional awareness skills
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context;
- a recognition of the need for, and an ability to engage in, life-long learning; and
- a knowledge of contemporary issues.

In the Besterfield-Sacre and McGourty study they ask two important questions: (1) Can such professional skills be taught? (2) Can they be assessed? In this paper we address the issue of assessing student growth in the ability to communicate effectively orally in the context of the undergraduate course *Global Systems*.

Purpose of the course. The core purpose of the course *Global Systems* is to bring the subject of globalization to engineering and other interested students in a way that strengthens their life-long professional and personal commitment to building global systems that are sustainable. We allocated a significant fraction of course time and student activity to developing their teaming and communication skills and their professionalism in the context of learning about globalization.

Course background. The course is required for sophomores in the College of Engineering who are majoring in Applied Engineering Sciences. The course is open to other university undergraduates with at least sophomore standing who have adequate scientific and technical background. In Fall 2010 sixty-four students drawn from ten majors took the course. The class included one freshman, fourteen sophomores, thirty-two juniors, and seventeen seniors. Each student attended a common lecture weekly that introduced the key topics (see below for details). Each student met weekly in a recitation section of twenty students in which they practiced their presentation skills and added to the body of knowledge about globalization.

Goals for student learning. In order to maximize student learning and skill development across a variety of majors and different levels of academic maturity we chose a formative model. We defined three course goals: (1) increase each student's awareness and understanding of the complex process of globalization; (2) increase each student's ability to communicate orally in a professional setting; and (3) increase each student's motivation to become involved professionally and personally with sustainability issues on a life-long basis.

Course design and implementation

A series of topic lectures developed a framework for understanding globalization in terms of three interacting systems: economic, engineering, and environmental, as shown in Figure 1 below.

Figure 1. Global Systems: economic, engineering, and environmental.

The fourteen core topics that built the framework of globalization were:
- An Introduction to Globalization
- The Environment: Spaceship Earth, How to Think Globally, Sustainability
- Economics: International Trade, International Finance, International Business, Michigan Economy
- Engineering: Energy, Water, The Internet, Security, Urbanization
- Globalization revisited

The critical roles played by politics and culture were acknowledged but the students were advised that the course would not be able to give them their due. The students were encouraged to build a deeper understanding of the roles of those domains in subsequent experiences.

Weekly recitation sessions provided the opportunity for students to make a number of presentations to their peers. The schedule of presentations was:
- Meet My Teammate (2 minutes, 2 team members)
- Spaceship Earth (4 minutes, 4 team members)
- Think Globally (4 minutes, 4 team members)
- International Trade (8 minutes, 4 team members)
- Letter-to-the-Editor (free topic, solo, letter submitted externally)
- International Business (8 minutes, 4 team members)
- Energy (3 minute elevator talk, solo, to Michigan Senator (actor))
- Water (3 minute elevator talk, solo, to US Senator (actor))
- The Internet (8 minutes, 4 team members, plus formal Q&A section)
- Water Scarcity (8 minutes, 4 team members, plus formal Q&A section)
- Final Project Proposal (6 minutes, 4 team members, Q&A section)
- Final Project (20 minutes, 4 team members, Q&A section)

Assessing student growth

Experience with earlier versions of the course had shown the instructors that this was a course that most of our students found to be novel in its organization and implementation. Therefore it was advisable to explain in detail to the students the course assessment plan, the reasons for the plan, and instructor expectation of the student's role during the course.

 The weightings among the three learning goals were
- Demonstration of awareness and understanding of globalization: 50%
- Demonstration of growth in communication skills: 35%
- Demonstration of growth as a professional and as a person relative to sustainability: 15%

To assess student status related to awareness and understanding of globalization, conventional written examinations were given. To assess status related to growth in professional and personal motivation each student was asked to submit a self-assessment report. To assess growth in professional communication skills each student was asked to reflect upon his or her experience and to submit a guided self-assessment report at the end of the course. This assessment approach is discussed in detail in the next section.

Assessing growth of communication skills: use of feedback and guided reflection

Students had the opportunity to practice eleven times before a 'professional' audience of peers, as the recitation activities listed above indicate. Early in the course they were given some guidance as to what makes an effective professional presentation. They were also encouraged to use their role as listeners to formulate criteria for what makes an effective presentation.

We felt that most students would be able to improve their presentation abilities if they were provided with access to meaningful personal feedback in an ongoing way and were encouraged to use it. To that end all student presentations were video-recorded and made available online to students for their review. It was our expectation that each student would review his/her recorded presentation, identify strong and weak elements, and make improvements leading to greater positive impact at the next presentation opportunity (usually the following week). During the semester there was clear evidence that this was going on but there was no systematic harvesting of assessment data by the instructors.

During the course anecdotal feedback was provided to individuals both by the instructors and by peers as circumstances permitted, usually initiated by the student (e.g., "How am I doing?"). Grading of presentations was avoided intentionally during the semester despite many students' requests for graded feedback (e.g., "How was that presentation – maybe a 3.5?"). We consistently emphasized the concept of self-directed professional growth as the way the students would have to learn to improve during their careers; we argued that the self-directed review approach was an excellent opportunity for them to practice while in school. We also tried having students evaluate one another more formally during the semester, but that did not prove useful and we dropped it.

We needed a way to evaluate the students' growth in professional oral communication skills at the end of the course experience. There are a variety of ways in which this might be done. Probably the most common assessment method is instructor-centric or expert-centric, that is, having staff-level evaluators grade selected presentations using a set of criteria defining effective communication. Growth would be demonstrated by the record of grades. We rejected that approach for two reasons: (1) it ran counter to the student-directed learning model we used throughout the course for skill development, and (2) it is very expensive to implement effectively at reasonable scale.

Another assessment option is guided reflection, a method that has been used for a number of years in various areas of education. Ash and Clayton offer this commonly used definition: Guided reflection is a process that allows the learner to "integrate the understanding gained into one's experience in order to enable better choices or actions as well as enhance one's overall effectiveness." [4] They further expand on its utility in the area of service learning. [5] Felder and Spurling have elaborated the learning styles of engineering students and related teaching styles. [6] They list one dimension (among four) of their learning model as "*active* (learn by trying things out …) or *reflective* (learn by thinking things through …)." [7] Chen et al. have used guided reflection in an introductory engineering design course in the context of "*Folio Thinking*, a coached process of creating learning portfolios and supporting reflection." [8] Feest and Iwugo used reflective learning logs in a graduate program in Water and Environmental Management. [9] All of these authors report success in meeting learning objectives in a cost-effective way using reflective learning as one of their strategies. Clearly, reflective learning can be applied at almost any level in higher education or professional practice in a wide variety of fields.

We identified two benefits to using guided reflection to assess communication skill growth in the *Global Systems* course. The first was that it provided an opportunity for students to learn more about improving their abilities by reflecting on them; one might call this the 'final exam review' benefit. The second benefit was that it provided a cost-effective way for students to demonstrate skill growth for purposes of assessment by others (i.e., the course staff). At the end of the course the students were required to demonstrate how their prowess in professional communication had increased during the course. We felt that guided reflection expressed in a self-assessment report would enable students to recognize the skill growth they had attained based on data, to feel positive about it for good reason, and to strengthen their resolve to continue their improvement after the course had ended.

Guidance for reflection can be provided in any number of ways, ranging from a blank sheet of paper to a detailed list of items to which to respond. A 'blank sheet' guide gives the evaluator more insight into which issues a group of students considered important but leads to tremendous variation in trying to assess individual improvement. A more detailed guide is easier for the evaluator to use but it requires less deep, or reflective, thinking on the student's part. The utility of the approach lies in how well the guide functions relative to the learning goals of both the students and the instructors. The reflection guidelines were designed to permit students to express themselves as freely as possible within boundaries set to ensure certain issues were addressed. Please see Appendix 1 for the guidelines.

Reflection results were submitted in the form of a formal self-assessment report. Use of a self-assessment report reinforced the message that students should focus on maximizing their

individual growth rather than comparing themselves to their peers. Samples of student-generated evaluation criteria for effectiveness of oral communication in a professional setting are presented in Appendix 2. The data include examples of reasons why they chose those criteria. Samples of evidence-based student self-assessment of skill growth are also included.

Discussion of results

The aggregated data from the self-assessment reports show significant student growth with respect to the course objective of increasing students' professional oral communication skills. This growth was achieved in a cost-effective way and reinforced the instructors' goal of stressing the importance of students' learning to "do it for themselves," rather than relying on instructor-based grading to provide corrective guidance. In addition, the approach based on individual growth is open-ended and gave even the best of our student communicators the opportunity for continuous quality improvement. Some students also felt good about their gains because they could see that they were more competent than some of their peers outside of the *Global Systems* course context.

From the perspective of the staff, student growth in professional oral communication skills was achieved in a cost-effective way. This is a necessary condition for the maintenance of a cost-effective course budget in tight times and will permit the future scale-up of course size without loss of effectiveness. Furthermore, the self-assessment report data give the staff insight into ways to improve the students' experiences in subsequent course offerings of the *Global Systems* course.

Conclusion

The course instructors of *Global Systems* view the guided-reflection self-assessment report approach course as successful in achieving its learning goals for students. Recalling the two questions raised by Besterfield-Sacre and McGourty, we can draw these conclusions:

(1) Can such professional skills be taught? Certainly, circumstances can be arranged such that a broad variety of students will learn desired communication skills at a significant level. To at least that extent they can be "taught."

(2) Can such skills be assessed? They can be assessed by use of student guided reflection and self-assessment reporting, which provides data-based evidence of growth of skill. The student-reported evidence can be verified to any extent desired by the staff, based on the same data used by the students. The practical limitations to verification are time and cost.

Based on instructor learning in Fall 2010 there are two changes we plan to implement in *Global Systems* in Fall 2011 regarding oral communication skill growth. The first is that students will be required to submit a guided-reflection self-assessment report of their oral communication skill improvement mid-way through the semester, as well as a comprehensive report at the end of the semester. There should be two benefits to student learning from this change. First, they will develop and apply a clear data-based assessment approach early on. Second, they will be able to improve their skills more effectively by focusing on their weaknesses more systematically.

The second change is to pair students during the semester as 'communication buddies.' Each will provide feedback to the other about his/her presentations. This effort should improve the observation skills of the observer as well as the delivery skills of the presenter. We will stress the concept of using feedback to enhance mutual growth rather than for competitive evaluation.

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Appendix 1. Communication Self-assessment Report Assignment.

This course has provided opportunity for you to improve your communication skills in a professional setting. The purpose of this final report, in which you reflect on your growth during the semester, is two-fold: it will, we hope, make you feel good about your personal gains and it will provide solid evidence on which you can base your 'case' for that growth. The report itself should be written as a professional document, so specifications for it are given below. Please read them and follow them. Make your document be impressive in content and appearance.

Title: **My Growth as a Communicator**
Name: "George/Gina Globalizer"
Setting: EGR 210 Global Systems, Fall 2010

Format Requirement Specifications

- o use Arial, 12 pt font
- o use 12 point separation between paragraphs
- o use 1.2 or 1.5 line spacing between lines (or close thereto)
- o header after the first page to be of the following form, left justified:
  "George/Gina Globalizer," EGR 210, Fall 2010
- o footer to be of the following form, center justified: Page 1 of 6
- o margins: 1" top, bottom, left, right
- o number of pages not to exceed 5 total

Over the course of the term, you have made a set of presentations ranging from very brief to more extensive. You have been a solo presenter, a member of 2-person and 4-person teams, and you have written and submitted for publication one letter-to-the-editor.

Each speaking presentation was video/audio-recorded and made available for review on the course website. You (or your team) also submitted a PowerPoint or other file as part of the record. You should have a copy of all such work in your e-file for this course. This end-of-term reflection is for you to review the available evidence and determine for yourself the progress you have made.

In order to generate meaningful data from the record you will need to do three things:

First, write down the communication criteria you will use to judge your presentations. Don't choose too many detailed criteria - you will make your job much harder that way. But be sure to include the topics you would use if you were helping a colleague to become a better communicator by providing feedback to her or him.

Second, establish a rating scale to use with your criteria. Keep it simple. Examples are:
[EXCELLENT GOOD FAIR NEEDS_WORK], [4 3 2 1], where 4 is best. You get the idea.

Third, select at least three of your presentations throughout the course to review. Use your rating criteria and rating scale to generate rating data for each presentation. Adding short comments will help you to remember why you rated yourself the way you did. If you can, make a figure from a frame of each presentation selected and put the date of presentation on it. Include the figures with comments to make a more interesting report.

Now for the easy part... tell your communication growth story in five (or fewer) punchy, well-documented pages. Make the reader laugh, make the reader cry, make the reader want to keep on reading your report. But be sure to use data to support your claims – "I feel better about myself as a communicator" is not evidence – it is hearsay.

We hope that you enjoy the experience of reflecting on your development as a member of the Fall 2010 Global Systems community.

Appendix 2. Sample Data from Self-assessment Reports.

The guidelines asked the student to define a set of criteria for making an effective oral presentation in a professional setting, to devise a quantitative scale for rating his/her performance against the criteria, to select at least three presentations of eleven total to assess, and to use data to support the claim of growth in skills. As these representative samples show, some students gave clear indication of their underlying thinking about the criteria and the sample sessions they chose, while some students did not. Note that italicized items below were inserted by the authors for increased clarity.

Student 1.

"It is very hard to determine exactly what *(sic)* components separate a good presentation from a great presentation. After much thought, I have decided that presentation criteria should be divided into four broad categories: delivery, PowerPoint, organization, and preparation. … (Presenters) should also be able to answer a wide variety of questions related to the topic. … I implemented a grading scale from one to four, with four being the highest.*(i.e., best)* … I chose to discuss four of my presentations. They all offered something different – whether it was team members, the audience I was presenting to, or the role I played in the group." This student also used frames from recorded presentations to show how he had made progress with respect to various criteria.

Figure 1: 9/14/10 This figure clearly shows me reading slides rather than explaining

Figure 4: 11/23/10. Apparent is clear eye contact, great slide layout, and animation
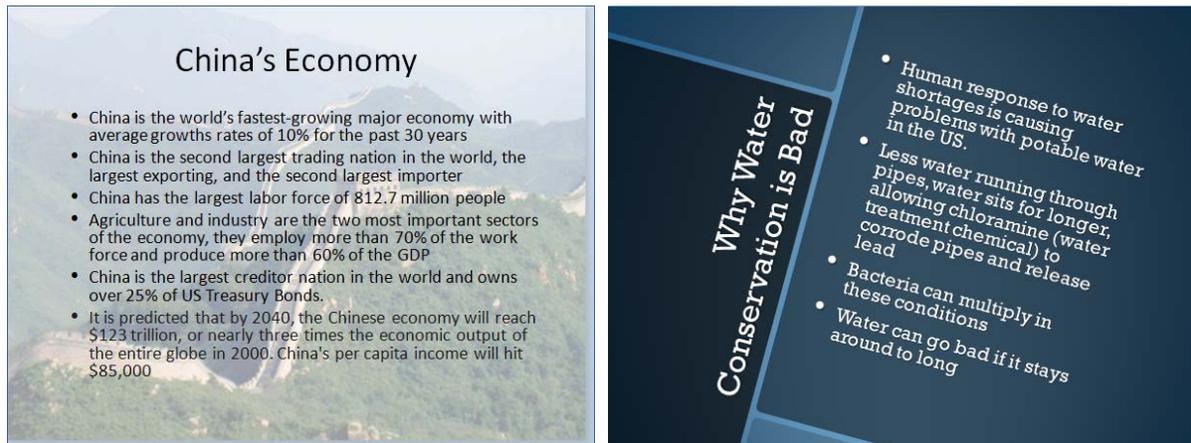
<u>Student 2</u>.

This student devised a table for recording his evaluation data. A tabular approach represents the most systematic and explicit approach used by students for generating data. He also analyzed some of his PowerPoint slides in detail.

[5,4,3,2,1] 5 is the best	Presentation 1: International Trade - 10/5/10	Presentation 2: The Internet - 11/16/10	Presentation 3 Water Scarcity - 11/23/10
Format	2 - Too many words on each slide	3 - Too many words on each slide still, but better than before	5 - More pictures than words, and explained on each slide rather than read
Presence	3 - Cracking fingers during presentation, not looking at audience, just read off slide a lot	3 - Know what I'm talking about better, but still reading off the slide	4 - Started off badly, but improved, more in tune with the audience
Flow	2 - Pause while talking a lot, say "um" a lot	3 - Better flow, less pausing and saying "um"	5 - Much better, no pauses, less "um"
Professionalism	2 - Too much pausing and not looking at audience	3 - More professional, everything fit together better	5 - Much better, explained diagrams on slides, things fit very well, slides were put together nicely

"Student's slide analysis. As you can see from figure 2 *(slide on left below)*, I really didn't have an understanding of what it is like to have a professional presentation. The background is quite nice but in some places makes it hard to read. Other than the background the slide is very hard to take in. It is very dull and there is way too much information on the slide. Everything that I said during this slide was read from right off the slide which isn't very professional at all.

In figure 3 *(slide on right below)* you can see that I have made a more professional slide, and it is easier to read. Although there are no pictures and still a lot of words, it has improved from the last presentation. My presence was better but I still could have improved from the last one. Before I was distracted and did not look at the audience. During this presentation I was a lot less distracted and said "um" less, but still didn't always look at the audience. Also, I was still reading right off the slide quite a bit."

Student 3.

This student showed considerable confidence in the potential efficacy of the criteria he chose. Clearly, he 'owns' the criteria. His subsequent experience will show him whether or not his confidence is warranted.

"To me there are a few very important aspects of a presentation that you need to have down before presenting anything, in any situation. These … are body language, use of support aids, and preparedness. If you are comfortable with all of these critical parts … you will be able to walk into any room and present your topic to anyone there, whether it is your peers, boss, or the President of the United States! … I will be using the following grading system: 1- needs work, 2- fair, 3- good, and 4- excellent."

This student made a good evidence-based case for his growth. "As a whole I believe I have grown as a presenter and communicator thanks to this course. I have made great strides in the areas of body language, use of support aides *(sic)* and preparedness. I went from an awful score of 1 to a good score of 3 in my body language. I showed good improvement in my preparedness by going from a 2 to a 4. And I believe I ma*(d)*e the most progress in my use of support aids, as I skyrocketed from a 1 to a 4. … this class has already helped me outside of this class. Last week I had to give a formal presentation … My audience consisted of my fellow classmates, my professor, and three members of the PACE board from GM. My partner and I took second place thanks to the priceless presenting techniques I picked up from this class." It is not clear from his report that this student recognizes the role he played in improving himself, as opposed to "the class," but he will probably continue to improve as an oral communicator.