

Assessment Rubrics for TAC-ABET Interpersonal Skills

Elaine M. Cooney, Kenneth Reid
 Purdue School of Engineering and Technology
 Indiana University Purdue University Indianapolis

Introduction

Measuring non-technical skills (sometimes called “soft skills”), such as the ability to function on teams (ABET Technology Criteria 2000, Criterion 1.e.), or the ability to communicate effectively (Criterion 1.g.) can be a challenge to technology faculty trained in engineering technology, but not necessarily experts in communication or leadership. These skills have traditionally been measured by engineering technology faculty the same way they are evaluated in the workplace: “I know it when I see it.” While this method may lead to a letter grade (“That presentation was pretty good – I’ll give it a B”), this is not truly assessing the student, the presentation or the degree program. Meaningful assessment of the student or of the presentation should include constructive feedback, and assessment of the degree program should include qualitative measurement of the necessary characteristics of a good presentation. Good assessment practices also recommend that data be “triangulated”, or measured in more than one way.

Gloria Rogers¹ has recommended a variety of assessment techniques for a comprehensive assessment plan. All assessment options have advantages and disadvantages, so that the “ideal” methods to measure any one objective should offer the best balance between the program needs, validity, and affordability (in time, effort, and money). She goes on to say that it is “crucial to use multi-method/multi-source approach to maximize validity and reduce bias of any one approach.” Of the many assessment methods Rogers recommends, the two methods that are used in this project are behavioral observations and performance appraisals. The crux of the matter is to take the behavioral observations or performance appraisals and get hard data that can be recorded and tracked.

Rubrics can be used to translate observations to objective data. A rubric is a scaled set of criteria that defines a range of what acceptable performance looks like. “The criteria provide descriptions of each level of performance in terms of what students are able to do and values are assigned to these levels.”² According to Bresciani, rubrics can be used in assessment to evaluate the effectiveness of entire programs, or individual student assignments, presentations or papers.³

This paper presents four rubrics developed to assess student assignments/behavior: written report, oral presentation, design project, and team work. These rubrics are not intended to be used to grade student work (although some instructors may choose to use them to help generate grades), but are instead to help track how students *as a cohort* are meeting the program objectives. The rubrics have been tested by several evaluators for both associate and baccalaureate level student work.

Written Report Rubric

This rubric (see Table 1) was developed some years ago to help assess TAC-ABET Criterion 1g, “an ability to communicate effectively.” “Effectively” is a term that must be defined in order to develop a working rubric. The initial focus during the rubric’s development was workplace writing, as apposed to academic writing. Of course, many criteria for both academic and work place writing will be the same (grammar, spelling, etc) but the organization used for technical writing may be very different than that used in a literature class. This rubric makes allowances for that.

Table 1: Written Report Assessment Rubric

	<i>Excellent</i>	<i>Average</i>	<i>Poor</i>	<i>Ex. Av. Pr</i>				
Introduction	Introduction provides background and a forecast of the document. Problem or situation is defined clearly with orienting material for audience	Introduction is adequate.	Introduction is missing or confusing	5	4	3	2	1
Organization	Points are clearly presented in a logical order. Easily followed. Page layout is effective & professional looking.	Most points are ordered well. No major problems with layout.	Confusing, disorganized. Layout is distracting or unprofessional.					
Language	Wording is concise, clear, and easy to follow. Style is consistent and appropriate in formality. Professional tone; consistently proper grammar, spelling and punctuation.	Author has most of the “Excellent” traits. Minor problems with grammar, spelling, punctuation.	Distracting word choice; style is not appropriate in formality. Unprofessional. Problems with grammar, spelling and punctuation inhibit reader understanding.					
Content	Consistently appropriate; Analysis is logical and sound - no gaps in topic coverage. Data / analysis clearly support the thesis.	Generally appropriate to audience and the author’s role; appropriate length; Data / analysis are accurate & sufficient.	Major gaps in information or analysis; too long or too short					
Conclusions	Clear, insightful conclusions.	Most but not all points contained in the conclusion	Inadequate summary; No conclusion.					
Visuals	Easy to read; improves comprehension	Layout is satisfactory; meets standard requirements	Visuals inappropriate or distracting					
Sources	Credit is given for all work from other sources using standard format. Material from external sources is relevant and adds to the report.	Credit is given for main points. Sources are listed.	Sources are not listed. External material is not relevant.					

The number of criteria was kept to a minimum to speed up the assessment process. According to Roberts, it isn't necessary to assess everything possible all the time. "There is generally an inverse relationship between the quality of measurement methods and their expediency."¹ Yet the more expedient the process, the more likely it is to be adopted for long term use. Thus, there must be a balance between ease of use and the precision of the data. This rubric finds that balance by being relatively quick to fill out – approximately one minute per paper (after the paper has been read). Since it does not add a significant burden to faculty, they are willing to participate in this part of the data collection, even if they do not use the rubric to assign grades. When this rubric is used, the five additional columns included on the right (5=Excellent, 1=poor) are used for the reviewers' tally marks. These numbers are then recorded. After faculty fill out the evaluations, the data can be compiled by someone else – clerical staff, or even student help.

After using this rubric (or slight variations of it) for several semesters, it has been found that it is applicable to a variety of written reports, for a variety of classes. In a recent semester, this rubric was used and data collected for three different reports in associate degree courses by three different instructors. There were no surprises: no outlying data points, no significant weakness found in the use of the rubric. The only exception is the "Sources" category. If external sources are not necessary, such as in design report for a small project, faculty must agree where to put the tally mark, or agree not to use the category at all.

This rubric is not suitable for grading as presented, because some categories must be weighted heavier than others. For example, if a student plagiarizes, there must be a more severe penalty than a one out of five for "Sources." On the other hand, is the format of the references as important as the organization of the paper for the overall grade? Yet each of these categories can stand alone for assessment purposes, so there is no need to weight the categories. Keeping the category results separate will make the assessment easier, because corrective measures will be easier to identify.

Oral Report Rubric

This rubric (See Table 2) was developed at the same time and with the same foci as the written report rubric: assessing students' ability to speak in the work place in an expedient manner. This rubric has been used for several semesters. When used, reviewers will place a tally mark in one of five additional columns (5=excellent to 1=poor, not shown here) while they are listening to the presentation. No additional time is required of the reviewer. For instance, this rubric has been used to gather data from senior design presentations. Industrial advisory board members attending the presentation were asked (and agreed) to give feed back on each presentation using the rubric. No training was necessary.

Table 2: Oral Report Assessment Rubric

	<i>Excellent</i>	<i>Average</i>	<i>Poor</i>
Introduction	Clear, concise and complete	Introduction orients the audience adequately.	Introduction is missing or confusing
Organization	Points are clearly presented in a logical order. Easily followed.	Most points are ordered well.	Confusing, disorganized; audience confusion because of organization

	<i>Excellent</i>	<i>Average</i>	<i>Poor</i>
Language	Wording is concise, clear, and easy to follow. Style is consistent and appropriate in formality. Professional tone; proper grammar.	Speaker has most of the “Excellent” traits	Distracting word choice; style is not appropriate in formality. Unprofessional
Delivery	Extemporaneous, relaxed body language; excellent eye contact, pace and volume.	Notes used minimum distraction; appropriate eye contact, pace and volume.	Obviously read or memorized major portions; little or no eye contact; too slow or fast; too soft or loud
Conclusions/ Q&A	Clear, insightful conclusions; questions handled well	Most but not all points contained in the conclusion	Inadequate summary; No conclusion; questions & answers handled unprofessionally
Visuals	Easy to read; improves comprehension	Layout is satisfactory; meets standard requirements	Does not use equipment smoothly; visuals inappropriate or distracting
Content	Consistently appropriate; Analysis is logical and sound - no gaps in topic coverage.	Generally appropriate to audience and the speaker’s role; appropriate length; Analysis is sufficient	Major gaps in information or analysis; too long or too short

Team Work Rubric

The authors have used a variety of peer evaluations to assess individual work in teams to help assign grades. But this rubric is meant to evaluate the entire team – a method appropriate for assessment, but not necessarily for grading. The rubric can be completed by the instructor (if s/he can observe the team behavior) and/or by team members. It took faculty familiar with the rubric one to five minutes to complete each evaluation, with the longer time being needed to review material submitted by students while completing the tally.

Note how the criteria for Excellent, Average, and Poor are all observable – not feelings or opinions. This rubric was validated by Cliff Goodwin of the IUPUI department of Organizational Leadership and Supervision. Evaluators reported that the designations were clear, and there was adequate delineation between categories. However, the faculty who have used this rubric claim it still subjective, and are concerned results might vary by 0.5 points.

Table 3: Teaming Assessment Rubric (evaluation of the entire team, not individual members)

	<i>Excellent</i>	<i>Average</i>	<i>Poor</i>
Contributions (quality/management of quality)	All members routinely contribute quality & useful ideas and information; the team evaluates all ideas and uses only the best.	Most (but not all) members contribute useful ideas & information; or the team as a whole adequately integrates the ideas presented	Internal conflicts results in team failing to achieve projects goals
Division of labor (equality/quantity)	All members make significant contributions & are accountable to complete assigned tasks	Progress is satisfactory, but unequal workload is observed	Serious problems due to unequal workload

	<i>Excellent</i>	<i>Average</i>	<i>Poor</i>
Communication (within the team)	Consistent communication throughout project; insightful use of real and virtual meetings: meetings are productive	Adequate number of meetings (real or virtual)	Inadequate meetings and communications
Professional conduct	All team members consistently behave in a professional manner (show up for meetings prepared and on time, treat other team members with courtesy & respect) & seek outside advise if team is not productive	Team members usually behave in a professional manner; do not repeat the same error & accept outside advise if team is not productive	Team members frequently fail to behave in a professional manner: team does not seek outside help
Group discipline	Stays focused on task; finds solutions as problems are encountered. Uses sound principles of inquiry when analyzing problems & seeking solutions.	Adequate focus to complete task; some problems are discounted until a later time	Totally lacks focus; problems are discounted; team does not take responsibility for failures of the group
Group dynamics	Synergy	Majority of team members willingly participate; team functions adequately	Everyone going their own way

Design Project Rubric

This rubric was developed to help quantify some important objectives best measured with projects, and give data that could be compared from one semester to another. Once an instructor is familiar with the rubric, it only takes about one to two minutes to complete (using tally marks in adjoining columns, again not shown here).

Table 4: Design Project Assessment Rubric

	<i>Excellent</i>	<i>Average</i>	<i>Poor</i>
Identification of Problem or Definition of Project	Clear & complete ID of design goals & objectives	Adequate ID of problem; any lack of specifics does not impair solution or design	Insufficient ID of problem; inadequately id's objectives
Technical design	Exceeds specs if appropriate; meets specs with efficient design	Meets nearly all specs	Missing significant specs
Complexity of project / design	Exceeds typical technical complexity for course level	Meets typical technical complexity for course level	Below typical technical complexity for course level
Appropriate choice & use of resources (e.g. computer apps, internet sources, lab equipment)	Innovative selection of resources; expert use	Appropriate resources used (such as demonstrated in class); resources limited to faculty-provided materials/tools	Inadequate use of suggested resources.

	<i>Excellent</i>	<i>Average</i>	<i>Poor</i>
Time Management	Identified plan/ timeline & worked to it; consistently met deadlines	Goals accomplished; most milestones met; some schedule defined; inconsistent use of time; misses some deadlines despite reasonable effort	Missed significant milestones or project not completed
Information management: Log book, status reports, documentation	Detailed, appropriate and timely entries; collected & distributed to appropriate parties	Adequate entries in journal or log book; only critical data/information collected & distributed	Insufficient data collection / recording; existing documentation not shared/utilized
Conclusions & result interpretation	Obtained & adequately interpreted meaningful results with appropriate, insightful conclusions	Produced some results, but struggled with interpretation or lacked sufficient support for their conclusions	Generated few results with little meaningful interpretation; conclusions are absent, wrong, trivial or unsubstantiated.

The design assessment rubric can collect assessment data for more than one criterion:

- TAC-ABET Criteria 1.a., “an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines” may be assessed using the “Appropriate choice & use of resources” category
- TAC-ABET Criteria 1.d., “an ability to apply creativity in the design of systems, components or processes appropriate to program objectives” may be assessed using the first three categories: “Identification of problem,” “Complexity of design,” and “Technical design”
- TAC-ABET Criteria 1.f., “an ability to identify, analyze and solve technical problems” may also be assessed using the “Identification of problem” category
- TAC-ABET Criteria 1.k., “a commitment to quality, timeliness, and continuous improvement” may be assessed using the “Time management” category

In addition to the skill mapping listed above, the “Information management” category can give information to assess TAC-ABET Criteria 1.g., “an ability to communicate effectively” and TAC-ABET Criteria 1.e., “an ability to function effectively on teams” *if* the project is a team project. However, it would be better to split the category and specify communication and team dynamics in the criteria if that data is desirable, rather than use one data point for two criteria.

After using this rubric to evaluate a variety of projects, the authors have determined that the rubric as it stands is effective gathering information about larger (six week or longer) projects that require teams to submit periodic status reports. For smaller projects it might not be possible to assess appropriate choice of resources and time management. Information management can only be assessed if students are required to submit documentation, such as log books, to the instructor for evaluation. Conclusions and results may also be assessed using the “Written Report Assessment Rubric” or the “Oral Report Assessment Rubric.”

Conclusions

The rubrics presented in this paper have been used successfully to collect data for a variety of objectives, especially non-technical skills. These rubrics can measure ability to function on teams, communicate effectively, apply creativity, and demonstrate a commitment to quality and timeliness. They have been demonstrated to be clear and quick to complete, both necessary qualities for busy faculty to accept their use on a regular basis. The use of a five point scale allows for data to be collected, stored and compared from semester to semester.

These rubrics alone cannot be used to assess required skills. Additional work should be done to compare results from these rubrics to other assessment methods. Triangulation of data is necessary for good assessment.¹

Rubrics are used to collect data, and data collection is only part of assessment process. What is done with data is just as, if not more, important. The data collected from these rubrics must be evaluated, faculty must determine if changes in the curriculum must be made, those changes implemented, the data collected anew, and more evaluation completed. Assessment is a process that is on-going; these rubrics are part of a larger picture.

References

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ELAINE COONEY is an Associate Professor in Electrical and Computer Engineering Technology. She received her BSEE from General Motors Institute and MSEE from Purdue University in West Lafayette, IN. Her areas of expertise include analog electronics, analog signal processing, electronics manufacturing, instrumentation and test engineering.

KENNETH REID is an Associate Professor in Electrical and Computer Engineering Technology. He has a BS in Computer and Electrical Engineering from Purdue University, and an MSEE from Rose-Hulman Institute of Technology. He is currently working to implement advanced digital design techniques into early digital courses, electronics manufacturing, and implementing different learning and teaching styles in the classroom.