Building a Stakeholder-Based Rubric to Enhance Student Communication Skills

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Abstract

The authors describe a step-by-step methodology used to create a rubric for measuring student communication skills in engineering. They also provide a description of the rubric's content, along with scenarios for its application. This rubric is unique in that its content is based on input from a particular group of stakeholders, in this case executives whose companies hire many of the students who will be assessed and evaluated using the rubric. The research method employed semi-structured stakeholder focus group discussions, and real-time collaborative coding of data by the stakeholders and the researchers. Additionally, the researchers synthesized and clarified the results, sorting the rubric into six major categories, along with sub-dimensions and descriptors at each level. A prototype example of a dimension for each of the six categories is included. The paper concludes with a discussion of important factors to consider when applying the rubric to contexts outside of those for which it was originally developed, including scenarios for industrial engineering, nursing, and developmental math.

Introduction

The critical processes for high quality assessment and evaluation in Process Education™ depend heavily on clear performance criteria (Beyerlein, Holmes, & Apple, 2007; Pacific Crest, 2007). These criteria are often addressed in practice via the use of a rubric or scoring system. The standard approach to developing a rubric is for one or more academicians to brainstorm and discuss important dimensions to be measured, and then to create a scale or scales to apply to each dimension. This approach has significant value in that expert analysis is applied to the creation of the rubric. However, this method, at best, only indirectly accounts for the many complex aspects of student performance that ultimately matter to stakeholders outside the institution.

The authors have taken a unique approach for the work described here. We at the Georgia Tech Stewart School of Industrial and Systems Engineering have developed a rubric based on the direct input of stakeholders. In this case the stakeholders are executives employed in companies that will ultimately hire many of our students. Thus, workforce expectations are embedded into the measurement system for student success. As mentioned previously, it is a much more common practice for faculty with relevant expertise to produce a communication rubric, such as in a speech class. The major exception to this approach was taken by Iowa State in constructing a communication rubric. They built their rubric based on a variety of real-life sources such as high school rubrics, state association rubrics, and rubrics from other universities (Payne & Blakely, 2004-2008, 2007).

However, at the Stewart School, the goal of the Workforce Communication Program includes: 1) enhancing the students' presentation skills; 2) assisting students with getting jobs upon graduation; and 3) helping them climb the career ladder quickly. In support of these goals, emphasis for this scoring rubric is based on input from successful leaders in the workplace. Executives have based many decisions on workforce presentations and have communicated well enough to have reached the top of the career ladder. Faculty input will also be gathered and used to enhance the rubric content for use in the academic setting. The main focus is to empower students to be capable contributors in the workforce by fostering significant growth in their skills as communicators.

In this paper, the authors describe the process used to plan for and carry out the data collection necessary to begin building a rubric for enhancing student communication skills. In documenting the process, the authors are, to the best of their knowledge, filling a void in the literature. Many others have built communication rubrics, but none have documented the process used to create them. The description the authors provide enables others to learn an effective step-by-step methodology for building communication rubrics in other areas. This building process emphasizes the operationalization of the concept of communication: describing it in terms of actual behaviors that can be measured, resulting in a more objective rubric. In contrast to an intangible competence such as "charisma," examples of actual behaviors include things like referring directly to audience needs to help define the goals of the presentation, appropriate tone and posture, or elaborating on slide content. The research method employed semi-structured stakeholder focus groups along with real-time collaborative coding of data by the stakeholders and the researchers to synthesize results. The authors also describe the process for using these synthesized results to develop the six major categories of the rubric, their sub-dimensions,

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and descriptors at each level. In addition, a prototypical example for one dimension under each of the six categories of the rubric is included.

The methodology described in this paper has resulted in the creation of a rubric that can be applied in many Process Education contexts such as the use of collaborative or cooperative teams with sessions for reporting out, formal oral presentations of work, oral delivery of assessment feedback, peer-led learning sessions, etc. The categories and sub-dimensions for communication skills identified by the executives can be adapted and applied to many disciplines and across many contexts. The emphasis on executive input for workforce speaking situations will make the tool universally applicable across disciplines and institutions. The paper concludes with a discussion of important factors to consider when applying the rubric to contexts outside of those for which it was originally developed; specifically, scenarios for its application to industrial engineering, nursing, and developmental math. Implications and future work are also discussed.

Background

Calls for educational reform, along with accreditation standards for engineering programs within the United States have been a major driving force for change in the quality of measurement, assessment, and evaluation. Key ideas for educational reform are represented in the influential report *The Engineer of 2020* and its follow-up companion *Educating the Engineer of 2020* (National Academy of Engineering, 2004 and 2005). These reports stress the need for a number of non-technical skills such as the ability to communicate effectively. In 2000, the Accreditation Board of Engineering and Technology (ABET) had passed guidelines requiring instruction in oral and written communication (ABET, 2000). In response, many engineering schools added oral and written communication instruction to their undergraduate curricula. This has resulted in a multitude of different methods for delivering instruction on student speaking and for evaluating it. This rubric is one tool that can help programs with student communication instruction move towards implementing quality assessment of outcomes for accreditation and general curriculum reform.

In the Stewart School of Industrial and Systems Engineering's Workforce Communication Program, about 300 students per semester are given communication instruction as part of two courses: Capstone Design and Basic Statistical Methods. The communication instruction is based on information gathered from personal interviews with practicing engineers and managers, and telephone interviews with executives in firms employing engineers. In the Capstone Design course, students work in small groups to apply their industrial engineering knowledge and methodologies to solve problems for real-world clients. They give six presentations over the semester. Their instruction takes place in the Workforce Communication Lab (a dedicated space including five presentation stations) and operates in parallel with their project work. The lab director and three teaching assistants provide six segments of instruction. The instruction includes:

- Storyboarding to check the logical flow of the slides
- Audience and situational analysis
- Review of slide design
- General speaking practice and feedback
- Targeted practice for specific speaking skills that need to be improved
- Review of videotapes of the speaker

Assessment of this instruction based on student self-report questionnaires has shown, for five semesters, a significant improvement in students' self-reported confidence and competence in presenting. Notably absent, however, is a system to accurately measure quality based on characteristics of actual student speaking performance. Such a system would be a more valid measure since it would focus on student behavior, which is more objective than student self-report. Such a system would save time and effort for both students and instructors. Additionally, the use of executive input would ensure that this behavioral measurement tool will be appropriate to the context of much of the communication that engineers and other workplace professionals do.

Literature Survey

Of course, the development of this rubric is not limited to the use of executive input only. Scoring rubrics for student speaking are already in use at other organizations, including high schools, state associations, and other universities. One of the key resources upon which this rubric builds is the most comprehensive work we know of to date: the previously mentioned work done by Iowa State, which is now used at several other universities (Payne & Blakely, 2004-2008, 2007). Rubrics for oral presentations for engineering are also in use, for example, at Carnegie Mellon (2009), Ohio State (2009), Oklahoma State (2009), University of Michigan (2009), University of Arkansas (2009), University of Illinois (2009), and University of Wisconsin (1998).

Another extensive project that includes engineering communication components and measurement tools is the Transferable Integrated Design for Engineering

Education (TIDEE) project (Davis, Beyerlein, Thomson, Olakunle, & Trevisan, 2009). The TIDEE project has developed multiple assessment instruments that can be employed for key activities within capstone design engineering programs. Many of these tools incorporate aspects of communication (with stakeholders, within a team, etc.). Each of these tools are considered in the development of the communication rubric described here.

Additionally, the development of our rubric incorporates scoring rubrics for oral presentations developed for other contexts, such as one developed for research presentations given by medical residents (Musial et al., 2005), and oral presentation rubrics offered in books by Michael Alley (2007) and by Jean-luc Doumont (2009).

Typically, no documentation is available to show how the rubrics described previously were developed. To our knowledge, only one of these rubrics (from Iowa State) was built with any opportunity for stakeholder input. Typically, these rubrics are built based on personal knowledge and adaptation of the work of others to satisfy local needs. For example, Doumont (2009) describes his work as being based on experience and common sense.

In developing this rubric, the authors have reached out to stakeholders who hold important positions in the workplace where students will be putting their skills and knowledge to use. These stakeholders have directly relevant knowledge, experience, and expectations for communication skills needed to succeed in the workforce. Input for this rubric originates from directly tapping into the executives as a resource and then capitalizing on the relevant experience of the authors (Norback; Norback, Llewellyn, & Hardin, 2001; Norback, Jernigan, Quinn, & Forehand, 2002; Norback, Sokol, Forehand, & Sutley-Fish, 2004; Norback & Hardin, 2005; Norback, Leeds & Forehand, 2009; Norback, Leeds, & Kulkarni, in press; Utschig, 2001, 2004, 2007). The authors also have professional connections with some of the key personnel involved with the projects at Iowa State and TIDEE. These connections have helped (and will continue to help) guide the process for this work.

Finally, the general literature contains a wealth of information describing the process for building quality rubrics that provides guidance for the construction of this rubric. This literature includes various systems for creating rubrics or scoring systems, and a few step- by-step processes for putting together a rubric to ensure that its content is consistent with course goals and outcomes. For example, Mullinix explains the different types of rubrics and their various uses (2007, 2009). Mueller provides a step-by-step description of how to create two different kinds of rubrics (2009). And Bargainnier has written a short summary about rubric fundamentals describing the importance of tying the rubric content to student performance in realistic contexts (2008).

Other authors explain how these rubrics can best be incorporated into a course or program when constructively aligned with the course or program learning objectives, outcomes, and performance criteria. For example, Arter & McTighe (2001) and Wiggins (1988) discuss how to design effective assessment tools. Wiggins and McTighe, in *Understanding by Design,* describe the broader view of assessment and evaluation plans that might incorporate rubrics such as ours (2005). Banta describes research-based assessment practices in *Building a Scholarship of Assessment* (2002).

Methodology

Overall Approach

Although advisory boards and accrediting bodies such as ABET often give direction, this work focuses on identifying content by seeking input directly from executives representing the workforce where many of our graduates will be hired. Therefore, this input is directly relevant to developing student skills for communication in the real world. The research method used for this work employed four identical semi-structured stakeholder focus group sessions. These sessions included individual and group brainstorming followed by real-time collaborative coding of data by the stakeholders and the researchers to synthesize results. This work was conducted using a script developed to guide the sessions conducted with the executives (see Appendix A).

These initial results were then further synthesized by the researchers, who used their knowledge of the literature and their expertise to develop six major categories for the rubric. This was done by grouping the data by common attributes and consulting with other communications experts to formulate names for the categories. Each rubric category consists of sub-dimensions that are derived directly from the executive input. Next, levels of performance for the rubric were defined, and for each sub-dimension, a set of descriptors at those levels of performance were produced by selecting key words and example behaviors observed in student performances within the context of engineering. This is the aspect of the rubric development process that combined the executive input with the existing knowledge from other rubrics and resources and which was described in the previous section. Accordingly, much of the content of this rubric may appear familiar to readers based on their personal experience. However, this rubric is

unique because of its focus on elements deemed most important by those in the workforce who are responsible for many hiring, promotional, and business decisions. These decisions are often based on presentations and information communicated in various settings.

Prototype items for one dimension under each of the six categories are provided as examples. These can be adapted for other fields as described later in this paper.

Scripting the Executive Focus Groups

Appendix A contains the script used to conduct the executive focus groups. There were three main parts to the executive focus group process. First, snippets of actual student presentations at varying levels of quality were shown to focus group participants. These were provided as cues to trigger the thinking of the executives and also gave them some understanding of the context in which our students deliver their presentations. These snippets were not intended to be comprehensive in representing student presentations, but rather served to orient the conversation and ground it in reality.

Second, the executive participants were solicited for their input about various attributes of workforce presentations. They were given a set of very simple written prompts on a single sheet of paper with space for them to respond to each individually. These prompts asked them to list positive and negative aspects of presentations they have seen in the workforce. Prompts were purposely open-ended, non-prescriptive requests so that the participants were not led to feel as if there were any particular expected responses.

Third, and finally, the group shared their ideas publicly with the rest of the group. As ideas were offered, they were recorded for all to see on large Post-It pages on the wall. Approximately 40 comments were recorded per session. Following are some examples of their comments:

- It is amazingly powerful when the presenter takes the time to make sure everyone is on board and to ask questions
- It is critical to know the audience prior to showing up. Who's going to be in the room?
- There is an objective you want to get across. You need to structure your presentation so that it is abundantly clear right from the beginning.
- I saw a presentation that went off topic. The presenter could have said all he needed to say in 15 minutes and spent over an hour. This was inconsiderate of people's time and really alienated his audience.

Once all of the participants' ideas were recorded, a discussion of the items ensued. The purpose of this discussion was to reduce overlap in ideas, to group similar items, and to produce a reduced list of performance characteristics for workforce communications which represented all or most of the comments offered. This resulted in between 7 and 15 general performance characteristics per session, each with a set of several corresponding descriptive attributes consisting of the original offered comments. Each list was built by writing the names of the performance characteristics on separate Post-It pages and numbering each one. Individual comments falling under the synthesized areas were then labeled with the corresponding number until nearly all individual items were used. Any remaining items that could not be classified were retained for possible integration into the results by the research team once all four focus sessions were complete.

Analysis of Executive Feedback to Produce the Rubric Format

The executive input at this stage consisted of four sets of 7 to 15 characteristics of performance in workforce presentations, each with a set of attributes composed of the individual comments from the executive participants. Some of the characteristics overlapped, but the overall set was still rather large when thinking of using it for a rubric that would feel accessible and manageable in the classroom.

This problem was addressed with the help of another communications expert who looked at the characteristics represented and further synthesized them into six general categories: 1) customizing the presentation to the audience, 2) interacting with the audience, 3) delivering the presentation, 4) telling the story, 5) sequencing the topics, and 6) designing the slides by focusing on key topics. Each category included a number of characteristics, each with their own attributes as defined from the executive focus groups. These characteristics were then used to form the dimensions of the rubric.

Looking at the contents of the rubric produced by this point in the process, one may conclude that they look similar to the content of other rubrics. The difference, however, is that this rubric has more validity for the Stewart School Program's goals, which, as stated previously, include enhancing student presentation skills, helping them get a job when they graduate, and moving them quickly up the career ladder. In addition, students' motivation to learn increases when they understand the basis for the communication instruction (Paretti, 2008); they are better able to transfer their learning from the classroom and apply it in the workforce (e.g., Mikulecky et al, 1993, 1994).

Once the characteristics were used to create the dimensions of the rubric, it was decided that the rubric would include four levels of performance for each characteristic. The four levels chosen were: novice, fair, very good, and best. The use of four levels rather than five was chosen in order to avoid the use of a "neutral" middle level and to force users of the rubric to make firmer decisions about students' performances. The names of the levels were also chosen to avoid the use of negative language so that one could focus on determining what a student presenter *could* do, rather than what they *could not* do.

Finally, focus group participants produced descriptors for each characteristic within the six major categories and at each level of performance. The goal for each descriptor was to make statements that were succinct yet easy to visualize with detailed examples. The purpose for this approach was to cue the user to look for specific evidence corresponding to the characteristic of the performance being described without prescribing exactly what that evidence should be. This is important for complex performances such as oral communication where characteristics of the performance can manifest themselves in many ways and not all attributes of that characteristic can be weighted in the same manner for each presentation.

Description of the Rubric Categories

The six prototype categories of the rubric are described along with specific examples offered by the executives describing how those categories might come into play during an oral presentation. At the end of the description for each category is a list of dimensions for that category which emerged based on the executive input (and supplemental input from the literature described in the background section).

1. Customizing the presentation to the audience

This category relates to identifying the audience members' characteristics prior to the presentation and customizing the presentation to audience interests.

The executives stressed that presenters should know their audience's characteristics (for example, their background knowledge) and their interests. For example, before giving the talk, the presenter should identify questions the audience will likely want to have answered. During the presentation, the speaker should stay focused on their audience's needs.

The executives also pointed out that if the subject matter is too technical for the audience, it should be simplified. The presenter should identify the vocabulary the audience is most comfortable with and usually uses. For example, an audience of industrial engineers will be very familiar with the acronym SKU (a stock-keeping unit or unit used to organize and count stock), but a general audience would need to hear the full phrase along with a brief explanation.

The executives emphasized the importance of engaging the audience by using examples relevant and interesting to them, instead of more general examples. For instance, a project leader plans to speak to two different audiences about the smart bridge built in Minneapolis after a bridge collapse ("smart" because it included embedded sensors to accurately detect structural issues). To an audience of civil engineers the project leader might focus on the structural components of the bridge, while to an audience of electrical and computer engineers the project leader might focus on the process of the sensors collecting and communicating data.

When presenters face an audience, they usually know how long their presentation is expected to be. The executives emphasized showing respect for the audience by beginning and ending on time.

Based on this input, and the relevant available literature, four dimensions emerged under the category having to do with customizing the presentation to the audience: audience connection, appropriate language, relevant details, and sensitivity to time.

2. Interacting with the audience

This category relates to maximizing the potential for audience members to question the presenter, to make comments during and after the presentation, and to feel connected to the presenter through the presenter's enthusiasm.

The executives emphasized the importance of having an interactive dialogue with the audience. After each major segment of the presentation, the presenter should ask the audience if they have any questions. The presenters may want to call on people in the audience if they see frowns or surprised looks. They should allow and encourage audience members to ask questions whenever they want, even if the questions interrupt the presentation. The presenter should also leave ample time at the end of the talk for audience questions and discussion.

The executives noted that, if the audience gets a copy of the Power Point slides in advance of the presentation, the presenter should take less time to refer to their slides. The presenter should also check the audience's nonverbal cues (such as eye contact) to regularly verify that he or she has correctly gauged the audience's level of preparation or familiarity and understanding.

Executives also emphasized that presenters should demonstrate their enthusiasm and excitement around the presentation's key points. For example, if the presenter has found the answer to a problem, they should explain the difference the solution will make.

Based on this input, and the relevant available literature, four dimensions emerged under the category having to do with interacting with the audience: anticipation, determining when to ask questions, how to answer questions, and enthusiasm.

3. Delivering the presentation

This category has to do with using nonverbal and verbal skills to enhance the delivery of the presenter's message (rather than distracting the audience from the message).

The executives agreed on a number of skills needed for the effective delivery of a presentation. They suggested that presenters should set themselves up for success by projecting confidence with serious clothing and meticulous grooming. They stressed that the presenter should know their material well without memorizing it, since audiences can generally tell when a presentation is memorized, and memorization can often lead to missteps. The executives also emphasized the importance of good posture and bearing, and the use of energy and good inflection during presentations. They mentioned that presenters should avoid ending sentences on an up note or rising tone so that it is clear that they are making a statement and not asking questions.

The executives advised that the presentation should be precise and succinct, and that the pace should be smooth and not too rapid. Presenters should pause where appropriate and leave slides up long enough to allow audiences to listen to explanations and digest any graphs or charts. The executives pointed out that eye contact (looking at individual members of the audience) is key, and that presenters should use their hands for emphasis but avoid too much body motion and nervous hand gestures.

Based on this input, and the relevant available literature, three dimensions emerged under the category of delivering the presentation: personal presence, how much to say, and how to say it.

4. Telling the story

This category has to do with using the flow and interconnectedness of ideas to combine coherent sequences and create a unified message.

The executives pointed out aspects of presenting that help the presenter "tell the story." The presenter should expand upon the displayed information by telling the audience about what they can't see. For example, presenters should use stories or anecdotes to support their main points. Concrete examples help put information in context and explain how it applies in "real life."

The executives agreed that the presenter should use appropriate slide headers and transitions between slides to create a coherent set of points. And when presenting data or charts and graphs, executives stressed that the presenter must support the data with a concise verbal description. The main point of the data should be explained and demonstrated with specific examples.

Based on this input, and the relevant available literature, four dimensions emerged under the category of telling the story: expanding slide information, creating coherence between or among points, speaking about data/charts/graphs, and putting information in context.

5. Sequencing the topics

This category has to do with putting the main topics in an order that establishes credibility and engages the audience.

The executives stressed that the presenter must begin by describing the presentation's purpose and importance to the audience. The presenter should describe the big picture and clarify what the audience will be able to take away from the presentation. The opening sentence is key to engaging the audience right up front.

The executives emphasized that presenters should also quickly establish their credibility so that audiences will trust their information. As presenters continue, they will need to keep referring back to the big picture and "what's in it [the presentation] for the audience." As presenters move from slide to slide, they should help their audiences see transitions, reviewing the main points they have already covered and describing briefly how the points lead to the next topic. It may help to have the final point on the slide lead in to the next slide.

Executives emphasized that at the end of the presentation, presenters should summarize key points. If the purpose of the presentation is to persuade, the presenter should end with a call to action and a "rallying cry" to tell the audience exactly what they are expected to do.

Based on this input, and the relevant available literature, four dimensions emerged under the category of sequencing the topics: purpose of the presentation, establishing the credibility of the presenter, linking key points to the big picture, and outcomes of the presentation.

6. Slide design and focusing on key points

This category has to do with being concise and including the appropriate information to back up the key points.

The executives stressed the importance of including on the slide only what is necessary to support the main points of the presentation. They pointed out that presenters should make one or two main points on each slide and mentioned the general guideline of eight words per bullet and eight bullets per page. They also suggested that presenters use charts and graphs to support the key points. Finally, presenters should distribute only a few takeaways.

Based on this input, and the relevant available literature, five dimensions emerged under the category of slide design and focusing on key points: being concise, making key points engaging, including adequate backup data, keeping slide information focused on the appropriate audience (technical or general audience combination), and handouts or takeaways.

Examples of the Rubric's Dimensions for Each Category

Table 1 provides examples of one complete dimension from the rubric for each of the six categories. The scale for performance includes four levels: novice, fair, very good, and best. A descriptor of the performance at each of the four levels is provided. As the speaker's quality of presentation improves, his or her position on the scale should be reflected accordingly.

This level of description is being developed for all dimensions within every category and an emphasis is being placed on keeping the descriptions concise and easy to understand.

Considerations in Applying the Rubric

The scoring system described in this paper was developed in an engineering context and will be applied to student presentations in Capstone Design. However, the scoring system can be translated and applied to other settings, such as the industrial engineer's workplace, nursing practicums, and developmental math settings in community colleges. Examples based on the six rubric categories are described for these three applications. As demonstrated, the important factors to consider are 1) identifying the communication situation, 2) reviewing the presentation list to see which dimensions apply to the particular setting, and 3) describing how the dimensions apply to that setting by giving specific examples.

Industrial Engineering – presentations to mid-level and high-level managers

Industrial engineers frequently communicate with different types of audiences as they work to increase the efficiency of various processes or layouts. Often part of their job is collecting data about the situation, analyzing it, and recommending solutions to an audience of mid-level and high-level managers. For example, one engineer may suggest more efficient trucking routes and new distribution centers for a company that distributes car parts.

Before presenting to the managers, the engineer should *customize the presentation to the audience* by learning about the backgrounds of the managers and the information they value most. Some managers will have just recently left an engineering job, while others will have never worked in engineering or worked in engineering a long time ago. For a mixed audience, the engineer will need to *use appropriate vocabulary* and include brief descriptions with any technical vocabulary such as the names of models used to predict the most efficient routes and placements of the distribution centers. The engineer will also *customize the presentation* by learning in advance how the current routes were determined so that he or she can provide examples that are familiar to their audience. The engineer will *interact with the audience* by watching for nonverbal cues such as frowns and by asking the confused audience member what needs to be clarified. The presenter will also take time to carefully *answer audience questions,* which may concern how and why he or she decided which solution to recommend.

To start the presentation, the engineer should include an executive summary, briefly describing the entire project and outcome in order to *grab the audience's attention*. The summary will include a description of the problem, the methods used in solving it, the resulting recommendations, and the cost savings. In *delivering the presentation*, the engineer will *sequence the topics appropriately* and include examples so that the audience can easily follow and *focus on the key points*. The engineer will go into detail only as much as necessary since managers usually want to progress quickly to the recommended action items. The presenter will use his or her *personal presence* throughout the presentation by showing enthusiasm for the recommended solution(s). He or she will maintain eye contact with most audience members, being careful to look at everyone, not just the major decision-maker. To keep the audience's attention, the presenter will use gestures and body language selectively to indicate key points on the slides and to emphasize the recommendations.

Table 1: Example of Rubric Dimensions for Each Category

Dimension	Novice	Fair	Very Good	Best
Category 1: Customizing the presentation to the audience				
Audience connection	Describes purpose of the work in terms of presenting a solution to a question Answers questions using the presentation itself or by describing the work process behind that content	Describes purpose/ goals of the work in terms of addressing specific needs of the audience Acknowledges audience perspective when answering questions by being careful and thoughtful	Greets audience with initial language to help define a mutual purpose for being present together Indicates specific areas where questions have been anticipated during the presentation Designs content of talk and delivers answers to questions that address the issues from an audience perspective	Greets audience and uses names of audience members if possible Refers directly to context in which audience is immersed to help define purpose/goals of presentation Demonstrates that audience questions have been anticipated Has additional information at hand to draw from when responding to questions
Category 2: Interacting with the audience				
Determining when to ask audience questions	Has no interactive dialogue with the audience. Ignores signs of questions coming up in audience members' minds.	Allows for interruptions if audience has questions but does not ask audience for questions or question the audience	Has some interactive dialogue by 1) asking for audience questions at several points and 2) asking audience questions when presenter sees audience members not paying attention	Has maximum interactive dialogue with audience by 1) asking for questions after each major segment of the presentation and 2) asking audience questions when presenter sees in audience signs of boredom, dissatisfaction, or lack of understanding
Category 3: Delivering the presentation				
Personal presence	Wears casual clothing and is not well-groomed; has poor posture Has little energy or inflection and, for the most part, does not look at the audience Uses a large number of hand gestures and a great deal of body motion so distracts the audience from message At the ends of sentences, tone gets higher Speaks very softly	Wears casual clothing, is well-groomed; has average posture Has little energy, some inflection, and some eye contact while presenting Hand gestures are minimized to the extreme and the presenter stands very stiffly Uses hesitant tone Speaks with moderate volume	Wears serious clothing and is meticulously groomed; has good posture Uses energy, good inflection, and eye contact Uses hands sparingly and avoids too much body motion Uses definite tone. At the ends of sentences, lowers tone while raising tone at ends of questions Uses high enough volume so all audience can hear	Wears serious clothing and is meticulously groomed; uses good posture and bearing Effectively combines energy, inflection, and eye contact to engage the audience Uses hands for emphasis but avoids too much body motion and nervous hand gestures Modifies and adapts tone to achieve purpose of presentation Uses high enough volume so entire audience can hear; modifies volume to emphasize certain points

Table 1 (*continued*)

Dimension	Novice	Fair	Very Good	Best
Category 4: Telling the story				
Speaking about data/ charts/ graphs	Shows the data and lets the audience draw their own conclusions OR does not explain data and displays data/charts/graphs briefly, assuming the audience can understand	Points out the different parts of the data directly from the visual; that is, notes details and assumes that the audience can understand the details and connect them to the main point	Supports some data with limited verbal description OR discusses main points and a few details	Supports the data with concise and specific verbal description, for example, describes why the audience is looking at all the numbers; explains the main point of the data and demonstrates with a couple of details
Category 5: Sequencing the topics				
Key points link to big picture	Different sections of the presentation can be distinguished by slide titles or verbal reference	Uses appropriate transitions at some points to clearly move from topic to topic during the presentation; and connects topics back to the big picture or reviews periodically	Creates a logical sequence of key points; clearly relates each point back to the big picture; and uses transitions that help connect, preview, or review each point	Helps the audience understand key points by referring to how each fits into the big picture; reviews the relationship between points already made; and uses transitional language between key points that logically shows how they lead to each new topic
Category 6: Designing the Slides and Focusing on Key Points				
Keeping slide information focused on the appropriate audience (technical, general audience, or combination)	Extremely technical slides for a lay audience, OR slides without any technical data for a technical audience, OR, slides designed for a combination audience have an irregular/illogical mix of technical and non-technical information	Slides for a general audience include many technical terms with descriptions, OR slides for technical audience lack technical information, OR slides for a combination audience are difficult to follow for many audience members	Slide information is usually (with a small number of exceptions) at the right level for the audience	Slide information is consistently at just the right level for the audience

Nursing – nurse/doctor communication

For nurses, most communication is either one-on-one or one person interacting with a small group. The audience often includes doctor(s), patients and their family members, other nurses, and nurse assistants. When interacting with a doctor, a nurse *customizes the "presentation"* by knowing and using the relevant technical terms and by keeping the interaction brief. To be effective, the nurse will optimize *interaction* in several ways. First, he or she will build into the interaction questions or cues that the doctor can respond to. Second, the nurse will close with a question asking if the doctor has everything he or she needs, leaving an opportunity for the doctor to request follow-up information.

With regard to *telling the story* and *sequencing the topics*, the nurse should start by letting the doctor know the level of criticality of the communication. This will help the doctor to turn his or her attention to the issue. The nurse provides context (for example, whether this deals with a particular patient or other nursing needs).

Then he or she will *emphasize key points* and continue to *customize to the audience* by avoiding irrelevant details and providing specific examples or specifics for each symptom, supporting points with the relevant documentation. In closing, the nurse should describe a plan of next steps for both the doctor and the nurse. And, as mentioned earlier, the doctor will be given the opportunity to ask for more information.

In *delivering the "presentation,"* the nurse will maintain eye contact to make sure the doctor is still paying attention. He or she may use hands for emphasis, for example, the nurse may hold his or her shoulder when discussing a shoulder injury. The nurse will build in brief pauses to allow the doctor to ask questions or acknowledge understanding of what he or she has said, and the nurse will make sure the relevant documentation is complete and at hand.

Developmental Math – problem solving in student pairs

In developmental math courses in a community college setting, the application of the scoring rubric would differ from its use in a nursing setting. We describe an example application in which developmental math students are reporting the results of work they have done in pairs (for example, graphing an exponential function). Students will have a mixed audience consisting of their professor and their peers. Therefore, they will *customize their presentation* to both audiences by demonstrating to the professor they understand the concepts and describing to their fellow students how they solved a particular problem. The pair of students presenting will need to demonstrate that they know the relevant math vocabulary and that they know how to use the concepts to solve the problem.

To make sure they *interact with the audience*, the two presenters should build into their presentations questions for the other students. For example, one of the presenters might ask, "How many groups used this step?"

The presenters will also *sequence their topics* as they *tell their story, focusing on key points.* To start, the presenters will repeat the problem to be solved and present an outline of the process they used. They will describe key steps, providing clear transitions between each step. The presenters will describe the necessary detail for each step, including any incorrect paths taken in prior trials which can be emphasized as key points to avoid pitfalls. At the end of the presentation, the two presenters will summarize their key points, describing the solution and generalizing, if possible, about the concepts learned so that they may be applied by the students to future math problems.

When *delivering the presentation*, the two speakers will coordinate so that each knows when the partner's speaking turn ends and his or her turn to present begins. The boardwork and delivery will be coordinated to allow for regular eye contact to check the audience's nonverbal cues. And they will pace the presentation so that it is smooth and not too rapid to follow.

The rubric would be applied to other settings using the approach described previously.

Conclusions and Implications

The methodology for developing a rubric for scoring engineering student presentations based on executive input has been documented, as far as we know, for the first time. As a result, professionals in other contexts can use this model to create more valid rubrics. The process has four key elements. First, the data was collected from the executives with a free-response brainstorming activity after viewing brief snippets of student presentations in typical context for a senior undergraduate engineering course. Second, the data was synthesized using group discussion for each of the four focus groups. Third, the data was further synthesized by the authors into six categories in consultation with additional resources and experts in communication. Fourth, the category sub-dimensions (or characteristics) were placed into four levels of performance in a matrix system. The matrix was populated with details of the characteristics at each level of performance based on the specific feedback provided by the executives.

We have described in some detail the original context for use of the rubric and have given examples of specific suggestions provided by the executives who provided us with stakeholder input. We have described examples from the rubric itself, providing readers with a tool that they can use. Readers can use all of the rubric or part of it, depending on their specific courses and contexts.

Finally, we have discussed how the basic categories for the rubric can be adapted to scenarios in industrial engineering, nursing, and developmental mathematics. This shows that the rubric can be re-interpreted and applied in additional contexts. The rubric has potential for widespread application in universities across the U.S. Potential users of the rubric include teachers wanting to add communication instruction to their courses and students preparing for and wanting to improve their workforce communication skills.

The work presented in this paper provides the Process Education community with unique value that is twofold. First, it outlines a methodology for developing a stakeholder-based rubric. In addition to the describing

the methodology, we have also presented, in the appendices, the tools used to collect and begin analyzing the data. Second, we have shared elements of the rubric itself so that readers can apply them or adapt them to other contexts. The topic of student communication (via oral presentations) applies to multiple aspects of a typical process educator's classroom, including the use of collaborative or cooperative teams with sessions for reporting out, peer-led learning sessions, formal oral presentations or work, and oral delivery of assessment feedback.

Future Work

We are continuing to move forward with the development of this rubric by working to make it more readily usable by a broad array of practitioners in higher education. In order to do this, we are synthesizing the large rubric into a more manageable form, and developing supplementary teaching guidelines including details and examples to use in teaching the presentation skills. For example, in discussing the use of appropriate language, the guidelines stress the proper use of technical terms. In one case, presenters are advised to use acronyms only if they are first explained. In another case presenters are urged to use professional language and to avoid using slang. In a third case presenters are advised to ensure that their grammar and spelling are correct. One tested approach to correcting grammar and spelling errors in the slides is to read the slides aloud very slowly and carefully

We also plan to collect other presentation rubrics used in capstone design courses so that we can compare and contrast the skills or competencies in each.

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Appendix A

Script for Executive Meetings: Input on Scoring Student Presentations

I. Introduction

1) As they come in
   a. Fill out demographic info
   b. Check with each executive individually to see if OK to videotape meeting
2) Goal
   a. Building scoring system for student presentations, based on your experience
   b. We are interested in what you think is important
   c. Want graduates to be able to give stellar presentations to executives
3) Plan= Georgia Tech students (teaching assistants) will do the grading. They are smart, but they don't have the experience of knowing what to look for. In order to get the best from them, need to tell them what to look for.
4) So, need it to be observable and recognizable
   a. Enough that can describe behavior so someone else can recognize it
   b. ***Think about entire presentation***: characteristics of auditory behavior, physical behavior, vis**ual aids**
5) As a result of execs' input, will have written description of things to look for—comments will be **anonymous**

II. Overview of meeting

1) Will show you some examples of student presentations
   a. These are not whole examples, just snippets
   b. <u>We are not asking you to evaluate these presentations</u>
   c. We are showing you the examples so you know what the raters will see and to stimulate your thoughts
2) <u>We will ask you to write down some things we should look for—both positive and negative</u>
3) We will have open discussion
4) We will ask you to rate the importance of the characteristics
5) Closing

III. Viewing Examples

1) Execs see six "snippets" of students presenting at end of Capstone Design, on screen—to set the stage
2) During "snippets," execs have will not have relevant slides as handouts in front of them (this is what professors see in class) — because if execs have slides, "they can compensate for content issues. Also they can control the speed of the paper slides but not the digital slides, which allows them to make up for deficiencies in the presentation (e.g., going too fast, too much text, too little explanation, too much complexity for one slide, etc.)" (W)
3) Have 2 examples each of "A," "B," "C" presentations
4) Randomize order, but start with "B" and end with "B"
5) Length of "snippets"…don't bore them, but don't skimp…get true flavor of presentation. E.g., no eye contact for many minutes, not just at beginning. E.g., repetitive behavior. Stop snippet when you're seeing nothing new…
6) Criteria in selecting snippets:
   a. None from companies executives represent
   b. Good quality audio and video
   c. Spread out within each grade level
   d. Represent wide range of things…graphs, charts, text, pictures…

IV. Note most important things to look for.

1) Have worksheet in front of execs:

Executive Meetings Form 1

Name _____ Date _____

Things we should look for:

Positive

Negative

Comments

V. Open Discussion (Turn on video camera if OK'd)

1) Beginning of second hour start discussion
2) Let's discuss for about 20 minutes
3) Begin by writing down all positives and negatives from each exec on flip chart sheets (large Post-It sheets) and put them on wall
4) Then list refinements on a new sheet…clustering, clarifying, providing examples
5) Try to get "general comments" notes into this list

TA assisting—List things to look for on form 2; print out as soon as finished

VI. Rate Importance

5) Ask executives to fill out form 2:

Executive Meetings Form 2

Name _____ Date_____

Things we should look for:

No.	Characteristic	Importance Rating				
		Low	Moderately Low	Moderately High	High	
	(from earlier discussion)					
	(from earlier discussion)					

VII. Summary and Close

1) Ask—email them write-up of points and ask them to rank order and comment—OK?
2) Other…

VIII. After meetings, aggregate across meetings