An Experiment in Integrating an Engineering Communications Toolkit into the Engineering Curriculum

by

Laura M. Stanley, PhD, CPE

Assistant Professor

Tawny Hoyt

Graduate Research Assistant

Western Transportation Institute

College of Engineering

Montana State University

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INTRODUCTION

A recent survey on the working habits of professional engineers found that nearly 2/3 of their day is spent communicating with others, while only 1/3 is spent on tasks commonly associated with engineering (Sageev & Romanowski, 2001). Whether it is face-to-face conversations, formal presentations, email correspondence, written reports, etc., communication skills are increasingly important in the professional workplace for today's engineer. In fact, the National Board of Engineering Education (1995) recommended that undergraduate curricula be redesigned to be more professional and socially oriented (e.g. working in teams). The traditional engineering learning experience, the one shared by most undergraduate students, is the lecture class where students "listen, transcribe, absorb, and repeat" (Kedrowicz et al., 2006). This type of learning fosters neither creativity nor the ability to experientially learn the material. This kind of learning results in students who are unprepared for the demands faced by the working engineer.

Communication skills have not been a focus of engineering curricula in the past and there is resistance from faculty as well as students to move in this direction. The initial reluctance from faculty to include nontechnical skills such as writing may come from the old bias that those skills are less important than the hard skills of engineering (Patton, 2008). Older faculty members have shown particular resistance to participation in writing workshops (Patton, 2008). Students are also hesitant to accept the importance of writing as a part of the engineering skills set. They do not want to spend any time or money on learning skills that will not help them advance in the job market. This attitude may be influenced by their professors, who are also resistant to the change and do not reinforce the importance of these skills (Patton, 2008). However if engineering curricula can better incorporate communication skills, students will likely come to see the importance of these skills in preparing for the engineering profession.

A typical response from many engineering departments when faced with incorporating communication skills development within a curriculum is to add a required technical writing course (Kedrowicz et al., 2006). Expecting that all communication skills can be taught in one course is more than optimistic (Patton, 2008). This writing-intensive course is often taught outside of the engineering department, with the result that its connection with the engineering discipline is lost and students' acceptance of writing as an important skill is weakened. Learning to write is a complex process that, for most students, requires more than a single course. It is an activity that requires practice and participation in an appropriate and applied context with expert guidance (Paretti, 2008). Training students in the writing skills they will need as engineers should take place within the engineering classroom.

Integrating communication skills practice throughout engineering curricula is proposed by many as a way to increase professional competency. While there are various ways of integrating communication skills, the Mechanical and Industrial Engineering (M&IE) faculty at Montana State University (MSU) has proposed a communications toolkit that could serve as a general reference for students to use throughout the curriculum. By looking at current successful practices in integrating communication skills in the engineering classroom a communication toolkit can be created to further aid the engineering students of MSU.

HOW THE STANDARDS FOR ENGINEERING EDUCATION HAVE CHANGED

The need to improve communication and management skills in engineering graduates has been widely demonstrated (Shuman et al., 2005). Several studies published in the 1990s pointed to these deficiencies in engineering education and urged reform. The Accreditation Board for Engineering and Technology revised its objectives for engineering education accreditation in 2001 to include these skills.

The National Academy of Engineering's Committee on Engineering Education has launched a program to identify the needs of future engineers entitled *The Engineer of 2020: Visions of Engineering in the New Century.* This program emphasizes the importance to engineers of:

> *"…an ability to* ***listen effectively*** *as well as to* ***communicate through oral, visual, and written mechanisms****. … The increasing imperative for accountability will necessitate an ability* ***to communicate convincingly*** *and to shape the opinions and attitudes of other engineers and the public"* (National Academy of Engineering, 2004).

The satisfactory performance of technical skills and the professional and effective use of communication skills are critical to engineering graduates seeking professional success. With little room in the undergraduate curricula for new courses, the most successful solutions thus far have involved courses that integrate engineering with the development of communication skills. The challenge for engineering curricula was to revamp course requirements to include communication skills while maintaining high levels of technical competence in students. This change has proven difficult at some universities because engineering has traditionally focused on hard technical skills. Yet the value of broadening the learning experience in this way has proven successful. The combination of hard and soft skills has been shown to create a deeper understanding among students of the course material (Paretti, 2008).

INTEGRATING COMMUNICATION SKILLS IN THE ENGINEERING CLASSROOM

Reconfiguring the undergraduate engineering educational experience has been an ongoing process since the mid 1990s. Various methods of integrating communication skills training in the engineering classroom have been studied at institutions around the world. Methods that have proven effective include integration of engineering and humanities courses, department-wide writing culture programs, and a writing integration program referred to as "writing across the curriculum."

Writing Across the Curriculum

Writing Across the Curriculum (WAC) emerged in universities around the country in the 1980s, but its implementation in engineering curricula has been more recent. WAC programs focus on integrating writing assignments with required technical course work. Among the ideas that the program is built on are the beliefs that writing is the responsibility of the entire academic community, writing should be taught throughout the curriculum, writing promotes learning, and that a facility with writing conventions can improve a student's ability to communicate effectively (Kiefer, 2010). Universities that have

successfully integrated WAC programs include Massachusetts Institute of Technology (MIT), George Mason University, University of California–Santa Barbara, Virginia Tech and many more.

Using alumni feedback, MIT developed a program integrating "substantial instruction and practice in writing and speaking into all four years and across all parts of MIT's undergraduate program" (Craig et al., 2008). The program's goal was to go beyond the school's existing "writing requirement" to include a broader range of communication skills such as oral and visual media and conventions of communication specific to the different professional fields. The unconventional, communication-intensive courses challenged students in ways that made them better able to communicate as engineers (Craig et al., 2008).

Collaboration of Engineering and Humanities Programs

Some universities have found success integrating communications training with the engineering curriculum through collaboration with communications departments. At the University of Utah, cooperation between the College of Humanities and the College of Engineering has proven successful in improving communications skills in engineering students. The fusion of colleges led to the creation of a new department in the College of Engineering called the Center for Engineering Leadership (CLEAR). The CLEAR department "fosters active learning of engineering material through speaking, writing, and teaming" (Kedrowicz et al., 2006). One unique part of the program is that CLEAR consultants, outside instructors in communication skills, teach students in the engineering classroom for short blocks of class time, usually 15-30 minutes. This occurs a few times during the semester and with a focus on subjects pertinent to the class. Consultations may cover how to write a good lab report introduction, prepare a team work plan, cite reference material, etc. (Kedrowicz et al., 2006). In this way, students can learn proper communication and teamwork skills and see the relevance of those skills in the engineering classroom.

The program introduces students to communication skills during their freshman year and builds on these skills through their senior year (Kedrowicz et al., 2006). The approach it takes is to have the students "write to learn" and "speak to learn." This requires students to synthesize what they are learning in order to explain it to their professors and peers (Kedrowicz et al., 2006). The program demonstrates to students that communication skills can aid in the learning process, and that they are critical to becoming a professional engineer. An assessment showed that both oral and written skills improved through this integrated learning experience (Kedrowicz et al., 2006).

Department-wide Writing Culture

In order to integrate writing into an engineering curriculum, the entire faculty needs to participate and a department-wide writing culture should be established. This is what the faculty of the University of Missouri did to improve on the school's established WAC program. Feedback from Missouri alumni indicated that writing and communication skills needed to be reinforced throughout the curriculum rather than covered in a just few courses (Patton, 2008). Missouri's WAC program identified certain courses as "writing intensive." However, in order to standardize, reinforce, and sequence writing skills in engineering undergraduates, communication skills instruction was spread out through the curriculum (Patton, 2008). Also, by practicing writing and communication skills in a variety of applications,

students were shown the writing skills that will be expected of them after graduation. By looking at writing in a comprehensive way, with all of its contexts and limitations, engineering students are introduced to the demands they will encounter in the workplace (Patton, 2008).

As an aid to the new writing program, a communication toolbox is hosted on the departmental homepage. This toolbox was created to standardize writing rules across the department and provides tools for proofreading and formatting (Patton, 2008). By creating this central source for students and faculty to reference, the department is emphasizing the importance writing skills have within the program and within the engineering discipline (Patton, 2008). Assessments of students after completion of an integrated writing course produced positive feedback. The majority of students felt that their writing process, critical thinking skills, and ability to write for a general audience had improved through practice in applied engineering contexts (Patton, 2008). Through support from faculty, a department-wide culture of writing can help students see the importance of these skills within the engineering discipline and encourage them to become better communicators.

OBJECTIVE

Research on engineering education has shown that integrating communication skills training into the engineering curriculum is best done in a comprehensive way and not confined to just one or a few courses. Writing standards should be enforced throughout the curriculum. MSU sought to do this by providing engineering students with a learning aid and reference guide in the form of an engineering communications toolkit in various M&IE courses. The toolkit was available to students in hard copy format and electronically as a file hosted on the M&IE webpage at http://www.coe.montana.edu/ie/faculty/stanley/IECommunications/default.htm. This toolkit was designed to help engineering students become better communicators during their undergraduate education. It was designed to comply with department-wide standards that would permit students to focus on content rather than the format requirements of individual professors. The researchers felt it was important that the toolkit be concise and emphasize writing needs relevant to specific assignments the students would encounter as MSU undergraduates. It should be noted that the toolkit was designed to complement other writing reference books, not to replace them. There is a vast amount of reference material and writing help available on the Internet, however this information can be daunting to a student who is not sure where to go for help with a specific assignment. The developers of the toolkit conducted a review of best practices in engineering communication education and compiled what they found into one concise reference aid. The long-term objective, which was beyond the scope of this grant, is to integrate this toolkit into all departments within the College of Engineering at MSU. Ultimately, it is hoped that this toolkit will help change the writing culture in the department among students and faculty by showing that writing skills are critical to an engineer's career success.

METHODS

The Engineering Communications Toolkit was developed through an intensive literature review of best practices among engineering communication integration programs. Technical writing materials (e.g.,

online resources, writing reference books, etc.) were also referenced. This research ensured that the Toolkit included the most important information students would need during their undergraduate tenure without being overwhelming in length. The Toolkit was designed to include tabs at prominent sections for easy referencing. Content was organized around specific types of assignments students are expected to encounter during their undergraduate education. Key assignments include written reports, oral presentations, correspondence, and creating an e-portfolio. Another goal for the Toolkit was that it be a quick referencing guide for faculty during class-specific assignments. In the end, the Toolkit was broken up into 12 key sections, with eight tabbed sections, as shown in Table 1.

Table 1– Structure of Toolkit

Section Title	Section Goals
*Technical Writing	• Define technical writing and its components • Provide guidelines structuring a report • Provide general formatting guidelines • Provide direction on how to properly cite material and create bibliographies • Define appropriate language to use in technical writing • Discuss how to properly conduct a peer edit
Common Mistakes	• Provide information on avoiding/correcting common mistakes regarding: o Sentence structure o Punctuation o Verb tense usage o Numerals
*Written Reports	• Provide information on structure and format for: o Formal Project Reports o Research Reports o Lab Reports
*Written Report Template	• Provide a basic report template with the formatting explained. Template used with permission from Alley, 1999.
*Oral Presentations	• Define purpose of oral presentations • Provide general guidelines for presenting • Provide general PowerPoint presentation guidelines • Provide general poster presentation guidelines
*Presentation Examples PowerPoint Presentation Examples	• Provide information on how to put together a PowerPoint presentation, shown in the form of PowerPoint slides
Poster Presentation Example	• Provide information on how to put together a poster presentation, shown in the form of a research poster
*Correspondence	• Discuss the importance of correspondence • Provide general guidelines for proper correspondence practices • Provide specific information on how to write: o Memos o Letters o Emails
Correspondence Templates	• Provide formatting and structure requirements for writing: o Memos o Letters o Emails
*E-Portfolio	• Define e-portfolio and its applications • Provide information on how to create an e-portfolio
*Grading Rubrics	• Provide a basic grading rubric for report writing and presentations from all members of the faculty • Discuss the expectations of quality as applied to grammar, content, etc., in written and oral presentations
References	• Provide a list of sources, properly cited

*Indicates a tabbed section

The Toolkit was written following the goals outlined in Table 1. The end of each tabbed section provides suggestions for further reading and a list of online resources related to the section. Researchers also took care to ensure the Toolkit was colorful and appeared attractive to students.

Data Collection

Data was collected from two primary survey instruments, one for faculty and one for students who used the Toolkit in the M&IE department. The overall data collection plan included a Phase One pilot study to determine what revisions were needed for the Toolkit in order to conduct a full evaluation in Phase Two. Phase One consisted of one class of students in the M&IE department using the Toolkit for an entire semester and assessing its usefulness. Also in Phase One, selected faculty members of the M&IE department were given the Toolkit to evaluate for potential use in future courses. Phase Two consisted of distributing the Toolkit in three courses and assessing its usefulness as reported by the students and faculty.

Assessment measures were developed to evaluate whether use of the Toolkit was meeting its objectives for students and faculty. The objectives outlined for students were:

- The Toolkit is a useful aid for writing and presentation assignments
- The Toolkit is a useful reference guide and learning aid for engineering communication
- The Toolkit will continue to be useful throughout curriculum

The objectives outlined for faculty members were:

- The Toolkit aids in teaching writing and presentation skills in the classroom
- The Toolkit makes assigning and grading communication practices easier

The final objectives of the assessments for both students and faculty were to determine what students and faculty liked and disliked about the Toolkit and to seek suggestions for future versions.

The same survey instrument was used for students in both Phase One and Phase Two because both sets of students used the Toolkit for the same period of time and researchers wanted to ensure consistency of results. Faculty member assessments were different for Phase One and Phase Two. Both assessments covered the objectives outlined above, but they were constructed to distinguish between those faculty members who reported they may use the Toolkit (Phase One) and faculty members who had just used the Toolkit (Phase Two).

Phase One

The initial phase of this study involved the distribution of the Toolkit to 11 students (one class) and five faculty members. Students of Industrial and Management Engineering (IME) 142, Introduction to Production Systems, were given the Toolkit to use throughout the spring semester of 2010. This course introduces students to system design and improvement methods. It also exposes them to report writing and presentation in the engineering classroom. Upon course completion students were asked to assess the Toolkit for frequency of usage and reasoning for specified use, effectiveness of the resource, and any comments or suggestions for improving the Toolkit. The survey instrument for student feedback was developed by an in-house assessment expert that can be found in Appendix A.

Faculty members of the Industrial Engineering program within the M&IE department, a total of five individuals, were contacted to provide feedback on the Toolkit. Faculty surveys were also developed by an in-house assessment expert and was designed to reflect how likely the faculty members were to use the Toolkit in their courses, the usefulness of the Toolkit's sections, whether or not the Toolkit would aid the grading process, and any comments or suggestions for improving the Toolkit. Responding faculty was 40 percent of those contacted. The assessment form distributed to faculty can be seen in Appendix B. It should be noted that one of the developers of the Toolkit was an M&IE faculty member herself; her feedback is not included in any results.

Phase Two

The second phase of this study involved the distribution of the Toolkit to a wider pool of students and included various faculty members using the resource in their class room. Three courses within the M&IE department utilized the Toolkit during the fall 2010 semester. These include:

(1) Industrial and Management Engineering (IME) 413 – *Ergonomics and Human Factors Engineering* had 11 students who were mostly seniors, and covered topics in the principles of biomechanics, design error, and motivational work theory.
(2) Mechanical Engineering (ME) 101 – *Introduction to Mechanical Engineering* consisted of 168 students who were mostly freshman, and introduced students to the mechanical engineering profession, problem solving, and design.
(3) Industrial and Management Engineering (IME) 300 – *Professional Practice and Responsibility* had 15 students who were mostly juniors, and introduced engineers to career planning, professional ethics, communications, and related professional topics.

A total of 194 students used the Toolkit during the fall 2010 semester. The assessment form used for students in Phase Two was the same one used in the initial phase and is shown in Appendix A.

Professors using the Toolkit in their courses assessed the second version of the Toolkit after a full semester of use. The Phase Two faculty assessment measured how they rated the Toolkit as a tool for their course, if they would be willing to use it in future courses, what sections were most and least useful, and whether the Toolkit aided in assigning and grading communication coursework. These assessments again asked faculty for suggestions in making the resource better. The assessment form used for faculty in Phase Two can be seen in Appendix C.

RESULTS

Phase One

Student Findings

The Toolkit assessments for students in the spring 2010 IME 142 class asked about various aspects of the Toolkit, including how frequently they used the Toolkit as a reference during the semester. Results are shown in Figure 1. When looking at frequency of use by the students of IME 142, it is pertinent to note that no students reported never using the Toolkit during the semester.

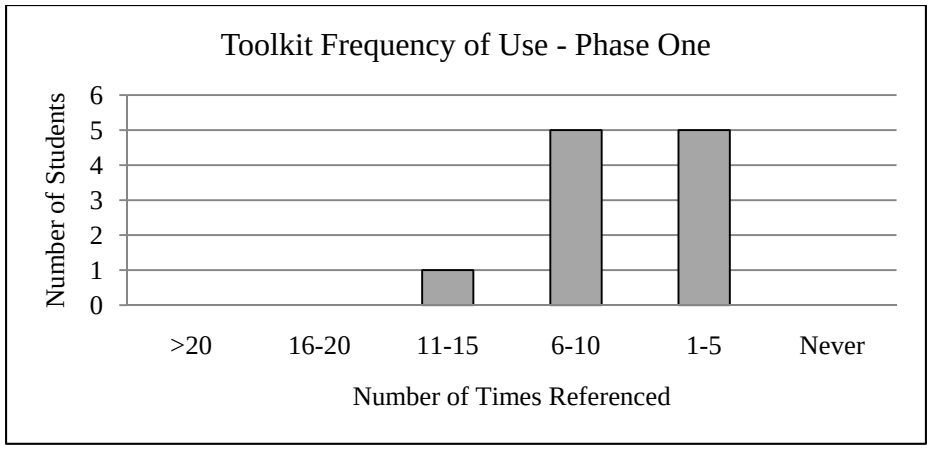

Figure 1 – Student Assessment of Toolkit, Section One, Phase One

The second section asked the students how often they used the various sections of the Toolkit and why. Use of the various sections correlated with class assignments for the introductory course. This course included assignments on report writing, PowerPoint presentation, and creating an e-portfolio. Topics relating to poster presentation and correspondence were not covered in this course but are included later in the curriculum. Figure 2 shows the frequency that students indicated using the different sections.

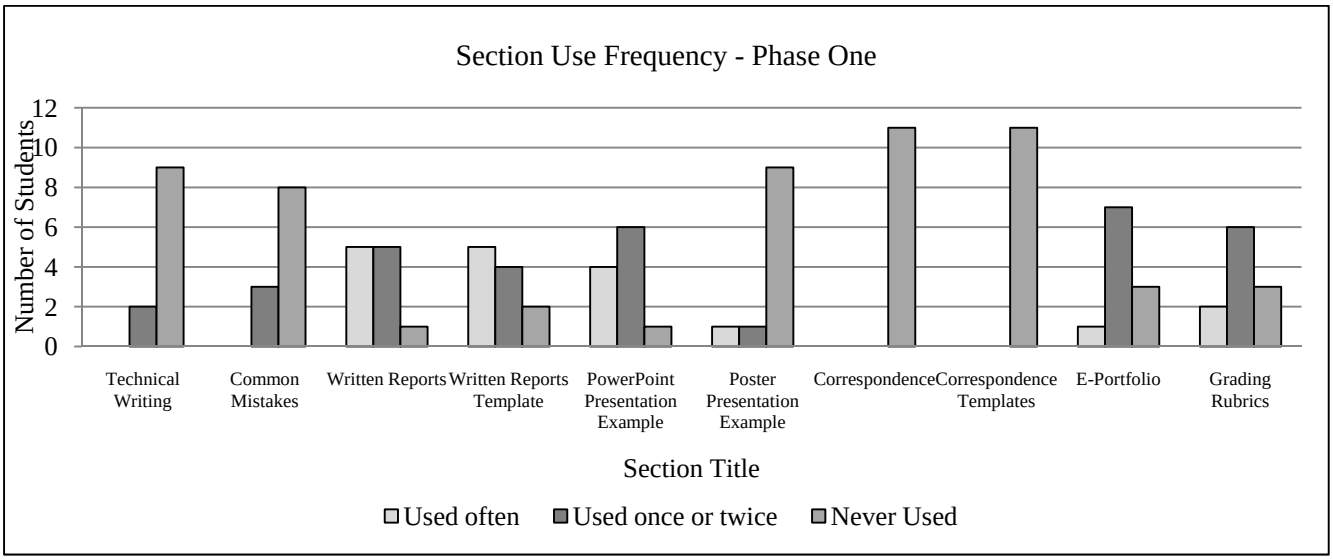

Figure 2 – Student Assessment of Toolkit, Section Two, Phase One

Student-reported usage of the different sections of the Toolkit suggests a dramatic contrast between frequently used sections and sections that saw little to no use. As expected, when relating to the course material, the sections on written reports, report template, PowerPoint presentation example, e-portfolio, and grading rubrics were used most often. Also, as expected, the sections on poster presentations, correspondence, and correspondence templates were used little by students. The surprising result from Figure 2 is that students reported little usage of the technical writing and common mistakes sections of

the Toolkit. A reason frequently cited by students for not using these sections was that they did not feel they needed help in this area or were unsure how relevant the sections were to course material.

The last section of the assessment assessed how useful the students found the Toolkit overall. Figure 3 shows the results from this section.

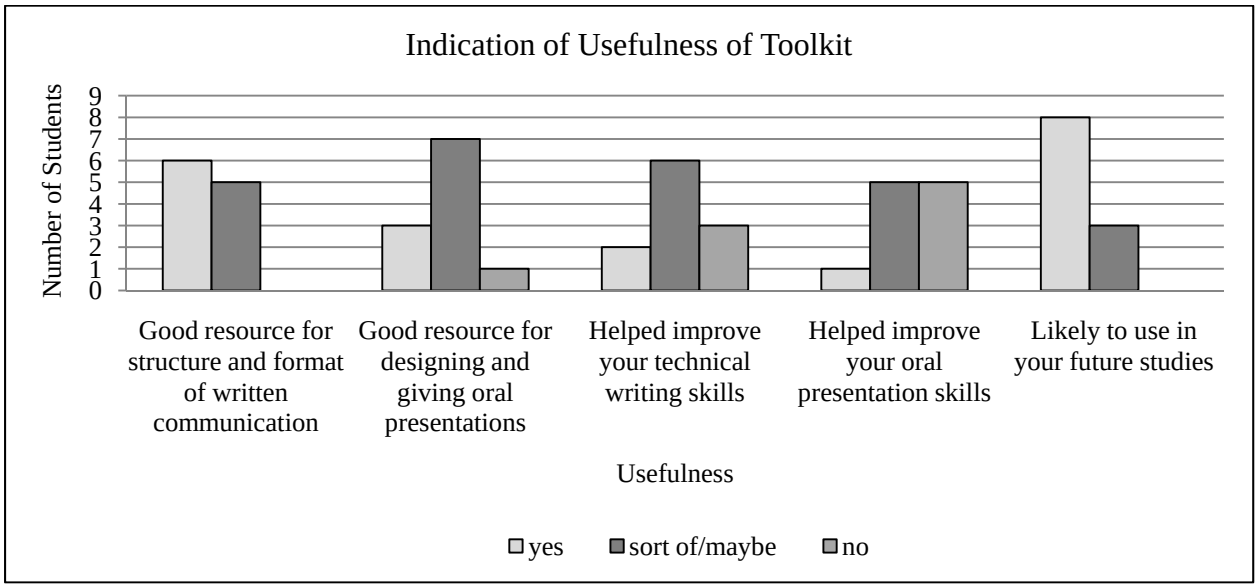

Figure 3 – Student Assessment of Toolkit, Section Three, Phase One

In general, students provided positive feedback on the Toolkit and called it a "good resource" for structuring, formatting, and designing written reports and oral presentations. Students did not feel, or felt unsure, that the Toolkit helped them improve their skills in technical writing or oral presentation skills. When asked why, most students stated that while the formatting guidelines were valued, their writing and presentation skills were not in need of improvement. In fact, most students cited structure and formatting to be one of the most valuable resources in the Toolkit. It is important to note that no student said they would not use the Toolkit in future studies, suggesting they see the potential of the Toolkit as a valuable communications resource.

Faculty Findings

Responding faculty members of the M&IE department reacted very positively to the Toolkit in the Phase One assessment. When asked how likely they would be to use the Toolkit in their courses, all responded "Very likely." Faculty also considered that over half of the Toolkit sections were most useful. The sections considered valuable varied among the faculty, likely due to the different courses taught, but when asked what they considered the single most useful aspect of the Toolkit, their responses were consistent. Faculty members reported the Toolkit was most useful as a common reference for both students and faculty to use in applying consistent standards to assignments with a communications element. One faculty member praised the Toolkit for providing information that is relevant to actual career scenarios.

When asked which sections they found the least useful, grading rubrics was mentioned by half the responding faculty members.

All who assessed the Toolkit said that it would make assigning and evaluating writing assignments easier in their classes. A final comment by one faculty member showed support for the goal of the Toolkit:

> *"I think this is an extremely worthwhile and needed utility that will increase both the quality and consistency of student work while simultaneously reducing the workload of both students and faculty by providing standardized formats."*

A complete compilation of student and faculty comments for Phase One can be seen in Section 1 of Appendix D.

Phase Two

Student Findings

Students who participated in the second phase of the Toolkit assessment were given the same form as students who used the Toolkit during the initial phase. Given that three different classes used the Toolkit during Phase Two, assessments were compiled by proportion of students in each course. This takes into consideration the different sizes of the classes to show how different classes use the resource.

The first section of the Toolkit assessment looked at how frequently the Toolkit was used by students. Figure 4 shows how often students in each course reported using the Toolkit.

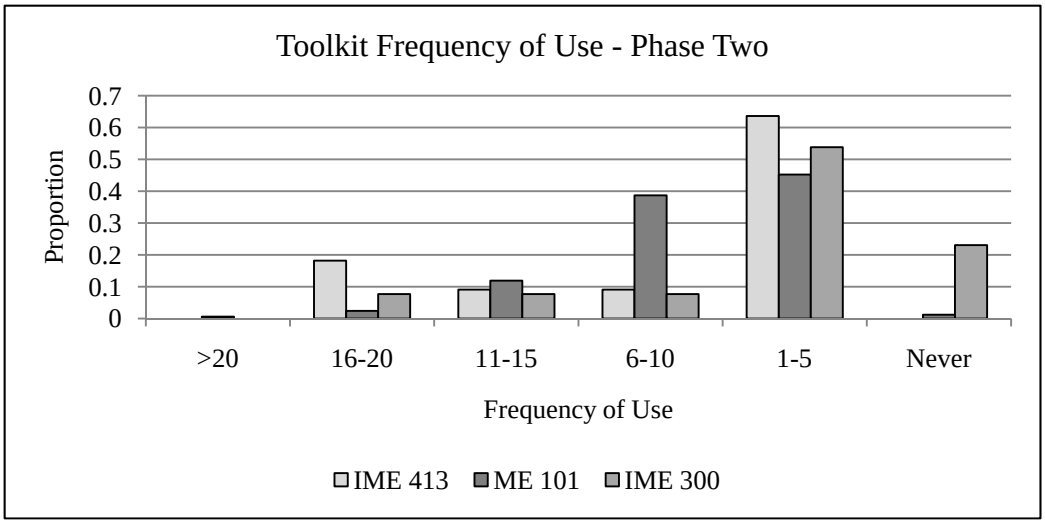

Figure 4– Student Assessment of Toolkit, Section One, Phase Two

Few students reported never using the Toolkit. The highest proportion of the students indicating they never used the Toolkit was from the IME 300 course, Professional Practice and Responsibility. These students said they had not used it yet but planned to use it on their final projects. The results shown in

Figure 4 indicate that while most students referred to the Toolkit from one to ten times during the semester, a considerable proportion indicated using the Toolkit 11 to 20 times.

The second section of the student assessments looked at how often each section of the Toolkit was used. As in the initial phase, section usage was expected to correlate with classroom assignments. Students in IME 413, a senior-level course, were required to submit a semester project that included a final paper and presentation. In ME 101, students were given regular written report assignments and were specifically asked to use the Toolkit's written report template as a formatting guide. IME 300 focused on technical writing practice and required students to write reports of various lengths. Figure 5 shows the results from this section of the Toolkit survey for students of IME 413.

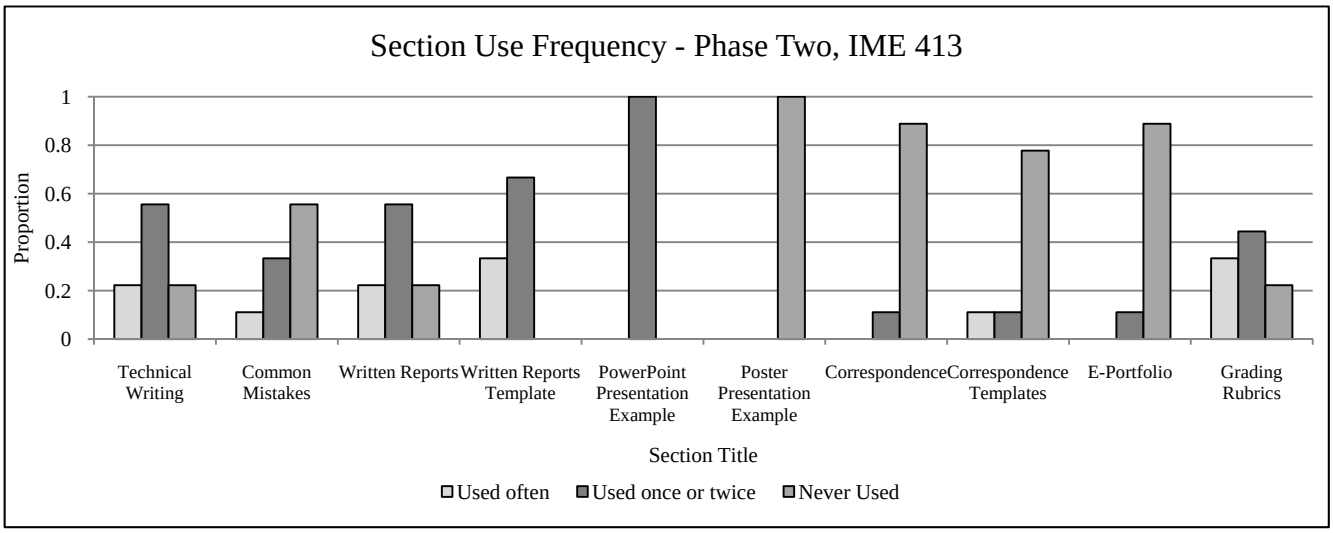

Figure 5 – Student Assessment of Toolkit, Section Two, Phase Two, IME 413

The Toolkit sections students reported using the most correlate to the type of work assigned in the course, as shown in Figure 5. The sections referred to most frequently were those on technical writing, written reports, written reports template, PowerPoint presentations, and grading rubrics. The frequency of reference to these sections may not be high, but these students had one paper and one presentation in the course, so the low frequency of use would be expected. Students were also asked to explain their reported usage frequency, and most responses related to course work. The sections on poster presentations, correspondence, and e-portfolio were not used very frequently by the students of IME 413, a course in which those activities were not assigned.

Figure 6 shows the Phase Two student survey results from the ME 101 course.

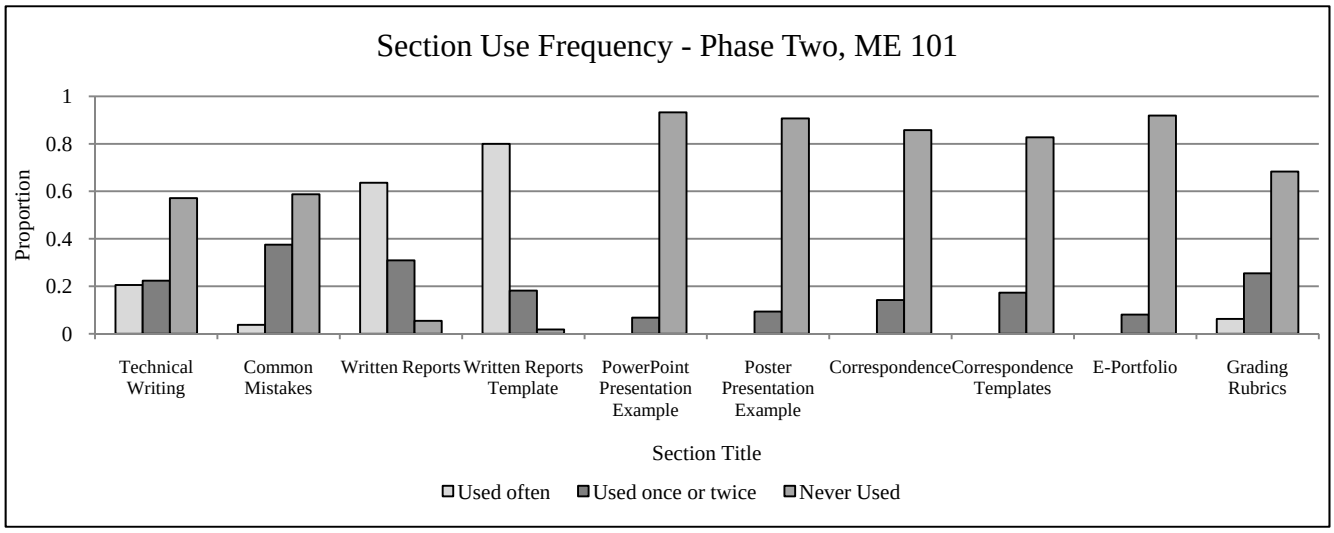

Figure 6 – Student Assessment of Toolkit, Section Two, Phase Two, ME 101

The ME 101 results tended to correlate with class assignments. The sections students reported using most often related to written assignments, technical writing, common mistakes, written reports, and written reports template. Other sections were little used, though some students said they looked at the other sections out of curiosity and mentioned the possibility of using them in future courses.

The results for Phase Two of the student survey from IME 300 are shown in Figure 7.

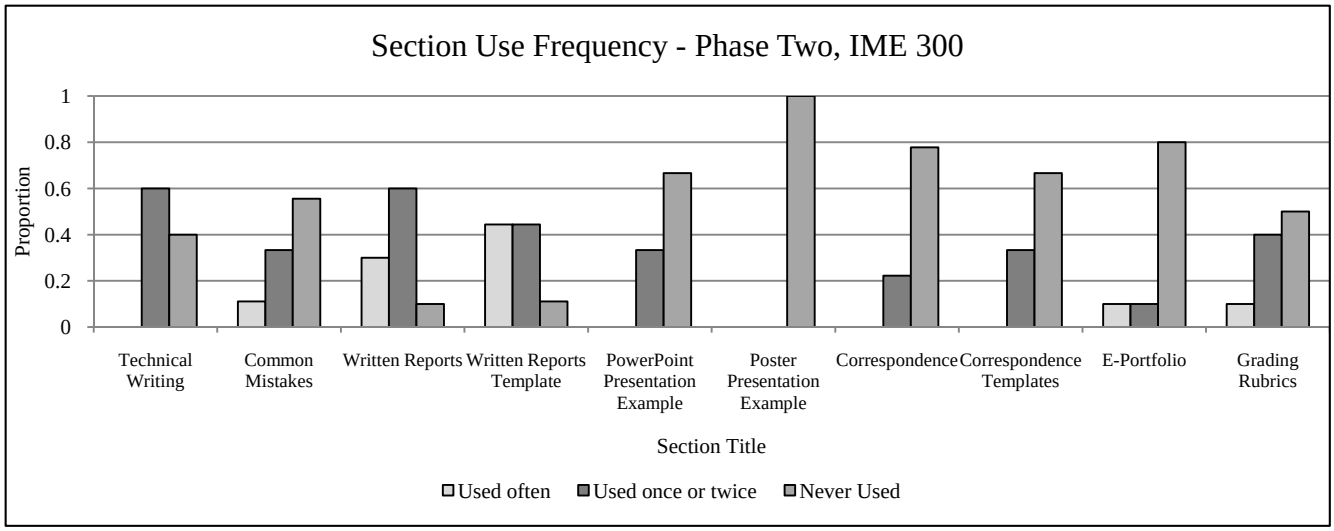

Figure 7 – Student Assessment of Toolkit, Section Two, Phase Two, IME 300

As was the case with the other classes, the sections used most frequently by students in IME 300 correlate with the course assignments. A number of written reports were assigned in this course, and students reported using the written reports and templates sections of the Toolkit. Poster presentation, correspondence, and e-portfolio were not covered in this course and therefore those sections were not used frequently by the students.

The third and final section of the Toolkit assessment looked at how useful the students found the Toolkit to be for their courses and for their engineering education in general. Figure 8 shows the results from this section of the survey.

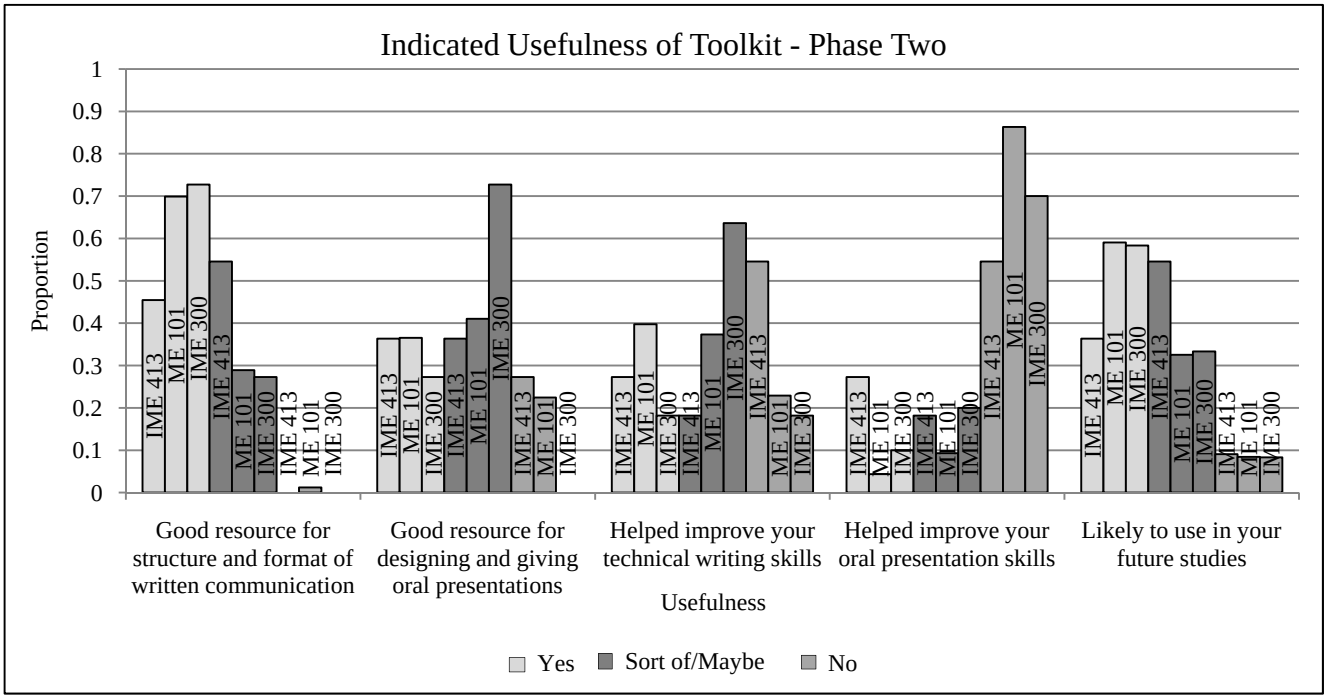

Figure 8– Student Assessment of Toolkit, Section Three, Phase Two

In general, students in all three courses said the Toolkit was a good resource for the structuring and formatting of their written communication. A smaller proportion, but still a majority of the students, said the Toolkit was a good resource for designing and giving oral presentations.

Across the three courses there were mixed responses regarding whether the Toolkit helped students improve their technical writing skills. Students who believed that the Toolkit did help to improve their technical writing skills primarily cited improvement in the organization and structure of their written reports. One student from IME 413 said the Toolkit "had [a] really good way of showing the technical details and requirements for writing." The students who did not believe the Toolkit helped their technical writing skills commented on using the Toolkit as a writing template and not a writing aid.

Most students said the Toolkit did not help improve their oral presentation skills. The main reasons given were that they were not assigned oral presentations during the semester or did not use the Toolkit as a resource for oral presentations. A student from IME 300 who indicated that the Toolkit "sort of" helped with technical writing skills said the Toolkit was a nice "refresher of things I already should have known all in one package."

Over 90 percent of students from each course said they were "likely" or "maybe likely" to use the Toolkit in future studies at MSU. As shown in Figures 5, 6, and 7, student use of the Toolkit was closely related to class assignments.

Faculty Findings

Faculty members responded very positively to having the resource in their classroom for a semester. Asked to rate the Toolkit as a resource for students and faculty, all responded that it was either "excellent" or "good." Also, all faculty members using the Toolkit said that they would be willing to use it again in the same or other courses in the future. All faculty members considered the technical writing, common mistakes, and written reports sections to be the most useful to their students. The portions of the Toolkit deemed least useful by all faculty were the correspondence, correspondence templates, and e-portfolio sections. This was likely because those topics were not covered in the courses.

Faculty members were asked what they believed to be the single most useful aspect of the Toolkit for themselves and their students. Several pointed to the Toolkit being a "single source for consistent presentation methods across written reports, slides and posters," as one responder put it. Also faculty members said they appreciated the structure and consistency that the Toolkit offers. One faculty member said the Toolkit provided "quick access for templates and [the writing] process without having to take serious class time." Overall, the Toolkit was well received by teachers as a classroom resource.

A complete compilation of student and faculty comments for Phase Two can be seen in Section 2 of Appendix D.

DISCUSSION

The Engineering Communications Toolkit developed by researchers in the M&IE department at MSU has proved to be a good resource for both students and faculty. Students showed a willingness to use the Toolkit in their courses. Few students reported never using the Toolkit during its two semesters of distribution, and most students said they believed the Toolkit would be helpful in future studies. Student comments received during the project's assessment included some that called the Toolkit a "very good tool" and "very helpful with [writing] reports." Faculty members welcomed the Toolkit as an effective and relevant writing resource. Research has shown that learning to communicate effectively is vital to the success of today's engineering graduates. By using this Toolkit, students in the M&IE department at MSU can improve their communication skills and become effective communicators upon graduation.

From the results of the surveys it was clear that certain sections of the Toolkit were found to be more useful than others. The Toolkit was designed to be used throughout a student's undergraduate education. Inevitably, chapters will be more or less relevant to courses according to the types of assignments students are given. A comment repeated among the students in ME 101 was that, although they had not yet had to use the Toolkit to help with oral presentations, they believed they would likely find it helpful in future courses where that type of presentation is assigned.

Though distribution of the Toolkit went smoothly and there was participation from students and faculty, the Toolkit was not well received by all contacted. Researchers initially found it difficult to convince faculty members that a resource focusing on communication skills was useful or necessary. Many professors in the M&IE department have their own guidelines regarding students' written and oral

communications and they were unwilling to accept a new standard meant to apply across the department. Their input in the process of developing the Toolkit was encouraged, but not all wanted to participate. Only 40 percent of the contacted faculty members responded to the Phase One evaluation. This reinforces the notion that even some engineering faculty members do not see the importance of communication skill development in undergraduate curricula.

This resistance from faculty members makes it even more important that a writing culture be developed in undergraduate engineering curricula. Research in the area fully supports the belief that communication skills are critical to the success of today's engineers. Comments from students on the assessment surveys showed the troublingly weak writing culture that persists among today's students. Asked why the technical writing sections were not used, some said "[I have] no writing classes this semester," and "I have [no need] for technical writing yet." These statements were made even though the course they were taking involved a substantial component of technical writing assignments. Some students distinguished between a "writing course" and an "engineering course" in their comments, highlighting the nature of the problem this Toolkit is intended to address. It is hoped that broader acceptance of the Toolkit among engineering faculty will lead to a better understanding of the need for effective oral and written communication skills in their classes. This is one avenue for developing a writing culture and maintaining it throughout the engineering curriculum.

With continued support, this aid will be integrated into freshman-level courses throughout the MSU College of Engineering and be further implemented and referenced through subsequent academic years. This would include performing assessments of the students' communications skills throughout their undergraduate tenure. Use of the Toolkit should enhance the professional competency of engineering students through integrated, systematic development of technical and professional communication skills across the engineering curriculum, and make MSU's engineering graduates better communicators and more competitive in the global workforce.

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APPENDIX A: STUDENT ASSESSMENT

Engineering Communications Toolkit: User Survey

The Industrial Engineering Communications Toolkit is still under development, and your feedback about the Toolkit will help us create a valuable resource for future IE student use. Thank you for offering your thoughtful responses to the questions below!

1. About how many times do you think you referred to the IE Communications Toolkit during the semester?

- ☐ More than 20 times
- ☐ 16 to 20 times
- ☐ 11 to 15 times
- ☐ 6 to 10 times
- ☐ 1 to 5 times
- ☐ Never

If you answered "Never," why didn't you use it?

2. Let us know which sections of the Toolkit you found to be most/least helpful by filling in the table below:

Toolkit Section	Frequency of Use			Reasoning for usage indicated
	Used often	Used once or twice	Never used	
Technical Writing				
Common Mistakes				
Written Reports				
Written Reports Template				
PowerPoint Presentation Example				
Poster Presentation Example				
Correspondence				
Correspondence Templates				
E-Portfolio				
Grading Rubrics				

3. Did the Toolkit provide a good resource for structuring and formatting written communication?

   - ☐ Yes
   - ☐ No
   - ☐ Sort of

4. Did the Toolkit provide a good resource for designing and giving oral presentations?

   - ☐ Yes
   - ☐ No
   - ☐ Sort of

5. Did the Toolkit help you improve your technical writing skills?

   - ☐ Yes
   - ☐ No
   - ☐ Sort of
   - ☐

   Why or why not?

6. Did the Toolkit help you improve your oral presentation skills?

   - ☐ Yes
   - ☐ No
   - ☐ Sort of
   - ☐

   Why or why not?

7. Are you likely to use the Toolkit in your future studies at MSU?

   - ☐ Yes
   - ☐ No
   - ☐ Maybe

8. What suggestions do you have for the Toolkit?

APPENDIX B: PHASE ONE FACULTY ASSESSMENT

Engineering Communications Toolkit: Faculty Survey

The Industrial Engineering Communications Toolkit is still under development, and your feedback about the Toolkit will help us create a valuable resource for future IE student use. Thank you for offering your thoughtful responses to the questions below!

1. How likely are you to use the Toolkit in one of your courses?
   - ☐ Very Likely
   - ☐ Somewhat Likely
   - ☐ Not Very Likely
   - ☐ Not a Chance

   If you are likely to use the Toolkit, for what course or courses?If you are not likely to use the Toolkit, why?

2. Which of the following sections do you think is most useful (check all that apply)?
   - ☐ Technical Writing
   - ☐ Common Mistakes
   - ☐ Written Reports
   - ☐ Written Reports Templates
   - ☐ Oral Presentations
   - ☐ PowerPoint Presentation Example
   - ☐ Poster Presentation Example
   - ☐ Correspondence
   - ☐ Correspondence Templates
   - ☐ E-Portfolio
   - ☐ Grading Rubrics
   - ☐ References

   What would be the single most useful aspect of the Toolkit for you or for your students?

3. Which of the following sections do you think is least useful (check all that apply)?

   - ☐ Technical Writing
   - ☐ Common Mistakes
   - ☐ Written Reports
   - ☐ Written Reports Templates
   - ☐ Oral Presentations
   - ☐ PowerPoint Presentation Example
   - ☐ Poster Presentation Example
   - ☐ Correspondence
   - ☐ Correspondence Templates
   - ☐ E-Portfolio
   - ☐ Grading Rubrics
   - ☐ References

   Please explain why you selected the sections that you did.

4. Do you think the Toolkit would make it easier to assign and/or evaluate writing in your classes?

   - ☐ Yes
   - ☐ No
   - ☐ Maybe

   Please explain your reasoning for your selection.

5. What suggestions do you have (if any) for the Toolkit?

APPENDIX C: PHASE TWO FACULTY ASSESSMENT

Engineering Communications Toolkit: Faculty Survey

The Engineering Communications Toolkit is still under development, and your feedback about the Toolkit will help us create a valuable resource for future engineering student use. Thank you for offering your thoughtful responses to the questions below!

1. After using the Toolkit in your course, how would you rate the Toolkit as a resource for students and faculty?

- ☐ Excellent
- ☐ Good
- ☐ Okay
- ☐ Poor

2. Would you be willing to use the Toolkit again in this course or other courses?

- ☐ Yes, definitely
- ☐ No way
- ☐ Maybe

Why or why not?

3. Which of the following sections do you think was most useful in your course (check all that apply)?

- ☐ Technical Writing
- ☐ Common Mistakes
- ☐ Written Reports
- ☐ Written Reports Templates
- ☐ Oral Presentations
- ☐ PowerPoint Presentation Example
- ☐ Poster Presentation Example
- ☐ Correspondence
- ☐ Correspondence Templates
- ☐ E-Portfolio
- ☐ Grading Rubrics
- ☐ References

What is the single most useful aspect of the Toolkit for you or for your students?

4. Which of the following sections do you think was the least useful in your course (check all that apply)?

- ☐ Technical Writing
- ☐ Common Mistakes
- ☐ Written Reports
- ☐ Written Reports Templates
- ☐ Oral Presentations
- ☐ PowerPoint Presentation Example
- ☐ Poster Presentation Example
- ☐ Correspondence
- ☐ Correspondence Templates
- ☐ E-Portfolio
- ☐ Grading Rubrics
- ☐ References

Please explain why you selected the sections that you did.

5. Do you think the Toolkit made it easier to assign and/or evaluate writing in your classes?

- ☐ Yes
- ☐ No
- ☐ Maybe

Please explain your reasoning for your selection.

6. What suggestions do you have (if any) for the Toolkit?

APPENDIX D: COMPILED ASSESSMENT COMMENTS

Section 1

Student Comments, Phase One, IME 142

About how many times do you think you referred to the IE Communications Toolkit during the semester? If you answered "Never," why didn't you use it?

(No one indicated that they *never* used the Toolkit!)

Did the Toolkit help you improve your technical writing skills? Why or why not?

- Helped a lot in formatting papers (yes)
- I didn't know the template before (yes)
- Did not try to use it to improve skill (sort of)
- I haven't needed to use this section yet (sort of)
- While the writing toolkit did offer some guidance towards writing a better paper, I felt that my writing skills were sufficient that I didn't need much help (sort of)
- I had not done technical writing before so it was a new experience for me (sort of)
- It helped me organize my writing but didn't do much to help start writing for a section (sort of)
- Didn't use it (no)
- Yes, the templates did (no)
- I didn't look at it to improve my technical writing skills. I used it mainly for formatting (no)

Did the Toolkit help you improve your oral presentation skills? Why or why not?

- The toolkit gave me helpful info on how to make a great ppt, so I used it regularly (yes)
- Helped improve organization of presentation but didn't help me speak more fluent and confidently(sort of)
- Com 110 helped a lot, good guidelines (sort of)
- Used it for bio-degradable presentation helped with slide layout (sort of)
- Gave good template/formatting for presentation. Rubrics helped to know what the criteria were (sort of)
- I feel very comfortable presenting (no)
- Not really (no)
- I have given many presentations before. I improve best by physically presenting, not reading (no)
- I've had a lot of work done in this area already (no)

What suggestions do you have for the Toolkit?

- Putting more specific common mistakes would improve it. Maybe put down phrases that shouldn't be used in formal writing, or conjunctions and words that shouldn't be included in formal writing.
- More technical writing examples
- Very good tool, not sure of any way to improve it
- I think the written report template could have been better. It would have been useful to have a better description of what information needed to be in each section instead of just talking about the font size and such.
- Tell students when to refer to toolkit
- None at this time that I can think of
- None specifically, it seems to accomplish its purpose
- Too much info on formatting seemed overwhelming. Add suggestions for writing give thoughts on how someone should start writing a section
- More color

Toolkit Section	Reasoning for usage indicated		
	Used often	Used once or twice	Never used
Scientific Writing		• Needed only limited help	• No writing classes this semester • Didn't think to look in here • Not needed (x3)
Common Mistakes		• Not real specific/more general outline material • Wanted a quick view of what not to do • For final project	• Should have used more • I didn't know there was this section • Didn't think to look in here • No need yet • Not needed
Written Reports	• For written report • Great tool • I used it for my term project • Did projects with these	• Found it useful, but used the template more frequently • For LCA project • For final project	• Didn't think to look in here
Written Reports Template	• For written report • Very helpful with report • I used it for my term project • Did projects with these	• For LCA project • For final project	• I used the template online • Didn't think to look in here
PowerPoint Presentation Example	• For ppt presentation • Required to use for a project, also wanted to learn basic most excepted way of making a ppt • Did projects with these	• Helped organize ppt • Only use to make sure I was doing it right • Used for biodegradable expectation • For 2 presentations in IME 142 • For product presentation and final project	
Poster Presentation Example	• Wanted to get basics and details right for a presentation		• Does not apply • No need • Not needed
Corres-pondence			• Does not apply • I didn't know this was in there • Not needed (x3)
Corres-pondence Templates			• Does not apply • I don't know what this is • Not needed (x3)
E-Portfolio	• Helped in constructing my website • Did projects with these	• Used for reference when making my portfolio • For e-portfolio (x3)	• Used online guidelines • Used handout
Grading Rubrics	• Referred to this to see what had to be done to obtain a high grade	• Yes, as a reference • Presentations • To see how I'd be judged	

Faculty Comments, Phase One

How likely are you to use the Toolkit in one of your courses? If you are likely to use the Toolkit, for what course or courses?

- IME 300 (Very likely)
- IME 513, 413, 410 (Very likely)

If you are not likely to use the Toolkit, why?

(No one indicated that they were not likely to use it)

What would be the single most useful aspect of the Toolkit for you or for your students?

- Common reference for students to establish standards across IE department that are similar to those that will be encountered in actual career scenarios
- Setting a standard across all courses is most useful

Please explain why you selected the sections that you did (least useful sections)

- I don't think any of the areas are really least useful
- Too much variation across courses and assignments (Grading Rubrics)

Do you think the Toolkit would make it easier to assign and/or evaluate writing in your classes? Please explain your reasoning for your selection.

- Department wide standards permit students to focus their efforts on content rather than capricious and potentially idiosyncratic format requirements of particular professors. (Yes)
- Having a single standard makes life easier. (Yes)

What suggestions do you have (if any) for the Toolkit?

- Include more examples and reference sources, even if they are links to online material. Also leave room for customization to address specific needs for different application areas while still maintain a basic overall common structure.
- I think this is an extremely worthwhile and needed utility that will increase both the quality and consistency of student work while simultaneously reducing the workload of both students and faculty by providing standardized formats.
- Include CD with templates.

Section 2

Student Comments, Phase Two, IME 413

About how many times do you think you referred to the IE Communications Toolkit during the semester? If you answered "Never," why didn't you use it?

(No one in this course reported never using the Toolkit.)

Did the Toolkit help you improve your technical writing skills? Why or why not?

- It had really good way of showing the technical details and requirements for writing (yes)
- I never had much experience with technical writing (yes)
- Was able to reference but was only used for this paper (sort of)
- I liked having more guidelines! (sort of)
- Didn't use (no)
- Plenty of experience from writing thesis (no)
- Same thing I have always seen (no)
- Didn't really use it (no)
- Good foundation already (no)

Did the Toolkit help you improve your oral presentation skills? Why or why not?

- Know what and what not to do (yes)
- Helped with power point slides (yes)
- I found it's suggestions ok, but I never remembered to use them (sort of)
- I have a lot of speaking experience prior to having the toolkit. Helped with class (sort of)
- I feel pretty comfortable talking in front of people (no)
- Only looked at example (no)
- Again, same sort of info I have seen (no)
- Good foundation already (no)
- Have guidelines from many other presentations (no)

What suggestions do you have for the Toolkit?

- It's really good, the only reason I didn't use it much is because I'm graduating and have a skill set.
- It's good. When I needed it it was helpful.
- Maybe include more information and make the info more clear and concise.
- I haven't seen too many things in here before, but it would be useful in my future.
- Promote its use more.
- I don't seem to have much use for it outside of one specific class.
- Haven't used many of these formats prior to seeing the handbook, hard to adjust to using new formats.
- More detail for the papers on example. An example of a paper written for some purpose would help with voice and goals to achieve in the paper.

Toolkit Section	Reasoning for usage indicated		
	Used often	Used once or twice	Never used
Technical Writing	• Has a lot of helpful tips	• Make sure I was on the right track • For class • Report format • Referenced for this paper other professors require other requirements form paper	• Wasn't fully realized of this documents resources
Common Mistakes		• Checking my mistakes • Seemed useful	• Wasn't fully realized of this documents resources • Good grammatical background already • Briefly read
Written Reports		• For class • Report format • Had to use for paper	• No need for it yet • Wasn't fully realized of this documents resources
Written Reports Template	• The template was very useful when I wanted to write the report for IME 413 • Highly referenced for paper	• For another class • Looked at it once • For class • Report format	
PowerPoint Presentation Example		• I looked it up when I wanted to make a presentation, but didn't follow it exactly • To follow the guidelines • Did one presentation • For class • Formatting	
Poster Presentation Example			• Have not felt the need yet • Not needed (x5)
Corres-pondence			• Wasn't fully realized of this documents resources • Not needed (x5)
Corres-pondence Templates			• Not needed (x5)
E-Portfolio			• No need to yet but have used it for another class • Wasn't fully realized of this documents resources • Not needed (x4)
Grading Rubrics	• Yes lots! • Used for guidelines for paper and presentation	• For class • Reference for grading criteria	• Have not felt the need yet • Wasn't fully realized of this documents resources

Student Comments, Phase Two, ME 101

About how many times do you think you referred to the IE Communications Toolkit during the semester? If you answered "Never," why didn't you use it?

- Not aware of said toolkit
- I didn't need it, I already knew the information provided in the toolkit, didn't want to spend $15

Did the Toolkit help you improve your technical writing skills? Why or why not?

- Kept things formal, good example, layout, etc. (yes)
- Gave me some solid examples to go off of (yes)
- It helped me understand the different sections more deeply (yes)
- Taught me how to do it better (yes)
- Gave a picture on how to write technically without directly tell you how (yes)
- It clarified what has to be stated in certain sections of a report (yes)
- It provided the template of exactly how to write the papers, including necessary and unnecessary info in a report (yes)
- Helped me to write scientifically (yes)
- I learned about the different parts of a written report and the toolkit helped me keep the reports in order (yes)
- Helpful organization (yes)
- Gave example of good technical writing (yes)
- I never had to write a lab report before so the book helped me how to do it (yes)
- Because it told me the technical (yes)
- It gave a good outline of how the writing should look and where everything goes (yes)
- Understanding of how to write a report (yes)
- A solid and absolute writing skill is introduced (yes)
- It kept me organized and looked presentable (yes)
- It created definite rules and helped make technical writing easier (yes)
- Showed me how to do it (yes)
- Gave go[od] advice on what to include (yes)
- Useful information (yes)
- Better understanding of what's necessary (yes)
- I had no idea how to write technically (yes)
- Gave an idea of how to properly set up a report (yes)
- I knew what I needed to be writing in a better sense after using it (yes)
- I had to work very hard to complete reports (yes)
- Information I didn't know (yes)
- Helped me learn proper format/Provided structure/Used the template (x26) (yes)

- I saw the toolkit as applicable mainly in ME 101 and future ME classes, but not so for others (sort of)
- Didn't do much technical writing for ME 101 (sort of)
- It gave me something to reference when I was doing reports (sort of)
- It helped me have a more straight forward and "scientific approach" (sort of)
- It helped with formatting my technical writing skills, but not my actual writing skills (sort of)
- It gave some examples of what to write for ex: procedure, purpose, introduction but some did not offer any guidance (sort of)

- I looked through it (sort of)
- It let you know what is needed in a description to be accurate (sort of)
- It did in a way but the online references were completely different so it would be nice if they gave you an example rather than just X's and O's (sort of)
- Mostly used it as a guide and did most of the writing from previous knowledge (sort of)
- It pointed out points I never thought of (sort of)
- How to write a report (sort of)
- I[t] gave me ideas how to be concise and to the point (sort of)
- Just showed example (sort of)
- Allowed for a consist[ent] format which is imp. in the industry (sort of)
- I already knew how to write one pretty well (sort of)
- The toolkit gave a number of good examples for technical writing but most of my skills were learned through practice (sort of)
- I have done a bunch before *I liked the templates the best (sort of)
- It just did (sort of)
- Already comfortable to a certain degree from past classes (sort of)
- It made writing papers for this class much easier to format (sort of)
- It's a different format than I am used to but it was good for knowing the criterion I would be held to (sort of)
- I had already written several technical papers in high school similar to this. But this was helpful for what kind of fonts and styles to use (sort of)
- Didn't use it too much (sort of)
- I didn't know the writing was so strict (sort of)
- Provided format and structure/Helped with organization (x30) (sort of)

- The toolkit is very confusing and disorganized. It looks like it was thrown together haphazardly and it often leaves me confused and with questions (no)
- Made me follow an exact format (no)
- Already knew how to write technical reports (no)
- Didn't need the technical writing section (no)
- It did not give a clear, easy to follow format it confused me (no)
- Learned that in high school science (no)
- Because I only used the template which was an organizational idea (no)
- Couldn't understand it (no)
- I'm already a fine writer (no)
- My writing skills have developed on their own, the toolkit allowed me to see what formatting is preferred (no)
- Because I don't think our class used it enough to have any effect. Also because it didn't help when trying to write up our first assignment (no)
- Didn't resource it to improve these skills (no)
- Writing was worse due to bulky format (no)
- Writing isn't something you learn from a book! (no)
- It was too ridged in its format (no)
- I mostly used the toolkit for single questions or to check myself (no)
- Hardly used; application expected to be self taught; not a writing class (no)
- Did not do technical writing this semester (no)

- The format was too clunky, and the writing assignments didn't seem to mesh at all with the sections of the essay forms (no)
- I had a bunch of AP classes in high school, and I had to learn to write well (no)
- I never referred to it for technical writing (no)
- It really is a ridiculous way to write, counting sentences, weird indents. It is overly flashy and unnecessary (no)
- All of the writing was technical writing stuff that I didn't need to improve (no)
- Only used for template/formatting, did not improve writing (x12) (no)

Did the Toolkit help you improve your oral presentation skills? Why or why not?

- More confident now (yes)

- Have not used it for oral presentations as of yet, but plan on using it (sort of)
- It taught me how to make a good presentation, but didn't help to give it (sort of)
- Gave me ideas, not extremely helpful (sort of)
- I didn't use it much for oral presentations (sort of)
- Didn't use it much for any classes this year (sort of)
- Haven't done any oral presentations yet/already excellent at presenting (sort of)
- Yes because it made me more organized (sort of)
- Not yet used for oral presentation, but Toolkit may help in future (x6) (sort of)

- My oral presentations leave no room for improvement (no)
- It may help but I have yet to refer to anything on oral presentations (no)
- Did not use it for presentations. Plus, am in COM 110 which is public speaking (no)
- I didn't use the book to give oral presentations (no)
- I've taken speech, given many, I didn't need if for that (no)
- Didn't resource it to improve these skills (no)
- I did speech and debate for 3 years, I'm fine (no)
- I had already taken a public speaking class (no)
- Have not used this section/Did not do any oral presentations (x90) (no)

What suggestions do you have for the Toolkit?

- Be more clear on what goes in the certain sections of the written report and the best way to separate these sections with subheadings
- Overall it was helpful, it gave a clear outline of the expected lab write-ups and was key in finishing the reports. Definitely keep this section the same.
- For each section in the template, specify what should go in each.
- Probably don't need some of the materials inside such as correspondence or e-portfolio
- It needs to be less vague.
- The templates and discussions could be a little more clear.
- More examples of writing… so in addition to describing a technical report conclusion, also provide an example one, etc.
- Maybe just teach engineers by making them take an English class or at least a class where they can learn to organize thoughts. I felt like I was in third grade when I used it. All the stuff about sentence hierarchy was useless.
- None its good.

- The structure was nice, but examples of what goes in each section would be helpful.
- None, in order to make a good suggestion, I would have needed to read all of the toolkit so I could know what it needs.
- Revision of essay questions to match report format, or revision of the report template in the toolkit.
- Keep it the same.
- Cut down on repetitive sections.
- Some input on what to write about for procedure…
- Don't make the titles for things in blue. Keep it black.
- The writing report section could be a little clearer in the aspect of examining what each section of the report entails. It would be nice if it provided examples.
- None, I'm happy with it.
- Say what you're supposed to write about in the report template.
- More examples in the writing rant than XXXXXX etc.
- None it is pretty good.
- Condense it.
- It should be free.
- More clear examples of what is wanted in report template sections.
- I liked it over all.
- Not require it.
- Don't just repeat things in the report section, say what each section should be like. See ME 257 lab book – they have a good report format instruction
- Give examples of the presentations and write ups
- Put more on reports, mistakes and PowerPoint as they're most used.
- The report format was somewhat vague. Better explanation of what goes in each section.
- What is supposed to go in each section of the report is not very clear.
- Be clearer on what to write in section areas.
- Possibly provide just a little more information on what info goes into what parts of a report or paper, like a quick overview
- Describe what goes in each section, not just the font type. For example, put what goes into the discussion tab or appendix tab.
- Doesn't make much sense to people who have never done much technical writing.
- Offer section on citing images.
- Nothing, it was very clear, easy to understand, and helpful
- The toolkit was very good. I would say that they be more specific but that could not be done.
- It's good thanks for the help.
- More detailed descriptions.
- Make the book more affordable.
- Cheaper for students.
- It would be nice to have sample reports in there instead of just the format without any words so it's more clear what goes in each section of a written report.
- Lower the price.
- Simplicity too damn broad.
- Written report section is unclear and confusing.
- Have at least one complete example of an actual written report with all parts located in the toolkit as an example.
- Keep it the same, it was very useful.

- Make it smaller
- None it does its job
- More info.
- More specifics on content.
- More examples of real reports to look at and use as models.
- Make the template easy to follow.
- Cheaper?
- More description/more examples (sometimes vague and confusing).
- ME 101 majors use this book frequently.
- Not necessary.
- Nothing but exceptional.
- More templates, less everything else.
- Make relevant to the subjects that will be used in class.
- Put it online.
- Make it available online. If in-print versions are required, charging less would be appreciated.
- Make it online. A book is a waste of paper and easily lost. Online is much more convenient.
- Include info about what things should be in sections. Not just format.
- Be more specific about everything just slightly to[o] brief.
- Great resource to be used again to ensure proper template use.
- More details on how sections in reports should be structured.
- Use more templates then examples.
- Very dry, but it's a writing handbook so that's to be expected.
- None I think it was put together well.
- That it need more information explaining things not just repeating them.
- Make it a pdf so we don't have to buy it.
- Template was slightly confusing at times.
- Better examples of writing.
- Make it better and more specific.
- It just needs to be more clear and organized. For instance, when I see that I am supposed to have a methods section I have little idea what a methods section is.
- More descriptive.
- Leave no grey areas. Some parts are not explained well enough, such as which font to use in the title…
- Give more examples.

Misc. Comments

- (after marking frequency of use 11-5 times) I expect to use it or refer to it several times in the future
- (no mark for questions 3 and/or 5)
    - I didn't have any oral presentations this semester
    - Never did oral presentations
    - No oral presentations
    - Did not use
    - Didn't do oral presentations
    - N/A, likely could have but I didn't do any oral presentations this semester
    - We had no oral presentation
    - Didn't use
- Book store didn't have it on the shelves, never asked for it, borrowed from a friend

- (reasoning for marking “used once or twice” for everything)
    - Read through kit first then reviewed template before each report
    - It was only required this many times for the reports required
- (in suggestion section)
    - None, I haven’t used it extensively enough to find anything wrong with it.
    - I haven’t used it enough to figure out everything that it has or doesn’t have so it’s hard to give suggestions for it. Written reports section is helpful for lab reports
- (after indicating “yes” in likely to use in future studies at MSU) Everybody has their own preferred format except in engineering where it is standard.

Toolkit Section	Reasoning for usage indicated		
	Used often	Used once or twice	Never used
Technical Writing	• Great for a lot of class project write ups • Usage and where to use things in a paper • For assignment • I needed it to write a paper in another class • Required for many classes • Writing papers. Style • This is good to reference when proofreading • To make sure I understood what was expected of my writing • Reports/Labs (x10) • Had a good format for writing (x6)	• Read through once to get a feel for expectations • Not required for class • To help with writing • To help understanding of writing style • Just to check • To get a review • I didn't need it that much • Just glanced • Looked at once • To see how to write more scientifically • Figure out what is wanted • Double check procedures • Just to [beef?] up my report • All together the hand out is okay • Curious • Simply for reference at the beginning of the semester • Homework/Labs (x12)	• Was already taught how to write technically • Didn't read • Didn't have a reason to use • Did not provide good info • Not needed/No technical writing/No assignments (x48)
Common Mistakes	• To follow the correct format • I make them • Used for the lab reports • Not using proper format	• Lab write-ups • I already write well and felt no need to use this section • Lab write ups • Never thought about it • How to write a report • Information for formal reports • ME 101 lab reports • Interesting, but didn't really need it for this class • It would be helpful to have more information • Lab reports • This is good to reference when proofreading • Labs • Didn't need to use it much but good for revising • To check for common mistakes (x15) • As a quick reference (x16)	• Used only really for ME 101 • I didn't look through • I should have looked at this, but I think I missed it when looking it over • I didn't make many • Have better reference • Just followed the template • Never saw it or thought I needed it • Easy enough to fix on my own • Written report was accessible and talked about mistakes • Not much on this topic • Didn't write one • Didn't look at it • Didn't think or feel the need to look at this section figured I'd learn from comments on report • Not needed/Not required (x44)
Written Reports	• See examples • To write better reports for a better grade • Majority of our work	• To see examples • Only had one or two written reports • Always good to look at	• Didn't have any written reports • Never needed (x3)

	• Make sure everything was included in report • Great to look at to see how they should be written • For writing it helped • To see how reports are written correctly • Did a lot of these • Much need • Constantly checking that I didn't any missing sections • Needed for class • Know the content • Great section, used quite a bit • Good material • It helped a lot • To find proper style • Lab reports/ Reports(x36) • Required for course (x6) • Format/Template (x15)	• To learn what the report was supposed to be like • Didn't know how the write up went • Required • Found some info in this section about what should be in each report section • To understand what they wanted • Just see what is needed • Kind of helpful • This is good to reference when proofreading • Labs/ Reports (x12) • Format/Template (x10)	
Written Reports Template	• To have and follow guidelines • Had several lab write ups to do • Majority of our work • I needed it • Had a few papers • ME 101 reports were far easier to write using this • Guideline for report styles • Great for our class assignment • Used as an example to follow • To see how reports are written correctly • Did a lot of these • A lot assigned • We only wrote reports • Use for class • Make sure done correct • Much need • Only one we used • Constantly checking that I didn't have any missing sections • I had many written reports to do this semester and found the template very useful to organize them • Needed to know all components required • Needed for class • Needed often for ME 101 • Style guide • Used for lab reports	• Only had one or two written reports • For class • We had an assignment that required we used the format • Required • Had to follow template for reports in ME 101 • Didn't know how the write up went • ME 101 • Just took basic format very hard to follow • ME 101 • Most helpful • It helped structure our reports • Used for lab/ written reports (x10) • Formatting/ Template (x3)	• No class of mine endorsed it yet

	• Helped but did not use that much • Make sure paper was right format • Written reports are a large part of the class • My writing class made us write a paper on how ME's usually write • Used for labs/ written reports (x53) • Required for course (x7) • Used to format papers (x23)		
PowerPoint Presentation Example		• Just curious • Another class • Didn't need to create a technical PPT • Didn't give any but just checked • Didn't have to make one	• Already know • Never needed • Toolkit only used for written reports • Would have used it, but never had to in first semester • Haven't had to do a PPT but will need it one day • Have better reference • Never thought I needed it • No class of mine endorsed it yet • Did not need/use (x45) • Did not give any oral presentations (x34) • Not required for this course (x5)
Poster Presentation Example		• Never really needed it • Didn't need to create a technical poster • Didn't have to make one • Poster was required for one class • For final project • Model airplane project • Only needed for one class • Only one poster • Had to make a poster • Used for assignment	• No reason for it in ME 101 • Already know • Toolkit only used for written reports • Would have used it, but never had to in first semester • Have better reference • No class of mine endorsed it yet • Did not need/ use (x44) • Did not do any poster presentations (x27) • Not required for this course (x5)
Corres-pondence		• Correspondence with SERC board and ME curriculum committee • I didn't need it • Just looked at it • Used for assignment • It was informative • Some similarities • ME 101 • Somewhat needed for class • Only needed to use for personal correspondence • Curious how to use properly	• I did not look at this section though maybe I should • Already know • Toolkit only used for written reports • Was not aware this section existed • Was not useful for me • Would have used it, but never had to in first semester • Have better reference • Unnecessary • Didn't even look at it • I didn't feel this was necessary for ME 101

		• Needed to write a memo (x4)	• Only used a phone so far in corresponding with groups • No class of mine endorsed it yet • I don't know what that is • Did not need/ use (x49) • Did not correspond (x14) • Not required for course (x3)
Corres-pondence Templates		• Correspondence with SERC board and ME curriculum committee • I didn't need it • Just looked at it • Read through it • ME 101 • Used for assignment • It was informative • Needed some guidelines • Somewhat needed for class • Only needed to use for personal correspondence • Had to write a letter • Curious how to use properly • Used to write a memo (x4)	• No reason for it in ME 101 • Already know • Toolkit only used for written reports • Was not aware this section existed • Would have used it, but never had to in first semester • Have better reference • No class of mine endorsed it yet • I don't know what that is • Never needed/ used (x 52) • Did not correspond (x14) • Not required for course (x3)
E-Portfolio		• Interested in seeing it • I didn't need it • Just looked at it • Read through it • Curious • Interesting but not used • For writing class	• Haven't had the motivation to look over yet • I will probably use this in the future when I have something to put in a portfolio • Already know • We never did those kind of reports in ME 101 • Toolkit only used for written reports • Would have used it, but never had to in first semester • Will need this and use this • Don't know what it is • Have better reference • No class of mine endorsed it yet • Not needed/ used (x56) • Did not make an e-portfolio (x14) • Not required for this course (x3)
Grading Rubrics	• Always used to check work • See how I compare • Checklist • Double check work • Get grade info • Used when writing • Very helpful • Looked at to understand what was expected and	• Just curious • Interested in seeing it • See grading scale • Looked through • To check my report • Didn't think much about it • Great to look at to see how • Not sure	• Haven't look through it yet • Already know • Didn't make one • Toolkit only used for written reports • Would have used it, but never had to in first semester • Teachers have their own given out or posted • Have better reference

	how it would be graded	• To see what a good report would be • Just to see • Understanding of what is looked at • Looked at it a few times • I looked it over once or twice • Haven't needed it • Same as most other rubrics • Only briefly looked at • Looked once for a reference • To see how papers would be graded (x12)	• Didn't notice it was in there • Self-explanatory • Didn't care • Not required for course • Did not need/ use (x45)

Student Comments, Phase Two, IME 300

About how many times do you think you referred to the IE Communications Toolkit during the semester? If you answered "Never," why didn't you use it?

- I don't have to use it till but I will use it
- I was not required to use it until now but I will be using it
- Haven't needed to

Did the Toolkit help you improve your technical writing skills? Why or why not?

- It simplified the process of formatting the paper (yes)
- Helped me write a memo, but it was short and not too important so I didn't need too much guidance (sort of)
- Was an accessory to my IE 300 lectures (sort of)
- Most of the structure has been similar to what other classes require (sort of)
- Gave examples (sort of)
- Gave some good outlines for my reports (sort of)
- I think some to general and must tailor to each client (sort of)
- Didn't use it (no)

Did the Toolkit help you improve your oral presentation skills? Why or why not?

- Refresher of things I already should have known all in one package. Didn't need to dig on the internet (sort of)
- Was an accessory to my IE 300 lectures (sort of)
- Did not use it for that (no)
- Never used it. I assume it would help (no)
- Haven't had any oral presentations (no)
- I already learned that material in Com 110 (no)
- Didn't use it (no)
- I'm already not good, just didn't help much (no)
- Have not had to use yet -> will for final projects (no response)

What suggestions do you have for the Toolkit?

- Possibly more samples of things that would fit (small things) correspondence, memos, email, PowerPoint, etc…
- It seems pretty complete as it is
- Satisfied the way it is now. Maybe some pics for better look
- Accompany a CD (or online access) for use of templates
- Make it free
- Don't require us to buy it

Toolkit Section	Reasoning for usage indicated		
	Used often	Used once or twice	Never used
Technical Writing		• To write a memo • How to setup paragraphs/things to consider • Lab write-ups • Technical writing	• Never needed • Had technical writing textbook
Common Mistakes		• Essay for music	• I probably should have used this more • Didn't seem necessary
Written Reports	• Wrote report requiring APA & MLA format • Used for papers & projects	• Just looked through • For greater insight in how to approach report • Used if for class • Report • Essay for music	• Didn't do
Written Reports Template	• Wrote report requiring APA & MLA format • Used for several classes • Used for papers & projects	• Nice to see widely accepted formats • Report	• Already know
PowerPoint Presentation Example		• Class • IME 355 project presentation	• Never needed • Have not had to use yet • Already know
Poster Presentation Example			• Never needed • Have not had to use yet
Corres-pondence		• Memos, etc.	• Never needed • Didn't do
Corres-pondence Templates		• Good example of simple format	• Never needed
E-Portfolio		• E-port for Laura's class	• Never needed • Didn't do
Grading Rubrics		• Used for class	

Faculty Comments, Phase Two

Would you be willing to use the Toolkit again in this course of other courses? Why or why not?

- A good resource (yes)

What is the single most useful aspect of the Toolkit for you or for your students?

- A single source for consistent presentation methods across written reports, slides and posters
- Quick access for templates and process with[out] having to take serious class time

Which of the following sections do you think was the least useful in your course? Please explain why you selected the sections that you did.

- We didn't cover these topics (correspondence, correspondence templates, e-portfolio)
- Just don't require for this course (oral presentations, PowerPoint presentation example, poster presentation example, correspondence, correspondence templates, e-portfolio)

Do you think the Toolkit made it easier to assign and/or evaluate writing in your classes? Please explain your reasoning for your selection.

- Students real application won't come until the end of the course when reports and presentations are completed (maybe)

What suggestion do you have (if any) for the Toolkit?

(no suggestions from faculty)

Misc Comments:

- In ME 118, we only referenced the toolkit for a couple of final project deliverables (a memo, and a poster), but I already believe that having a good, common example was a valuable tool.
- Is there any standard within the department on MLA vs. APA? Personally, I prefer MLA, but don't want to force the students to use that if the preponderance of assignments are using APA.
- One suggestion on the slides standard is to include the campus communication standards, ours are available at http://www.montana.edu/cpa/graphics/downloads.html

APPENDIX E: FINANCIAL ACCOUNT

Financial Account - Status as of December 31st, 2010

Cost share to 4W2913 paid with University Transportation Centers Education Funds to fund one graduate student.

Salary	$	2,601
Tuition	$	2,416
Cost Share Total	**$**	**5,017**

Inception to Date Report: JAN FY 2011

Grant: W2913 Title: An Experiment in Integrating an Eng Start Date: 22-OCT-09
Fund: 4W2913 PI: Stanley, Laura M End Date: 31-JAN-11
Status: A FM: Kastella, Peggy Sponsor ID: EIF09.05
Dept: Western Transportation Institute Agency ID: ENGINF

	Budget	Curr Period	To Date	Encumb	Total Commit
Receipts:	14,819.00	0.00	14,819.00		
Expenditures:					
Salaries	11,399.00	264.00	10,973.03	1,320.00	12,293.03
Benefits	3,420.00	88.07	3,007.23	430.32	3,437.55
Supplies	0.00	0.00	109.99	0.00	109.99
Awards	0.00	0.00	0.00	0.00	0.00
Direct Cost	14,819.00	352.07	14,090.25	1,750.32	15,840.57
Total	14,819.00	352.07	14,090.25	1,750.32	15,840.57
	Cash Balance:	728.75	Free Balance:	-1,021.57	

Total Expenditures	Total Billed	Total Unbilled	Total Hold	Total Payments
14,090.25	13,738.18	352.07	0.00	14,819.00

Date: 19-JAN-2011 W2913/4W2913 Bill Format: NOPR F and A %: