Client Interaction Rubrics: Supporting Student Professionalism on Client-Based Projects

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It is well established that communication between project teams and client sponsors is an essential skill for engineering students and practitioners alike. This paper discusses the development and implementation of two rubrics to guide and support student-client interaction at the outset and throughout the duration of capstone projects. The rubrics were tested in multiple capstone design courses at three institutions. Formal and informal assessment was conducted yielding positive feedback on both rubrics overall, especially regarding the value of each in preparing for meetings. Based on feedback, use of both rubrics will continue; future work includes developing supplemental materials plus performing additional research studies. Both rubrics are available online, are easily editable, and are adaptable for use in whole or in part in capstone and similar project-oriented courses. Through the use of such tools, student engineers are better positioned for creating value for their clients and related projects.

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Introduction

One of the growing trends in engineering education is the call for incorporating real-world design experiences into the curriculum, with a key aspect being student teams working with external clients. One such approach is through the "entrepreneurial mindset" (EM) promoted by the Kern Entrepreneurial Engineering Network (KEEN) via a paradigm that features, in addition to technical fundamentals, a focus on business principles, customer awareness, and societal needs.[1] This paradigm emphasizes three educational outcomes: curiosity, connections, and creating value. Those possessing such a mindset demonstrate *curiosity* in exploring possibilities, make *connections* across various sources to gain insights, and *create value* by persisting through failure; however, such skills cannot be learned through an individual course or project.[2]

The research presented here was initially motivated by efforts to improve and expand the EM content in the computer science program at Ohio Northern University (ONU). While many components of the initial EM effort in establishing service learning partnerships in developing educational software were successful,[3] some weaknesses were observed, the most notable being a general lack of mastery by students in interacting with clients. Communicating with others, especially those outside one's profession, is an essential skill; unfortunately, the students had not been prepared through the curriculum for such interactions. In the aforementioned prior work, single-point rubrics[4] were developed and employed as the primary means for formative assessment. Based on the positive results of those efforts, it was hypothesized that creating a rubric to help guide students' interactions with clients would be of value to ONU students and, if successful, could also be shared with the wider capstone community.

Phase 1: Student-Client Interaction Rubric

Inspired by the desire to support their students in client-oriented, project-based learning activities, the authors developed a general "Client Interaction Rubric" using the single-point rubric format. The rubric format and objectives were selected to assist students in preparing for, facilitating, and reflecting upon meetings with clients. The rubric underwent multiple iterations as it was tested with students at two institutions and with internal and external clients. The rubric objectives were also validated through a survey from one institution's Industrial Advisory Board.

The current version of this rubric, available on the CDHub 2.0 website,[5] includes eight main sections: preparation, status, planned questions, responsive questions, conclusion, follow-up, mindset, and conduct. Its format offers the pedagogical and logistical benefits of a single-point rubric as well as the means for recording qualitative feedback regardless of the cited performance level. The rubric can be used by students as a checklist before a meeting or as a post-meeting self-reflection guideline; it can also be given to clients to evaluate student performance.

The rubric received positive reviews by students at the two institutions who used it to help guide their interactions with real-world clients. For example, one student commented that the rubric was "*surprisingly useful when preparing for meetings.*" Another noted that the rubric's open format "*allowed for the person filling it out to provide more substantial feedback.*" Additional details about the development and use of the rubric were presented at ASEE 2017.[6]

The original Client Interaction Rubric functions well for client meetings in general, but it does not capture items specific to the *initial* client meeting, something noted by students and client users. This feedback was also echoed by the Industrial Advisory Board, who emphasized the importance of preparing for the first or "kick-off" meeting with clients. As such, the authors collaborated to create a version of the Client Interaction Rubric specifically tailored for first meetings.

Phase 2: Student-Client Initial Meeting Rubric

The development of the Initial Meeting Rubric was the result of collaboration between the authors, who have a combined 40+ years of capstone coordinating experience. This process capitalized on the background and experience of the authors, as well as the Industrial Advisory Board's input. The rubric creation process focused on four primary objectives: (1) providing guidance for the initial meeting in accordance with project priorities, (2) developing a working relationship with the client based on confidence and trust, (3) establishing early success metrics,[7] and (4) serving as a teaching and reflection tool for the student teams. Thus, the development process sought to form a chronological framework with a conversational substructure. Namely, the rubric follows a general sequence of activities and can guide the initial meeting preparation, agenda format, and follow-up interactions. The full version of the Initial Meeting Rubric is available for download on the CDHub 2.0 website.[5]

The inaugural deployment of the Initial Meeting Rubric occurred with the fall 2017 capstone courses at ONU, Northeastern University (NEU), and Smith College; the rubric was distributed prior to any interactions with clients of capstone projects. To determine the rubric's effectiveness, a survey was constructed focusing on the overarching theme of studying capstone projects involving clients. This survey was administered to capstone students at all three institutions (NEU: n=22, ONU: n=46, Smith: n=15) and is to be administered to a control group at NEU who worked with clients but was not provided with the rubric. Teams generally consisted of groups of four students working on a wide range of projects including local non-profit agencies, small- to large-scale corporations, and various government entities as external clients; internal clients included faculty members and university organizations.

Several things must occur prior to having the initial meeting, most notably the "first contact" in making the arrangements for the meeting. Survey results indicated that over half the time (53%) a team member made the first contact, whereas a client initiated less than 3% of the time. The remaining first contacts were performed by faculty in their roles as either project advisor or capstone coordinator. For those respondents indicating that a team member made the first contact (n=42), the initial meeting was usually held within 1 week after the first contact and within 2 weeks of having received the project. It was also generally the case that all team members attended the initial client meeting.

There are several possible activities that student teams can engage in to prepare for their initial client meeting, including making a checklist, creating an agenda, developing talking points, researching the client's organization, investigating the competition, and/or gathering background on the meeting participants. Of those responding to this question (n=73), 94% indicated that some form of meeting guidance document was developed, and 63% indicated that some form of preparatory research was conducted. To gain additional insight into preparatory activities, the responses from several related follow-up qualitative questions were processed into word clouds; Figure 1 shows responses regarding meeting preparation.

Figure 1. Responses to "How did you and your team decide how to prepare for the initial client meeting?"

What is notable here are those words that are conspicuously missing: "outcome", "success", and "expectations". This might indicate that the Initial Meeting Rubric could benefit by being revised to highlight having a discussion on what the outcomes should be, what the client's expectations are, and what constitutes success for a given project.

Other surveyed aspects of meeting preparation included inquiries about what materials were provided to the client prior to the meeting and what each team brought with them to the meeting. Figure 2 shows a word cloud of the student responses regarding provided materials. While many teams did provide the client with an agenda, the most common response was “none”, which indicates a need to better emphasize what constitutes good meeting practices.

Figure 2. Responses to “What documents did you provide to the client for guiding the initial meeting? Enter ‘none’ if nothing was provided.”

The responses provided by students regarding what they brought to the meeting is shown by the word cloud in Figure 3. Teams were at least prepared on their side of the table, bringing a variety of items for conducting the meeting and for taking notes during the meeting.

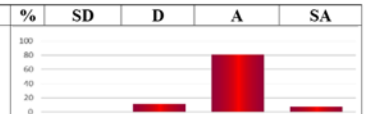
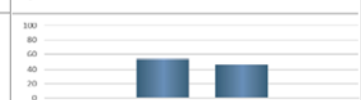
Figure 3. Responses to “What did you and your team physically bring with you to the initial client meeting? Enter ‘none’ if nothing was brought.”

Students were also asked about their comfort levels for each of the seven outcomes listed in the Initial Meeting Rubric. The reported discomfort levels were relatively consistent across all outcomes, ranging from 7.5% to 11.5%, while the comfort level in each case was at least 76%, with the most comfortable activity, “preparing for the meeting,” coming in at 87%. In retrospect, most students (75%) indicated that nothing was overlooked, not covered, or not addressed during their initial meeting, however, a general theme from the minority responses indicated questions remained regarding project scope, desired clarifications, and specifics regarding objectives.

In terms of what students wished they would had known prior to the meeting, the word cloud illustrated a dichotomy between “none” and “research”. Regarding research, students indicated a need for having “*a better grasp on knowing how to properly research related literature*,” performing “*some prior research on the company and the liaison*,” knowing “*more about the client prior to the meeting*” as it affected that respondents’ expectations, and for having “*a better understanding of the project*” so that more in-depth questions could have been constructed. Among the additional responses were such items as “*probably need to work on social skills*” (as this respondent used the wrong company name multiple times during the meeting), a need for how to politely interrupt domineering participants “*to move along a meeting and keep it within a set time*,” and a desire for a “*more developed problem statement*” that included some of the basic technical terms used by that client.

At the end of the fall semester, students from Smith and ONU were surveyed again regarding their experience with the Initial Meeting Rubric and their suggestions for improving the rubric for future classes/teams. Nine project teams from Smith and four project teams from ONU provided both quantitative and qualitative feedback. The quantitative portion of the survey included three primary prompts using a 4-point Likert scale. The results from the responding student teams (n=13) are shown in Table 1 below:

Table 1: Follow-Up Survey Responses

Statement	% / SD / D / A / SA
1. We found the Student-Client Initial Meeting Interaction Rubric document valuable in preparing for our initial client meeting.	
2. We found the Student-Client Initial Meeting Rubric valuable after the first meeting in reflecting on what went well and what to change for future client meetings.	
3. We would recommend using the Student-Client Initial Meeting Interaction Rubric again for future classes involving client-based projects before initial meetings.	

SD=Strongly Disagree, D=Disagree, A=Agree, SA=Strongly Agree

As is clear from Table 1, student teams found most value in using the rubric to prepare for the initial meeting and all responding teams would recommend using the rubric again with future teams. In supporting their Likert-scale ratings, teams provided such comments as “*The rubric is really helpful to prepare a team who has no idea what they are getting into*” and “*Helpful in terms of expectations for meetings and getting started talking to liaisons*”.

When asked what they liked most about the Initial Meeting Rubric, student comments included responses such as "*we like that it covers different areas to cover during the meeting*", "*the instructions for each party were very helpful*", and "*the descriptions are brief and to the point*". One team noted that having the rubric meant that "*the team did not have to decide our own standards*", something that may well be valuable especially so early in a project experience.

Student opinion was mixed on the value of the rubric after the initial meeting as a reflection tool. Comments included "*rubric was useful in figuring out next steps*" and "*helped us identify what we may have missed*", but several teams noted that they did not revisit the rubric later or only did so quickly and did not find it useful. Several teams also noted that their meeting format was not as formal as the rubric suggested, so the rubric was not fully applicable. Two teams suggested getting liaison feedback on their performance as a value-add for reflection; this was one potential function for the Initial Meeting Rubric, but was not implemented during the pilot usage.

Student teams were also asked to provide feedback on the rubric contents, format, and the wording itself. While suggestions varied, many implied that there were too many checkboxes and that they would prefer the checkboxes be grouped together, instead of following the single-point rubric format. Several teams suggested including a section to record facilitator and note-taker assignments; others recommended making some sections optional since not all sections apply to all meetings.

Future Work

Future work entails adjustments to the initial meeting rubric itself, strategies for implementing the rubric effectively, and research regarding additional factors.

In the current Student-Client Initial Meeting Rubric, specific amendments include adding emphasis on outcomes, expectations, key performance indicators, and success metrics. Additional clarity on problem scoping would help establish methods for determining project boundaries. Revisiting the single-point rubric format, especially regarding the checkboxes for different levels, aligns with student requests.

To enhance implementation of the Initial Meeting Rubric, one specific recommendation is to underscore the value of reflection, using the rubric as a tool. Additionally, creating a facilitator/quick reference guide would provide tips and suggestions for students (and faculty) regarding client meetings.

Future studies involve investigating the following questions with research methodology:

- Does the degree of comfort with the initial meeting differ according to whether the Student-Client Initial Meeting Rubric was used?
- Do the number of topics missed, forgotten, or left unclarified during the initial meeting differ according to whether the Student-Client Initial Meeting Rubric was referenced?
- Does the degree of comfort with tasks differ according to whether the client is internal or external?
- Does the students' prior level of professional work (employment, fieldwork, internship, co-op) correlate with client interaction comfort level?

Conclusions

Two rubrics have been developed that allow capstone student to better connect with clients through the planning and execution of effective meetings. One rubric specifically focuses on the initial client meeting while the other provides a framework for ongoing meetings. The rubrics have been tested and refined with student input. Both rubrics are available online, are easily editable, and can be adopted in whole or in part for use in capstone design courses. Through such tools, students are better positioned for creating value for their clients and related projects.

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