



Exploring the Effectiveness of Visual Literacy and Communication Skills Instruction

Heather Seminelli | Assistant Director for Communications and Assessment | heather.seminelli@westpoint.edu



Above: Corps of Cadets parade in front of Jefferson Hall (home of USMA Library)

Background

The United States Military Academy (USMA) is a four-year undergraduate liberal arts college with a strong core curriculum requiring all students to take math, science, and engineering courses. All graduates are commissioned into the United States Army as 2nd Lieutenants and serve a minimum of 5 years on active duty.

The Association of College and Research Libraries defines visual literacy as “a set of abilities that enables an individual to effectively find, interpret, use, and create images and visual media.”

There are assumptions that students growing up as digital natives will have an inherent aptitude for visual literacy. However, exposure does not equal competency.

To help students improve their presentations, the library’s liaison to the Department of Mathematical Sciences worked with the course director for MA104: Single Variable Calculus to develop a lesson on visual literacy and communications skills. This is a freshman level course with approximately 900 students enrolled each spring.

This study investigates the effectiveness of this instruction.

Does instruction in visual literacy and communication skills change cadet presentations?

Instruction

The visual literacy and communication skills class was developed to include presentation preparation tips, critical thinking, preattentive visual properties, choosing appropriate visuals, fair use, copyright, and attribution.

After the introduction, as a class, we went through examples of actual student presentations (multiple class years, courses, and with identifying information removed) that represented the spectrum of student work. Using the information they just learned, students discussed how they would improve each slide.



This class was taught by the library liaison to all MA104 instructors, and to 3 sections of students.

Some instructors used the lesson with their students, and others did not.

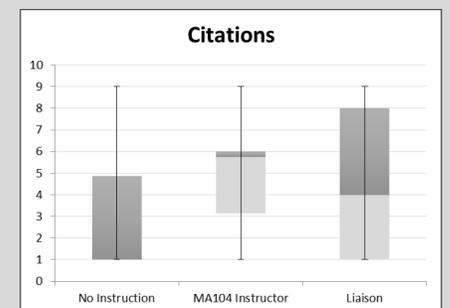
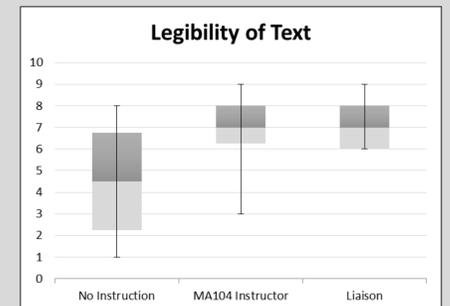
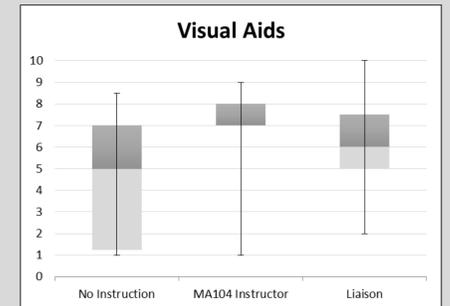
Coefficients
The general additive regression model equation is $Y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k + \epsilon$
Our Equation:
 $Y = 14.9831 + .4771x$

Task and Purpose
CDE's X and Y will conduct a sensitivity analysis to determine which of four available cables provide the best cable tension in order to provide the gondola with the lightest and strongest cable available.

Problem Overview
The NASA scientists and engineers assigned to study on Mars require a stable basecamp location to support viable living conditions and space for study. Additionally, they require a safe space for departure from Mars. The crater where the MEM is located is designed to protect their spacecraft from inclement weather that would prevent their departure. In order to facilitate a swift departure from Mars NASA must develop a lift system that extracts astronauts from their base to the MEM in 5 minutes while supporting the weight of the astronauts and the lift gondola with the support of 10 meter poles with 70 meters of cable between all of the poles. The support of the cable is paramount in making a quick trip from the base camp to the MEM.

Results

Students who received instruction in visual literacy and communication skills performed at a statistically significantly higher level in citations, use of visual aids, and legibility of text.



There was not a statistically significant difference in performance between students who learned these skills from their instructor or a library liaison.

This result suggests that this program can be scaled successfully so that more students can benefit from learning about visual literacy to improve their communications skills.

Methodology

A sample of 116 students from 8 sections of MA104 were identified as being part of group 1 (did not receive instruction), group 2 (received instruction from their instructor), or group 3 (received instruction from the library liaison). All presentations were graded using rubrics, including those below.

Criteria – Use of Visual Aids	9-10	7-8	5-6	3-4	0-2
Diagram of Scenarios	High quality diagrams used for both scenarios	Low quality diagrams used for both scenarios	Diagram used for one scenario	Poor quality or not useful	Missing
Additional visuals	Visuals enhance presentation	Visuals add some value to presentation	Visuals do not detract from presentation	Visuals detract	None used

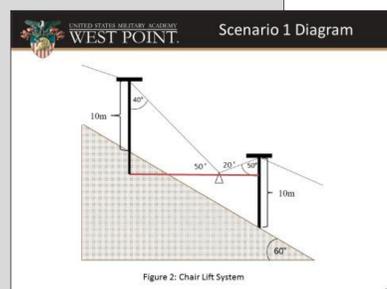
Criteria - Legibility	9-10	7-8	5-6	3-4	0-2
Easy to read, no conflicting backgrounds	No difficulty reading	Occasionally difficult to read	Some difficulty reading	Difficult to read	Unreadable
Amount of information presented on slide, large enough font	Appropriate amount of text	Sometimes wordy or needs a little more detail	Often has too much text	Difficult to read due to amount of text	Full paragraphs in presentation

Examples of rubrics used to analyze student presentations

Recommendations
Cable 4 is the best – sensitivity analysis

Weight	Cable One	Cable Two	Cable Three	Cable Four
Small Weight	F1 = 2062.21 N F2 = 2351.36 N	F1 = 2061.92 N F2 = 2401.64 N	F1 = 3491.76 N F2 = 2929.04 N	F1 = 3401.18 N F2 = 2518.29 N
Medium Weight	F1 = 3432.08 N F2 = 3079.60 N	F1 = 3491.76 N F2 = 2929.04 N	F1 = 3571.34 N F2 = 2998.71 N	F1 = 3613.62 N F2 = 3064.79 N
Heavy Weight	F1 = 4061.84 N F2 = 3468.29 N	F1 = 4121.53 N F2 = 3468.29 N	F1 = 4281.1 N F2 = 3523.14 N	F1 = 4260.79 N F2 = 3575.22 N
Max Cable Tension	3300 N	3700 N	3900 N	4400 N

*Note: If there is a red X in a box then the tension exceeds the max cable tension of the given weight. If there is a green checkmark in a box, then the cable does not exceed the tension and can be used.



Examples of presentations done by cadets who received this instruction

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