

---

## **AC 2011-1246: COMMUNICATING WITH HYPER-TWEETS**

**John M Robertson, Arizona State University, Polytechnic campus**

John Robertson, PhD, is a Professor in the Engineering Technology Department at Arizona State University Polytechnic where he specializes in semiconductor technology. His research interests include process control and its application to educational development. He was formerly an executive with Motorola and now participates in many senior technical training programs with the JACMET consortium.

# Communicating with Hyper-tweets

## Abstract

Improving student writing skills is one of the most persistent challenges in technical education. The problem is too stubborn to expect a single solution but it is too important to accept the status quo. This paper describes the results of a modest project to improve short reports. Concentration on this segment of the problem has intrinsic advantages because short reports are demanded frequently and the topics can be tightly defined. Since they require only a few hundred words, they qualify for the term 'hyper-tweets'. A PowerPoint template has been established to constrain the scope and present the content as a single image to encourage a focused visual effect. It can be easily converted to a Word document if required. The format has an additional advantage of presenting the same compact message to the reader, especially if it is being read on a screen or tablet device. Student responses indicate that the project goals are being met.

## Problem statement

Complaints about poor student writing skills have been rampant for generations. Effective communication (in all its forms) has been identified by Wagner as one of the seven survival skills for careers, college and citizenship in the 21st century <sup>1</sup>. There is also ample evidence from field studies that higher-level communication skills such as the ability to elucidate concepts that span many business functions is an essential attribute for promotion to business decision-making roles <sup>2</sup>. Of all the forms of communication, writing has the highest penalty for poor performance since the recipient is totally in control and there is no scope for mitigating intervention with other (better) communication skills.

Within every engineering or technology program, effective communication is an ABET outcome so the institution is committed to continuous improvement to improve quality. All forms of communication are tackled: listening, questioning, writing, presentations and deal-closure but of these, writing remains the most persistent as a weakness in the skills inventory of too many students. Solutions are in place; every student is required to take English composition and technical writing classes. They can be complemented with informal and personalized tuition yet the overall dissatisfaction with written fluency persists.

The views of the student body are always interesting in such conditions. The most systematic surveys by the author have been done at the junior year level. Since about a third of the class transfers from community college at that level, this is the best time to form a picture of the intrinsic skills of the graduating cohort. Outcomes from a self-assessment survey of one junior-

level class of 25 students are shown in figure 1. This is typical of the results that are obtained from such surveys.

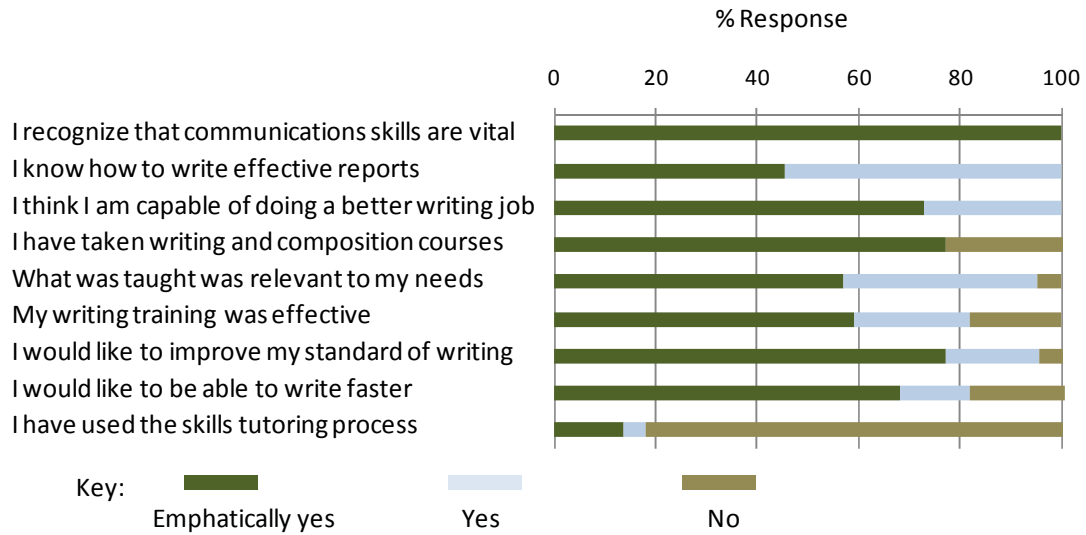


Figure 1. Class self-assessment of writing skills and needs.

The data shows a conflicting mix of confidence, some doubts and a desire to improve. The important outcome from all such surveys is that students realize the skill is important and they genuinely wish to do better. This is a strong justification to find other ways to help.

A second driver for change is to find a reporting format that is easy to read using the new generation of electronic media – laptops, tablets and even smart phones. An increasing proportion of student reports are submitted electronically. This saves space and allows easy submission, especially for working students so the trend seems likely to continue. However, if a student has problems with writing, one of the manifestations will be a lack of structure. On a small screen a poorly formatted Word document requires a lot of scrolling up and down and the weaknesses are exaggerated. The usual recourse is to print the document and thus negate the electronic medium advantage. We have reached the tipping point where we have to admit that most documents are read on a screen so their layout should be designed to match that format.

### Solution strategy

At first sight, the problems seem too entrenched for any small-scale solution. However, that is no excuse for doing nothing. The challenge is very typical of managing any complex system with multiple inputs and mechanisms that influence results. Using the systems analogy, there are six familiar quality enhancement techniques that can be used:

1. Make the problems quantitative and visible to the key stakeholders.

2. Create a taxonomy or open network of key parameters for the subject.
3. Use that structure to identify components that can be addressed independently.
4. Plan from the beginning to synthesize a system solution from the successful components.
5. Implement trials in their operational context (ie: on-the-job, not in an exam).
6. Make the solutions and quantitative progress visible to the key stakeholders.

This paper follows that system development sequence. Using the principle that students are familiar and comfortable with short text and Twitter messages, the format has been adapted and renamed ‘hyper-tweets’ to define short technical reports. It is a logical starting point since it is a routine activity where any improvement in clarity is immediately appreciated both by the author and the reader. It offers a very modest educational contribution but the problems are too deep-seated to ignore any positive step, especially when it can be easily implemented.

### Stakeholders and motivation

Communication is a bilateral process. It can be represented as shown in Figure 2 by an originator and receiver, in this case, student and faculty.

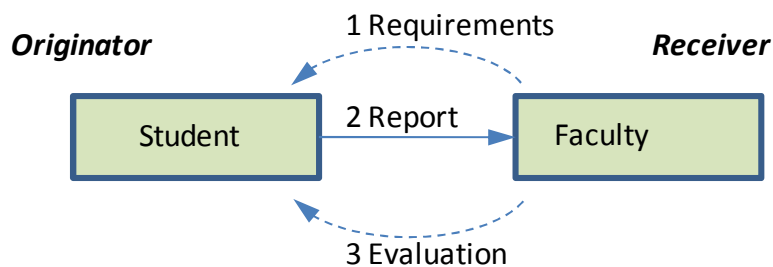


Figure 2. Bilateral communication process.

Most emphasis is placed on the transfers labeled 2 and 3; submission of the report and feedback comments on its quality and acceptability. However, both are strongly conditioned by the initial terms specified in transfer process 1. That is rarely given as much emphasis as the other two. However, there is ample evidence from analysis of project failures<sup>3</sup> that a major cause is poor management of stakeholder involvement through lack of executive support and poor expression of requirements. Setting up student reports is no different so the first requirement for any solution is to clarify requirements and expectations.

In an academic program, the professor is usually the final receiver and the report goes no further. However, in a company or a sponsored project, reports have much greater significance since they are part of a lengthy communications chain. The first person to feel the impact of a poorly written communication is the receiving manager. Something has to be done with the report. It

may be used to make a decision, be forwarded internally or used to represent the company position to a customer. In all cases, the content must be correct, clear and meet all appropriate technical and linguistic standards. If the author cannot meet these specifications, the job has to be done by a technical writer or by the manager. Both cases represent a waste that has to be eliminated in any lean organization. Students get the point quickly; asking your manager to fix your mess is not the way to treat the person who determines your pay and progress<sup>4</sup>. It is then no surprise that effective communication is also an important filter in the hiring process<sup>5</sup>.

### **Advice to students**

Industry Advisory Board (IAB) members are a good source of support for the message. Some of the outcomes from a very enthusiastic ASU discussion on the topic (May 2010) were:

- All e-mail is on the record, probably IM too so be VERY careful.
- Scope and clarity are essential for data preparation explanations.
- Tune the style to the audience, especially if it goes 'up the line'.
- Get used to making weekly presentations.
- Be able to pick out essentials but support it with lots of back-up detail.
- Webex communications are becoming the norm for distance teams.
- Increasingly, design manuals and reports are in HTML so design accordingly.
- Start with the most important value-added claim/point.
- Lab notebooks are still needed, especially for IP priority.
- However presented, the reader must be able to grasp the results.
- You will become the person that others look to for explanations.
- If you don't tell anyone, it didn't happen.
- If the report is weak, the work (and therefore you) is assumed to be poor too.
- Written communication skills must be practiced continuously and systematically.

Similar comments will emerge from almost any IAB discussion of the topic but they have much greater impact if they can be delivered directly by the members to the student body.

### **Taxonomy**

Writing is never easy. Promises that it gets better with practice offer little comfort to struggling students. It is more useful to demonstrate the many factors that are involved. Each factor is easily understood and with some effort it can be mastered. However, the combinations and interactions make the overall composition process complex. Figure 3 shows a very simple taxonomy in the form of three lists. The number and scope of the topics can be readily adjusted to suit the application but those shown have been found to be adequate for most technical writing at undergraduate level.

Organize structure	Manage sources	Tactical expression
Set scope Target impact Flow of ideas Level of detail Balance Headings Paragraphs	State assumptions Boundary conditions Assemble data Search to fill gaps Distill information Prioritize for impact Match to structure	Sentence structure Grammar Syntax Punctuation Spelling

Figure 3. Open taxonomy as a set of lists

The left block – how to organize the structure of a report or presentation – usually gets least attention either in writing class or by students when they start an assignment. This is partly because it is a sub-set of style that has very specific features in the context of a technical report. As an example, the conventional structure for a recreational text such as a novel builds up to a climax at the end. In a technical report, it is usually better to have the punch-line at the beginning and the case details follow. The reader opens a technical report with very different intent from opening a novel or biography; there is no expectation that a technical report will be read in full or in the sequence presented. It is a functional tool to be used as the recipient desires, not a work of art to be admired in the round. The intellectual property belongs to the organization, not to the author. A short report makes one significant point. The PowerPoint format focuses on a statement of that point with its supporting evidence in a single image.

Students are familiar with the middle block - managing sources - but it is rarely a systematic process. However much faculty may regret it, the primal student urge to start with a Google search has to be recognized and managed. Delaying tactics have been found to be effective. If a required part of the assignment is to state what is known, what will not be covered and the information that is available with no search, then Google's assistance can be delayed and concentrated on the information gaps as shown by the sequence in the middle block.

The third (right) block usually gets the most attention. However, it is rule-based and the easiest to fix, albeit with some effort. Students usually have access to good tutoring services and they should be encouraged to use them.

There is a latent heresy in these guidelines. Instruction on technical report writing usually follows a very well-defined sequence with the implication that it can be blindly applied in all cases. That process may be adequate but it will rarely generate an enthusiastic response from the

boss. Form is much better determined by function which should be embodied in the initial scope and target impact statements. The structural components follow.

### **Structural organization**

Defining a report structure (the left block of figure 3) can be reduced to three tasks:

1. State the message clearly
2. Determine the flow of ideas to convey the message.
3. Write a suitable text to make each point.

The biggest challenge is to persuade students to tackle the job in that order, not in reverse. Point 1 has usually been stated by the instructor but rephrasing it provides ownership and commitment for what follows. Story-boarding (point 2) uses a mapping layout and has not been a problem since most students have stronger visual than linguistic skills. Point 3 needs practice. Students had to (re)discover the concept of the paragraph as an exposition of one simple topic. The whole report is then an ordered concatenation of paragraphs.

Fortunately, all six courses within the trial had a very convenient structural feature to help the process. Students submit their own short explanations of key topics every week after they have prepared the class material. The reports are reviewed and returned with comments before each class. The process allows the class discussion to focus on the points of common concern. Every week, there is also a follow-up report to use what has been learned. Each report is short (100 – 300 words) with a single topic and limited scope. That eliminates most of the excuses that relate to not knowing what to write. Writing five or six reports per week quickly builds up a routine for writing and time commitment. By making it a routine communications activity, the name ‘hyper-tweets’ followed. That title has more sales-appeal than the more realistic claim to have re-discovered the paragraph as a communications construct.

### **Template solution**

The requirement for fast turn-round for comment means that the reports have to be read and commented using a Tablet lap-top. To facilitate readability, a common template in landscape-format PowerPoint rather than Word was used. Hand-written comments by the professor present challenges in legibility but there is ample space for comment and the immediacy of comment and suggestion is clear.

This has four advantages:

- Students have to fill a text box which can only contain about 200 words. They see how much has to be done and it is less intimidating than an open Word document.

- Having the whole text image on one screen allows them to focus on the message.
- The reports are easy for the professor to read on a laptop. There is no more scrolling back and forth trying to make sense of a fractured Word document.
- If an extended response is required, several slides can be used but the rule is that each slide deals with only one topic.

The slide template is shown in figure 4. At first, everyone finds it strange to be using PowerPoint for extended text but adaptation is quick.

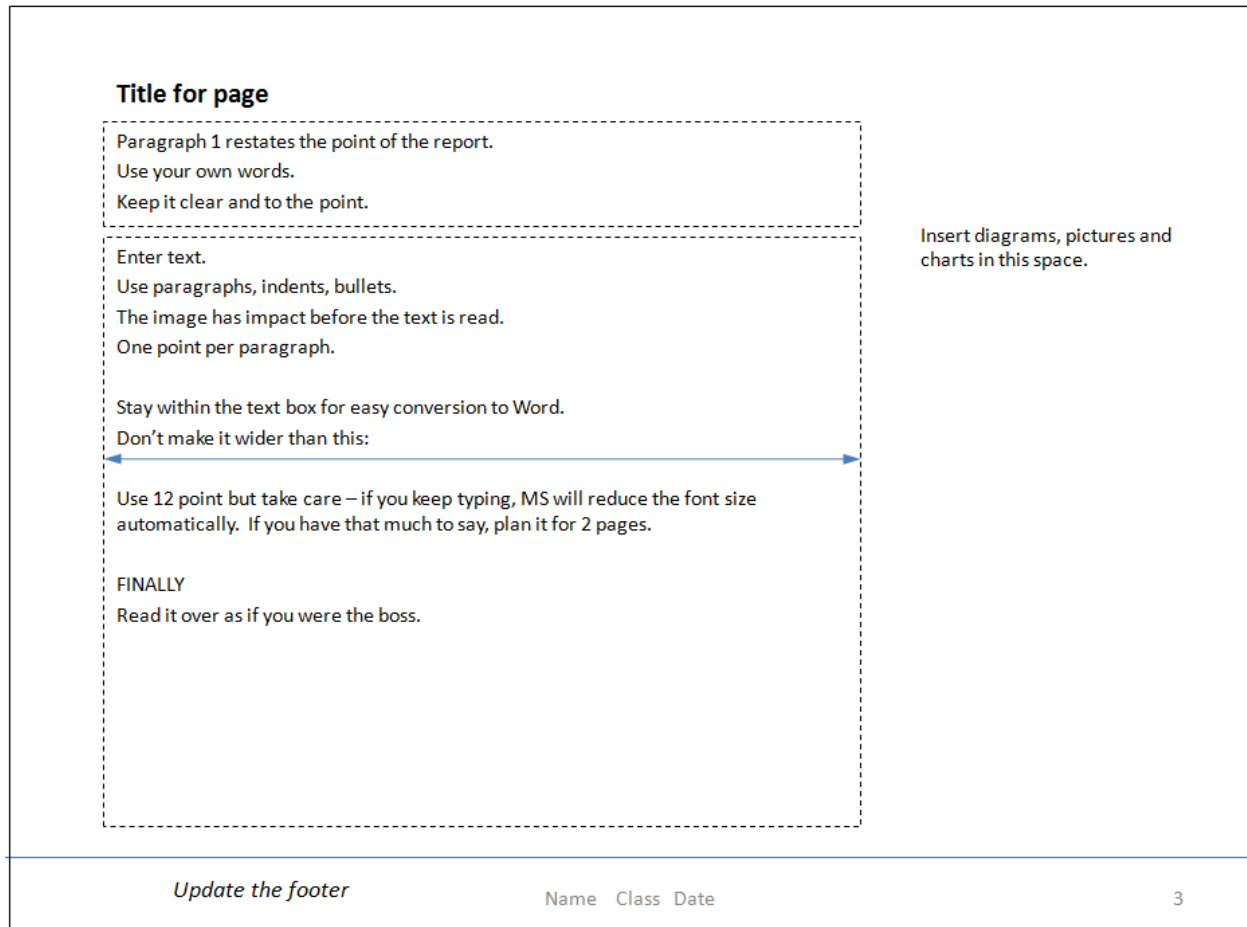


Figure 4. Slide template.

The use of template text boxes makes it very easy to convert the PowerPoint slides into a Word document. By switching to 'outline mode', all the text (in several slides if necessary) can be copied directly into a Word document. It is already in a structured sequence so the final Word document only needs minor changes. Diagrams in the slide can be inserted separately with minimum additional editing.



## Outcomes and assessment

Results from six classes at junior and senior level are available. The response is very positive, especially considering that students were being asked to write 6 – 8 slides per week with up to 200 words per slide. The stamina test was perhaps more visible in the grading and comment process. A class of 20 generated up to 150 pages to be turned round in 4 hours. This was done and logged entirely in electronic format.

One class also used the process for an extended term paper as well as for their weekly preparation and outcomes reporting. Their weekly results were similar to the other classes but there were more reservations about the term paper. The class was evenly split between a preference for the PowerPoint format and doing everything from the beginning in Word. The professor's preference for reading the term paper as PowerPoint slides on a laptop was unchanged.

All students were asked the same evaluation questions. The averages are shown in figure 5.

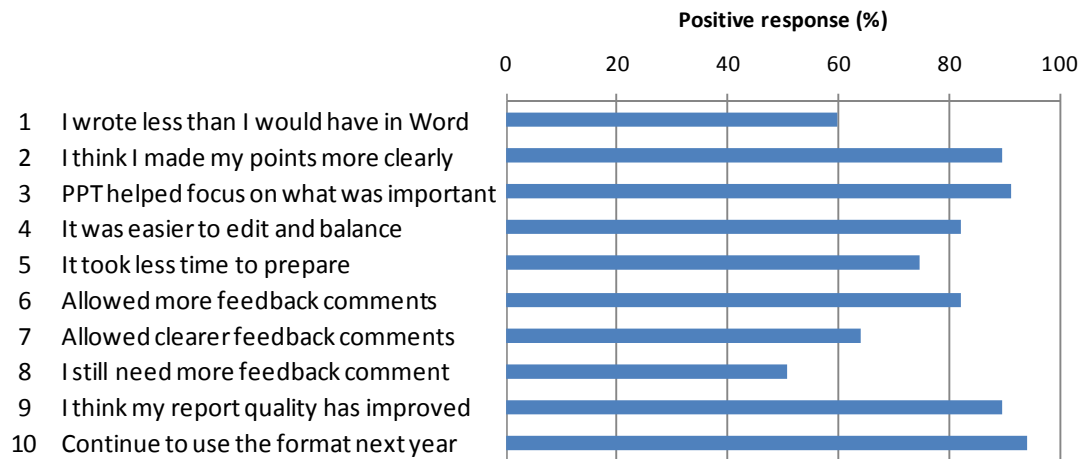


Figure 5. Average assessment results.

The spread of results for the same ten evaluation questions is shown in figure 6. For clarity, data from only three courses has been used but the others are statistically similar.

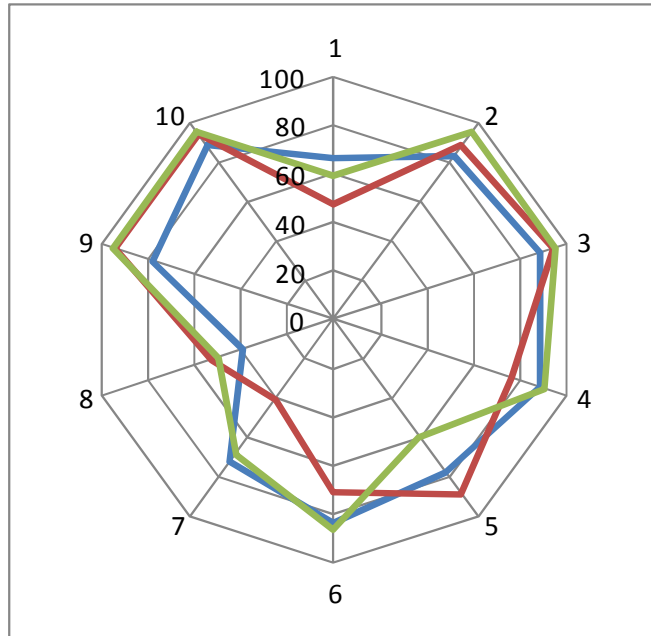


Figure 6. Distribution of responses for three courses

## Conclusions

A simple PowerPoint template for reports has been developed and evaluated. Students consider that the overall effect has been beneficial and are emphatic that the experiment should continue. The format is optimized for reading on a laptop so it easier for the professor to see and comment on the salient points of each report.

## Bibliography

1. A Wagner, "The Global Achievement Gap: Why Even Our Best Schools Don't Teach The New Survival Skills Our Children Need--and What We Can Do About It". Basic Books 2008. [www.schoolchange.org](http://www.schoolchange.org).
2. A Kleinbaum, T Stuart & M Tushman, "Communication (and coordination?) in a modern complex organization", Harbard Business School Report 09-004, 2009.
3. The Cobb paradox – why projects fail. The Standish Group, "Unfinished voyages", 1996.
4. S Robbins, "Understand what motivates your boss", Harvard Business School Working Knowledge, May 13<sup>th</sup> 2006.
5. "Skills needed to get hired" Video from NSF-sponsored project, [http://www.youtube.com/watch?v=A42Tab\\_bu6A](http://www.youtube.com/watch?v=A42Tab_bu6A)