

**A TWO-CAMPUS COMPARISON OF STUDENT PERCEPTIONS ON
EFFECTIVE VISUAL AID USAGE**

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ABSTRACT

Four hundred seven undergraduates at two state universities, with seemingly distinct homogenous cultures, were subjected to a Visual Aid Usage Presentation Survey (VAUPS). Principal axis factor analysis was performed on collected data; and a MANOVA analysis revealed significant differences in students' perceptions between the two campuses on grade level, gender, income and age on combined factors. These results suggest that business professors should present visual information according to the unique similarities and differences in a diverse population of students.

Key words: Effective visual aid usage; visual perceptions

INTRODUCTION

A good summary of how unique individual visual perceptions are formed can be found in Spence (1978):

In the case of these constructed illusions, experience in the form of trying to touch objects or otherwise perceive them leads to a correct spatial perception based on an altered set of assumptions or rules congruent with the abnormal situation. Ittleson and Kilpatrick hypothesize that in visual perception “the subject relates to the stimulus pattern a complex probability-like integration of his past experience with such patterns”. Thus, “the world each of us knows is a world created in large measure from our experience in dealing with the environment”, (161).

Visual perceptions seem to be the most abundant learning style; people learn by seeing. Although only 150 hues can be distinguished, the color spectrum is said to yield 350,000 different color sensations. Understanding how the speaker can manipulate complex visual stimuli (as tools in effective visual aid usage) depends on the unique experience of a particular audience member. Speakers are thought to be more effective when they are directive: each member of an audience feels a personal connection with the speaker when gesticulations complement words, when eye contact is continuous and made person-to-person, and when visual aids enhance sincerity (Sandford and Yeager, 1942). Although this traditional pedagogic speech jargon is apparently anecdotal (Hugenberg and Hugenberg, 1997) it gives ample theoretical grounding for researchers attempting to investigate how an audience might respond positively to a speaker’s usage of visual aids. A literature search was conducted to determine if any studies had been

published that would shed light on the visual perceptions of a divergent student population in relation to their perceptions of effective visual aid usage in presentations.

RELATED LITERATURE

Scheiber and Hager (1994) presented strong evidence that visual aid selection was beneficial to presentation effectiveness and its persuasive meanings. They found that more than two thirds of the managers they surveyed reported that they “very frequently” or “frequently” gave presentations. Morrison and Vogel (1998) found that although business presentations rely on a variety of factors beyond the substance and structure of the presentation (audience factors, environmental factors, and perceptions of the speaker), the visual variable affected all factors. They found a 79 percent over 58 percent audience consensus when comparing visual to non-visual usage. They also found that too many colors and an overuse of animation could backfire on the presenter.

Pruisner (1993) conducted a study to determine the impact of color on learning. The entire seventh-grade class from a Midwestern junior high school was used in one of four treatment groups: (1) color-cued presentation, color-cued assessment; (2) color-cued presentation, black/white assessment; (3) black/white presentation, color-cued assessment; (4) black/white presentation, black/white assessment. It was determined that the preferred presentation type was color-cued; an important factor in enhancing performance appeared to be the presence of a systematic color cue in graphic presentation.

Wilson (1967) provoked an early discussion on the aspect of visual aid to determine a clear understanding of visual perception that is important to teachers. For a teacher working with

specific problems, visual perception can aid a child to become a better reader and a better learner.

Allen and Daehling (1968) used still slide programs with audiotapes in three forms: figural, symbolic, and semantic. A total of 247 sixth-grade students were randomly assigned to one of the nine treatment groups, and measures of mental, verbal and cognitive abilities related to the three intellect factors were obtained for all participants. Performance was assessed by a written post-test. They found no conclusive interaction between modes of presentation, inherent content of materials, and learner characteristics.

Wheelbarger (1970) tested theories in audiovisual education that held that learning from a visual illustration was directly related to the realism of the visual aid. They used five treatment groups and all groups were pre-tested, taught the same unit of instruction, and post-tested. Four groups saw slide sequences with illustrations with a different degree of realism: line drawing (black and white), line drawing (color), shaded drawing (black and white), and shaded drawing (color). The fifth group saw a slide presentation with words only. The results of the study showed no significant difference among the five groups' learning achievement.

Bennett (1988) provided examples of visual representations that are helpful in understanding number relationships and the algebraic statements of those relationships. They suggested teachers use the representations to aid students in discovering number relationships.

Roth (1992) suggested visualization as a factor of intelligence that includes the mental manipulation of spatial configurations and has been associated with spatial abilities, creative thinking, and conceptual problem solving. They suggested that the shift from print to electronic media would increase the need to educate the next generation for the use of visual images.

Beck (1965) provided guidance on studies of the effectiveness of instructional television that showed it to be at least as productive as standard methods. Suggestions on its integration into the classroom as a presentation tool were also made. Allen (1963) suggested that teachers integrate technology into the classroom; as other instructional tools, the key value of television is its effective use in conjunction with classroom instruction.

Harland and Whyte (1981) investigated the proposition that males have a predominant tendency to encode visually when reading, whereas females tend to encode phonologically. Their findings indicated that males appeared to benefit more from word training, whereas females benefited more from letter training in the transfer task. The findings suggest that when teaching reading to young children, a more visually oriented method might be more effective for boys and a less visual method might be more effective for girls.

Bell and Quazi (2005) reported statistically significant differences across undergraduate students' majors and grade levels on six derived factors in a study they conducted at a regional university. The derived factors represented underlying constructs of visual aid effectiveness according to students' perceptions. Those students surveyed appeared to perceive presentations with an emphasis on speech purpose (persuade, inform or entertain) to be the most important factor; in MANOVA tests, freshman and sophomores were statistically different on their perception than juniors and seniors. Color contrasted with text made a big difference to MIS majors compared to other majors. Although Bell and Quazi (2005) found a plethora of statistically significant differences across majors and grade levels on one college campus, their study had an inherent weakness. Their results could not be generalized to any aspired student population at any other college or university. However, they did link student visual learning style to visual aid usage in presentations.

Bell and Quazi (2005) relied on Sandford and Yeager (1942) and Dunn and Dunn (1993) for a theoretical basis on which they defined visual learning style as a door to the mind. Learning styles (visual, auditory, kinesthetic) might be viewed as ways in which people think, solve problems and learn. According to Bell and Quazi (2005) visual aid effectiveness and its theoretical link to visual learning can have an operational definition as such:

A visual “door to the mind” could be construed as any word or phrase that evokes responses connected with sentient experiences (such as learning) in a student audience. Visuals could alter their beliefs and actions towards the presenter’s purpose. Hence, the operational definition for this study was determined: Visual aid usage is any tool that can be a “thing seen” by an audience and manipulated by a presenter in making the presentation more effective. Any gesticulation, eye contact, facial expression, mechanical device, color usage in slides, electronic equipment including PowerPoint, and non-technical devices (flip chart, chalkboard, transparency, etc.) are all examples of *Visual Aid Usage* if used during a presentation to enhance its effectiveness. If student learning increases as a direct result of a visual aid used by a professor, that would represent an effective visual aid.

Bell and Quazi (2005) made it clear the scope of their study was limited to the perceptions of a small population of approximately 1,000 business students. They also cautioned the academic community there exists a need to sample from a broader population of students in order to overcome the weaknesses inherent in their own study. A population of students representing diverse cultures on more than one college campus would generate additional

evidence for developing a “transmissional perspective” on viewing knowledge of student perceptions on effective visual aid usage.

The literature review revealed several articles with relevance to the scope of this study and its purpose (Scheiber and Hager, 1994; Bell and Quazi, 2005; and Morrison and Vogel, 1998). No additional articles directly related to the topic were published since 2005. Multivariate statistical procedures were used in this study, in addition to systematic data collection procedures.

PROCEDURE

A twenty-five item VAUPS and a separate list of questions that pertain to assessment of demographics were administered in two campuses. Business professors asked their students in sixteen different (core) undergraduate business courses to complete the VAUPS during the fall 2004, spring 2005, and fall 2005 semester. Courses sampled were Principles of Microeconomics, Introduction to Business, Accounting Principles, Leadership, Management Information Systems and Business Communication. These courses are considered to be core requirements for business majors at both campuses.

Campus one is seemingly homogenous in the demographic compilation for its students. More than 90 percent of all students enrolled at campus one are reported to be White Americans by their respective institution. Campus two is also seemingly homogenous in the demographic compilation for its students. More than 90 percent of all students enrolled at campus two are reported to be African Americans by their respective institution. Separately, the two campuses are seemingly homogenous, yet, combined the two campus population is demographically biracial.

The survey was strictly voluntary, and students read a disclosure form prior to completing the survey. Four hundred fifteen business and non-business students completed the survey. As shown in the *Appendix*, the students responded to a five-item Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Three (3) was used as the Neutral term.

Descriptive Data

There were 415 completed surveys (189 for campus one and 226 campus two) and eight were found to be unusable due to too much missing data; therefore, the statistical analysis presented in this study is based on 407 observations. Table 1 presents information concerning usable questionnaire returns. Two majors at the campus one location were not offered by the campus two location; therefore, the students with majors in Business Communication and Leadership who completed surveys at the campus one location had to be eliminated from the data set for comparison purposes. The 222 original campus one surveys were reduced to 189.

Table 1: Usable Questionnaire Returns

Campus	Group Size	Usable Returns	Usable Percent
Campus 1	189	189	100.0
Campus 2	226	218	96.5
Total	415	407	98.6

Detailed information regarding the mean, standard deviation and percentage of responses selected for each of the 25 items is presented in Table 2 below. Statements are indicated in Table 2 by S1, S2, S3, etc., where, for example, S2 refers to statement 2 - “A business presentation is

more effective when color slides are used rather than black and white slides.” The full list of statements is presented in the *Appendix*.

Table 2: Means and Standard Deviations of VAUPS Statements across Two Campuses

Statement	Campus 1		Campus 2		Total	
	Mean	SD	Mean	SD	Mean	SD
S1	4.06	0.84	3.97	1.00	4.01	0.93
S2	4.29	0.85	4.28	0.92	4.28	0.89
S3	4.36	0.75	4.31	0.85	4.33	0.81
S4	2.22	0.80	2.40	1.09	2.31	0.97
S5	2.88	0.91	3.30	1.13	3.11	1.06
S6	3.49	1.04	3.90	1.09	3.71	1.09
S7	3.90	0.88	3.70	1.04	3.79	0.98
S8	3.63	0.89	3.74	1.09	3.69	1.01
S9	2.70	0.86	2.77	0.99	2.73	0.93
S10	4.08	1.09	3.85	1.27	3.95	1.19
S11	2.94	1.01	2.75	1.12	2.84	1.07
S12	3.65	1.11	3.19	1.08	3.40	1.12
S13	2.88	0.89	2.88	1.03	2.88	0.97
S14	3.44	0.97	3.34	1.11	3.38	1.05
S15	3.53	0.84	3.49	0.92	3.51	0.89
S16	3.86	0.97	3.71	1.05	3.78	1.02
S17	3.98	0.92	3.85	1.06	3.91	1.00
S18	3.80	0.93	3.84	1.00	3.82	0.96
S19	3.51	0.87	3.56	0.97	3.54	0.93
S20	3.67	0.92	3.85	0.90	3.77	0.91
S21	4.04	0.74	3.93	0.89	3.98	0.82
S22	3.86	0.90	4.08	0.87	3.98	0.89
S23	3.50	0.91	3.64	0.97	3.58	0.94
S24	4.15	0.76	4.14	0.81	4.14	0.79
S25	3.74	0.96	3.95	0.94	3.86	0.95

Analysis of the demographic data revealed that 218 males and 197 females completed the survey. Four hundred students were 17-26 years old and 13 were 27-36 years old and 2 were 37 or older. Income was reported to be less than \$10,000 by 342 students, between \$10,000-\$30,000 by 63 students, between \$31,000-\$50,000 by 7 students, and \$51,000 or more by 3 students. The declared majors of the respondents were as follows: Accounting – 102, Management – 101,

Marketing – 47, Finance – 28, MIS – 76, Double-major – 29 and Non-business – 32. There were 104 freshmen (which comprised 25.1% of the respondents), 87 sophomores (21.0%), 113 juniors (27.2%), and 111 seniors (26.7%). Summaries of demographic frequencies between campus one and campus two are presented in Table 3a, 3b, 3c, 3d and 3e.

Table 3.a: Frequency Distributions for Grade Levels across Two Campuses

Grade Level	Campus 1		Campus 2		Total	
	Frequency	%	Frequency	%	Frequency	%
Freshman	51	27.0	53	23.5	104	25.1
Sophomore	45	23.8	42	18.6	87	21.0
Junior	45	23.8	68	30.1	113	27.2
Senior	48	25.4	63	27.9	111	26.7
Total	189	100	226	100	415	100

Table 3.b: Frequency Distributions for Declared Majors across Two Campuses

Major	Campus 1		Campus 2		Total	
	Frequency	%	Frequency	%	Frequency	%
Accounting	58	30.7	44	19.5	102	24.6
Management	30	15.9	71	31.4	101	24.3
Marketing	27	14.3	20	8.8	47	11.3
Finance	20	10.6	8	3.5	28	6.7
MIS	20	10.6	56	24.8	76	18.3
Double Major	21	11.1	8	3.5	29	7.0
Non-Business	13	6.9	19	8.4	32	7.7
Total	189	100	226	100	415	100

Table 3.c: Frequency Distributions for Gender across Two Campuses

Gender	Campus 1		Campus 2		Total	
	Frequency	%	Frequency	%	Frequency	%
Female	94	49.7	103	45.6	197	47.5
Male	95	50.3	123	54.4	218	52.5
Total	189	100	226	100	415	100

Table 3.d: Frequency Distributions for Age across Two Campuses

Age	Campus 1		Campus 2		Total	
	Frequency	%	Frequency	%	Frequency	%
17+	181	95.8	219	96.9	400	96.4
27+	6	3.2	7	3.1	13	3.1
37+	2	1.1	0	0.0	2	0.5
Total	189	100	226	100	415	100

Table 3.e: Frequency Distributions for Income Levels across Two Campuses

Income Level	Campus 1		Campus 2		Total	
	Frequency	%	Frequency	%	Frequency	%
<10 k	153	81.0	189	83.6	342	82.4
10-30 k	32	16.9	31	13.7	63	15.2
31-50 k	4	2.1	3	1.3	7	1.7
51k +	0	0	3	1.3	3	0.7
Total	189	100	226	100.0	415	100

Reliability

A scale reliability test (Cronbach’s Alpha) was performed on the VAUPS instrument for the biracial (combined two-campus) population. The item-wise alpha reliability coefficients and the overall scale coefficient, was 0.78, which well exceeds the Nunnaly (1978) criteria of 0.70 for an acceptable alpha. It is presented in Table 4. The Bell and Quazi (2005) alpha was .78 on the campus two, African American, business student population.

A personal comfort range for alpha coefficients recommended by Devellis is “below .60, unacceptable; between .60 and .65, undesirable; between .65 and .70, minimally acceptable; between .70 and .80, respectable; between .80 and .90, very good...” (1991: 85). The larger biracial population reliability of .78 was respectable; therefore, the VAUPS instrument should be considered a respectable standard measure of perceptions regarding visual aid effectiveness in

presentation. Once VAUPS reliability was established for the larger biracial population, the factor analysis was conducted.

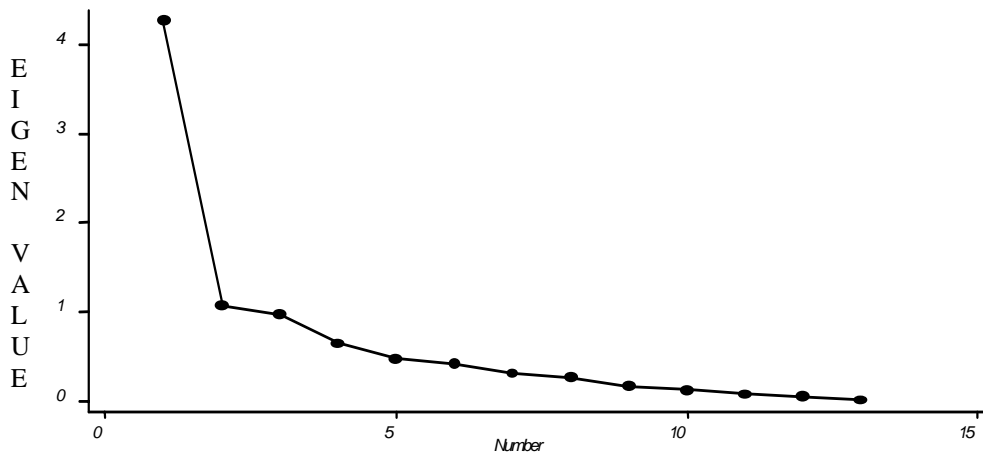
Table 4: Reliability Statistics (Cronbach's Alpha)

Statement	Item-test Correlation	Item-rest Correlation	Avg Inter-item Correlation	Alpha
S1	0.56	0.49	0.12	0.77
S2	0.62	0.55	0.12	0.76
S3	0.63	0.56	0.12	0.76
S4	0.31	0.22	0.13	0.78
S5	0.11	0.01	0.14	0.79
S6	0.22	0.12	0.13	0.79
S7	0.49	0.40	0.12	0.77
S8	0.40	0.31	0.13	0.78
S9	0.10	0.00	0.14	0.79
S10	0.34	0.25	0.13	0.78
S11	0.16	0.06	0.13	0.79
S12	0.27	0.17	0.13	0.78
S13	0.15	0.06	0.13	0.79
S14	0.28	0.18	0.13	0.78
S15	0.37	0.28	0.13	0.78
S16	0.56	0.49	0.12	0.77
S17	0.55	0.47	0.12	0.77
S18	0.53	0.45	0.12	0.77
S19	0.28	0.18	0.13	0.78
S20	0.52	0.44	0.12	0.77
S21	0.51	0.43	0.12	0.77
S22	0.58	0.50	0.12	0.77
S23	0.39	0.31	0.13	0.78
S24	0.63	0.56	0.12	0.76
S25	0.47	0.39	0.12	0.77
Test Scale			0.13	0.78

Factor Analysis

The VAUPS administered to 407 students were subjected to an exploratory factor analysis using principal factors method. An unrotated factor solution and “scree” test suggested that six factors be retained for rotation that could account for 48% of the total scale variance explained, as can be seen from Graph 1 below. Promax (Oblique) Rotations were then used to extract the six factors. The criterion for selecting factor loadings was set at 0.35, which conforms to the commonly used cut-offs in the literature (Devellis, 1991; Kachigan, 1991).

Graph 1: The Scree Graph



Using these criteria, four items (S1, S2, S3 and S7 in the VAUPS) were found to load on the first factor which was subsequently labeled “*Colorized Visual Aid Necessity & Use of Graphics*”; two items (S4 & S5) loaded on factor two which was labeled “*Gradation in Complexity of Visual Aid Usage*”; three items (S9, S14 & S15) loaded on factor three which was labeled “*Bodily Delivery, Color Restriction and Caution*”; five items (S16, S17, S22, S23 & S24) were found to load on factor four which was labeled “*Appropriate Non-verbal Cues & Directness with Speech Purpose*”; three items (S19, S20 & S25) loaded on factor five and was labeled “*Importance of*

Bells & Whistles in Entertaining Presentations”; and two items (S8 & S18) loaded on factor six and was labeled “*Electronic Visuals Aids Preferred to Non-electronic Visual Aids*” (see Table 5 for factor loadings and uniqueness).

Table 5: Promax (Oblique) Rotations with Six Factors

Rotated Variable	Factor Loadings						Uniqueness
	1	2	3	4	5	6	
S1	0.62	-0.02	0.09	0.02	0.05	0.08	0.59
S2	0.64	-0.28	-0.04	0.03	-0.08	0.08	0.40
S3	0.66	0.10	0.04	-0.06	0.01	0.06	0.50
S4	-0.17	0.61	0.00	0.01	-0.01	-0.07	0.54
S5	0.18	0.49	-0.13	0.05	-0.14	-0.05	0.73
S6	0.15	0.11	-0.03	-0.05	-0.09	-0.18	0.92
S7	0.50	0.13	-0.02	-0.12	0.11	0.05	0.71
S8	0.24	-0.13	-0.04	0.04	-0.09	0.49	0.65
S9	-0.13	0.12	0.36	0.15	-0.12	0.08	0.84
S10	0.08	-0.13	0.03	-0.15	-0.10	0.00	0.90
S11	-0.12	0.13	0.13	-0.16	0.27	0.05	0.85
S12	0.13	-0.09	0.17	-0.21	0.28	0.00	0.82
S13	0.01	0.21	0.30	0.01	0.08	0.16	0.80
S14	0.01	-0.05	0.52	-0.07	0.03	-0.13	0.72
S15	0.18	-0.11	0.47	0.03	0.00	-0.04	0.73
S16	-0.03	-0.06	0.09	-0.57	-0.06	0.10	0.57
S17	0.10	0.03	-0.11	-0.64	0.03	0.03	0.56
S18	0.10	-0.04	-0.08	-0.26	-0.15	0.48	0.56
S19	0.06	0.01	0.16	0.11	-0.36	-0.01	0.85
S20	0.10	-0.03	-0.01	-0.09	-0.50	0.09	0.65
S21	0.29	0.00	0.14	-0.13	-0.19	-0.16	0.72
S22	0.02	-0.01	0.13	-0.36	-0.29	0.05	0.64
S23	-0.15	0.13	0.00	-0.36	-0.33	0.04	0.75
S24	0.13	-0.06	0.02	-0.49	-0.23	-0.10	0.53
S25	-0.03	0.07	-0.06	-0.21	-0.55	0.11	0.60

Among the six factors, factors four and five had negative loadings. Loadings **S16, S17, S22, S23, and S24** for factor four were negative; components **S19, S20, and S25** were negative loadings for factor five. Negative loadings merely reflect an inverse relationship of the particular variable loading and the underlying construct (Kachigan, 1991). For example, campus one

(White) and campus two (African American) students differed on factor five in a MANOVA test with a p value = .000. This suggests White students, with a mean of .168 on factor five, compared to African American students, with a mean of -0.145, would have opposite reactions to more or less of variable S20 (*Animation can make the presentation more effective*) and the underlying construct (Factor Five) in a presentation using this type of visual aid.

Table 6: New Factors and Item Descriptions

Factor One: Colorized Visual Aid Necessity & Use of Graphics
S1: A one-hour business presentation is more effective if colorized examples of technical information, in the form of Bar Charts, Pie Charts and Histograms, is used.
S2: A business presentation is more effective when color slides are used rather than black and white slides.
S3: Visual aids such as Overhead Transparency, PowerPoint, Whiteboard, Flip Charts, or Handouts make the presentation more effective.
S7: Accounting and finance presentations are more effective when using graphs and charts.
Factor Two: Gradation in Complexity of Visual Aid Usage
S4: Black and white slides are just as effective as color slides for a one-hour business presentation.
S5: Colorized Transparencies are as effective as Power Point slides.
Factor Three: Bodily Delivery, Color Restriction and Caution
S9: Hand gestures are more important than mechanical visual aids.
S14: Four or five colors should be the maximum number used in a slide.
S15: Background colors should be determined before any other color is selected when creating slides.
Factor Four: Appropriate Non-verbal Cues & Directness with Speech Purpose
S16: The presenter's clothes can make the presentation more effective.
S17: Business apparel should always be used during a business presentation.
S22: Eye contact is the most important visual aid for an effective speaker.
S23: Presentation visuals that persuade a change in my beliefs or actions are effective.
S24: Presentation visuals that enhance information make the presentation more effective.
Factor Five: Importance of Bells and Whistles in Entertaining Presentations
S19: Letter size matters more than color in a slide show.
S20: Animation can make the presentation more effective.
S25: Presentation visuals that are entertaining are very important regarding effectiveness.
Factor Six: Electronic Visuals Aids Preferred to Non-electronic Visual Aids
S8: PowerPoint is more effective as a visual aid than Transparencies and Whiteboards combined.
S18: Video presentations are more effective than using a chalkboard.

Recall, factor five was named, “*Importance of Bells & Whistles in Entertaining Presentations*”. White students would perceive a presentation integrated with “bells and whistles” more favorably than African American students if more of S20 was present. In contrast, African American students would perceive “bells and whistles” more favorably than White students if less of variable S20 was present.

To ascertain if there were any significant differences in students’ perceptions in the two-campus comparisons and independent variables (grade level, declared major, income, age and gender), data were further analyzed using Two-Way MANOVA and a Mean Comparison Test (with unequal variance and unpaired observations) for individual factors among selected classifications.

Hypothesis Testing

A Two-Way Multivariate Analysis of Variance (MANOVA) and Mean Comparison Test procedure were used to test for statistically significant differences among (1) campus one and campus two, (2) declared major, (3) age (4) grade level, (5) gender, and (6) income regarding students’ perceptions of effective visual aid usage. The hypotheses were stated as follow:

Hypothesis 1: There is no significant difference between campus one (White) and campus two (African American) students regarding their perceptions of effective visual aid usage.

Hypothesis 2: There is no significant difference between campus one and campus two students’ declared majors and their perceptions of effective visual aid usage.

Hypothesis 3: There is no significant difference between campus one and campus two students' ages and their perceptions of effective visual aid usage.

Hypothesis 4: There is no significant difference between campus one and campus two students' college grade levels and their perceptions of effective visual aid usage.

Hypothesis 5: There is no significant difference between campus one and campus two students' gender and their perceptions of effective visual aid usage.

Hypothesis 6: There is no significant difference between campus one and campus two students' income levels and their perceptions of effective visual aid usage.

Survey data was used to determine the rejection or acceptance of the null hypotheses. Descriptive statistics, results of a Multivariate Analysis of Variance (MANOVA) and a Mean Comparison Test are summarized for the six null hypotheses tested at a significance level of 0.10. We selected a confidence interval of 0.10 because of the large sample size and the reliable instrument ($\alpha = 0.78$).

The MANOVA results in Table 7 show that there appear to be statistically significant differences across grade levels, gender, age, and campus for all six factors combined. Students differed significantly on grade level (p value = 0.0819), gender ($p = 0.0516$), age ($p = 0.0585$); and, most importantly, campus ($p = 0.000$). Since there is an extremely significant statistical difference in the biracial student population regarding their perceptions of effective visual aid usage (the p value for the campus variable is 0.000), **we reject Hypothesis 1**. Results from a Mean Comparison Test in Table 8 show that students' perceptions from the two campuses differ on all factors with opposite signs. The differences in factor score mean turn out statistically significant for factors 2, 3 and 5 and marginally significant for factor 4.

Table 7: Summary of Two-Way Multivariate Analysis of Variance with Between Groups Design

Source	Wilks' Lambda	DF	F Statistic	p-value
Model	0.6890	16	1.56	0.0006
Grade Level	0.9335	3	1.50	0.0819
Major	0.9338	6	0.74	0.8668
Gender	0.9684	1	2.11	0.0516
Age	0.9488	2	1.72	0.0585
Income	0.9377	3	1.40	0.1223
Campus	0.9098	1	6.40	0.0000

Table 8: Mean comparison test for individual factors across two campuses

Factors	Campus 1		Campus 2		t statistic	p-value
	Mean	SD	Mean	SD		
1	0.027	0.821	-0.024	0.063	-0.585	0.280
2	-0.098	0.046	0.085	0.057	2.492	0.007
3	0.072	0.048	-0.062	0.054	-1.834	0.034
4	-0.058	0.061	0.049	0.060	1.257	0.105
5	0.168	0.056	-0.145	0.054	-4.013	0.000
6	0.019	0.049	-0.016	0.048	-0.503	0.308

*(p values are from one sided t tests)

Results from a Mean Comparison Test in Table 9 show that there was a statistically significant difference in campus one and campus two students' declared majors and their perceptions of effective visual aid usage; **therefore, we reject Hypothesis 2.** Campus one and campus two Accounting majors differed at a .073 level on factor five. Campus one and campus two Management majors differed on factors one (p= .028), two (p= .010), three (p= .037) and four (p= .030). The Finance majors differed on factors two (p= .067) and five (p= .055). The MIS majors differed only on factor five (p= .000), and double majors also differed only on factor five (p= .000). Finally, non-business majors differed on factors two (p= .096) and six (p= .079). Campus two MIS, Accounting, Finance, and Double-majors all had negative means on Factor Five and Campus one MIS, Accounting, Finance, and Double-majors all had positive means on

Factor Five. This fact implies perceptions White and African American students have about the effectiveness of integrating bells and whistles into the presentation are inverse.

Table 9: Mean comparison test for individual factors across major and campus

Factors	Major					
	Accounting			Management		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
1	-0.051	-0.036	0.464	0.120	-0.189	0.028
2	-0.112	0.047	0.164	-0.121	0.207	0.010
3	0.024	0.153	0.195	0.105	-0.197	0.037
4	-0.021	-0.001	0.450	-0.168	0.191	0.030
5	0.180	-0.054	0.073	0.008	-0.059	0.315
6	-0.107	-0.023	0.275	0.133	-0.050	0.110
Factors	Marketing			Finance		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
	1	0.173	0.526	0.039	0.121	0.005
2	0.062	-0.201	0.112	-0.201	0.289	0.067
3	0.265	0.017	0.126	0.080	-0.148	0.276
4	-0.219	-0.270	0.416	-0.077	-0.014	0.427
5	-0.013	-0.273	0.121	0.258	-0.331	0.055
6	0.053	0.100	0.403	0.172	-0.277	0.122
Factors	MIS			Double Major		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
	1	0.051	-0.008	0.356	-0.226	0.353
2	-0.185	0.044	0.121	0.017	0.100	0.402
3	0.018	0.034	0.458	0.021	-0.230	0.194
4	0.021	-0.000	0.449	0.165	-0.188	0.172
5	0.384	-0.256	0.000	0.341	-0.638	0.000
6	-0.003	0.161	0.219	-0.027	-0.361	0.232
Factors	Non-Business					
	Campus 1	Campus 2	p-value			
	1	0.087	-0.203	0.238		
2	-0.214	0.058	0.096			
3	-0.047	-0.325	0.198			
4	-0.077	0.269	0.201			
5	0.109	0.097	0.485			
6	0.117	-0.257	0.079			

Results from a Mean Comparison Test in Table 10 below show that there is a statistically significant difference in campus one and campus two students' ages and their perceptions of effective visual aid usage; **therefore, we reject Hypothesis 3.** The 17+ students differed significantly on factors two, three, four and five with $p = .002$, $p = .024$, $p = .051$ and $p = .000$. The 27+ students differed significantly on factor two ($p = .011$).

Table 10: Mean comparison test for individual factors across age and campus

Factors	Age					
	17+			27+		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
1	0.046	-0.032	0.183	-0.684	0.228	0.138
2	-0.121	0.103	0.002	0.381	-0.468	0.011
3	0.079	-0.068	0.024	-0.050	0.139	0.313
4	-0.093	0.045	0.051	1.017	0.175	0.121
5	0.153	-0.151	0.000	0.908	0.053	0.105
6	0.047	-0.016	0.181	-0.402	-0.005	0.146

Table 11: Mean comparison test for individual factors across grade level and campus

Factors	Grade Level					
	Freshman			Sophomore		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
1	0.159	-0.116	0.046	0.052	-0.044	0.302
2	-0.081	0.205	0.048	-0.065	0.165	0.055
3	0.205	-0.134	0.025	-0.028	-0.062	0.407
4	-0.122	0.117	0.084	-0.190	0.188	0.015
5	0.135	-0.274	0.003	-0.033	-0.185	0.166
6	0.220	0.078	0.131	-0.060	-0.198	0.186
Factors	Junior			Senior		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
	1	-0.138	0.067	0.137	0.019	-0.028
2	-0.069	-0.040	0.408	-0.173	0.062	0.055
3	0.039	-0.106	0.122	0.054	0.043	0.470
4	-0.002	-0.090	0.315	0.085	0.048	0.408
5	0.168	-0.098	0.061	0.392	-0.061	0.001
6	-0.035	-0.012	0.434	-0.070	0.022	0.247

Results from a Mean Comparison Test in Table 11 above show that there is a statistically significant difference in campus one and campus two students' college grade levels and their perceptions of effective visual aid usage; **therefore, we reject Hypothesis 4**. Freshmen between the two campuses differ significantly on factors one, two, three, four, and five with $p = .046$, $p = .048$, $p = .025$, $p = .084$ and $p = .033$, respectively. Sophomores differ significantly on factors two ($p = .055$) and four ($p = .015$), while juniors differ significantly on factor five ($p = .061$), and finally the seniors differ significantly on factors two ($p = .055$) and five ($p = .001$).

Results from a Mean Comparison Test in Table 12 below show that there is a statistically significant difference in campus one and campus two students' gender and their perceptions of effective visual aid usage; **therefore, we reject Hypothesis 5**. Recall from the Table 7 above that males and females differed significantly at the $p = .0516$ level in the MANOVA test. The Mean Comparison Test revealed that female students between the two campuses differed significantly on factors two ($p = .074$) and five ($p = .047$), while male students differed significantly on factors two ($p = .021$), three ($p = .010$) and five ($p = .000$).

Table 12: Mean comparison test for individual factors across gender and campus

Factors	Gender					
	Female			Male		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
1	0.118	0.011	0.205	-0.062	-0.052	0.466
2	-0.105	0.051	0.074	-0.092	0.113	0.021
3	0.024	-0.010	0.381	0.119	-0.105	0.010
4	-0.102	0.041	0.124	-0.013	0.056	0.278
5	-0.027	-0.207	0.047	0.362	-0.091	0.000
6	0.001	-0.020	0.418	0.035	-0.012	0.298

Results from a Mean Comparison Test in Table 13 below show that there is a statistically significant difference in campus one and campus two students' income and their perceptions of

effective visual aid usage; **therefore, we reject Hypothesis 6.** Students reporting an income of less than \$10,000 differed significantly on factors two, three and five with $p = .007$, $p = .051$ and $p = .000$, respectively. Students reporting an income between \$10,000 and \$30,000 differed significantly on factor five ($p = .070$), while students reporting an income of \$31,000 to \$50,000 differed significantly on factors three ($p = .027$) and four ($p = .075$). No student at campus one reported having an income greater than \$50,000; therefore, no two-campus comparisons could be made at that level of income.

Table 13: Mean comparison test for individual factors across income level and campus

Factors	Income Level					
	< 10 k			10-30 k		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
1	0.033	-0.019	0.292	-0.098	-0.021	0.370
2	-0.107	0.093	0.007	-0.052	-0.033	0.457
3	0.054	-0.081	0.051	0.103	0.015	0.286
4	-0.063	0.041	0.133	0.050	0.081	0.443
5	0.175	-0.141	0.000	0.104	-0.207	0.070
6	0.031	-0.038	0.184	-0.109	0.012	0.229
Factors	31-50 k			51k +		
	Campus 1	Campus 2	p-value	Campus 1	Campus 2	p-value
1	0.802	-0.087	0.109	No observation in Campus 1.		
2	-0.128	-0.029	0.341			
3	0.494	-0.344	0.027			
4	-0.692	0.509	0.075			
5	0.401	-0.102	0.206			
6	0.575	0.425	0.140			

Bell and Quazi (2005) have explored and analyzed these types of differences in their single campus study. Similar types of analyses were repeated in this paper. In addition, the discussion part of this paper focuses on similarities and differences concerning a biracial population of students and their perceptions of effective visual aid usage in presentations.

DISCUSSION

We used the Mean Comparison Test (t-test with unequal variance and unpaired observations) for individual factors among selected classifications to test the six hypotheses. These classifications are obtained by first categorizing the main sample by independent variable characteristics (one at a time) of gender, age, grade level, income level, and major. Each sub-sample was then divided into two groups: campus one (White students) and campus two (African American students). For example, some of the sub-samples were all male campus one students vs. all male campus two students; all junior campus one students vs. all junior campus two students, and all Accounting campus one students vs. all Accounting campus two students, etc.

Then the t-test was applied to each of the six factors (one at a time), to assess if there was any significant statistical difference in, say, the mean value of factor 3 for all female campus one students vs. the mean value of factor 3 for all female campus two students. We have reported both t-test statistics and p-values in appropriate table form, and for the sake of space, only the p-values in tables 9-12. The test results show considerable differences (p-values in bold faces) across these tables. We have reported the p-values from one-sided tests (instead of the more customary two-sided tests), as that will allow us to conclude which campus has the statistically significant higher mean for the tested factor. The two-sided test statistics would only allow us to conclude if the two means are statistically different, not which one is statistically higher/lower. We justify our use of the one-sided t-test given the large sample size. We also needed to know which direction students at the two campuses perceived effective visual aid usage. There are significant implications to our findings.

Implications

The best part of a research study is in its findings. The similarities in campus one and campus two students are in the factors that were derived as a result of rigorous methods. Factors represent the underlying constructs of the students' perceptions. Our findings suggest that both campus one and campus two students (White and African American students) have the common perception that Factor 1 (*Colorized Visual Aid Necessity and Use of Graphics*) might be the most important visual aid; recall they did not differ significantly on the Mean Comparison Test shown in Table 8 above with a $p = .280$. Both race groups perceived color and the use of graphics to be paramount in effective visual presentations. This is not surprising given what we know about how visual perceptions are formed (Spence, 1978). Students live and learn in a colorized world.

Students also perceived Factor 2 (*Gradation in Complexity of Visual Aid Usage*) to be an effective visual aid. Factor 2 implies that technical devices do not necessarily mean a better visual aid than non-technical devices. The six derived factors is the best example of what a biracial audience might perceive to be effective visual aid usage in a presentation. Although the factor analysis revealed similarities and provided construct validity, science is primarily concerned with comparisons for determining significant differences between and among groups. The differences we found were complex and numerous. We now know that differences exist in grade level, gender, age, and income within a population composed of White and African American students; however, what does this all mean?

Given the campus one and campus two differences on factors 2, 3, and 5, professors teaching courses to an audience composed of White and African American students should be aware that African American students might favor more simple (non-technical) visual devices than White students. They also may respond better to hand gestures, bodily delivery and

restricting the use of color in visual devices. White students might favor “bells and whistles,” animated visual devices, fancy coloring, good-sized letters, and speeches that entertain more so than African American students. African American students might perceive high-technology visual aids as “gimmicks”, and they might react negatively to them if they are overdone.

White students reacted negatively to factor 2 (*Gradation in complexity of visual aid usage*) with a mean of -0.098, while African American students reacted positively to factor 2 with a mean of .046. This result further supports our inference that African American students perceive low-technology visual aids to be just as effective as high-technology visual aids. Part of the difference might be explained by the fact that White students (campus one) had access to more business communication courses and more professors teaching business communication than the African American (campus two) students who are required to take only one undergraduate core business communication course. The difference might be explained by curricula variety or the fact campus one has a degree program major in Business Communication.

Although all meaningful differences cannot be discussed in this paper for the sake of brevity, gender differences are addressed. Interestingly, White female students differ on low-tech/high tech visuals and bells and whistles in visual presentations with African American female students. Just as White male students favor factor 2, so do White female students. On factor five, however, African American females tend to be a bit more similar to White male and female students on bells and whistles. African American males tend to be consistently perceptive of low-tech visuals. They tend to like low-technology visual aids, while White males tend to favor the opposite. White male students were negative on factor 3 (*Bodily Delivery, Color Restriction and Caution*), but African American male students were positive. This is consistent

with earlier findings. People who pay a great deal of attention to computer aided visuals and colorized slides may pay less attention to the traditional speech aids, namely gesticulations and the notion the “whole body speaks” (Sandford and Yeager, 1942; Sprague and Stuart, 2000).

Although many other inferences might be surmised from the data we have gathered and analyzed, the specific findings presented here can shed new light on the pedagogic practices of professors teaching business subjects and professors requiring students to make presentations in class. The American population is becoming more diverse and university faculty can expect more student diversity to be present in the courses they teach in the future; therefore, understanding what methods are best suited for visual learning in a diverse student audience is necessary.

Our findings can be generalized to a biracial population of White and African American business students at two regional college campuses. Professors teaching at universities with biracial student populations should find the results and implications presented here useful. African American students were found to be similar to White students on the six derived factors (validated constructs of effective visual aid usage) that could account for 48 percent of the scale variance explained. White students differed with African American students on the factors 2, 3, and 5 mostly associated with high technology and low technology visual aids. Males and females were consistent with their own race on factors. Business professors should use a good blend of colorized high and low technology visual aids when presenting information to a biracial student audience.

Limitations and Delimitations

Hispanics and other race groups were underrepresented in this study. The twenty-five statements in the survey (the survey is included in the Appendix) reflect a very small number of potential visual aids used by business professors and students. No attempt was made to measure all available types of visual aids for instruction, especially figures of speech and thought (allusion, allegory, personification, irony, interrogation, etc.), which rely on a variety of factors beyond the substance and structure of the presentation (Morrison and Vogel, 1998). Furthermore, the survey statements merely reflect the visual aids observed to be routinely used by faculty and students at two regional universities and those suggested important in the literature.

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VISUAL AID USAGE PRESENTATION SURVEY

I am enrolled as a: Senior ____, Junior ____, Sophomore ____, or Freshman ____					
My Major is: Accounting __, Management __, Marketing __, Finance __, MIS __, or a Double Major in: _____ and _____ or other/non-business _____					
My gender is: Male _____ or Female _____ My age is: 17+ __, 27+ __, 37+ __					
My Income is: Less than \$10,000 ____ \$10,000-\$30,000 ____ \$31,000-\$50,000 ____ or \$51,000+ ____					
<i>This survey is designed to measure your perception of visual aids as they are related to an effective business presentation. Please circle the number that best reflects your level of agreement with the corresponding statement:</i> 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree					
1. A one-hour business presentation is more effective if colorized examples of technical information, in the form of Bar Charts, Pie Charts and Histograms, is used.	1	2	3	4	5
2. A business presentation is more effective when color slides are used rather than black and white slides.	1	2	3	4	5
3. Visual aids such as Overhead Transparency, PowerPoint, Whiteboard, Flip Charts, or Handouts make the presentation more effective.	1	2	3	4	5
4. Black and white slides are just as effective as color slides for a one-hour business presentation.	1	2	3	4	5
5. Colorized Transparencies are as effective as Power Point slides.	1	2	3	4	5
6. A one-hour PowerPoint business presentation with fifty slides <u>does not</u> make the presentation more effective.	1	2	3	4	5
7. Accounting and finance presentations are more effective when using graphs and charts.	1	2	3	4	5
8. PowerPoint is more effective as a visual aid than Transparencies and Whiteboards combined.	1	2	3	4	5
9. Hand gestures are more important than mechanical visual aids.	1	2	3	4	5
10. A one-hour business presentation without any visual aids would be boring and ineffective.	1	2	3	4	5
11. Cartoon characters should not be used in a business presentation.	1	2	3	4	5
12. Red should never be used in the business presentation when expressing a healthy income statement.	1	2	3	4	5
13. The color of the room should not contrast with the colors of the slides.	1	2	3	4	5
14. Four or five colors should be the maximum number used in a slide.	1	2	3	4	5
15. Background colors should be determined before any other color is selected when creating slides.	1	2	3	4	5
16. The presenter's clothes can make the presentation more effective.	1	2	3	4	5
17. Business apparel should always be used during a business presentation.	1	2	3	4	5
18. Video presentations are more effective than using a chalk-board.	1	2	3	4	5
19. Letter size matters more than color in a slide show.	1	2	3	4	5
20. Animation can make the presentation more effective.	1	2	3	4	5
21. Bullets or numbers help delineate a business presentation better than text alone.	1	2	3	4	5
22. Eye contact is the most important visual aid for an effective speaker.	1	2	3	4	5
23. Presentation visuals that persuade a change in my beliefs or actions are effective.	1	2	3	4	5
24. Presentation visuals that enhance information make the presentation more effective.	1	2	3	4	5
25. Presentation visuals that are entertaining are very important regarding effectiveness.	1	2	3	4	5