Co-ops and Interns-What Do They See as Their Communication Needs

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Co-ops and Interns – What Do They See as Their Communication Needs?

Across the United States and actually across the globe, the number of courses, seminars, and suggestions for providing students with materials to help them in their future careers abound. We have courses focusing on how to properly maneuver through a dining experience and how to carry on a conversation in an elevator. We try to teach young men and women how to dress properly for success while giving them tips on how to formulate resumes and cover letters. We march any number of employers through our classrooms providing those students with masses of information on those companies and their products. All in all there is nothing wrong with this approach. We know what they need to know and we try to provide as much of it as possible. But with that there is a sense that we have left something out of the equation. We have failed to ask the students what they think and what they see as important in their own working lives. This paper starts to delve into the issue of student opinions and the wealth of information that students can offer to help us provide better materials for them to be successful in the world of work.

The first element in the equation looks at a means to give students something to research in their first co-ops and internships – the work report. Details of what the student must find on the job that will help him or her formulate a plan for their future will be provided. The work report forms the basis for carrying on a conversation with students on what they find useful in the workplace. It also allows the student to provide input into areas of interest that they find in the workplace. The student is then writing about areas of interest in the workplace and can focus on how they need to communicate that interest to the reader.

Once the information has been collected from the students, the next step is to go directly to those students and find out from them what they see as distinct needs in their communication of work-related text. This paper looks at the kinds of issues raised by students and suggests way that educators can incorporate those suggestions into the curriculum through a variety of means.

The Work report

Many times students are asked to write elaborate technical reports which seem to echo the classroom mantra of give back to the instructor the information that he or she has provided and if it equals what was originally presented then a good grade will follow. The work report is in itself an original document. Its material comes from the research of the student who is involved in the co-op, internship, or experiential learning experience. The material is also important to them because it may shape the paths that they will follow in their future careers. The students can use this document to think about the communication elements used to create it.

The work report itself is straight forward and relevant. Students are asked to create a document that addresses the following points of interest (both to them and their instructors).

I. Nature of the Work Setting
   a. The functions, products, or services of your employing organization.
   b. The organizational structure of your employer.
   c. The relationship of your unit or department to the overall structure.
   d. The objectives of your position. The utilization of your technical background in the position.
II. Duties and Responsibilities
   a. A detailed account of your major activities to date (emphasis on the specific technical functions of your position.)
   b. Any additional responsibilities you anticipate before the completion of your co-op assignment.
   c. Your assignments and their relationship to your field of study.
   d. Your accomplishments that will make you a better engineer.
III. Relationship to Career Goals and College Study
   a. Ways in which your career goals been reinforced or modified.
   b. Changes in your plans for future coursework.
   c. Value of experience on potential career options.
IV. Overall Evaluation
   a. Has your employment experience met your expectations?
   b. In what ways has it differed from your objectives?
   c. In what ways could your assignment be improved by your employer?
   d. Could it be improved by you?
   e. Have your assignments provided a broad, developmental experience?
   f. Has your co-op assignment given you a progressive, in-depth learning experience?
   g. What would you want your professors to know about your assignment, your educational enrichment, your technical accomplishments and your overall development as an engineer?

As the student builds the information for the work report, it becomes easy to talk about how the text flows and how logical is the progression of the material. Since the information is personal to the writer, it provides a basis of interest and a template on which to improve the text and the skill level of the writer.

Initial Investigations

Instead of simply complaining about the lack of communication skill demonstrated by engineers, it is important that interested parties in engineering departments investigate the actual deficiencies and concerns of those affected. These parties are comprised of students, faculty, and employers. Faculty provide the usual insights, "Engineers continue to be poor communicators!

They can't write! They can't speak!" This may not be very helpful in trying to bring about change. Students are also fairly limited in their comments, "I can't write! I can't speak!" Certain employers will provide the same train of thought in their estimation of student output. These comments, though, do not provide much in the way of substantive help when it comes to correcting deficiencies. Therefore, access to actual concerns must be provided.

The initial investigation into communication issues began with a survey that was created to delve below the surface of "Can't write/Can't speak, " and discover what were the actual concerns of students and faculty. In this survey, faculty and students in the College of Engineering were asked to participate. Seventeen faculty members participated, distributing questionnaires to 28 classes. The two separate surveys produced a variety of interesting results, especially the similarity of concerns from both faculty and student alike. Since the surveys focused on the need for specifics and not the general attitude that "engineers can't communicate, it was important to gain insights about where the actual concerns lay.

The principal area of concern for both groups was the issue of grammar, punctuation, and spelling. This concern was followed closely by lack of organization skills, unclear expression of ideas, poor verbal skills, difficulty with writing introductions and conclusions, and weak logic. The rankings for the students were as follows:

    Grammar
    Expression of ideas
    Organization
    Support of ideas
    Verbal skills
    Poor introductions and conclusions
    Logic

The student responded to the questions on how to improve the communication skills of engineers. They felt that more written assignments with increased feedback would help immensely. This applied equally to the verbal skills where more presentations were suggested with a more concerted effort toward providing constructive feedback. Class analysis of technical papers, providing equal grading for both technical and the way the material is presented, more practice, and the teaching of presentation tools like PowerPoint were all listed as helps to improving the communication skills of engineers. Future work will more clearly indicate concerns and the ways to address these concerns in an engineering department. Samples of the surveys are included in the Appendix.

The current focus of engineering faculty and corporate leaders over the lack of communication skill expressed by engineering undergraduates has merit when we look at many of the documents

produced by young engineers in their early engineering courses and within their co-op, internship, and experiential learning experiences.

These weak documents become the basis for much of the text production that is seen in the upper level engineering courses. Poor training in and attitudes toward the production of technical documents and a lack of concrete connections to the technical world in early writing classes have created a weakness in the communication system in many engineering departments. It is necessary, therefore, to address and correct this problem in any manner that will bring about improved communication skill. Many avenues have been suggested to do just this: writing across the curriculum, writing intensive courses, tutors. The list is extensive. Another method may be to investigate the typical problems shown in the text produced by the average engineer and devise methods to address these particular problems within the engineering classroom.

The goal of any engineering course should be to produce technically competent engineers who can produce written text that is free of mistakes in both the technical content and the presentation of that material and utilize that skill in the working world. If communication skills are to be scrutinized in the engineering classroom by the engineering faculty member, it is necessary to provide information on specific areas of concern along with ways to address these concerns. By focusing on problems that are generally encountered in engineering text, the faculty member does not have to assume the role of English teacher. There will only be a necessity of directing the attention of the students to a very specialized list and requiring that the student address the concerns.

Avenues for Improvement

After investigating almost ten years of text produced by junior and senior mechanical engineering students, five common areas of concern were found to be most prevalent: the problems involved in simply beginning the production of a text, specific grammatical mistakes, difficulty in creating text that flows, awkward wording, and a lack of direction in editing. If every engineering professor makes an effort to direct students to focus on these concerns, the text production in engineering courses will improve.

Engineering students need to be told to let text flow from the knowledge that they possess. They need to sit down and brainstorm the information that may or may not be included in their writing. Telling students to make an effort to generate as much text without a concern for order or grammatical correctness produces a wealth of material that a student can then organize into a coherent document. By producing copy with as much information as the student can generate, a clear indication of gaps in necessary material will also be evident. Suggesting that outlines should be produced from this early writing will allow the student to see the direction in which the text will move, a movement that will result in a much more competent production.

A common concern among faculty readers is the level of poor grammatical skills expressed by student writers. But where does one start in a fluid mechanics or in a vibrations course to address these concerns. The unfocused feeling expressed by faculty is probably the same as the students who have no idea where to begin their reports when they have only the blank computer screen in front of them. There needs to be a basic list upon which to focus. After looking at a wide range of technical reports, a common set of errors came to light. These errors were in the use of tense: especially present and past. A simple request to look at the tense usage in text may be enough to correct some of these mistakes. Another area that seems to appear in many pieces of student text is incorrect documenting of sources both in the text and in the way bibliographies and reference lists are created. A great deal of complaint is raised, but if examples are given in the early days of a class, the problem might simply disappear. The last broad grammatical problem area concerns simple punctuation mistakes: punctuation with equations, both before and internally; where to place commas; the use of the semi-colon; punctuation with lists; and where does the punctuation go in figures and tables. A few grammar rules presented in the context of technical documentation to an engineering course at the beginning of each semester or quarter will, in most cases, eliminate many of these mistakes.

A third concern among readers of student text is the flat dull quality that comes from much of the text that is produced by students. This quality reflects a lack of flow in the wording, a condition similar to reading a list that indicates no apparent connection among the various parts of the list. This lack of connection makes a reader quickly begin to wander, sometimes becoming lost in personal thoughts far from the actual text. The three items that may help improve all student text are a focus on outlines, a review of simple paragraphing with topic sentences and supporting information, and an overview of the transitions that can be placed in a piece of writing to make the text flow. These relatively easy elements in writing can make a great difference in the quality of a student's text.

Another problem that is seldom mentioned to an entire class of students (but appears at some time or another in the text that they write) is awkward wording. Students are never shown examples of text that absolutely makes no sense; sentences that are so long that the reader loses contact with the core meaning; and word choices that are either inappropriate, ambiguous, or redundant. Faculty who during the course of a semester or quarter give an overview of the kinds of text that do not convey concise meaning provide students with a clear indication of what their own text should avoid.

Lastly, many papers look as though the writer made no effort to read the paper after it was completed. Students sometimes feel that the final click on the computer to print the document is sufficient for a quality piece of text. But does anyone really spend time in giving students an indication of how they should approach their text to proofread and edit the copy. A simple process is to instill in students a need to first look at the content and make sure that they have supplied all the information required. They can then approach the issue of clarity. Is the wording clear and

concise? In the third step they review the text for grammatical correctness. The last two steps require students to evaluate their own writing for its ability to present the text in the least number of words and to investigate their own particular style. These efforts will lead to a much better production and fewer concerns over the finished text.

Conclusions

The comments about student writing in the above text are quite simplistic, but therein lies the message. It does not require a great deal of effort to make students aware of the problems that commonly exist in their writing. Common mistakes seem to appear in most student text production. By looking at text that is produced in their own engineering courses, faculty can pinpoint the most common errors and address those concerns. Students will receive the message that errors in communication are important to their lives as engineers and improvements will begin.

It does not require a great deal of effort to survey the attitudes of faculty and students alike to gain insight into where problems are perceived. Organizing the department into groups that can address elements of concern will do much in both changing attitudes and creating better technical communicators.

Students during their co-op, internship, and experiential learning experiences can produce text from which faculty can provide insights into improvements that will carry into the documents of the work setting. This begins a relationship between the text created in the classroom and the text required in the working world.

Appendix

Communication Surveys

To: All professors in the College of Engineering
From:
Re: Student technical communication skills

FACULTY RESPONSE
There is concern about the engineering student's ability to effectively communicate via either the spoken or written word. As a result, the following survey is being distributed to determine, from the professor's perspective, what needs to be improved upon and how this might be accomplished. Your participation is greatly appreciated and will go a long way to solving this critical problem.

Once finished with the survey, either e-mail back via the reply to sender command to XXX or place a hard copy of the survey in my mailbox in the Mechanical Engineering office.

In addition, there is a survey for the students to complete on this same subject. As I realize, it is close to the end of the semester; it might be preferable to distribute them at the same time as the SIRS forms or the last class period or during the final exam period. Please note below how many surveys are needed for your classes.

I need_____surveys to distribute to my class(es),

_____

For each of the classes you are teaching this semester please respond to the following questions.

	# 1	# 2	# 3
Course Number	____	____	_____

Types of students in your class, please specify only those groups that account for a significant portion of the class population.

	# 1	# 2	# 3
Grad Student	_____	____	_____
Senior	_____	____	_____
Junior	_____	____	_____
Sophomore	_____	____	_____
Freshmen	_____	____	_____

Types of communication performed by the students in your course

	# 1	# 2	# 3
Formal presentations	_____	____	_____
Short oral presentations	_____	____	_____
Demonstrations	_____	____	_____
Essays	____	____	_____
Projects	_____	____	_____
Formal Reports	_____	____	_____
Lab Reports	_____	____	_____
Other (memos, progress reports, feasibility studies, correspondence)	_____	____	_____

please specify_____

Communication problem areas for students (please use 1 for major problem area and 2 for minor problem area.)

Grammatical, spelling, and punctuation	_____	_____	_____
Organization of paper or presentation	_____	_____	_____
Expression of ideas	_____	_____	_____
Logic	_____	_____	_____
Support of ideas	_____	_____	_____
Lack of technical comprehension	_____	_____	_____
Introduction or conclusion	_____	_____	_____
Transitions	_____	_____	_____
Proper use of visual aids	_____	_____	_____
Not focused on who the audience is	_____	_____	_____
Use of ummm in oral communication	_____	_____	_____
Verbal skills	_____	_____	_____
Stilted or rambling style of presentation	_____	_____	_____

Other,

please specify_____

Please list below any suggestions as to what you think should be included in a technical communications course to improve these skills in our student population.

_____
_____
_____

Please list below any ideas on how to educate the students on the various, areas of concern.

_____
_____
_____

Other comments or concerns

_____
_____
_____

Thank you for your time and cooperation

TECHNICAL COMMUNICATION SURVEY

STUDENT RESPONSE

An area that is of great importance to an engineer but in which there is little formal training or attention paid is technical communication. To help correct this problem, more emphasis is being placed on determining deficiencies for both the student and the system. Ibis survey hopes to identify those areas of concern and possible solutions to this situation. Your participation is greatly appreciated.

You are:

___Grad Student ___Senior ___Junior ___Sophomore ___Freshman

You have worked at (please mark all that apply):

___an internship ___a co-op ___a job within the engineering field

Please list any classes that have dealt specifically with the subject of developing communication skills through any means that you feel have been valuable.

_____
_____

What types of communication have been discussed or examined in your courses (please mark all that apply),

      ___Formal presentations

      ___ Short oral presentations

___ Demonstrations

___ Essays

___ Projects

___ Formal Reports

___ Lab Reports

___ Other (memos, progress reports, feasibility studies, correspondence)

Please specify_____

_____

Please list below communication problem areas for yourself and possibly other students as well (please use 1 for major problem area and 2 for minor problem area).

___Grammatical, spelling, and punctuation

___Organization of paper or presentation

___Expression of ideas

___Logic

___Support of ideas

___Lack of technical comprehension

___Introduction or conclusion

___Transitions

___Proper use of visual aids

___Not focused on who the audience is

___Use of ummm, you know in oral communication

___Verbal skills

___Stilted or rambling style of presentation

___Other, please specify_____

_____

_____

Please list below any suggestions as to what you think should be included in a technical communications course to improve these skills.

_____
_____
_____
_____
_____
_____
_____

Please list below any issues that never seem to be raised in this kind of course that should be raised.

_____
_____
_____
_____
_____
_____
_____
_____

If you have worked at a co-op, internship or within the engineering field, please indicate, what if anything, the industry has taught you about the needs of communication that would be valuable in a communications course.

_____
_____
_____
_____
_____
_____
_____
_____

Please list below any ideas on how to educate students on the various areas of concern.

_____
_____
_____
_____
_____
_____
_____

Other comments or concerns

_____
_____
_____
_____
_____

Thank you for your time and cooperation

TECHNICAL COMMUNICATION SURVEY – **Internship/Co-op/Experiential Learning focused**

An area that is of great importance to an engineer is technical communications. Emphasis is being placed on determining what, if any, technical communication deficiencies there are for both the student and the system. This survey hopes to identify those areas of concern and possible solutions. Your participation is greatly appreciated.

Have you already responded to this survey already THIS SEMESTER?

___Yes ___No If yes, please go no further.

You are:

___Grad Student ____Senior ____Junior ____Sophomore ___Freshman

What is your present major?_____

You have worked at (please mark all that apply):

___an internship ___a co-op ___a job within the engineering field

Do you believe engineering students have deficiencies in their technical communication skills?

___Yes ___No

What types of communication have been assigned in your courses (please mark all that apply).

this semester	college career	
___	___	Formal presentations
___	___	Short oral presentations
___	___	Demonstrations
___	___	Essays
___	___	Projects
___	___	Formal Reports
___	___	Lab Reports
___	___	Other (memos, progress reports, feasibility studies, correspondence)

please specify _____

For each of the various areas of communication listed below, please circle whether it is a major problem, minor problem, or no problem at all for yourself and/or possibly other students as well.

PROBLEM

Major Minor No   Grammatical, spelling, and punctuation

Major Minor No   Organization of paper or presentation

Major Minor No   Expression of ideas

Major Minor No   Logic

Major Minor No   Support of ideas

Major Minor No   Lack of technical comprehension

Major Minor No   Introduction or conclusion

Major Minor No   Transitions

Major Minor No   Proper use of visual aids

Major Minor No   Not focused on who the audience is

Major Minor No   Use of ummm, you know in oral communication

Major Minor No   Verbal skills

Major Minor No   Stilted or rambling style of presentation

Major Minor No   Other, please specify_____

During your Co-op/Internship/Experiential Learning experience were you given an indication of areas within your communication activities that could benefit from improvement and further study?

_____
_____
_____
_____
_____

Please list any classes that have dealt specifically with the subject of developing communication skills through any means that you feel have been valuable. For each class, please briefly explain why they have been valuable.

_____
_____
_____
_____
_____

Please list below any suggestions as to what you think should be included in a technical communications course to improve these skills.

_____
_____
_____
_____
_____

Please list below any issues that never seem to be raised in a technical communications course that should be raised.

_____
_____
_____
_____
_____

If you have worked at a co-op, internship or within' the engineering field, please indicate, what if anything, the industry has taught you about the needs of communication that would be valuable in a communications course.

_____
_____
_____
_____
_____

Please list below any ideas on how to educate students on the various areas of concern.

_____
_____
_____
_____
_____

Other comments or concerns

_____
_____
_____
_____

Thank you for your time and cooperation.