A Pilot Study of Self-Assessment of Word Processing and Presentation Software Skills in Graduate Students in Technical Communication

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Abstract

Technological literacy—both at the skills level and at the conceptual/critical level—is a crucial part of technical communication pedagogy. A pilot study examining self-assessment of word processing (Microsoft Word) and presentation application (Microsoft PowerPoint) skills was performed in a graduate course in technical communication. Study population comprised 13 students who completed an online survey of perceptions of proficiency in word processing and presentation software, followed by online examination using a commercial evaluation and remediation package (Skills Assessment Manager [SAM] and Training Online Manager [TOM] by Thomson Learning). SAM exams simulated PowerPoint and Word operations, and were adapted from Microsoft Office User Specialist (MOUS) preparation instruments, based on skills objectives for Microsoft certification. Participants accessed the TOM online tutorial, and performed a second set of equivalent exams. 62% accurately self-assessed skill level in PowerPoint, while 38% overestimated skill. 23% accurately self-assessed skill level in Word, while 77% overestimated skill. Mean difference between pre and post-training PowerPoint scores was 14.38%, statistically significant ($p < .001$). Mean difference between pre and post-training Word combined scores was 10.46%, statistically significant ($p < .001$). Participants expressed appreciation for attention to foundational technical tools skills. A long term, refined study will follow. Keywords: tools, skills, word processing, presentation software, literacy.

1. Introduction

The question of whether or not technical communication programs should "teach tools and software skills" is a continuing debate among professionals. A recent discussion on the ATTW-L ("Tool Texts in the Classroom," April 3-8, 2003, prompted by Johnson's question about using Word in technical writing courses) framed the issues well [1].

On one hand many like Foster argue that it is a "waste" of time to teach skills "when theory and practical applications easily fill a semester's schedule" [2]. On the other hand, many, like Bernhardt, attack the attitude that "teaching software skills is a waste of time" by arguing that "tools shape the writing and the writer" and that "when writers think like text designers, they are better writers (they make better, more compelling, more organized arguments") [3].

The positions on the question are not either/or but frame a much larger pedagogical and literacy issue. Many, like Allen, argue that teaching of skills should "include evaluation of how that tool controls what we can do and say (and cannot do or say) and therefore influences what becomes the basis of knowledge in an organization and beyond" [4].

Word processing and presentation software skills are regarded as foundational in incoming students in technical communication at the graduate level. Faculty frequently report an apparent disparity between student perceptions of their own skill levels in word processing and presentation software, compared to their true proficiency. A pilot study was conducted to address two research questions:

1. How accurately do graduate students in technical communication self-assess and report technical skill using Microsoft Office word processing and presentation applications?
2. Is self-remediation of Microsoft Office skill deficiencies effective using a commercial online tutorial product?

This article reports the results of our preliminary study. First, we discuss the materials and methods used in the study; then we present the findings of the pilot project; then we discuss the implications of the study, including its limitations; finally, we present some conclusions based on the data we obtained in the light of current discussions of this topic.

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2. Materials and Methods

The pilot study population comprised 15 graduate students in a technical communication foundations graduate course in technical writing and editing. 13 of 15 participants were technical communication majors. 13 students completed the research activities (N=13). The population consisted of 11 females and 2 males. Most participants (85%) reported experience using Microsoft PowerPoint (average 3.2 years). All participants reported experience using Microsoft Word (average 6.9 years). Participants were initially surveyed for demographic information for purposes of categorizing the results based on prior use, attitudes regarding technical skills, and other factors. Also, they were initially surveyed about their own perceptions of their skills, using an instrument related to the exam certification instrument. 100% reported that they considered word processing skill to be "extremely important." 87% reported that they considered skill in presentation software to be "extremely important."

Participants completed an online skills application assessment created and delivered using Thomson Learning's Skills Assessment Manager (SAM) [5] for Office XP. The exams were modified from simulated Microsoft Office User Specialist (MOUS) [6] certification instruments (Tables 1, 2, and 3), and consist of about 65 operations simulated operations in PowerPoint and 100 in Microsoft Word (two-thirds drawn from the MOUS core exam objectives and one-third from expert exam objectives). Microsoft Office XP versions were selected for technical reasons (applications are simulated and need not be resident on participant machines) and because most operations in both applications were judged to be comparable and transferable from previous Microsoft Office editions. Participants reported current experience in a range of four editions of Microsoft Office (Office 97 through Office XP). The SAM exams were set to present the pre-selected exercises in random order, and were accessed online via lab or student home computers. Participants randomly selected randomly generated user names, and were assured anonymity. The SAM exam reports performance data to an off-campus instructor database, and links to an online tutorial application to provide remediation customized for each student's exam performance. Students accessed the Training Online Manager (TOM) online and at their discretion, and then completed a second, operationally identical online exam to measure skill improvement.

Table 1. PowerPoint 2002 comprehensive exam objectives (Microsoft Office Specialist).

Creating a presentation	**Printing presentations**
Create presentations (manually and using automated tools)	Preview and print slides, outlines, handouts, and speaker notes
Add slides to and delete slides from presentations	**Working with data from other sources**
Modify headers and footers in the Slide Master	Import Excel charts into slides
Inserting and modifying text	Add sound and video to slides
Import text from Word	Insert Word tables on slides
Insert, format, and modify text	Export a presentation as an outline
Inserting and modifying visual elements	**Managing and delivering presentations**
Add tables, charts, clip art, and bitmap images to slides	Set up slide shows
Customize slide backgrounds	Deliver presentations
Add Office Art elements to slides	Manage files and folders for presentations
Apply custom formats to tables	Work with embedded fonts
Modifying presentation formats	Publish presentations to the Web
Apply formats to presentations	Use Pack and Go
Apply animation schemes	**Workgroup collaboration**
Apply slide transitions	Set up a review cycle
Customize slide formats	Review presentation comments
Customize slide templates	Schedule and deliver presentation broadcasts
Manage a Slide Master	
Rehearse timing	
Rearrange slides	
Modify slide layout	
Add links to a presentation	

Table 2. Word 2002 core exam objectives (Microsoft Office Specialist).

Inserting and modifying text	**Managing documents**
Insert, modify, and move text and symbols	Manage files and folders for documents
Apply and modify text formats	Create documents using templates
Correct spelling and grammar usage	Save documents using different names and file formats
Apply font and text effects	**Working with Graphics**
Enter and format Date and Time	Insert images and graphics
Apply character styles	Create and modify diagrams and charts
Creating and modifying paragraphs	**Workgroup collaboration**
Modify paragraph formats	Compare and Merge documents
Set and modify tabs	Insert, view and edit comments
Apply bullet, outline, and numbering format to paragraphs	Convert documents into Web pages
Apply paragraph styles	
Formatting documents	
Create and modify a header and footer	
Apply and modify column settings	
Modify document layout and Page Setup options	
Create and modify tables	
Preview and Print documents, envelopes, and labels	

Table 3. Word 2002 expert exam objectives (Microsoft Office Specialist).

Customizing paragraphs	**Customizing word**
Control pagination	Create, edit, and run macros
Sort paragraphs in lists and tables	Customize menus and toolbars
Formatting documents	**Workgroup collaboration**
Create and apply character and paragraph styles	Track, accept, and reject changes to documents
Create and update document indexes and tables of contents, figures, and authorities	Merge input from several reviewers
Create cross-references	Insert and modify hyperlinks to other documents and Web pages
Add and revise endnotes and footnotes	Create and edit Web documents in Word
Create and manage master documents and subdocuments	Create document versions
Move within documents	Help protect documents
Create and modify forms using various form controls	Define and modify default file locations for workgroup templates
Customizing tables	Attach digital signatures to documents
Use Excel data in tables	**Using mail merge**
Perform calculations in Word tables	Merge letters with a Word, Excel, or Access data source
Creating and Modifying Graphics	Merge labels with a Word, Excel, or Access data source
Create, modify, and position graphics	Use Outlook data as mail merge data source
Create and modify charts using data from other applications	
Align text and graphics	

The post remediation exams were technically identical to pre-instruction exams, including item content, but presented a different writing scenario. Participants completed exam and remediation activities asynchronously, within a specified time window. Total reported time to complete research project activities ranged from five to thirteen hours (mean 9.6 hours). Participant exam performance is reported as tabular data, and performance before and after remediation was evaluated using standard statistical analysis techniques. SAM exam performance was further ranked, using three categories, for both PowerPoint and Word (Table 4).

Assigning descriptive skills categories is problematic because Microsoft does not provide information on passing scores for certification exams. Microsoft certification exams are apparently statistically standardized exam by exam, and cut scores therefore vary. Skills rankings used in this study are best estimates, based on subject matter expert opinion. The issue is further complicated by the circumstance of two Microsoft certification exams in Word (Core and Expert), but a single comprehensive exam in PowerPoint.

Table 4. Rubric used to rank skills levels by SAM exam scores.

Skills ranking	PowerPoint	Word
Expert	≥85%	≥75% in both core and expert exams
Competent	70% to 84%	≥75% in core exam, only
Novice	<70%	<75% in both core and expert exams

3. Results

Sixty-two percent of participants accurately self-assessed their skill level in PowerPoint, while 38% overestimated their skill level, and none underestimated. Twenty-three percent of participants accurately self-assessed their skill level in Word, while seventy-seven percent overestimated their skill level, and none underestimated. There were insufficient data to compare skills self-assessment by gender Fifty-four percent of participants increased measured skill level in Word by at least one skill level following TOM remediation; none declined. Ninety-two percent increased measured skill level in PowerPoint by at least one skill level following TOM remediation.; none declined (Table 5).

Table 5. Self-assessment and measured scores.

Participant	PowerPoint Self-assessment	PowerPoint Measured	PowerPoint Post TOM	Word Self-assessment	Word Measured	Word Post TOM
1	novice	novice	novice	expert	novice	novice
2	competent	novice	competent	competent	novice	competent
3	expert	competent	expert	expert	competent	expert
4	competent	competent	expert	expert	competent	competent
5	non-user	novice	expert	competent	competent	competent
6	competent	competent	expert	competent	novice	competent
7	competent	novice	expert	competent	novice	competent
8	novice	novice	competent	competent	competent	competent
9	competent	novice	competent	competent	novice	competent
10	non-user	novice	competent	novice	novice	novice
11	competent	competent	expert	expert	competent	expert
12	competent	competent	expert	expert	competent	competent
13	competent	novice	competent	competent	novice	competent

All participants improved skills in PowerPoint and Word following remediation using TOM. Because the data from the pre-training observations were logically tied to the data from the post-training observations, a dependent t-test was performed. The mean difference between the pre and post-training PowerPoint scores was 14.38%, which was statistically significant, $t_{(.05,12)} = 6.437$, $p < .001$. The mean difference between the pre and post-training Word combined scores was 10.46%, which was statistically significant, $t_{(.05,12)} = 6.710$, $p < .001$ (Table 6). Skills improvement was highest in participants with lowest initial skill levels (Table 7).

Table 6. PowerPoint and Word (combined) exam performance.

Participant	PowerPoint Exam 1	PowerPoint Exam 2	Change	Word Exam 1	Word Exam 2	Change
1	61%	66%	5%	48%	56%	8%
2	56%	70%	14%	57%	65%	8%
3	84%	86%	2%	71%	81%	10%
4	83%	90%	7%	79%	80%	1%
5	66%	86%	20%	68%	73%	5%
6	72%	86%	14%	65%	80%	15%
7	64%	86%	22%	63%	74%	11%
8	69%	83%	14%	69%	81%	12%
9	53%	81%	28%	58%	73%	15%
10	52%	73%	21%	28%	52%	24%
11	78%	96%	18%	76%	86%	10%
12	87%	90%	3%	76%	87%	11%
13	61%	80%	19%	56%	62%	6%
Mean	69%	85%	14%	65%	74%	10%

Table 7. Improvement by initial skill category.

Initial skill ranking	PowerPoint post TOM improvement	Word post TOM improvement
novice	18%	14%
competent	10%	9%
expert	3%	NA

Participants were debriefed as a group, and surveyed individually following the exam and remediation events, and this provided qualitative data on the pilot study. The majority of students reported an overall positive perception of and viewed the experience as valuable. Most students expressed appreciation for the direct attention to assessing and remediating essential technical tools skills. Several students reported technical failures, sometimes resulting in lost exam data, and causing feelings of frustration, as lengthy exams had to be repeated. Many students complained that the SAM exam inaccurately assessed certain skills because of rigid evaluation criteria. As one student explained, "I knew how to do a lot of these operations, but because I didn't do it their way, I lost the points." This is a valid criticism of the technical package, in that both PowerPoint and Word often provide multiple pathways and steps to achieve an operation, but there is little flexibility in steps, and the ordering of steps, in the SAM exams.

4. Discussion

Findings

This pilot study indicates that the accuracy of self-assessment of word processing and presentation application skills (research question one) is poor, and that there is a strong tendency toward overestimation of proficiency, particularly in the case of word processing skills. The study also indicates that an off-the-shelf commercial tutorial package is significantly effective in remediating word processing and presentation application skills deficiencies.

Limitations

The pilot study is limited by small sample size, and will be followed by a long term, expanded and refined study comprising a sample size of 50 or more participants. The pilot study is also potentially limited by the researcher decision to provide anonymity to participants. The issue of anonymity likely has paradoxical effects on participant performance. That is, the researchers expected participants to self-report their skills assessments less conservatively if their measured

performance was anonymous. Conversely, the cloak of anonymity may have blunted participant effort. As one participant reported, “If it wasn’t anonymous, I wouldn’t have taken that nose-dive on that long PowerPoint exam half way through.”

The most important research question in this pilot study is question one, concerning the accuracy of perceptions of skill levels. The lesser question of the effectiveness of a commercial tutorial is admittedly muddied by the media comparison [7] criticism. It was not our intent to compare computer-managed instruction to other methods, but merely to verify that a commercially available tutorial on word processing and presentation software skills significantly improves performance scores—the answer is affirmative. It appears that teaching presentation and word processing applications may be a uniquely good fit as an instructional goal to be achieved using microcomputers.

It is recognized that the skills improvement we measured may be explained, at least in part, by other factors. These would include remediation efforts by participants outside the TOM tutorial, neither controlled nor reported, such as asking peers for assistance, consulting texts and online references, consulting application help files, and trial and error. Skills may have improved simply by performing the successive exams, and this was exacerbated by frequent technical errors and system crashes. Participants reported dramatically fewer technical glitches in post TOM exams, and the researchers suspect that this is largely due to students having mastered the operational and gamesmanship aspect of the exams. The vendor also provided a software patch, which improved exam recovery in instances of system crashes.

In this pilot study, researchers verified that all participants accessed the TOM remediation tutorial, but did not ensure that participants completed remediation tasks for all errors on the initial SAM exams. This issue will be rectified in the forthcoming long term study.

As 69% of the participants were unfamiliar with XP versions of the Microsoft Office applications, exam scores are probably affected to an undetermined degree. The researcher decision to test using XP versions is based on an assumption that there is little functional difference in most operations between XP and previous versions. There are also compelling technical advantages in the XP versions of the SAM software. Some students reported the unfamiliarity with XP version operations as a handicap using PowerPoint XP, but less so with Word XP. This appears to be born out by the data, which shows higher mean improvement for PowerPoint skills.

That participants with lower initial skill measurements benefited most from the tutorial is noteworthy, and bears out an interesting observation by human performance improvement pioneer Gilbert [8], that performance is easiest to improve in low performers. Gilbert further points out that exemplary performers are likely to improve themselves. Gilbert admonishes against confusing behavior with performance, explaining that it is quite possible to learn all the steps to a task and remain unable to perform it competently. Writing with word processing technology may be such a task.

Implications

The larger issue that should be addressed in the study of students' use of electronic software is not simply one of skills or knowledge but one of technological literacy which is essential in the electronic age. Cook "synthesizes and classifies current thinking about technical communication pedagogy into a framework encompassing six key literacies" [9]. The fourth of the six literacies is "technological literacy." Noting that this literacy has only recently appeared in technical communication pedagogical frames, "it has become an integral component of most technical communication instruction." She observes that technological literacy is now defined with these characteristics:

- "a working knowledge of technologies that helps professional communicators to produce communications, documents, or processes;
- "an awareness of how these technologies promote social interactions and collaboration;
- "an ability to research how users work with technologies; and
- "an ability to critique this research and act upon it to make decisions and produce documents designed with and for users." [9]

Similarly, Selber "examines the pedagogical issues that accompany increased computer use in technical communication classrooms and the limits this causes in moving beyond skill building" [10]. Selber surveyed college and university course descriptions and Internet discussion groups to determine "common approaches to integrating computers in technical communication curricula land in what ways these approaches may or may not move beyond skill building to include broader literacy and humanistic issues" [11].

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5. Conclusion

Any continuing study of technological literacy should include not only the assessment and remediation of students' skills but also their understanding of and ability to critically evaluate the influence of technology on their social cultural, and professional lives.

This study and the opinions of a broad cross-section of the profession suggest that technical communication pedagogy cannot consciously ignore either tools skills or technological literacy in its broadest sense. Popham observes that "language after all is a tool, too. And we value and teach it all the time" [12].

At SPSU, we intend to teach the tools in ways that benefit not only students' skills in electronic software but also benefit their comprehensive technological literacy. For example, this fall Dayton is introducing a foundation course for our undergraduate majors in which he will teach students the following skills:

- outlining using electronic tools
- styles such as Word, HTML, and FrameMaker
- methods of quickly learning new software on their own [13].

Addressing the issues that Allen raises—about evaluating the impact of technology—must be a part of all our courses, for each topic raises particular questions that are not easily addressed by focusing on the impact of technology apart from the specific context in which it occurs.

Kalmbach (citing Krug, *Don't Make Me Think*) observes that what most of us (including our students) do in tackling a task using technology with which we may be unfamiliar is "satisficing"; that is "we use the first rational model we find for accomplishing a task and stick with that model no matter how inefficient it may be until a better one jumps out and bites us" [14]. Kalmbach also observes that Johnson's book on emergence suggests that we reach a "false plateau" which does not represent the best but only an acceptable choice and never move from it.

The teacher's responsibility is to "push them off the plateau to force them to find better solutions. As a writing teacher, . . . part of our job is to constantly problemize our students' conceptual literacy and not let them be satisfied with easy solutions" [14].

Addressing technological literacy—both at the skills level and at the conceptual/critical level—seems to be a crucial part of technical communication pedagogy.

6. References

[1] Johnson, C. S. *Tools Texts in the Classroom*. Retrieved June 7, 2003 from http://lyris.acs.ttu.edu, April 3, 2003.

[2] Foster, D. C. *Tools Texts in the Classroom*. Retrieved June 7, 2003 from http://lyris.acs.ttu.edu, April 3, 2003.

[3] Bernhardt, S. *Tools Texts in the Classroom*. Retrieved June 7, 2003 from http://lyris.acs.ttu.edu, April 3, 2003.

[4] Allen, N. *Tools Texts in the Classroom*. Retrieved June 7, 2003 from http://lyris.acs.ttu.edu, April 3, 2003.

[5] Thomson Course Technology: http://www.course.com/

[6] Microsoft Training and Certification: http://www.microsoft.com/traincert/mcp/officespecialist/requirements.asp#officeXP

[7] Clark, R. E., Media will never influence learning, *Educational Technology Research & Development*. 42: 21-29, 1994.

[8] Gilbert, T. F., *Human competence : Engineering Worthy Performance*, Tribute ed. Silver Spring, Maryland: International Society for Performance Improvement, 1996.

[9] Cook, K. C., Layered Literacies: A Theoretical Frame for Technical Communication Pedagogy, *Technical Communication Quarterly*. 11: 5-29, 2002.

[10] Alred, G. J., Essential Works for Technical Communication, *Technical Communication*, in press.

[11] Selber, S. A., Beyond Skill Building: Challenges Facing Technical Communication Teachers in the Computer Age, *Technical Communication Quarterly*. 3: 365-390, 1994.

[12] Popham, S. *Tools Texts in the Classroom*. Retrieved June 7, 2003 from http://lyris.acs.ttu.edu, April 3, 2003.

[13] Dayton, D. *Tools Texts in the Classroom*. Retrieved June 7, 2003 from http://lyris.acs.ttu.edu, April 3, 2003.

[14] Kalmbach, J. *Tools Texts in the Classroom*. Retrieved June 7, 2003 from http://lyris.acs.ttu.edu, April 3, 2003.

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