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**Utah Academy of  
Sciences, Arts, & Letters**

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2013 Annual Conference  
held at  
Utah Valley University  
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**Editor**

Kristin L. Kraus

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**Cover Photo:** Zhuolin Yu, G. Edward Harris, and Andrew Drake. “A Curriculum Model for Teaching Network Administration,” p. 49

## Utah Academy of Sciences, Arts, and Letters

**History:** Founded 3 April 1908, the Utah Academy of Sciences was organized "to promote investigations and diffuse knowledge in all areas of science." Beginning in 1923, the Academy started publishing the papers presented in its annual meetings in *Proceedings*. In June 1933 at the annual meeting, the Academy was enlarged to include arts and letters, and the name was changed to the Utah Academy of Sciences, Arts, and Letters. Articles of incorporation and non-profit organization status were accepted by the Academy membership at the spring meeting in April 1959. In 1977, the name of the journal of the Academy was changed from *Proceedings* to *Encyclia*. It became a refereed journal at this time. In the mid 1980s, the scope of the Academy was expanded further to include (1) business, (2) education, (3) engineering, (4) library information and instruction, and (5) health, physical education, and recreation. Beginning with the 1998 issue, the journal became *The Journal of the Utah Academy of Sciences, Arts, and Letters*.

**Annual Meeting:** The Academy's annual meetings are normally held in the spring on one of the Utah campuses of higher education. The plenary session is called the Tanner Lecture, endowed by Mr. O.C. Tanner in 1986.

**Best Paper Awards:** The best paper presented in every division is given a cash award, which is presented at the Academy's "Awards Evening" held the following fall.

**Distinguished Service Awards:** The Academy recognizes outstanding contributions to teaching and scholarship by means of annual Distinguished Service Awards, alternating every other year between disciplines.

**Membership:** When the Academy was founded in 1908, membership was by nomination, ratified by the Council, and elected by a "three-fourths votes of members present." Today, the Academy's membership is available by application.

**Institutional Members:** All Utah institutions of higher education are members of the Utah Academy. The Academy appreciates their patronage.

## Publication Policy

The *Journal of the Utah Academy of Sciences, Arts, and Letters* publishes works in all of the fields of study encompassed in the Academy's mission. Papers published in *The Journal of the Utah Academy of Sciences, Arts, and Letters* are drawn from papers presented by members in good standing at the annual conference of the Utah Academy. To qualify for publication, the papers must be recommended through a refereeing system.

Presenters are encouraged to publish their paper in *The Journal of the Utah Academy*. *The Journal's* criteria are that a submission is (1) fresh, meaningful scholarly insight on its subject; (2) readable and well written; and (3) of general interest for an academic readership beyond the author's field.

If you wish your paper to be considered for publication in *The Journal*, please submit a Microsoft Word document to the section editor of the appropriate section by the indicated deadline. Contact information for the section editors is available on the Utah Academy's website ([www.utahacademy.org](http://www.utahacademy.org)).

*The Journal of the Utah Academy* is a refereed journal. Editorial responses will be forthcoming after the resumption of school the following fall when referees have returned their comments to the division chairs.

Papers should be between ten and twenty double-spaced pages. Detailed instructions to authors are available at [http://www.utahacademy.org/Instructions\\_for\\_Authors.pdf](http://www.utahacademy.org/Instructions_for_Authors.pdf).

Among the bibliographic services listing the journal are Bowker Serials Bibliographies and The Standard Periodical Direction. Indexing and abstracting services that cite articles in the journal include Arts and Humanities Citation Index, Biosciences Information Services, Current Geographical Publication, Chemical Abstracts, Mathematical Reviews, MLA Biography, Sociological Abstracts, Excerpta Botanica, Social Planning, Policy and Development Abstracts, Language and Language Behavior Abstracts, Index to Scientific Technical Proceedings, and Index to Social Sciences, and Humanities Proceedings



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Sciences, Arts, & Letters—2013**

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DISTINGUISHED SERVICE AWARD

**Marlin K. Jensen**

*Historian*

*The Church of Jesus Christ of Latter-day Saints*

Elder Marlin K. Jensen was named a member of the First Quorum of the Seventy of The Church of Jesus Christ of Latter-day Saints on April 1, 1989. He served as Executive Director of the Church History Department and was sustained as the Church Historian/Recorder in April 2005 General Conference. He became an Emeritus General Authority at the October 2012 General Conference. Previously, he served in the Presidency of the Seventy and as the Executive Director of the Curriculum, Historical, Priesthood, and Family and Church History Departments. He has served as the President of the Utah North, North America Northeast, and Europe Central Areas. He was president of the New York Rochester Mission from 1993 to 1995.

Elder Jensen previously practiced law in Ogden, Utah, specializing in business and estate planning. He is a partner in a family ranching enterprise. He received his bachelor's degree in German from Brigham Young University in Provo, Utah, and his Juris Doctor degree from the University of Utah Law School in Salt Lake City, Utah.

Elder Jensen was born on May 18, 1942, in Ogden, Utah, to Keith G. and Lula Hill Jensen. He is married to Kathleen Bushnell of Clearfield, Utah. They are the parents of eight children and have 25 grandchildren.

ACADEMY FELLOW 2013

**James W. Harrison, Ph.D.**

*Southern Utah University*

Professor Jim Harrison obtained his Bachelor and Master degrees in German at the University of Utah. He then completed a Ph.D. at the University of North Carolina, Chapel Hill, specializing in German language and literature, with an emphasis in the Middle Ages and Reformation.

Jim has been a professor of German at Southern Utah University of the past 37 years. During that time, he was also an adjunct percussion professor for over 20 years. During his time at SUU, he served as Chair of the Department of Foreign Languages and Philosophy for 8 years. He was also the Director of the Grace A. Tanner Center for Human Values from 2002 through 2012.

Dr. Harrison remains active in research. He has presented at least one conference paper per year for the past 10 years. He has published articles in *Selecta*, *Southwest Scholar*, and the *Journal of the Wooden O*, as well as the *Journal of the Utah Academy of Sciences, Arts, and Letters*. Among the many awards Jim has received over the years are the Outstanding Educator of the Year in 1989, the Sigma Nu Teaching Award in 2000, and the Cedar City Chamber of Commerce Award for Contribution to the Arts.

Over the years, Jim has been very active in the Utah Academy. He was the Chair for the Letters Division from 1998 through 2005. He then served as President from 2005 through 2007. In 2010, Jim's article, "The Women of Parzival: An Experiment in Jungian Literary Criticism" was published in the journal. He frequently participates in the annual conference, having recently presented papers in 2009 and 2013.

## JOHN & OLGA GARDNER PRIZE

### **L. Douglas Smoot**

*Professor Emeritus*

*Brigham Young University*

Dr. L. Douglas Smoot is senior consultant, cofounder, and a principal owner of Combustion Resources. He is also Professor Emeritus of Chemical Engineering and Founding Director of the Advanced Combustion Engineering Research Center at Brigham Young University.

Dr. Smoot completed his graduate work at the University of Washington in 1960. He was at Brigham Young University from 1967 to 2006. Doug served as Department Chair from 1970 to 1977 and Dean from 1977 to 1994. His previous experience includes four years at Lockheed and one year at the California Institute of Technology. He has consulted with about 70 companies and agencies in energy, combustion, fires, explosions, and chemical propulsion in the U.S., Europe, and Asia. Dr. Smoot has been an expert witness on many legal cases involving a variety of explosions and fires over the past two decades.

While at BYU, Dr. Smoot served as principal investigator or project director on over \$35 million in combustion-related research from industrial and governmental agencies. Areas of emphasis have included fossil fuel combustion and pollutant emissions, theory of combustion, rocket propulsion combustion, coal gasification, fires and explosions, and gas combustion.

Dr. Smoot has published over 100 peer-reviewed papers and invited reviews, over 100 other technical articles, four books, and five chapters in books on combustion, fires, and explosions. He served on the Governor's Science and Technology Advisory Council for the State of Utah. He has been given the Distinguished Faculty Award at BYU, the University's Presidential Award, the first Governor's Medal for Science and Technology in the State of Utah, the ASME International Perry Nicholls Award, and in 1994, Dr. Smoot was confirmed by the U.S. Senate as a congressional advisor to the Office of Technology Assessment. In October 2002, the U.S. Department of Energy, Fossil Energy Division, presented its most distinguished award, the Homer H. Lowery Gold Medal, to Dr. Smoot for outstanding contributions to the science and technology of fossil energy.

In his community of Provo, Dr. Smoot has donated thousands of hours over the past decade in service on three different councils, including chairing a successful effort to rescue and preserve the historic Brigham Young Academy Building as the home of the city's new library.

O.C. TANNER LECTURE

**J. Bonner Ritchie**

*Professor Emeritus  
Brigham Young University*

*Scholar in Residence  
Utah Valley University*

Professor Ritchie is Professor Emeritus of International Organizational Behavior at the Marriott School of Management, Brigham Young University, and a Scholar in Residence at Utah Valley University. After completing his B.S. and Ph.D. at the University of California, Berkeley, he joined the faculty of the University of Michigan (1967-1973). From 1973 until retirement in 2000, he served on the faculty of the Marriott School at Brigham Young University. He was a visiting professor at Stanford University, the University of California, Berkeley, St. Mary's College, BirZeit University (Palestine), the University of Jordan, the Jordan Institute of Diplomacy, and the University of Southern Europe.

Awards received include the University of Michigan Distinguished Teaching Award, BYU Maeser Distinguished Teaching Award, BYU Honors Professor of the Year, Exxon Teaching Excellence Awards, the Marriott School of Management Outstanding Faculty Award, and the William G. Dyer Distinguished Alumni Award.

Professor Ritchie's teaching, research, publication, and consulting activities have been in the areas of leadership development, organizational change, conflict resolution and peacemaking, and organizational ethics and philosophy. Professor Ritchie is the coauthor of the text *Organization and People*, author of over 75 book chapters and professional articles, and producer of four training films. His recent consulting efforts have focused mainly on leadership development, organizational change, and peacemaking in the Middle East.

Professor Ritchie and his wife, Lois, have four children and eight grandchildren and reside in Provo, Utah.

AWARDS EVENING LECTURE

***The Evolution and Implementation of Genomic Cancer Medicine***

**Lincoln Nadauld, M.D., Ph.D.**

*Intermountain Healthcare*

Dr. Nadauld received a Bachelor's Degree in Zoology from Brigham Young University. He went on to complete medical and doctoral degrees (M.D./Ph.D.) followed by clinical training at the University of Utah. His doctoral dissertation focused on the molecular genetics of colon cancer. He completed clinical training in Medical Oncology at Stanford University, where he also completed a postdoctoral fellowship in solid tumor genomics in the laboratory of Dr. Calvin Kuo. Dr. Nadauld then remained on the faculty at the Stanford School of Medicine, focusing on cancer genomics and personalized cancer medicine. In 2012, Dr. Nadauld was awarded the prestigious Young Investigator Award by the American Society of Clinical Oncology and a Career Development Award from the National Cancer Institute. More recently, Dr. Nadauld was appointed Director of Cancer Genomics at Intermountain Healthcare, where he is leading the clinical implementation of genomic-based cancer medicine.

HONORARY MEMBER

**Gloria L. Cronin, Ph.D.**

*Brigham Young University*

Professor Gloria L. Cronin was born in New Zealand in 1947 and graduated from Canterbury University, Christchurch, in 1968 with BA degrees in English Literature and Comparative Religion. She received an MA in American Literature and Middle English studies in 1976 and a PhD in American Literature and Folklore in 1980. She joined the faculty at BYU-Hawaii in 1981 with a joint appointment in the English Department and as Editor of Publications of The Institute for Polynesian Studies. In 1984, she returned to a faculty position in the English Department at BYU in Provo, becoming a full professor in 1990.

In 1990, Professor Cronin was one of three founders of the American Literature Association; she continues to serve within the ALA as Board Member and Executive Coordinator. She has served as co-editor of *The Saul Bellow Journal* and as Executive Director of the Interanational Saul Bellow Society since 1991. In connection with the National Endowment for the Humanities, she organized an annual symposium for the Jewish American and Holocaust Literature Association from 1986 through 2011.

Professor Cronin has published extensively in the fields of Jewish American, African American, and women's literatures and is the author or coauthor of 10 books. Among other honors, she has received the Silver Key Award from the Jewish American and Holocaust Literature Association, the Service Award of the American Literature Association, and the Pozner Bibliography Prize of the Jewish Library Association.

Professor Cronin has a long-standing record of outreach efforts to local schools, women's groups, book clubs, and libraries—and has been especially influential in educating these groups about the Holocaust and Holocaust literature. She has organized and facilitated inter-campus events involving Brigham Young University, the University of Utah, Weber State University, and Utah Valley University. She has served as contributor/lecturer/consultant to the BYU Museum of Art, BYU Women's Studies, the BYU American Studies program, and other campus bodies; and she is a presenter at The Big Read program sponsored by the Orem Public Library.



## 2013 BEST PAPER AWARDS

### Biology

#### **Determination of Microbial Populations in a Synthetic Turf System**

Jason J. Bass, David W. Hintze, Craig J. Oberg, Karen Nakaoka, and Joel A. Bass

*Weber State University*

### Business

#### **An Unpopular Proposal that Won't Go Away: A Case for a National Sales Tax**

Ronald Mano

*Westminster College*

### Education

#### **Addressing the Effectiveness of the Research Experiences for Undergraduates at BYU**

Henry Jimenez, Laura Snelson, and Steve Turley

*Utah Valley University*

### Letters—Foreign Language, Humanities and Philosophy

#### **The Poetic Imperative: The Humanities, Spanish Poetry, and Pedagogies of Hope**

David Richter

*Utah State University*

Letters—Literature

**Look Who’s Talking: Exploring Conference Interactions and Subsequent Revision**

Christopher Lee, Angie Carter, DeAnna Ashworth, Ryan Krage  
*Utah Valley University*

Social Science

**“In the World, but Not of the World”: The Paradox of Plastic Surgery among Latter-day Saint Women in Utah**

Joylin Namie  
*Utah Valley University*

# Determination of Microbial Populations in a Synthetic Turf System

Jason J. Bass, David W. Hintze, Craig J. Oberg, Karen Nakaoka, and Joel A. Bass  
*Weber State University*

## Abstract

*There is growing concern regarding the contribution of infilled turf fields on athlete infections. Abrasions that occur on these fields create a port of entry for pathogens such as Staphylococcus aureus that are present on the athlete's skin or possibly on the field's surface. This study compares the occurrence of microbial populations on two infilled synthetic turf fields (year-old turf vs. 6-year-old turf) in three locations. Both fields were sampled once a week for at least 14 weeks (exact number varied on field and location) during the late summer and fall of a football season. Sites sampled included the sidelines, the middle of each field, and the end of each field. Tryptic soy agar was used to determine total microbial load, mannitol salt agar (MSA) for Staphylococcus, and Eosin methylene blue agar to count the number of enteric organisms such as Escherichia coli. Much higher microbial populations were found on the older turf field, with as much as a  $10^4$  increase over similar locations on the newer turf. This suggests microbial populations can accumulate in synthetic turf infill from year to year. When comparing the bacterial load on different areas of the field, the sideline*

had the highest counts with an average of  $1.12 \times 10^8$  colony-forming units (CFUs) per gram of rubber infill on the older field. On the new synthetic turf, the area with the highest number of total microorganisms was also the sideline, with an average of  $2.5 \times 10^5$  CFUs per gram of infill. A high number of salt-tolerant bacteria were able to grow on MSA, indicating possible staphylococci, with an average of  $2.77 \times 10^2$  CFUs per gram on the new field and  $6.58 \times 10^3$  CFUs per gram on the older field. These results indicate that infill material can serve as a source for the spread of pathogens among student athletes and that these organisms seem to accumulate over time posing a greater risk if proper turf cleaning is not regularly performed.

## Introduction

There is growing concern regarding the contribution of infilled turf fields to athlete infections. The overall spread of *Staphylococcus*, respiratory infections, and enteric infections has steadily increased over time, including in athletic settings (Cohen, 2005; Kirkland and Adams, 2008). Sport-related skin infections have gained national attention and generated public interest, with many athletes and teams reporting increased incidents of skin and soft tissue infections (Cohen, 2008; Kazakova et al., 2005; Nguyen et al., 2005). These findings have provided impetus for more research on the source of such infections, particularly in athletic settings. Athletes participating in contact sports have a higher risk of acquiring methicillin-resistant *Staphylococcus aureus* (MRSA) and other pathogenic bacteria, and football players have been shown to carry *S. aureus* more frequently than control groups (Oller et al., 2010). One important risk factor that may lead to increased infections for football players is the large number of abrasions they receive while practicing and playing on synthetic turf fields. Vidair (2010) showed that the rate of skin abrasions due to contact with the turf was two- to threefold higher for college soccer players competing on synthetic turf compared with those competing on natural turf. While the seriousness of individual skin abrasions was similar on the two surfaces, the higher skin abrasion rate increases the risk of skin infections in athletes using synthetic turf relative to natural turf (Vidair, 2010). These injuries, even if they appear insignificant, create a portal of entry for pathogens such as *S. aureus* (Begier et al., 2004).

Synthetic turf is being used in more applications than ever before. One of the great appeals of synthetic turf is the fact that it never needs to be fertilized, mowed, or watered. Maintenance is not completely eliminated, but it is much simpler, less expensive, and less labor inten-

sive. This allows universities and other recreational facilities to save resources and increase revenue since they are decreasing maintenance costs. When Ohio State University announced the decision to switch to synthetic turf, they noted the primary reasons were increased practice and play frequency, the synthetic turf field's playability in various weather conditions, and the consistency of the artificial surface (York, 2012). While skin and soft tissue infections are spread in a variety of ways, this study focused on the microbial populations found within synthetic turf fields as a potential source of pathogens when skin abrasions serve as a portal of entry. With a new synthetic turf field being installed the previous year, the opportunity presented itself to compare the microbial populations between the new turf field and a six-year-old synthetic turf field on the same university campus in Ogden, Utah. More specifically, we investigated whether there were any differences in microbial populations between two separate synthetic turf fields in similar time periods and locations. This study provides insight into the existence of harmful bacteria on synthetic turf fields, the amount and kind of bacteria present on each field, the specific areas on turf fields in which they exist, and whether increased use of turf fields affects these microbial populations. Application of these findings could impact the frequency of cleaning of the infilled turf field to help prevent infection and provide a better understanding of the risks that athletes face when playing on synthetic turf fields.

## Materials and Methods

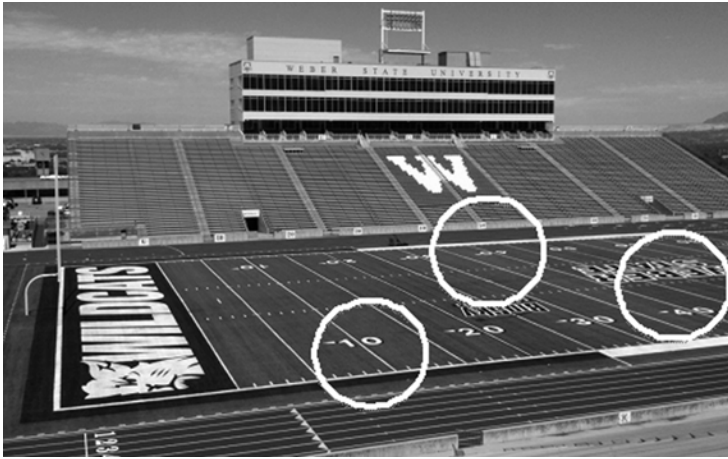
### *Synthetic turf field sampling*

Two infilled turf fields were sampled: a new synthetic turf field completed one year before this study and an older one, installed six years earlier (Table 1). Each of the synthetic turfs was made from a

<b>Table 1. Characterization of the two synthetic turf systems</b>				
<b>Age</b>	<b>Product</b>	<b>Infill Material</b>	<b>Pile Height</b>	<b>Pad</b>
New	Matrix-turf	SBR+Silica pea gravel	<b>57.15–63.5 mm</b>	<b>Ye s</b>
Old	Syn-Turf	SBR	~ 60 mm	No

SBR, styrene-butadiene rubber (crumb rubber)

monofilament polyethylene material. The rubber infill crumb was sampled from three locations on each field every one to two weeks for 4 months throughout the late summer and fall of the 2012 football season, with microbial enumeration done on three selective media. Sites sampled included the sideline (near the 50-yard line), the middle of the field, and the end of the field (Figure 1). These sites were sampled on both fields. Games are held on the new field, and both fields are used for practice primarily by the football team at Weber State University in Ogden, Utah. The two fields are located only 0.7 miles apart.



**Fig. 1.** Sample locations on new turf field (end, sideline, center). Sample locations are comparable on old turf field.

### *Microbiological enumeration*

Rubber infill was collected from each test site by using a sterile spatula to scoop infill material into a sterile Whirlpak bag. Ten grams of rubber infill was stomached in 90 ml of sterile phosphate buffer for four min at 260 rpm using a Stomacher 400 Circulator (Seward Laboratory Systems Inc., Bohema, NY) to homogenize the samples. Tryptic soy agar (TSA) (Hardy Diagnostics, Santa Maria, CA) was used to determine total microbial load, mannitol salt agar (MSA) (Becton, Dickinson, and Co., Sparks, MD) for *S. aureus*, and eosin methylene blue agar (EMB) (Hardy Diagnostics) for the number of coliforms such as *Escherichia coli*. After serial tenfold dilutions using sterile phosphate buffer as the diluent were done, spread plates were done on each media to enumerate samples. Samples of the old turf infill were plated on TSA, MSA, and EMB. All inoculated plates were incubated at 37°C for

48 hours and then colony-forming units (CFUs) were enumerated. EMB plates were incubated in gaspaks.

### *Confirmation of S. aureus isolates*

Potential *S. aureus* colonies found on the MSA plates were aseptically picked off and quadrant streak plated for the single colony isolation. *Staphylococcus aureus* was confirmed by the indication of mannitol fermentation on MSA, a positive coagulase test (Coagulase Plasma, Rabbit with EDTA; Becton, Dickinson, and Co., Sparks, MD) performed on a slide, and the observation of Gram-positive cocci using the Gram stain.

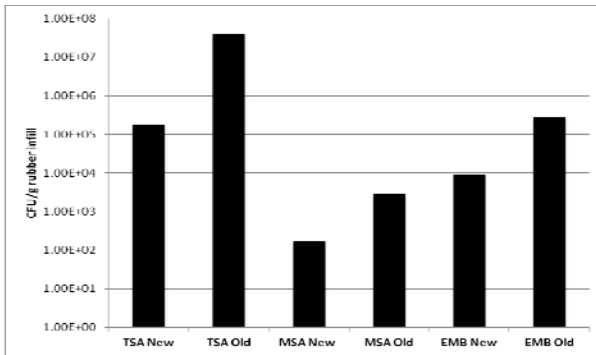
### *Statistical analysis*

A comparison was done between the two fields to determine differences between microbial loads. Means at each site were determined and compared both for each sample time and over the test period. GraphPad software was used to perform T tests, at the website: <http://www.graphpad.com/quickcalcs/ttest1.cfm>. A paired T test was performed using all of the collected microbial counts at each location. The old and new turf fields were compared by microbial load for each media in each location.

## **Results and Discussion**

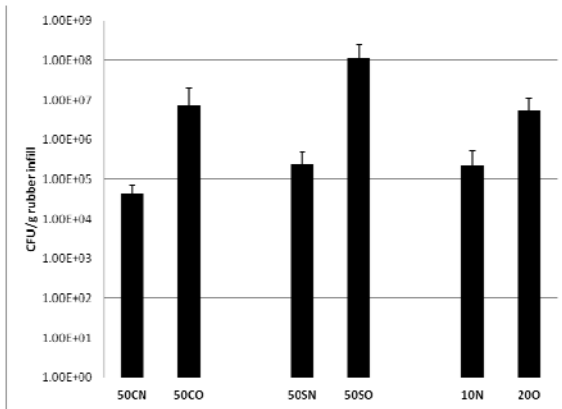
### *Total microbial loads: Old vs. new turf*

Higher microbial populations were found on the older turf field (as much as a  $10^4$  increase over similar locations on the new turf), as well as in areas of high traffic such as the sidelines (Figure 2). This suggests microbial populations can accumulate in synthetic turf infill from year to year. When comparing the microbial load on different areas of the field, the sideline on the older turf had the highest bacterial counts with an average of  $1.12 \times 10^8$  CFUs per gram of rubber infill on the older turf (Figure 3). On the new turf, the area with the highest number of total microorganisms was also the sideline, with an average of  $2.50 \times 10^5$  CFUs per gram of infill (Figure 3). A paired T test showed the differences between old and new turf total bacterial loads in each location were significant when comparing counts at the center ( $p=0.0337$ ), the sideline ( $p=0.0105$ ), and the end of the field ( $p=0.0041$ ) (Table 2).



**Figure 2.** Comparison of overall averages (combining all three test locations) for the three media: New vs Old Turf. Error Bars were not used because an overall average of each medium was plotted.

bacterial counts are comparable with the results by McNitt et al. (2008), who found up to  $8.0 \times 10^4$  CFU per gram of infill, and Vidair (2010), who found infill bacterial loads as high as  $5.3 \times 10^4$  CFU per gram. Both studies used much smaller sample sizes for analysis and agitated samples for a considerably shorter time period prior to dilution, which may have led to lower bacterial counts.



**Figure 3.** Total plate counts (TSA) on new and old turf. Numbers on the X axis represent the yard line on the field, C represents center, S represents sideline, and N and O represent new and old, respectively.



<b>Table 2. Paired T test showing a significant increase in bacterial load based on similar locations</b>						
<b>TSA</b>						
	<b>50CN</b>	<b>50CO</b>	<b>50SN</b>	<b>50SO</b>	<b>10N</b>	<b>20O</b>
<b>Mean</b>	$4.31 \times 10^4$	$7.60 \times 10^6$	$2.50 \times 10^5$	$1.12 \times 10^8$	$2.34 \times 10^5$	$5.48 \times 10^6$
<b>SD</b>	$2.79 \times 10^4$	$1.19 \times 10^7$	$2.37 \times 10^5$	$1.39 \times 10^8$	$3.16 \times 10^5$	$5.56 \times 10^6$
<b>SEM</b>	$6.97 \times 10^3$	$3.19 \times 10^6$	$5.76 \times 10^4$	$3.73 \times 10^7$	$7.66 \times 10^4$	$1.49 \times 10^6$
<b>N</b>	16	14	17	14	17	14
<b>P Value</b>	0.0337		0.0105		0.0041	
<b>MSA</b>						
	<b>50CN</b>	<b>50CO</b>	<b>50SN</b>	<b>50SO</b>	<b>10N</b>	<b>20O</b>
<b>Mean</b>	$5.94 \times 10^1$	$1.96 \times 10^2$	$2.77 \times 10^2$	$6.58 \times 10^3$	$1.80 \times 10^2$	$1.46 \times 10^3$
<b>SD</b>	$8.14 \times 10^1$	$4.94 \times 10^2$	$6.98 \times 10^2$	$7.66 \times 10^3$	$4.65 \times 10^2$	$3.36 \times 10^3$
<b>SEM</b>	$2.03 \times 10^1$	$1.32 \times 10^2$	$1.65 \times 10^2$	$2.05 \times 10^3$	$1.10 \times 10^2$	$8.99 \times 10^2$
<b>N</b>	16	14	18	14	18	14
<b>P Value</b>	0.2706		0.0101		0.1409	
<b>EMB</b>						
	<b>50CN</b>	<b>50CO</b>	<b>50SN</b>	<b>50SO</b>	<b>10N</b>	<b>20O</b>
<b>Mean</b>	$5.73 \times 10^3$	$3.65 \times 10^4$	$1.50 \times 10^4$	$7.51 \times 10^5$	$6.00 \times 10^3$	$5.01 \times 10^4$
<b>SD</b>	$1.14 \times 10^4$	$8.92 \times 10^4$	$3.24 \times 10^4$	$9.36 \times 10^5$	$1.41 \times 10^4$	$1.16 \times 10^5$
<b>SEM</b>	$2.86 \times 10^3$	$2.38 \times 10^4$	$7.64 \times 10^3$	$2.50 \times 10^5$	$3.33 \times 10^3$	$3.09 \times 10^4$
<b>N</b>	16	14	18	14	18	14
<b>P Value</b>	0.1846		0.0102		0.1614	

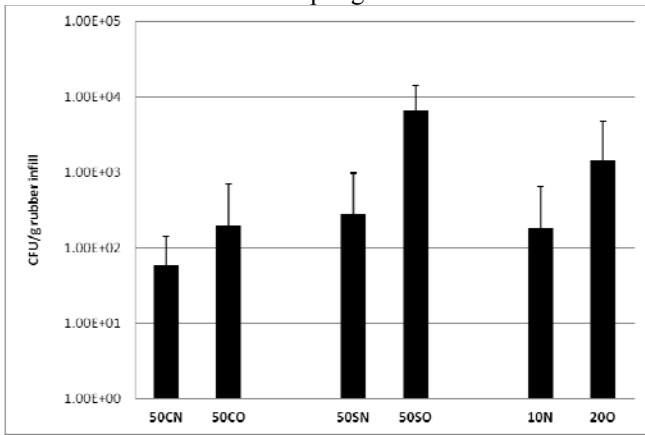
TSA, tryptic soy agar; MSA, mannitol salt agar; EMB, eosin methylene blue agar.

A significant increase was seen on all locations when using TSA. A significant increase was only seen on the sideline when using MSA and EMB. Numbers represent the yard

line on the field, C represents center, S represents sideline, and N and O represent new and old, respectively.

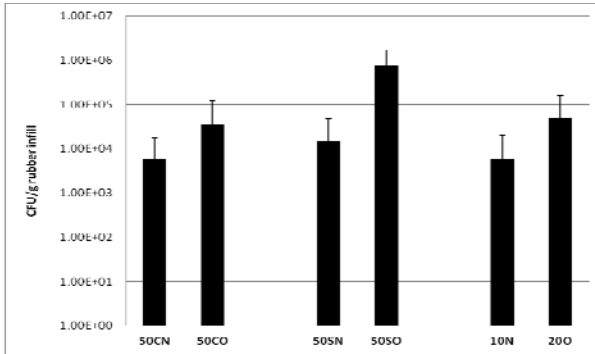
### *Bacterial loads using MSA and EMB*

Counts from the MSA plates revealed a relatively high number of mannitol-fermenting salt-tolerant bacteria, a possible indication of staphylococci, with an average of  $2.77 \times 10^2$  CFUs per gram of infill on the new turf and  $6.85 \times 10^3$  CFUs per gram of infill on the older



**Figure 4.** Staphylococcal counts (MSA): New vs Old Turf. Numbers represent the yard line on the field, C represents center, S represents sideline, and N and O represent new and old, respectively.

turf (Figure 4). The sideline was the only location that showed a significant difference between old and new turf when plating on MSA ( $p=0.0101$ ) (Table 2). McNitt et al. (2008) failed to isolate *S. aureus* from any samples of infill, while Vidair (2010) found presumptive *Staphylococcus* species in the infill from 2 of 30 synthetic field samples but did not speciate further nor confirm the initial isolations.



**Figure 5.** Enteric bacteria counts (EMB): New vs Old Turf. Numbers represent the yard line on the field, C represents center, S represents sideline, and N and O represent new and old, respectively.

A similar trend was noted when infill samples were plated on EMB agar from the two fields. Enteric bacterial counts were higher on the old turf than on the corresponding position of the new turf field (Figure 5). Similar to bacterial loads on MSA, the sideline was the only location to show a significant difference between old and new turf when the infill was plated on EMB ( $p=0.0102$ ) (Table 2).

## Discussion

These results indicate that infill material can serve as a potential source for the spread of bacterial pathogens among athletes and that these organisms seem to accumulate over time, posing a greater exposure risk if proper cleaning is not routinely performed. Specifically, areas with increased human traffic, especially the sidelines on both the old and new synthetic turf fields, had increased microbial loads when compared with less frequently used areas of the fields. During the fall football season, many of the athletes, coaches, and athletic staff are stationed on the sidelines. This leads us to believe that increased human traffic results in a higher microbial count, perhaps due to spitting, sweating, bleeding, drink water, sport drinks, etc. In addition, *S. aureus* was initially indicated to be present in situ on one of the synthetic turf fields, which is in contrast to another study where they could not find this pathogen on their synthetic turf samples (Serentis et al., 2011). This difference may be due to the use of a different selective media since Serentis et al. (2011) used Baird–Parker agar while we used MSA. The amount of infill turf sampled might also have affected the results. Serentis et al. (2011) sampled only 0.075 grams of infill

whereas we sampled 10 grams of infill each time. Another difference was their turf samples were collected in the summer while our samples were collected in the fall and early winter when field temperatures were lower and thus more conducive to survival of *S. aureus*. These observations also hold true for comparisons with the studies of synthetic turf done by McNitt et al. (2008) and Vidair (2010), both of which could not confirm *S. aureus* in their infill samples.

In addition to the artificial turf microbial results presented here, we propose that the athletes are also at risk while training indoors. In data not presented here, we found MRSA on shared athletic equipment. All of these data underscore the fact that collegiate athletes are at risk both on and off the field for exposure to potential pathogens.

This knowledge of the microbial load at specific sites on each turf field and their accumulation over time should assist with providing useful interventions by athletic trainers and other medical staff. As athletic medical personnel endeavor to prevent infections and help athletes heal in the quickest time possible, it would aid their cause to know where bacteria counts are highest so that they can provide each athlete with the safest environment possible (Kahanov, 2011). The limited scope of this current study and the paucity of studies by others on this topic illustrate the need for further research to ameliorate this expanding problem.

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# **Educating the Next Generation of Human Resource Management Practitioners—Benefits and Challenges of Using Experiential Methods in Collegial Human Resource Management Education**

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## **Abstract**

*Utah Valley University (UVU) states in its mission the call to educate its students via experiential education. The UVU faculty dedicated to revive business education with a focus on human resource management (HRM) at the Woodbury School of Business have developed a plan to follow the university's mission, build a sustainable support program with local companies, help students gain practical experiences that are easy to transfer to future work assignments, and make UVU the educator of choice in the region for HRM. This paper describes the suitability of HRM for experiential education, the anticipated advantages for HRM students and the local business community, the skills and knowledge HRM students are supposed to develop to generate a higher*

*readiness for full productivity of UVU HRM program graduates, and the rewards, satisfaction, and reputation for teachers and the university.*

Utah Valley University (UVU) is dedicated to create a learning environment for its students that allows an engaged and interactive acquisition of knowledge and skills, applicable to future job success. The faculty of the Woodbury School of Business (WSB), in particular those charged with teaching human resource management (HRM) and marketing, have developed a curriculum that stands true to UVU's mission, serves its business community, and builds a reputation for the WSB as an educator of choice for HRM students. This article outlines the suitability of HRM education in a community-engaged experiential learning pedagogy, what critical skill sets employers and the Society for Human Resource Management (SHRM) are expecting from college graduates with an HRM degree, what is currently delivered by degree-granting institutions of higher education in Utah, and the HRM program to be developed at UVU targeted to fill the existing gap.

### **Suitability of HRM Education in a Community-Engaged Experiential Learning Pedagogy**

UVU's mission challenges the university to be "a teaching institution which provides opportunity, promotes student success, and meets regional educational needs. UVU builds on a foundation of substantive scholarly and creative work to foster engaged learning. The university prepares professionally competent people of integrity who, as lifelong learners and leaders, serve as stewards of a globally interdependent community" (UVU, 2013a). In particular, the WSB vision is to be "a community-engaged school of business that integrates teaching and scholarship, we aspire to be a school of choice and a leader in student development, entrepreneurship, global involvement, and innovative teaching." (UVU, 2013b).

The mission and vision are in congruence with the definition of service learning formulated by the American Association for Higher Education, which states that experiential education "helps to promote both intellectual and civic engagement by linking the work students do in the classroom to real-world problems and real-world needs" (Kenworthy-U'Ren, 1999). Based on this agenda, HRM education founded in community-engaged experiential learning pedagogy is ideally suited to provide students with opportunities in which students gain practical experience. Business students need to find out what the nature of HRM



is and how it impacts the bottom line of organizations. Students engage in semester-long experiential education projects with local companies to gain a deeper understanding of current challenges HRM practitioners face daily. Service-learning projects give them a chance to experience the strategic centrality of HRM first hand. Experience-based student projects help the learner investigate various HRM core aspects. Students can deliver results of their projects to clients, which serve as triggers for brainstorming activities in HRM departments. The goal of strategic partnerships between UVU and regional companies is to build alliances to share the responsibility and leadership in developing the future workforce of the region and to educate the next generation of HR practitioners. This bond should convince businesses that UVU wants to support its community and be true to the mission of higher education. UVU shall strive to provide a quality education for the public good that assures students' civic development, workforce training, and educational success. UVU ought to help students develop knowledge and skills that transfer into their future employment quickly because students acquired them in experiential educational settings.

## **Employers' and the SHRM's Expectations for College Graduates with an HRM Degree**

Currently, the state of Utah has one of the nation's lowest unemployment rates at 5.2%, making the so-called "war for talent" a hard reality for many Utah businesses (Trendlines, 2012/2013). As a result of this development, HRM-related degrees are predicted to require a growth of 1.5–2% in the state of Utah (Trendlines, 2012). Nationwide, between 2004 and 2011, HR manager employment increased by 39.1%, with a particular jump from 2010 to 2011 of 8.3% (Bureau of Labor Statistics, 2012).

Parallel to the national and regional development, locally Tracee Comstock, Finance/HR Director at Five Star Auto Direct, stated in February 2013 in her email response to a request for feedback from regional professionals about employer expectations of HRM degree graduates: "We need an excellent HR degree in the state of Utah to attract new leaders to this great field of expertise." Similarly, Karlyn Norton, Director of Human Resources at Xactware, said that a highly useful degree needs to be based on community-engaged experiential learning for future HRM graduates (personal communication).

In addition to the needs of local employers, the global organization unifying more than 250,000 HR professionals, the Society for Human Resource Management (SHRM), has established educational expectations for HRM graduates. To certify college students graduating

with an HRM degree, SHRM has developed the Assurance of Learning Assessment. This test has four main goals:

1. to help universities meet their accrediting body's assurance of learning requirements by showing that the HR degree program teaches its students what it says it will teach them;
2. to show that the student has acquired the knowledge required to enter the HR profession at the entry level;
3. to provide HR students with an achievement, by passing an exit exam, to help them differentiate themselves in the job marketplace; and
4. to replace a student's eligibility to take the Professional in Human Resources (PHR) certification offered by the HR Certification Institute (SHRM, 2013).

Any degree program aspiring to serve its constituents in the most effective and efficient way needs to stand up to these market, employer, and SHRM expectations. The next section describes which HRM degree programs in Utah currently meet these aspirations.

## **Analysis of Current HRM Programs in Utah and the Intermountain West**

Presently, no specialized and comprehensive undergraduate HRM program exists in Utah or the greater Intermountain West region. Some universities, like the University of Utah, Southern Utah University, or Idaho State University, offer no HRM program at all. Other programs, like those at UVU and Weber State University, offer an HRM emphasis. Utah State University offers an undergraduate minor HRM degree and their nationally recognized Master of Science in HRM. Brigham Young University offers an undergraduate degree that mixes HRM with Organizational Behavior (OB); yet, the program is mostly focused on OB and has little HRM specialization. Currently, students intending to serve Utah businesses in an HRM role are severely underserved by universities in Utah and the Intermountain West region.

## **UVU HRM Program Built on Experiential Learning Principle Filling the Gap to Meet Employers' and SHRM Expectations**

The gap between the market, employer, and SHRM demands and current HRM degree offerings in Utah and the Intermountain West re-

gion leaves students intending to serve Utah businesses in an HRM role in a vulnerable position. Our students and the business community need a first-class HRM education in the state of Utah. Institutions of higher education in Utah need to prepare students to enter the professional world and become productive sooner. A degree program offering multiple service-learning projects with real-world clients is desperately needed.

As a result of this state of HRM education in Utah, the management faculty at UVU has proposed an HRM program that addresses this issue. By 2015, UVU hopes to offer a specialized and comprehensive Bachelor of Science HRM degree curriculum consisting of 40 credits (ten courses, plus one capstone simulation/senior thesis credit, six HRM-related elective credits, and three HRM internship credits). The program will contain classes in employment law, organizational development, HRM information systems, training, total compensation, strategic staffing and performance management, international HRM, and strategic HRM. To enhance the service-learning emphasis of the program, students will complete the degree in a cohort program, allowing seven of the ten HRM courses to be conducted as service-learning classes in which students work with local/regional/global companies on a multitude of experiential projects. Additionally, all B.S. students will join the national and local SHRM chapters to have access to the knowledge base SHRM provides online and to connect with local HRM professionals.

In particular, the inclusion of courses in International Human Resource Management (IHRM) and Human Resource Information Systems (HRIS) would be unparalleled in their combination by any HRM program in Utah and the Intermountain West area. These two courses are of vital importance to the education of UVU graduates because 63% of respondents in a global study among top executives agreed that “HR functions are likely to become more globalized, centralized and uniform in the next three years, suggesting that HRM policy and strategy needs to grow globally” (Maurer, 2012). In the same study, the author noted “25% of respondents said that their HR departments effectively source key talent globally; 24% said HR effectively supports the company’s globalization strategies”. HRM graduates need to be prepared for this international HRM development. Of equal importance is a thorough training of students in HRM information systems. The same global study of executives found that

“the advent of data analytics—the most commonly cited area by respondents for IT investment in the next three years—will lead to the next technological quantum leap for HRM. [...] For

example, 57% of respondents said that data analytics is helping to identify future talent gaps already” (Maurer, 2012).”

Measurable objectives of the B.S. in HRM at UVU are:

1. Teach students to learn to listen and observe analytically, to think critically, and to generate solutions creatively,
2. Teach students to ask informed questions to analyze real-world organization’s HRM practices,
3. Teach students to communicate recommended solutions to real-world HRM problems in organizations orally and in writing in appropriate business fashion,
4. Teach students to understand the impact of the legal environment on a business organization’s HRM practices, and
5. Develop the skills in students necessary for effectively and efficiently aiding organizations as a value-adding business partner in their quest for excellence.

UVU and the WSB have already identified community partners willing to open their doors to students and offer them opportunities to learn first hand what it means to work in the field of HRM. The following companies and local organizations have already offered experiential education projects to UVU students: Zions Bank, Xactware Inc., Sundance Resort, 1-800-CONTACTS, Aribex Inc., Big Brothers Big Sisters of Utah, Planned Parenthood of Utah, Habitat for Humanity of Utah County, American Red Cross of Utah, and Orem City.

After finishing UVU’s HRM degree program, students are well-prepared to take the Assurance of Learning Assessment from SHRM and have contacts in the professional Provo and Salt Lake City SHRM chapters and beyond. UVU students will be the best-prepared HRM graduates in Utah, represent UVU in the community with excellence, and help build an alumni network for future HRM student generations. All of the main stakeholders—students, community partners, and UVU/WSB—have significant benefits from the institution of such a comprehensive HRM degree curriculum:

### *Advantages for HRM students*

- Students get a real education, not just a degree
- Students develop transferable skills and a wide-ranging knowledge base making them more employable and competitive
- Students acquire a higher readiness for full productivity

- Students learn to build cooperative relationships across organization to break out of artificial silos
- Students develop a greater understanding of HRM contributions to organizational bottom lines.
- Students cultivate contacts with HRM practitioners in local businesses, increasing their chances to find internships and employment after graduation.

### *Advantages for Utah community partners*

- Community partners save staff time that might otherwise be occupied with administrative duties and putting out fires, resulting in a lack of time to strategize.
- Community partners receive help via experience-based student projects investigating aspects HRM practitioners normally do not have time to research.
- Community partners receive meaningful and value-adding results from students' projects, which serve as solutions for current problems or triggers for brainstorming.
- Community partners receive student consulting projects free of charge.
- Community partners see the next generation of HRM practitioners before they graduate, allowing them to recruit and hire the best and brightest before the competition can

### *Advantages for UVU/WSB*

- UVU/WSB educate the next generation of HRM practitioners, helping to build strong community ties with future HRM leaders to build a sustainable experiential education program
- UVU/WSB build alliances to share the responsibility and leadership in developing the future workforce of the region
- UVU/WSB develop students who get more than a degree, giving students a quality education, serving the public good, and assuring students' civic development, workforce training, as well as educational and professional success
- UVU/WSB develop a reputation as the educator of choice in the region for students interested in an HRM career

Of course, the proposed HRM curriculum is not the panacea for all experiential education problems HRM programs face. Several challenges exist, such as (to name only a few):

- Finding the faculty members qualified and willing to support such a work-intensive curriculum;
- Finding suitable community partners willing to offer challenging, rewarding, and manageable projects to students;
- Recruiting students into this program who have the personal and business maturity to represent UVU in the community with respect and dignity, are capable to learn from faculty and professionals alike, and are willing to engage in the hard work needed to complete high-profile community-based service-learning projects; and
- Delivering measurable value in student projects to participating community partners.

A communal effort between UVU/WSB, its faculty members, the community partners, and the students is necessary to fill this program with life, make it work, allow it to succeed through trials and errors, and serve the greater Utah community to the best of its capacity.

## **Proposed Future Research**

Despite the efforts of the authors to prepare the B.S. of HRM curriculum for implementation, much research needs to be conducted to point the focus on a number of issues:

First, customer satisfaction scores and feedback from clients ought to be collected via empirical studies to validate that students, client organizations, instructors, and UVU have directed their efforts toward fulfilling the mission and vision statements and obligations to tax payers. In addition, follow-up work with community clients determining whether student projects have actually created value for participating companies should be executed in an effort to provide each constituent with valuable feedback and suggestions for continuous improvement.

Second, empirical evidence is necessary to find out whether students participating in experiential education projects hit the road running after graduation. The benefit of service-learning projects for HRM graduates taking their experiential education into practice is still not verified. An empirical study collecting scores from students about feelings of readiness, ease of transition, transferability of experiences, and other factors ought to be conducted.

Third, to customize future teaching methods, an analysis of potential differences in community client expectations and educational approaches in service-learning projects between not-for-profit, government organizations, and corporate partners is necessary.

Last, the social responsibility and sustainability of service-learning approaches in student consulting projects needs to be investigated.

## **Conclusions**

Utah Valley University and its Woodbury School of Business have a mission and vision challenging them to develop civically engaged, competent, and upright business professionals via engaged learning opportunities. Currently, neither UVU nor any other university in Utah or the greater Intermountain West region provides that kind of learning environment for students interested in a career in HRM. A significant gap exists between employer and market expectations, SHRM requirements for HRM graduates, and educational opportunities in Utah.

Faculty at the WSB have developed a comprehensive and specialized HRM curriculum based on experiential education principles to address this shortcoming. If implemented, this degree program offers multiple benefits to all stakeholders involved: the students, the community partners, and the university. As a result, UVU and the WSB should be voluntarily recommended by local and regional organizational leaders as the educational institution of choice because students will receive a rich educational experience that enhances students' knowledge and skill base that broadens students' horizons and helps future employers and the greater Utah community.

This program would go beyond previously established borderlines of higher education. The integration of students into the solution-building process with local business partners allows the community to embrace UVU and its students because they add true value to this community. By cooperating with UVU students, local businesses make an investment into the future workforce of this region as a strategic talent management step. It allows community partners to secure the most talented HRM recruits for their companies and propel their organizations and the greater Utah business area to even greater success and prosperity.

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# **An Unpopular Proposal That Won't Go Away: A Case for a National Sales Tax**

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## **Abstract**

*Twenty-five years ago, Ronald Mano suggested that the federal income tax be replaced with a national sales tax. That proposal has received increasing support from various contingencies over the intervening years, including by some of the candidates for President in the last election. This article examines some of the issues relating to the adoption of a national sales tax and particularly the benefits that would derive to the U.S. economy if such a system were adopted in place of the current onerous income tax system. Particular emphasis is placed on the significant burden that would be taken from the American citizen if*

*such a system were adopted in place of the current one. This article promotes the position of Thomas Hobbes who argued “that people should be taxed for what they take out of the ‘common pot,’ not what they put in it.”*

Over 26 years ago, in 1986, Mano published an article titled, “An Unpopular Tax Proposal,” in the journal *Management Accounting* that recommended replacing the income tax with a sales tax. It seems that just like bow ties and skinny pants, this “unpopular” idea has now found a growing fan base. At the state level in 2013 alone, Louisiana, Nebraska, and Kansas governors have all proposed replacing the state income tax revenue with sales tax (Deluc, 2013). It appears there are now many supporters for what is now called by its supporters, “The Fair Tax.”

Things move from unpopular to popular because either the functionality of the item improves or the needs and wants of the users change. In this case, we suggest that the following items in a changing landscape have caused many people to reassess the relative benefits of the sales tax.

1. The macro-economic impact of the sales tax is argued to have favorable benefits versus the income tax for long-term growth. Current slow macro-economic growth and employment levels are an increasing problem.
2. The fairness of our current system is questioned in terms of level and breadth of participation.
3. The administrative, legislative, and tax shelter problems with our current income tax system have placed us on a path that is not sustainable.
4. Compliance with the current system continues to become more and more burdensome.

The growth of support for a national sales tax can be easily seen. In 1994, a group of Houston businessmen established Americans for Fair Tax as an advocacy group dedicated to replacing the national income tax with a sales tax and pushing the name “fair tax” as a term for sales tax.

- *The Fair Tax Book* has been on the New York Times Best Seller List.

- In every Congress since 1999, a sales tax bill has been introduced with growth in co-sponsorship, although the bills have not made it out of committee.

Congress	106	107	<b>108</b>	109	110	111	112
Years	1999-2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2011-2012
Sponsors	8	8	56	63	78	72	80

Source: [www.govtrac.us](http://www.govtrac.us)

- In 2008, Mike Huckabee made the "fair tax" part of his presidential campaign, and in 2012, candidates Herman Cain and Gary Johnson voiced support for the "fair tax."

Clearly, there has been growing support for the idea of a national sales tax.

## Economic Impact

When we tax something, we penalize it and discourage it. When we tax income or consumption, we depress it. So the question becomes, “what is the economic impact of depressing income versus depressing consumption?” This argument goes back to the 17<sup>th</sup> century, when Thomas Hobbes argued that people should be taxed for what they take out of the “common pot,” not what they put in it (Case, Fair, & Oster, 2012, p. 394). He argued that producing income and savings should be encouraged and that consumption, representing a reduction of the common pot, was the best tax base.

A second key negative for income tax is the impact on savings. In essence, taxing income also taxes savings, because savings comes from income. Irving Fisher argued as early as 1939 that income tax creates a double tax on savings (at the time the principal is earned and at the time a return is earned), thereby discouraging it (Fisher, 1939). Because almost all economic growth models are dependent on savings for capital investment, which drives growth, savings are seen by most economists today as a key to macroeconomic growth. Unfortunately, in the United States, we have averaged low to negative savings for many decades. Recently, the U.S. recorded the lowest savings rate in recorded history with an overall negative national savings. Is it any surprise that our national economy is not growing? In a simulation, Jokisch and Kotlikoff (2005) showed that the U.S. capital base would grow at twice the rate if savings were stimulated by having a consumption tax instead of

an income tax. For this reason, a group of more than 80 economists have cosigned a letter delivered to the U.S. Congress and the president endorsing a version of the sales tax (Bender, 2005).

## **Fairness**

The fairness of a tax system is usually measured by its equity over depth and breadth. A fair tax is usually thought of as a progressive tax, where individual cheating is minimal and everyone participates.

The income tax is not as progressive as we might think because of the many tax loopholes and special exceptions. In addition, the current payroll tax is very regressive and may need to be increased because it is no longer properly funding Social Security and Medicare to which it is dedicated. In contrast, the sales tax proposals that have been floated can be made quite progressive by giving pre-bates and exempting certain basic items (food).

This progressiveness is enriched because consumption comes from wealth as well as income. Apparently, some wealthy individuals with low income and even some with high income currently pay little or no income taxes. In a recent tax case in Utah, the now-convicted individual was driving a bright yellow new Hummer; however, on his income tax return, he had taken an earned income credit. Whether that was an honest tax return or not, if we had a National Sales Tax instead of the income tax, he would have paid a sizable tax when he purchased that bright yellow Hummer. A consumption or sales tax would include these individuals, and they would begin to pay their fair share of taxes based on consumption. If the tax burden were placed at the point of consumption, the only way the wealthy or large corporations would be able to avoid the payment of taxes would be to avoid consuming. The more they consume, the more taxes they would be required to pay. Therefore, if they chose to commute in Porsches or Mercedes rather than subcompact cars, they would pay a higher tax.

Our present system encourages spending and taxes earnings. If someone consumes through borrowing and overborrows, there is no tax until they earn the money to pay back the borrowed funds. In fact, if the borrower were to go bankrupt and never repay the funds owed, he/she would never be taxed on those funds. How is this a fair contribution to society?

With income tax, unreported income is a major problem. Individuals who provide services, including beauticians, paper carriers, and waiters, have large amounts of income from gratuities; in addition, there are numerous workers who are paid in cash. If we tax on consumption, this type of income would be taxed as soon as it is spent. The

dishonest and illegal problem of failing to report income would be solved. Would the barter economy flourish as a tax avoidance mechanism? You would have to be naïve to think that it does not now flourish; however, consider the dentist who each evening after work has people arrive to place an addition on his home and later provides dental services to the construction crew. If this is strictly a barter situation, neither side reports income; however, if we had a national sales tax, at least the lumber for the addition and the supplies used by the dentist would be subject to taxation.

It is now widely published that almost 50% of our earners pay no income tax. Are we tipping toward a society where a majority of our population votes themselves benefits extracted from the minority? Beside the perception problems, could this be a violation of the equal protection clause of the Constitution? In any public endeavor or social undertaking, all should participate at some level in the effort—otherwise it is not a true social undertaking but a project for the few.

These arguments suggest that a national sales tax could be constructed to be fairer in many ways than our current income tax system.

## **Administrative Problems**

Under the current income tax system, we are well on our way into an administrative and legislative black hole. We are clearly on an unsustainable path because of abusive tax shelters, administrative burdens, the quantity and inconsistency of laws, the social engineering using the tax code, and the lack of value added by the tax processing industry. Something needs to change: do we tinker around the edges or make a fundamental change?

Currently, only 20% of tax filers submit their own taxes without help (Mediamark Research & Intelligence, 2009). Why shouldn't a working man or woman be able to figure out his or her own taxes without professional help? Does the professional help add any value to society? The reality is that the tax code is 3 inches thick, accompanied by an 18-foot stack of regulations and explanations. It is updated every year with new laws and rulings.

Abusive tax shelters add no value and distract investment. Under a national sales tax, the only way to shelter income would be to not spend it. The only way to avoid taxes on an investment would be to make sure it was profitable and save the money rather than spend it. The only investments that would make sense would be those that have a viable business purpose, and abusive tax shelters would cease to exist.

Because of the need to encourage savings and investment, we currently have complex individual retirement accounts (IRAs) and pension

tax laws as well as the capital gains tax. These burdensome laws would not be needed; neither would we have the tremendous cost of administering IRA and pension laws. Many financial institutions profit from administration fees assessed to IRA and pension accounts—another large hidden burden with no value added.

Perhaps the most telling critic of the non-value added and administrative problem of our current tax system is a study by the Beacon Hill Institute in 2007. Tuerck, Bachman, and Sanchez-Penalver (2007) claim that the administrative burden of the fair tax proposal is \$346 billion less per year than our current tax system.

A quote from David Kendall, professor of economics and finance at the University of Virginia's College at Wise, sums up the way many Americans now feel: "Our federal income tax system is inefficient, far too costly, and simply not the best way to pay for government. I think all Americans are dismayed, outraged and disgusted that our federal tax code contains millions of eye-glazing words spread across more than 60,000 pages. We all know it's a disgrace, and we all know it must be changed (Bender, 2005)."

## **The Tax Preparation Business**

During the Great Depression, the Federal Government came up with a make-work program call the Civilian Conservation Corps (CCC). It was a program where unemployed citizens were put to work doing such things as building park benches and trails in national parks. It was a way to get some work accomplished but also to deal with the unemployment problem of the day.

We argue that the biggest make-work project ever created is the business of tax preparation. This is a profession where a large workforce is created to help people comply with a law that has been thrust upon them. This make-work project creates no food, no shelter, not even park benches. At least the CCC created some benches for people to enjoy in national parks. In the United States, there are more tax preparers (1.2 million) than there are law enforcement officers (765,000). We suggest that if the income tax were replaced with a National Sales Tax, no citizen would even be forced to submit another tax return. The profession of tax preparation would disappear. If we were to employ half of those people to dig a hole each morning and the other half to fill it each evening, and pay them exactly what they are receiving now, the country would be no worse off than it is today. If that large workforce were put to producing worthwhile goods or services, how much better off would our county be?

Now being accountants ourselves, we realize that this is not a popular proposal to our friends, colleagues and acquaintances who are in that profession. However, we do believe that mankind should be involved in productive efforts and we believe that the tax preparation is the most unproductive activity we have ever created. Let's replace it with a system that would increase the productive capacity of the United State of America.

## Conclusion

As seen, it can be argued that a national sales tax makes good sense economically, and that it can be structured to be a very fair tax, and that it will be much more efficient and less of a burden on society. As such, the idea is gaining traction and may eventually even become "popular." We are not arguing at this time for any of the specific proposals that have been floated as the national sales tax idea has gained popularity. These proposals are new, ideas are still being polished. Now is the time for all the ideas to be encouraged, developed, winnowed, and sharpened. It must be recognized, however, that we are going to be forced to make a change in our tax systems and these are strong arguments for a national sales tax replacing the income tax.

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# **A Curriculum Model for Teaching Network Administration**

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## **Abstract**

*This paper presents a unique model and course template for teaching a networking course for IS (Information Systems) majors. The IS 2010, OSRA/OEIS 2004, and ABET 2009–2010 curricula models are used for a basis for the course and its contents. We have found this course structure a very effective process for teaching critical networking and data communication concepts. Student feedback has also been the best the authors have seen. The basic concept starts with the hardware setup using removable hard drives for both servers and client workstations so each student can preserve exactly what was accomplished from their last lab. Virtualized access is also being implemented. A materials list with details about switches, routers, wireless components, wiring diagrams, and other needs are included. A series of 15 step-by-step labs, suggested textbooks, case studies, examinations, security suggestions, course structure with calendar, instructional strategies, and teaching suggestions are available upon request.*

## I. Introduction

Computer networks and the Internet have become the most critical infrastructure for information dissemination, business transactions, social networking, scientific computing, games, etc. Computer networking is woven into every corner of businesses, organizations, and our daily life. Thus, there is a pressing need to provide college students with a solid foundation of every aspect in computer networking. It is always challenging to teach a computer networking course with the proper mix of theory and hands-on instruction. Research on the many different methods, tools, examples, labs, exercises, techniques, motivational suggestions, and uses of hardware and software have been published, yielding an increasing literature and support materials for both theory and hands-on computer networking courses.

This continuous discussion of how to teach the subject in the most effective method is both promising and productive. Since a plethora of research has been published on this topic, it is our attempt in this paper to consolidate the research done by other authors and then to incorporate successful ideas presented by others, adding some of our own, and presenting it a logical step-by-step format that can be used as a template, a checklist in creating a course, or as comparison of an existing networking course.

Our research did not find a similar paper presenting this type of meta-analysis implementing the concepts researched by the authors during the past 10 years. In addition, we have included the two predominate curriculum models (IS 2010 ACH/ACM and OSRA/OEIS 2004 Model Curricula) listing networking topics and learning objectives. Our objective is to provide instructors a template for teaching a comprehensive networking course that will meet the objectives of the curriculum models and give students a solid foundation of networking principles. Depending on the university's resources and instructor and student preferences, this template can also be modified to suit the desired learning outcomes.

## II. Literature Review

Many journal articles about networking courses have been published in the past few years. One of our goals is to provide a meta-analysis of methods of teaching networking methods. For example, Sarkar (2006) lists some practical laboratory exercises (practicums) and other materials. Sarkar emphasizes that practical experience with server hardware and software is crucial to effective student learning. The effectiveness of those practicums was evaluated when we set up our networking course. Course contents and lab layout (with removable hard

disk drives) are provided in this paper. Although other instructors may be using removable hard disk drives, this was the only paper we found that mentioned them. This is a cornerstone in our method of teaching networking courses. At the beginning of each semester, each student checks out as many removable hard drives as necessary to set up a small network with a server and several client computers. At the end of each class, students shut their computers down, remove their hard drives, and place them in small individual lockers provided in the lab. This enables students to resume their work exactly where they left off in the previous class, being assured that no one has changed any settings or data.

Another critical component used in our networking courses is to be isolated from the campus network to allow experimentation with administrative access in client workstations, servers with IIS (Internet Information Services), DHCP (Dynamic Host Configuration Protocol), DNS (Domain Name System), applications, and user accounts without compromising campus network security. Cigas (2003) mentioned that physical access is required to have direct control over the actual hardware and software. Research shows this is the predominant method presently used by instructors. In addition, having all 32 workstations and 8 file servers connected via 8 switches down the center aisle in the lab as one network provides students with this experience. Then, by using a different combination of wires in the 8 switches in the lab, the instructor can have 1, 2, 4, or 8 servers and 32, 16, 8, or 4 clients. Later in this paper, we also describe how virtualization can be used in several ways, including setting up several virtual servers on one box and/or virtualized servers in the cloud. Armitage et al. (2007) described a remotely accessible sandboxed environment with application to a laboratory course in networking. They discussed the clustering–virtualization technologies synergy and showcased some of the pedagogical benefits by detailing existing laboratories. In other studies, Nakagawa et al. (2003), Galan et al. (2004), and Keller and Naues (2006) described the use of virtualization tools in computer network laboratories. Nakagawa et al. introduced the use of VMware on a host machine. Galan et al. described and analyzed how a free-software tool named VNUML (Virtual Network User Mode Linux) is being used to enhance and simplify the management of an existing computer network laboratory. Keller and Naues designed an internet-based laboratory. Sloan (2002) showed a remotely accessible networking laboratory. By supplying remote access, the laboratory provides an authentic laboratory experience, gives greater access to the equipment, and opens the laboratory to asynchronous and distance education uses. In addition, the newly released Windows Server 2012 has even greater virtualization and cloud capability.

This approach also allows remote setup, managing, and monitoring the servers; however, this adds a complexity to the course and limits the isolation advantages of creating an independent closed environment network. Depending on the objective of the course(s), this may be something that is just explained in theory, demonstrated by the instructor, or actually completed by students during a lab.

Richards and Waisbrot (2002) illustrated network concepts using wireless handheld devices. The handheld devices can be used to supplement existing networking courses or as the core of a new higher-level course. Chang (2004) described an “experiential” learning approach to teaching a foundational course on computer networking and assessing its effectiveness. It identifies learning and teaching difficulties and the contents of Chang’s labs. It also presents the students’ feedbacks. Stockman and Nyland (2010) focused on the proper mix between theoretical understanding and hands-on technology in the networking/system administration courses taught freshman through senior years. A pedagogical method has been laid out mapping Bloom’s taxonomy (Bloom et al. 1956) (cognitive domain) to the mix of theory versus hands-on for networking/systems courses within and informational technology undergraduate curriculum. We took all these resources and included the concepts in our template.

Cross (2010) discussed a four-week data communications protocol assignment, and Tan and Venables (2010) showed how to redesign a network and systems computing curriculum to fit the needs of various stakeholders. They also incorporated the industry-based certifications to the curriculum. While this can be a worthy goal, we chose not to include the actual certification process but do encourage interested students to complete vendor certifications after taking our course.

Greca et al. (2004) introduced a set of laboratory experiments developed for a senior-level data communication course. The experiments are shown in detail, and students’ performances are discussed. Greca et al. also mentioned that it is difficult to learn computer networking on real operating networks without risks. This is one reason we are able to isolate the lab network(s) from the rest of the campus by unplugging the outside line from the first switch in the center row.

### **III. Model Curricula**

Our model is based on two standardized models: (1) IS 2010 Model Curriculum, which is a joint curriculum of ACM (Association for Computing Machinery) and AIS (Association for Information Systems) entitled Guidelines for Undergraduate Degree Programs in Information Systems and (2) OSRA’s (Organizational Systems Research

Association) OEIS (Organizational & End-user Information Systems) Curriculum Model (2004). Summaries of those course descriptions are excerpted below.

IS 2010.5 uses **IT Infrastructure** as the Core Course. OSRA/OEIS has two model curricula that are related to our course, OEIS 5: “**Telecommunications & Networking Foundations**,” and OEIS 10: “**Network Administration**.” OEIS 5 provides foundation information and skills relating to telecommunications and networking in the business environment. OEIS 10 is designed to develop senior-level OEIS students’ advanced network administration skills. The learning objectives of IS 2010 and ORSA/OEIS 2004 are summarized in Table 1.

<b>Table 1. Summary of IS 2010 and ORSA/OEIS 2004 Model Curriculum Course Contents and Learning Objectives</b>		
	<b>Network Topics</b>	<b>Learning Objectives</b>
<b>IS 2010</b>	<ul style="list-style-type: none"> <li>-Types of networks</li> <li>-Core network components</li> <li>-TCP/IP model</li> <li>-Physical layer: wired and wireless connectivity</li> <li>-Data link layer: Ethernet</li> <li>-Network layer: IP, IP addressing and routing</li> <li>-Transport layer: TCP</li> <li>-Application layer: core Internet application protocols</li> <li>-Network security and security devices</li> <li>-The Internet as a key networking platform</li> <li>-Network device configuration</li> <li>-Organizing storage on organizational networks</li> </ul>	<ul style="list-style-type: none"> <li>-Understand the principles underlying layered systems architectures and their application to both computers and networks.</li> <li>-Understand the differences and similarities between the core elements of an IT infrastructure solution, such as clients, servers, network devices, wired and wireless network links, systems software, and specialized security devices.</li> <li>-Understand how IT infrastructure components are organized into infrastructure solutions in different organizational environments.</li> <li>-Understand the principles underlying service virtualization.</li> <li>-Understand through practical examples how</li> </ul>

		<p>protocols are used to enable communication between computing devices connected to each other.</p> <p>-Configure an IT infrastructure solution for a small organization, including a network based on standard technology components, servers, security devices, and several different types of computing clients.</p> <p>-Apply the core concepts underlying IP networks to solve simple network design problems, including IP subnetting.</p>
<p><b>ORSA/ OEIS 2004</b></p>	<p>-OEIS 5</p> <p>-Conceptual information</p> <p>-Telecommunication applications</p> <p>-Networking fundamentals</p> <p>-Use of Internet/intranets</p> <p>-Management issues and practical applications</p> <p>-OEIS 10</p> <p>-Both client and server applications will be dealt with</p> <p>-Strong emphasis will be placed on network operating system software</p> <p>-The students will also be exposed to multi-vendor networking topics and specific course topics will include:</p> <p>--Setting up and configuring a Working Web Server</p> <p>--Web Site Security, SLL, DNS (Domain Name System)</p>	<p>-Install Server Operating Systems.</p> <p>-Install, configure, and troubleshoot access to resources.</p> <p>-Configure and troubleshoot hardware devices and drivers.</p> <p>-Manage, monitor, and optimize system performance, reliability, and availability.</p> <p>-Manage, configure, and troubleshoot network connections.</p> <p>-Implement, monitor, and troubleshoot security.</p> <p>-Develop a working vocabulary of technical terms in networking.</p> <p>-Identify advanced networking components.</p> <p>-Configure advanced networking components.</p>

	--DHCP (Dynamic Host Configuration Protocol) --WINS (Windows Internet Naming Service) --Remote Access, IP (Internet Protocol) Routing --IP Security, NAT(Network Address Translators) --Other core networking/ internetwork applications.	-Apply SSL security services. -Establish and configure an Internet Information Server (IIS) web server. -Be able to configure multiple “virtual” web servers on one ISS system. -Articulate how other Internet services interact with a web server (such as DNS) -Install and configure DNS. -Install and configure DHCP and WINS. -Establish a working FTP site. -Install and configure necessary server extensions for web page software.
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Our template includes all items in the IS 2010 and OEIS 2004 model curricula.

## Course Objectives

The objective of this course is to provide a basic understanding of the technical and management aspects of business data communications and networking. By the end of the course, students should be able to:

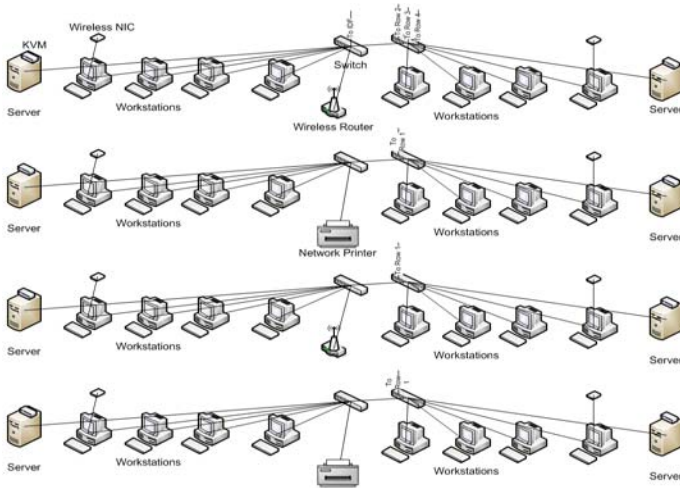
1. Explain how networks such as the Internet move messages from one computer to another through the different hardware and software components
2. Explain LAN standards, acquisition, and WAN carrier services
3. Design networks using a variety of LAN, backbone and WAN technologies and components
4. Install, configure, and manage commonly used network software
5. Demonstrate they have practical experience with inter-networking
6. Demonstrate in-depth knowledge of networking and telecommunications fundamentals including LANs (Local

Area Networks), MANs (Metropolitan Area Networks), WANs (Wide Area Networks), intranets, the Internet and WWW (World Wide Web).

#### IV. Infrastructures of the Networking Lab

There are three labs with a setup that consists of small individual lockers in the back of the room, an instructor's station with a computer, DVD, document camera, overhead projector, SmartBoard, plugin capacity to connect a laptop audio and video to the overhead projector or any client or server in the room to the projector. These are especially useful if a student or a team has a problem—the instructor can let the entire class view the server on the overhead projector to have the class as a whole solve the problem or simply demonstrate how to fix the error.

The labs have 32 client workstations each with an internal hard drive and a removal hard drive. Eight servers with removable hard drives (one at the end of each row) and two switches are placed in the middle of each row with a printer for each lab (Figures 1 and 2).



**Figure 1.** Computer networking lab layout.





**Figure 2.** Routers

Wireless routers and transmitters are checked out from the instructor. A single master UTP (unshielded twisted pair) wire unplugs the lab from the campus network. By plugging and unplugging wires in the switches, the lab can be set up as a combination of networks using the 32 clients and 8 servers divided in many, many combinations as illustrated in Table 2. This adjustable configuration also allows students to practice network security of their network in a safe isolated lab environment.

<b>Table 2. Possible classroom setups</b>	
<b>Servers &amp; Clients</b>	<b>Clients &amp; Servers</b>
1 network with 8 servers and 32 clients	2 networks, each with 4 servers and 16 clients
3 networks, each with 2 or 3 servers and 10 or 11 clients	4 networks, each with 2 servers and 8 clients
5 networks, each with 1 or 2 servers and 6 or 7 clients	6 networks, each with 1 or 2 servers and 5 or 6 clients
7 networks, each with 1 or 2 servers and 4 or 5 clients	8 networks, each with 1 server and 4 clients

## V. Networking Labs

The network should be a stand-alone network, not connected to the campus network or other student networks in the lab. This can be done by checking the connectivity on the switches in the lab and can be confirmed via a client computer searching for networks. This is true for most of the labs unless you are instructed to do otherwise.

### *Networking lab 1: Windows Server 2008 installation*

- Demonstrate a fresh installation of Windows Server 2008 x64 to the instructor.
- Delete any existing partitions and create a new NTFS Partition where to install Windows Server 2008.
- Open the Device Manager, and troubleshoot, install any missing drivers, and correct any problems.
- Open the Control Panel and verify the System Properties. Check that the computer name is unique on the network and the computer is set as a member of the workgroup. Make any appropriate changes.
- Configure automatic updates and update the server, check and adjust the virtual memory, performance settings, configure server as a member of a workgroup.
- Assign the server with a static IP address as either IPv4, IPv6, or both (<http://www.simplifiedns.com/private>).
- Setup a workstation to verify both server and workstation can be seen by each other. If troubleshooting is required, a list of hints is provided (like using the ping command).

### **Network lab 1 sign-off**

Demonstrates the correct installation of Windows Server 2008 using the team's prototype network. The demonstration includes:		
Show all workstations available in My Network Places.	Show Device Manager.	Show Virtual Memory settings.

### **Questions to think about and discuss**

What is the difference between NTFS Quick and NTFS when formatting partitions?	How do you know which licensing mode to choose?	Why is it important to have a unique name for each computer?
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Why is it important to look at the device manager?	How do you know if there are problems or not in device manager?	If there are problems when you look at device manager, how can you fix them?
What is virtual memory?	What is the recommended level to set the virtual memory at?	Where should the paging file be stored?

### *Networking lab 2: Establish domain and DHCP*

- Check the switch connectivity and static IP server address.
- Build a domain for the network project, adding server manager, roles, and Active Directory Domain Services (ADDS), and run dcpromo to create a new domain name and function levels. Various possible settings are discussed in class. Set paths for database, log files, etc. on another volume to help traffic flow are discussed in class.
- Configure Domain Host Control Protocol (DHCP) on the server including an appropriate subnet mask, default gateway, and lease settings. DHCPv6 is also configured.
- Configure DHCP client computers to obtain dynamic IP addresses from the DHCP server, and troubleshoot for any problems.

### **Networking lab 2 sign-off**

Demonstrate correct installation of the domain and DHCP services using team's prototype network. The demonstration will include:	IP Address pool and exclusions	Assigned IP addresses leases
DHCP configuration on workstations	IP and DNS addresses assigned to a workstation	Demonstrate that DNS is set-up to the instructor by showing the DNS Management tool on the server.

Demonstrate that DNS is working correctly on your network using the ping command and simple query as performed in step 7 above.		
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### Questions to think about and discuss

What is DHCP? How does it work?	When might you want to create a DHCP reservation?	What is DNS? How does it work?
Why might you want to keep your internal domain separate from your Internet domain?	Why might you want to change the lease duration for DHCP?	When might you want to configure a server to forward DNS queries?
What is a forward lookup zone?	What is a reverse lookup zone?	What is the <code>_msdcs.[your domain]</code> in the forward lookup zone?
Open the properties of the DNS forward lookup zone for your organization. Why is it important to allow only secure dynamic updates as shown on the General tab?	Right click on Forward Lookup Zones and click New Zone. What are the differences between a primary, secondary, and a stub zone?	Why does a recursive query (refer to step 7c) to other DNS servers fail on our network?
What is a name server?	What is a host?	What is the start of authority?

### *Networking lab 3: Users, groups, and file server management*

- Design a structure for network access by users via creating a fictitious company organized logically such as Accounting, Sales, etc. (as opposed to physical) in Organizational Units (OU).
- Create Active Directory user accounts (with user ID and passwords) and groups (within established Domains).
- Create folders to organize data on the second partition created in Lab 1. The “Auto apply template and create

quotas on existing and new subfolders” is checked, and the company folders are shared for each group data folder, with appropriate permission levels established.

### Network lab 3 sign-off

Show the groups and users created in Active Directory Users and Computers.
Draw a diagram showing a hierarchical organization of the users and groups using Visio, Excel, Word, or some other graphical software. All members of a team will use the same diagram. Submit this in WebCT/Blackboard.

### Questions to think about and discuss

Why might it be a good idea to create a standard for usernames? Are there any disadvantages to this?	What happens if you do not select a standard that will allow for unique names for every employee (e.g., Standard is first initial last name and have Sandra Harris and Shauna Harris both sharris)? What could you do about that?	Is there a better way to create users to help ensure all accounts for a given group are standardized and access levels are appropriate? What would you suggest?
What do you think is the most common request for any organization’s help desk? Show me how to take care of that request.	Can users belong to more than one group?	Why might it be a bad idea to give full control to the users in a group for file sharing?
Why is it a good idea to use quotas? When might it be a problem?		

### Networking lab 4: Share and NTFS permissions

- Test user login, access to group folders, and share rights by logging into a client computer and using My Computer

to verify the domain, server(s), and folder access (or denial if the User is not a member of the group).

- Submit a test plan and test results for user access to network folders similar to the ones below. The test plan includes test conditions and expected results with a minimum of 4 tests to show all possible access combinations. Test results and actual outcomes should also be shown. An example test sheet is shown below.

Logon ID	User is a Member of this Group	User is Attempting to Access this Group	Expected Result (Access/Deny)	Actual Result (Access/Deny)	Comments
Mharris	IT	IT	Access	Access	Worked as expected
Mharris	IT	Sales	Deny	Deny	Worked as expected
Jharris	Sales	IT	Deny	Access	Forgot to remove Everyone Group
Jharris	Sales	IT	Deny	Deny	Worked as expected
Jharris	Sales	Sales	Access	Access	Worked as expected

## NTFS Permissions

Logon ID	User Group and Folder Name	Share Perm. for Folder	File Name	NTFS Perm. for File	Result*		Comments
					Exp.	Act.	
Mharris	IT	Full Access	mharris.txt	only mharris Full Access	A	D	Denied whole group instead of denying users
Mharris	IT	Full Access	mharris.txt	only mharris Full Access	A	A	Worked as expected

Eharris	IT	Full Access	mharris. Txt	eharris Deny Access	D	D	Worked as expected
Mharris	IT	Full Access	eharris. Txt	mharris Read Only, eharris Full	RO	RO	Worked as expected
Jharris	Sales	Read Access	sales. txt	Sales Group Full Access	RO	RO	Worked as expected
Sharris	Sales	Full Access	jharris. txt	sharris Read Only jharris Full	RO	RO	Worked as expected

\*(Exp.) Expected; (Act) Actual; (A) Allow; (D) Deny; (RO) Read-Only

- Load data files in group folders, and then restrict access to the files to only certain members of the group. One or more members of the group will not be able to access the data files. Note: this is not the most efficient way to perform this task, but it helps students understand the differences between NTFS and share permissions. Load two or more files in each of the group folders.
- Write down the file names and which members of the group should be able to view the data.
- Assign NTFS permissions to files based on access restrictions; then assign NTFS permission to each file and test the permissions.
- Example of testing user logons and access to folders table: (Test access to each of the files by logging onto the domain as employees who should be able to access the file, and not access other files as illustrated below)

#### Network lab 4 sign-off

Demonstrate File Server Management with a user accessing a file	Shared folders and files	Open sessions
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Open files	Disk defrag status	Disk management: capacity and free space
Submit test plans and results to the instructor	Each student will demonstrate NTFS permissions for files in at least two folders, and submit a completed test plan. Test must include logons by users who can and cannot access the files.	Test must also include different combinations of Share vs. NTFS permissions.
Discuss the questions below with partner and then with instructor		

### Questions to think about and discuss

<p>Right click on the text file you created in the Group folder in step 7 and open the properties.</p> <p>Now Right click on one of the shared group folders, open the properties, and compare the tabs at the top to the text file property tabs. What is different? Why is that significant?</p>	What do the \$\$s mean after the share names in the Shares folder of the File Server Management Tool?	When might you need to disconnect an open file? What would happen on the user's side when you disconnected the file?
What additional options for control do NTFS Permissions that Share Permissions does not have?	On the company folder where everyone has access, why did we select the domain users group instead of everyone group?	Why might you want to use a combination of Share and NTFS Permissions?



<p>What would happen if you set an NTFS permission to deny for a group and full access to a particular user who belongs to that group?</p>	<p>If someone logs onto the server locally (rather than over the network) who does not have permission to access a folder, will they have access to the folders if only shared permissions are set? What about if NTFS permissions are set?</p>	<p>What is the difference between Contributor vs. Co-Owner?</p>
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### *Networking lab 5: Windows Deployment Service (WDS)*

- Open “Server Manager” and ensure you have Active Directory, DHCP, and DNS roles added to their Server.
- Install and configure Windows Deployment Services (WDS).
- Configure WDS for remote installation by editing the properties of your WDS Server and changing the network settings to obtain an IP address from DHCP. Edit any of the other settings in the various property tabs and add an unattended file (if you first create an appropriate xml or inf file). An unattended file is not necessary for the completion of this lab.
- Perform the remote installation.
- Start your client computer (note: you may have to change the boot sequence to perform a network boot first). When the client attempts to contact the server, go to the server, open the WDS snap-in, and select Pending Devices on your server. You should see the Request.
- Right click, and select name and approve. Type an appropriate name.
- Hit F12 for a network service boot when prompted on the client (if you are not fast enough, you will need to re-boot).
- Enter your username and password when prompt in the format of [your username]@[your domain].local or [your username]@[your domain].com
- Select the operating system you would like to install

- Follow the onscreen prompts similar to a typical installation (You can sign off this lab prior to the completion of the remote OS installation).

### Network lab 5 sign-off

Show the installed images and boot images in the Windows Deployment Services snap-in.

### Questions to think about and discuss

Why might Windows Deployment Services be useful?	What is the difference between the Respond only to Known Clients and the Respond to all Client Computers settings?
What must you have for a successful install using Respond only to Known Clients?	Is it possible to do an unattended install? How?

### *Networking lab 6: Exploring group policy*

- Create a new Group Policy (which will later be linked to a domain) using the Group Policy Management snap-in.
- Expand the forest, the domain(s), and Group Policy Objects (GPOs). Create a login script and other settings are executed. The process includes using the GPO editor and testing the settings.

### Network lab 6 sign-off

Show the GPO created with the settings described in the lab.

Demonstrate the user with the mapped drive and the user without the mapped drive.

### Questions to think about and discuss

Why is it good practice to not change the Default Domain Policy settings, but rather to create a new policy to apply to the domain?	Why might you want to backup your group policies before making changes? How do you backup a group policy?
Can you create a new Group Policy that is already linked to an OU without having to manually create it? How?	Are there any advantages to the longer method performed?

What other settings in Group Policy might you want to configure? (Answers may vary widely).	
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### *Networking lab 7: Network connectivity maps*

- Create two connectivity maps. MS Visio should be used to draw the maps.
- A campus network detailed connectivity map can be assigned: MAC and IP addresses should be included.

Lab workstations	Lab server	Lab switch(s)
Lab printer	Lab cabling	Central switches
Firewalls	Routers	Other known servers
T-1 Lines	T-3 Lines	Backbone
Optical fiber media	Internet	Etc.

### **Network lab 7 sign-off**

A map of the site campus network (LAN) in Visio.
A map of the whole campus network (WAN) in Visio.

### *Networking lab 8: Install IIS*

- Install IIS and FTP on their server, create a web page, copy it to the server, and assign the created web page to IIS. You can edit the bindings to set the IP Address to match the server's IP using port 80;
- Verify the web site is functioning properly
- Create an FTP site by creating a folder on a drive in the server setting the IP Address to match the server and leaving the default port to 21.

### **Networking lab 8 sign-off**

Demonstrate the configuration of the web server and FTP server
View a web site from a client computer
Use FTP to move files between client and server

**Questions to think about and discuss**

What are the dangers of using a single folder as both an FTP and web site?	What freedoms does step 7 allow us?
How secure is FTP even with passwords?	Is it good practice to install IIS on your domain controller like we did here? Why or why not?
What is the purpose of the Default Document file?	

*Networking lab 9: Remote desktop connection*

- Install desktop connections to remotely control the server from any computer that is attached to the network or Internet. This allows server administrators to make changes to server setting without touching the server its self. The main technology used to make this connection is the RDP client. Remote Desktop Protocol comes standard on all Windows XP, Vista, Windows 7, Windows Server 2003, and Windows 2008 operating systems. Earlier editions of Microsoft operating systems need to download and install the RDP client.
- Learn about connecting to a server with Mac OS, and that it only supports remote desktop connections via port 3389.

**Networking lab 9 sign-off**

Demonstrate a Remote Desktop Connection to the server from a workstation
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**Questions to think about and discuss**

How do you connect to a computer using Remote Desktop connections whose port has been changed from the default value?
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What are some of the reasons to change the default port?
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*Networking lab 10: Establish print server*

- Connect a printer to the switch in the lab and assign the printer a static IP address.

- Add the printer, driver, and security rights to the server, and print a test page.
- Setup access to the printer at each workstation by using the printer's IP address.

### Networking lab 10 sign-off

Demonstrate the print server configuration on the server.
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Print a document from a workstation on the network.
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If DHCP is used for the printer, show how to create a reservation for your printer.
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### Questions to think about and discuss

Why is it a good idea to either set a static IP address for your printer or create a DHCP reservation?
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Are there times you may want to change the security for a particular printer to something other than everyone?
--

### Networking lab 11: Backing up and restoring files

- Backup the server by using Windows Server Backup Tool. This tool is not a default installation, so you will need to install this add-on before performing a backup.
- Familiarize yourself with the many different options that can be used during the backup.

### Networking lab 11 sign-off

Demonstrate the restore operation of the Test folder using the Recover tool in Windows Server Backup.
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Demonstrate how to create a Backup Schedule using Windows Server Backup feature.
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### Questions to think about and discuss

What options did you select during the backup and why did you choose them?
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Can you think of a scenario when you might change your answers?
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### *Networking lab 12: Wireless network setup*

- Check out several wireless USB send/receive units and a wireless router from the instructor; reset the router; connect the router to a PC with an UTP cable. The router will assign the PC an IP address and can be confirmed by using the command prompt “ipconfig/all.” The IP address can be typed in Internet Explorer or any web browser. From the file server, the IP address of the router is changed to be in the network’s address range. This static IP address is entered in the server’s DNS.
- Configure the wireless router with security settings of WPA2, 128 bit encryption, passphrase, and MAC filtering. The frequency of the wireless router may need to be changed to avoid conflicting with others in the lab.
- PCs on the network (with a wireless send/receive device connected via a USB cable) connect to the wireless network. If the university has an existing wireless network within range of the lab, you may also try to connect to it.

#### **Networking lab 12 sign-off (from a wireless PC)**

Ping the server
Connect to the Domain
View company website
View user folders

#### **Questions to think about and discuss**

Are there any other configuration settings you would change?
Are there any disadvantages to the settings you selected in the lab above?

### *Networking lab 13: Apache server on Ubuntu 7.10*

- Disable DHCP and connect your network to the campus network so you have an Internet access.
- Boot a computer from your network to Linux and renew the IP address from the campus DHCP.
- Install Apache2 by opening “Terminal” from the “Applications, Accessories” menu by entering “sudo apt-get install apache2”.

- View the default Apache web page can be by typing “http://localhost/apahce2-default “ in the address bar.
- Create a folder named www and a simple web page saved as “index.html” and move to the Apache default location so it can be viewed with the URL of http://localhost/
- Create and test the DHCP IP reservation for the Apache Server and a DNS entry.

### Networking lab 13 sign-off

Demonstrate setup of the Apache Server
Show the web page hosted on the Apache Sever from an XP client in your network
Demonstrate creating a DNS host and a DHCP reservation.

### Questions to think about and discuss

What does the sudo command do?
Why couldn't we just browse to the configuration file and edit it like you can in Windows?
What other options can you change in the configuration file?

### *Networking lab 14: Windows 2008 Certificate Server*

- Add the Active Directory Certificate Services Role.
- Allow ActiveX on trusted sites.
- Create a secure site and request a certificate for it.
- Test the secure site from the client.

### Networking lab 14 sign-off

Demonstrate to the instructor viewing you HTTPS website.
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### *Networking lab 15: Virtual network*

- Install a virtual network with a Windows 2008 server and two Windows workstations by using Windows Virtual PC (or Virtual Box or VMware) on one physical PC.
- Create a virtual hard disk with Disk2Vhd utility provided by Windows 7.

### Networking lab 15 sign-off

Demonstrate the setup of a virtual network with one server and two workstations on a single physical PC.
Show your virtual network works: the server and workstation can communicate with each other
Demonstrate that you can create a virtual hard disk.

### Questions to think about and discuss

What does Disk2Vhd do?
What are the advantages of using a virtual network?
What are the benefits of creating a virtual hard disk?

## VI. Conclusion

Computer courses in general require constant changing with newer hardware, software, and techniques needing updates on a yearly basis, if not more often. In fact, since starting this paper, virtualization is more widely used, and Windows Server 2012 has just become available from Microsoft. It is our opinion that it will take a few years before it mostly replaces Window Server 2008, but surely it will over time. Therefore, like general computer courses, networking courses constantly need updating. We believe this paper presents a solid format that meets our objective “to consolidate the research done by other authors; incorporating successful ideas presented by others, adding some of our own, and presenting it a logical step-by-step format that can be used as a template, a checklist to use in creating a course, or as a comparison for an existing networking course.” We believe that this template will work for any university networking course.

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# Assessing the Effectiveness of the Research Experience for Undergraduates

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## **Abstract**

*The National Science Foundation in cooperation with the Department of Physics and Astronomy at Brigham Young University (BYU) undertook the Research Experience of Undergraduates (REU) program during the summer of 2012. This program is grant driven, and BYU has been a recipient for several years. The REU program is implemented in universities across the U.S. and is intended to attract students into the science fields; in the case of BYU, the physics field is the focus. This evaluation was conducted to determine the effectiveness of the program at helping participants have a significant research experience, as well as the impact of the program on students' attitudes towards the field of physics and towards graduate school. This report contains the findings of the evaluation and recommendations for program improvement.*

## Introduction

Support for undergraduate research has come from government programs, like the National Science Foundation (NSF)'s Research Experiences for Undergraduates (REU) program, with aims at increasing the shortage of professionally trained scientists in the United States. The Department of Physics and Astronomy at Brigham Young University (BYU) has been the recipient of funds from the NSF to support the REU program for about 13 years now (<http://volta.byu.edu/REU/>). The NSF requires all participant institutions to demonstrate the extent to which these programs are effective at achieving its intended outcomes. To this end, a formative and summative evaluation of the BYU REU program was conducted during summer of 2012. The evaluation focused on identifying the program's influence on affective characteristics of the participants (i.e., students' attitudes towards the field of physics in general, research in this field, and graduate school in this subject area). This evaluation was intended to give more support and insights to an area of research already explored at a broader level, but also to provide more extensive qualitative data of individuals, which seems to be lacking in the 22 published journal articles reviewed. Students typically do not have a voice in how the program is conducted; however, through the formative efforts of this program's administrators and all the results from the data collected through this evaluation, students were given a voice that may influence how the program is run in the future.

## Methods

The methodology for this year's REU evaluation followed the format of prior evaluations, which are described next.

### *Research design*

This evaluation used the outcome-type evaluation (Stufflebeam 1999). We obtained qualitative and quantitative data to assess short-term results describing the immediate effect of the program on student participants including surveys, interviews, observations, and analysis of participants' reports to determine the degree to which the program objectives were achieved. We also provided formative feedback to the stakeholder in areas in which the program may be improved.

## *Participants*

The participants were six male and four female undergraduate students and two male high school teachers. We did not have information about their ages. The program awards participants with a \$4,000 stipend to cover the cost of living expenses in the site. Participants are selected from a pool of online applicants. Participants self-select their mentors according to their area of interest. All participants are exposed to the same conditions of research experiences. Class status and ages were not required to be disclosed.

## **Materials**

The 42-item Colorado Learning Attitudes towards Science Survey (CLASS) is an instrument designed to measure students' beliefs about science and learning about science, in this case, physics (Adams et al. 2006). This instrument builds on work done by existing surveys by probing additional aspects student's beliefs and by using wording suitable for students in a wide variety of physics courses. This instrument has been validated using interviews, reliability studies, and extensive statistical analyses of responses from over 5000 students. The instrument is subdivided in eight subcategories of 4 to 8 statements that characterize a specific aspect of student thinking. The instrument has just been validated for characterizing students' beliefs in the aggregate. This instrument does not characterize an individual student in a useful way. Examples of the items comprising the scale are: "A significant problem in learning physics is being able to memorize all the information I need to know" and "When I am solving a physics problem, I try to decide what would be a reasonable value for the answer." Each item is scored on a five-point scale for 1 (strongly agree) to 5 (strongly disagree). A lower score is indicative of a lower student belief in learning physics.

Two 10-item bipolar scale surveys were administered to measure students' attitudes towards research and graduate school. One 10-item satisfaction survey was administered; each item was scored on a five-point scale from 1 (strongly agree) to 5 (strongly disagree). Structured interviews with students were also conducted.

## **Procedure**

All assessment instruments, such as surveys, interviews, and focus group protocol, were reviewed and approved by the program stakeholder prior to their use. We also used student initial drafts and final research papers. We used three pre and post attitude surveys, which we

adopted from prior evaluations; they were reviewed, modified, and administered via web upon stakeholder approval. One research assistant was trained by the evaluator to perform survey programming using Qualtrics software. Pre-surveys were administered via web the first day students arrived to the site. Student interviews were conducted at the end of the semester, and, in contrast to the prior year's evaluation, faculty interviews were not conducted for this study. A focus group with participating students was conducted at the end of the program. To guide discussion in focus groups we used structured questions. Students' initial and final research reports were electronically collected as evidence of meaningful research experience. The production of quality research papers was expected to include the following: description of the initial proposal based on organization (it should preview the topic, arrange the material in an interesting way, and provide details about how it will be conducted and concluded), the quality of scholarship with regards to the chosen topic (it should be based on sound principles of prior research in the area and appear to represent innovation with a solid foundation). To better determine the quality of the research papers, the evaluator suggested the stakeholder create a rubric in which the essential elements to identify the paper as of quality could be determined and taught to students during the program. The rubric was not made available to the evaluator during this evaluation period.

## **Literature review**

Most REU sites publish their evaluation results individually, but a few national studies are available for overall comparisons of sites. The section that follows looks at the findings of these evaluations and notes the more frequent issues or limitations encountered when working with REU-type programs.

Previous studies indicate that REUs in general have the same practices (e.g., their time frame, sponsoring academic institution, funding, presentation of science knowledge, types of research and instructional activities) and the same intended outcomes. Their main goal is to provide a positive research experience for their participants. In general, these programs are found to be successful at achieving this goal, and there are also reports of generally positive unintended outcomes.

### *Student attitudes towards research*

The literature about the effect of REUs on students' attitudes towards research shows a positive effect (Van der Spiegel et al. 1997; Alexander et al. 2000; Kardash 2000; Russell et al. 2007; Brandenberger 2013). Other findings on the effect resulting from participating in

REUs show an increase in students' understanding of how to conduct research (Seymour et al. 2004).

### *Attitudes toward graduate school and career interest*

The literature about the effects on students' attitudes related to REUs encouraging participants' awareness of what graduate school is like is generally positive; it is also found that participation in this program encourages students towards applying and attending graduate school (Hirsch et al. 2007; Russell et al. 2007). To the contrary, however, Lopatto (2007) states that the participating in REUs could have a polarizing effect where participants either move towards or away from a particular career.

### *Student-faculty mentors effect*

Interacting with a faculty member as their mentor while in the REU program has been found to be helpful in that participants learn to network with other faculty and students, especially with regards to collaboration with other experts in the field (Abramson and Jacobs-Lawson 2004; Seymour et al. 2004). The level of faculty commitment to mentoring REU students is thought to be of importance to the success of the program (Van der Spiegel et al. 1997; Lopatto 2007).

### *Benefits and insights*

Findings on the direct benefits of REU programs include increased retention rates for undergraduates (Nagda et al. 1998) and increased involvement from underrepresented groups such as women and ethnic minorities (Nagda et al. 1998). A few participants benefitted from co-authoring papers and presentations with faculty (Van der Spiegel et al. 1997; Seymour et al. 2002). Finally, participants who are truly interested in the program were most likely to experience positive outcomes (Russell et al. 2007; Van der Spiegel et al. 1997).

### *Issues in REU programs*

The literature review shows five key issues or limitations that stakeholders would like to address when directing future REU programs. They include (1) working with underrepresented populations in the sciences; (2) the lack of a control or comparison group for research programs; (3) concerns of validity of results due to the self-reporting nature of the studies; (4) the importance of apprenticeship by faculty mentors to program success; and (5) student differences as they apply

to research participation, including academic ability, gender, and college level, and to the academic resources and practices that more inclusively and effectively involve students in research (Taraban and Logue 2012).

### *Gender and ethnic minorities underrepresented in the sciences*

One of the issues that the 2012 REU administration intends to answer relates to what the literature says about African Americans, Hispanics, and Native Americans as well as women generally being underrepresented in the field of science (Alexander et al. 2000; Lopatto 2004, 2007). Nagda et al. (1998) believe that the lack of Hispanics in research causes other Hispanics to not want to take part either. It appears that these minority groups are also underrepresented at BYU REU. The evaluators suggest that REU administrators should structure the program to attract racial/ethnic minorities or female students (Russell et al. 2007) so REU programs could help students gain enthusiasm about the experience as is supported by Taraban and Logue (2012).

### *Issues in finding a control group*

The small sample size that REU programs deal with is the most frequently cited issue for assessment (Kardash 2000; Ward et al. 2002; Lopatto 2003, 2007; Olade 2003; Seymour et al. 2004). Seymour et al. (2004) suggest that this issue of small sample size is due to how REUs self-select their participants. Because of the nature of small sample sizes, evaluations of REU programs are typically case studies.

### *Validity issues*

Lopatto (2007) recommends that observational data or mentor assessments should be used in conjunction with surveys to better understand the data. Kardash (2000) believes that using faculty mentor assessments of the participants as supplemental qualitative information is a way to overcome the challenge of dealing with the validity of attitudinal and personal experience measurement. In studies of the same populations, qualitative data collected by Seymour et al. (2004) seemed to support conclusions made from quantitative data collected by Lopatto (2004).



### *Faculty mentor issues*

The level of commitment of faculty mentors and the level of faculty–student interaction offered to the student is considered a key aspect for program success (Van der Spiegel et al. 1997). Another desired outcome of the level of student-to-faculty interaction is the networking that could be beneficial if the student decides to undertake the graduate path (Page et al. 2004). High-quality faculty-to-student interaction is said to benefit African-American students in particular (Nagda et al. 1998).

### **Evaluation design**

This evaluation used the outcome-type evaluation. We obtained qualitative and quantitative data to assess short-term results describing the immediate effect of the program on student participants, including structured and unstructured surveys, structured interviews, observations, and analysis of participants' reports. We also provided formative feedback to the stakeholder in areas in which the program might be improved.

### *Evaluation questions*

There are two questions that guided this evaluation: (1) the *program success question*, which reads: To what degree did the physics REU at BYU achieve its primary goal of helping student participants in the physics program progress to the point that they could have significant independent research experience by the end of the summer of 2012? and (2) the *participant attitude question*, stated as: To what degree did the physics REU at BYU affect participant attitudes towards the field of physics in general, research in this field, and graduate school in this subject area?

### *Evaluation criteria and standards*

The evaluation criteria and standards for question one are aligned to the program objectives and are to determine to what degree the program helped students have a significant research experience after they finish their summer program. These questions are to be considered as the criteria for the program success since they are based on the values of the two main stakeholders, the BYU REU administration and the NSF. Table 1 shows the description of these criteria and the corresponding evaluation standard.

<b>Table 1. Program Success Question: Criteria and Standard</b>		
<b>Criterion</b>	<b>Assessing Criterion</b>	<b>Standard</b>
1. Participants should have found some value in all activities offered as part of REU (mini classes, lab, presentations, reports, etc.)		Participants must have met four of these criteria for the program to be rated as successful.
2. Participant established a positive relationship with faculty mentor and peers.		
3. The program positively influenced participant's attitudes towards undertaking graduate studies in the science field		
4. The program positively influenced participant's decision considering the physics field as a career		
5. Participant's overall experience with the program was positive.		

The standard for judging the criteria and standard for the second evaluation question were determined by the observation of a positive change in student attitudes in each of the three areas: physics, research, and graduate school. If a positive gain was observed in each of the three areas for all participants by the end of the summer, the program was judged to have been successful. These criteria and the coinciding standard for the question are summarized in Table 2.

<b>Table 2. Participant Attitudes Criteria and Standard</b>		
<b>Criterion</b>	<b>Assessing Criterion</b>	<b>Standard</b>
1. The participant had a positive gain in attitude towards research		A positive gain was observed in each of the 3 criteria to be judged successful at having a positive effect on student's attitudes.
2. The participant had a positive gain in attitude towards graduate school		
3. The participant had a positive gain in attitude towards the field of Physics		

### *Data collection*

Data for this evaluation were collected using different instruments: pre and post web surveys, structured interviews, observations, focus groups, and textual analysis of participant research reports. While each distinct survey was intended to measure a specific attribute or answer a specific evaluation question, the other methods (interviews, observations, and textual analysis) were useful for providing additional points of view to better understand the survey data. Table 3 shows a summary of the various instruments used for this evaluation. Before data collection began, participants were asked to sign a consent form (see Appendix A) and were given the opportunity to opt out of the evaluation at any time. Subjects were notified of procedures, risks, benefits, confidentiality, and compensation before they signed.

<b>Table 3. Summary of Data Collection for All Respondents</b>	
<b>Instrument/Method</b>	<b>Respondents</b>
Colorado Learning Attitudes Survey CLASS (pre)	13
Colorado Learning Attitudes Survey CLASS (post)	11
Survey Attitudes Towards Research (pre)	13
Survey Attitudes Towards Research (post)	11
Survey Attitudes Towards Undertaking Graduate Studies (pre)	13
Survey Attitudes Towards Undertaking Graduate Studies (post)	11
Survey Attitudes Towards Physics (pre)	13
Survey Attitudes Towards Physics (post)	11
Student Research Proposal Review Initial-Final	11
Final Research Report	13
Participants with Final Presentations	9
Participants in Focus Groups	9

The degree of change in students' attitudes towards learning physics was measured by administering a survey called "The Colorado Learning Attitudes" at the beginning and the end of the program. Although this instrument measures attitudes in nine sub-areas, the authors

of this instrument concluded “the work presented here has only been validated for characterizing student beliefs in the aggregate and not at the individual student level.” Thus, results in this study reflect analysis of the aggregate. Details of nine areas follow: (1) personal interest—do students feel a personal interest in connection to physics; (2) real-world connection—seeing the connection between physics and real life; (3) general problem-solving ability; (4) problem-solving confidence; (5) problem-solving sophistication; (6) sense making/effort—how worthwhile the amount of effort needed to make sense of things is; (7) conceptual understanding—understanding that physics is coherent and is about making sense, drawing connections, and reasoning not memorizing; (8) applied conceptual understanding—understanding and applying a conceptual approach and reasoning in problem solving, not memorizing or following problem-solving recipes; and (9) an overall assessment of attitude towards science.

To measure the degree of change in student attitudes towards research, physics, and graduate school, we used a survey originally created by Olade (2003) designed to measure attitudes of graduate and undergraduate nurses. The survey was adapted to measure degree of attitude change in three areas by changing the prompt to focus on physics, research, and graduate school. These surveys were administered once at the beginning and once at the end of the program. These surveys were approved by the stakeholder and used in past REU evaluations. To assess the effectiveness of various program components, we used a custom-made survey approved by the REU administration.

### *Student observations*

The REU administration and the evaluator determined to adjust the frequency of observation to gain insights on regarding student attendance and frequency of student-to-faculty interaction. Observations this year would not be as frequent as in the previous year. Data collection through observations for summer 2012 consisted of two to three hours per day and two to three days per week by only one research assistant.

The research assistant conducted observations and took written notes regarding student–faculty interaction in the laboratory or in their assigned stations. The observation data were collected daily by the sudden appearance of the research assistant and lasted 20 minutes per student participating in REU. Not all students were observed in one day because some of them were not located in their assigned stations.

## *Research proposals*

Each REU participant was required to write an initial research proposal on the topic of their choice. These proposals had to be submitted to the director of REU program within the first two weeks of starting the program. At this time, students were recipients of the first portion of their stipend. The second and final portion of students' stipends was given at the presentation of the final research paper. An oral presentation was also required to be given at the end of the program to peers and faculty in the topic of study. The evaluator used the initial and final proposals to evaluate the quality of students writing their research paper as part of assessing the student research experience in REU.

## *Data analysis procedures*

Data analysis procedure consisted of first converting the online data stored in Qualtrics survey software to the software package for statistical analysis (SPSS). Once our sample data were gathered through our experimental study, statistical inference allowed us to assess evidence in favor of our initial claims: "Students will have an increase in attitudes towards the field of physics, research, and graduate school after going through the program." A test of significance (t-test) was used to make inferences to support or reject our claims. Similarly, tests of significance (t-tests) were used to determine differences in gender. The paired t-test served as a means to determine the significance between pre and post student mean responses to the surveys regarding measures of change in attitudes. For the CLASS test, we calculated Chronbach alpha reliability coefficient.

Student interviews and observational data from student-faculty interaction and final project presentation was coded using N-VIVO software for qualitative data analysis. N-Vivo enables researchers to determine patterns in participants' responses. In Summer 2012, the REU administration decided not to interview faculty. The survey assessing overall student satisfaction was analyzed by determining the frequency of students' responses to each question and calculating the mean response. The open-ended responses to the satisfaction survey were analyzed using a qualitative analytical software, N-VIVO. The quality of students' initial and final research proposals were planned to be evaluated using a rubric and a corresponding rating criteria provided by the evaluator. The rubric was not made available to the program evaluator.

The combination of data collection through attitudinal surveys, satisfaction surveys, and observational data were mainly used to answer

the participant attitudes question. However, interviews, the REU survey, and observations of final presentations were used to triangulate attitudinal survey findings. A written final report was made available to the program stakeholder, which include findings and recommendations about the evaluation. Conclusions and recommendations were shared with the program administrator. Consideration of implementing findings and suggestions in future REUs was expressed by the program director. The purpose of the final report was to share with the client findings about the two evaluation questions that guided this evaluation against established criteria and recommendations. The client will use this report to inform NSF and faculty about the findings of the REU program evaluation.

### *Required resources*

One part-time research assistant was hired to collect observational data of students' daily interactions and to perform survey programing. The research assistant was also responsible of keeping observational data in a written format on a computer and emailing data collected to the evaluator for analysis purposes. Office equipment (two computers) was used by the evaluator for analysis of quantitative and qualitative data and for report writing. The computer had the necessary software for statistical analysis purposes (SPSS and Microsoft Office). The research assistant used the second laptop computer to collect and transcribe data as well as for survey programing. Electronic correspondence was used between the evaluator and other evaluation team members as well as the client to exchange, distribute, and gather information.

## **Findings**

The section that follows provides a summary of the findings of the two questions that guided the present evaluation. The first question addresses the *program success question* and reads: "Is the physics REU program at BYU achieving its primary aim, at helping student participants in the physics program progress to the point that they can have a significant independent research experience by the end of the summer?" The second question addresses the "*the participant attitude question*" and reads: "How does the physics REU at Brigham Young University **affect** participant attitudes towards the field of physics in general, research in this field, and graduate school in this subject area?"

### *Criteria for the program success question*

To answer the “*program success question*”, we analyzed data from (1) the REU satisfaction survey, which included questions related to practices in REU that may have enhanced students’ research experience, practices that may have promoted students’ interest in undertaking graduate school, and activities that may have had an influence on students’ decision choosing physics as a career; (2) the quality of initial and final research proposal and oral presentations; (3) the observational data regarding student–faculty interaction; and (4) the suggestions for improvement section from the REU satisfaction survey to address areas that administrators may have considered to be of formative value, although this section does not tie directly to criteria specified for evaluating the program success. All these data provided participant perceptions of the usefulness and/or effectiveness of the program components.

### *Experiences with mini-classes*

The purpose of the mini-classes was to expose students to a variety of topics related to the physics field as a way to aid student participants in gaining different perspectives from the various levels of expertise of both faculty and students. Survey results regarding attendance to the mini-classes are as follows: of a total of 11 respondents, six said they attended “always,” four said they attended “sometimes,” and one said he or she “never attended.” This year’s responses regarding mini-classes attendance have improved, and we believe this was due to students’ awareness about this program component. The information about the mini-classes was provided to students at the beginning of the program as being beneficial to them, and they were all encouraged to attend.

### *Student–faculty interaction*

Results on the frequency of student–faculty interaction derived from a survey question stated as follows: “*Indicate the frequency of interaction with your assigned mentor.*” Four of 12 respondents indicated that their interaction with faculty was at any time they needed help. Three respondents said they interacted with faculty three times per week, two participants said they interacted with faculty every day, two participants said their interaction with faculty was four times a week, only one respondent interacted with faculty several times a day, and one participant interacted with faculty only twice per week. This year’s findings indicated that more than one student had less student–

faculty interaction compared with other students in the group. Follow-up interview data also showed that some students did not have the same expected level of student–faculty interaction as their peers. For example, one comments was “my mentor was absent for long periods of time, I did not know the reasons.” Another student said “my mentor had to leave the program and I was left without a mentor. I had to work with a graduate student instead. I had no-one to go to find immediate help. Even though other mentors were around, I could not interact with them because of the specificity of the area of research.” The evaluator recommends the REU administration could develop a strategic plan in case a mentor is absent for long periods of time since the student–faculty interaction plays a major role in the success of the student.

### *Attitudes towards graduate school*

The level of student attitude towards graduate school was assessed with the following question: “After participating in the REU program, are you planning to undertaking graduate school?” Nine students out of 12 indicated they are still interested in undertaking graduate school, and three did not respond to the question. We did not expand on this topic during the focus group.

### *The research experience*

One of the goals of the REU program was to invite students to have a meaningful research experience. We wanted to evaluate whether the student participating in REU was aware of the program goals. All 12 student participants this year knew that one of the program’s goals was to provide students with meaningful research experiences.

Students were also asked to reflect on the best practices that contributed the most towards having a meaningful research experience. They indicated that the laboratory experimentation, the interaction with students who had varying degrees of knowledge in physics, the faculty expertise, and the quality of the laboratory equipment were the best practices that contributed towards their meaningful research experience. These types of responses were similar to prior REU program evaluation responses. This year, we did not report results regarding final presentations because of a miscommunication regarding the location at which final presentations were to take place.

The number of observations was considerably lower this year than the prior year. Random observations were done to evaluate whether students were working in different laboratories. Results from random observations were found to be successful. Observational data indicated that students were often found working on their stations either on their



own or with a faculty member. During one observation event, one student raised a complaint again regarding the level of student–faculty interaction. The student “was frustrated not to have help when needed” and expressed some disappointment of participating in the program.

### *Physics as a career*

Nine out of 12 respondents indicated that after experiencing the REU program they were very interested in physics as a career, but only 2 out of 12 said were very confident that they would be successful in a career in physics. Seven respondents said were somewhat confident in their ability to be successful in career in physics. We were unable to conclude whether the program had a direct effect on students choosing physics as a career, but the program, they said, re-enforced their decision to continue in the physics field, especially after participating in the various activities in REU. Three students did not respond to the question regarding their confidence in their ability to be successful in the physics field.

### *Suggestions for improvement*

In this section we asked about things students liked the most and least about REU 2012. Some participants suggested that offering a writing techniques class would come in very handy for students and enhance the objectives the program is trying to accomplish.

### *Do you have any additional questions/comments regarding your experience this summer at REU/RET?*

Comments were directly quoted from students’ responses. All comments regarding student faculty interaction were positive. Students overall enjoyed and appreciated faculty time while in the program. A couple of students, though, expressed their concerns regarding student–faculty interaction.

“After almost a month into the program I found out that my original mentor did not have time to work with me. It was very hard to take because first I got to meet him after two weeks, second he talked to me maybe twice after that, and I was the one that went seeking him out. Also I found a lack of administrative organization when I came in. I am a diligent person and I did all that was required from me according to the website but then when I got here I was not able to register for the first 3 days. Also the fact that my advisor-to-be was not even

here -- it was very discouraging. One last comment: I felt bullied by some administrative personnel into doing something I did not agree on. But those things will never be able to eclipse the great/life changing experience I had here. I loved every moment of it when I started working on my research area. Dr. Stephens, Dr. Jones, and Dr. Migenes were a huge help and I have tons of respect for them.”

### *Summary of findings: program success question*

Students’ responses varied regarding students research experiences in REU. The results of this evaluation determined that the standards for the program to be successful at helping student have a meaningful research experience were met.

In this year’s evaluation we did not measure the extent to which the mini-classes contributed towards participants’ research experience, but we plan to assess this area next year. Respondents indicated they always attended the mini-classes. Students also identified other activities as being a considerable contributor towards their success doing research; for instance, the informal student–faculty interaction that enabled students to stay on task and focus on their research goals, the interactions with more knowledgeable students (graduate students), and the lab experimentation.

This year we did not measure student–faculty interaction from the faculty perspective.

### *Findings on gains in students’ attitudes*

To answer this question, we used two attitude surveys and combined these responses with interview data findings that will be described in the next section.

### *Student attitudes towards learning physics: survey findings*

Student attitudes towards leaning physics were measured were measured with a survey called CLASS (Adams 2006). CLASS was administered at the beginning and end of the program. This instrument is fairly large and has 42 items. We calculated the initial and final reliability index of the scores to observe change over time in students’ attitudes towards learning physics. After properly recoding the negatively worded items we found the following: The initial survey reliability index was (0.787) and the final score reliability index was (0.922). The positive change in reliability indicates that student’ attitudes experienced a small increase over time from the beginning to the end of the

program. The inter-item correlations for the initial survey ranged from 0.787 to 0.809, and the final inter-item correlations ranged from 0.794 to 0.922 (Table 4).

<b>Table 4. Summary of Student Attitudes Towards Learning Physics</b>						
<b>Survey</b>	<b>Mean</b>	<b>SD</b>	<b>t</b>	<b>p</b>	<b>Reliability Index</b>	<b>Pre-post Correlations</b>
<b>Pre-Survey</b>	2.84	.18	-1.464	.164	787 to .809	.60
<b>Post-Survey</b>	2.95	.19			794 to .922	

Our research design to measure students' attitudes towards physics, research, and graduate school was a between-subject repeated measure analysis. We detail the findings of each in the same order. We first start by detailing the findings of students' attitudes towards physics. For this, we conducted a paired sample t-test to determine the change in students' attitudes. We took student's initial survey scores and final student scores obtained a mean score for each to see whether the mean of the scores in the pre-survey increased significantly compared with the mean score in the post-survey. Results were determined at  $\alpha = 0.05$  level. There was no statistically significant difference in the scores for students initial attitudes  $M = 2.84$ ,  $SD = 0.18$  and students final attitude measure  $M = 2.95$ ,  $SD = 0.19$ ,  $t(13) = -1.464$ ,  $p = 0.164$ . There was a medium-high 0.60 positive correlation between initial and final scores, indicating that people who scored relatively high at the beginning of the program did score high as well at the end of the program and that the observed differences between the mean scores was due to chance alone. The question then is whether the program had an effect on any students' attitudes towards learning physics. Our results suggest that the program did not necessarily have a direct effect increasing students' attitudes towards physics, but, based on results from student's interviews, we could conclude that students were able to solidify their attitudes towards physics with the components that REU had to offer while participating in the program. We believe that the non-significant change in student's attitude may have to do with the tardiness in survey administration. Surveys were administered one week after students arrived to the research setting. By then, students would have already met their mentors, walked to the facilities, and gotten acquainted with other students.

### *Student attitudes towards research*

The literature about the effect of REUs on student's attitudes towards research indicates that REUs have a positive effect (Van der Spiegel et al. 1997). Participants' attitudes towards research were measured using a survey consisting of 10 semantic differential items (Appendix B). We conducted a paired sample t-test to determine the change in students' attitudes towards research. Results were determined at a  $\alpha = 0.05$ . There was no statistically significant difference in the scores for students initial attitudes ( $M = 4.55$ ,  $SD = 0.39$ ) and students final attitude measure ( $M = 4.58$ ,  $SD = 0.64$ ,  $t(10) = -0.237$ ,  $p = 0.817$ ). There was medium to high 0.60 positive correlation, indicating that people who scored relatively high at the beginning of the program also scored relatively high at the end of the program, meaning that the observed differences between the mean scores were due to chance alone.

These results suggest that the program may not have had direct effect on increasing students' attitudes towards research but rather that students came to the program with positive attitude towards research already (Alexander et al. 2000; Kardash 2000; Russell et al. 2007). Other findings on the effect resulting from participating in REUs show an increase in understanding how to conduct research (Seymour et al. 2004). Students in the program indicated that they had the opportunity to be forced to look deeply into doing research and finding out what other scholars have contributed to their field of interest. They appreciated being in the laboratory for long periods of time learning more about their specific topic of interest.

### *Attitude towards graduate school*

Participants' attitudes towards graduate school were also measured using a survey consisting on 10 semantic differential items (Appendix B). Similar to prior attitude surveys, we conducted a paired sample t-test to determine the change in students' attitudes towards research. Data collection was done via a survey administered at the beginning and the end of program. Results were determined at  $\alpha = 0.05$  level. There was a statistically significant difference in the scores for students' initial attitudes ( $M = 2.95$ ,  $SD = 1.2$ ) and students' final attitude measure ( $M = 5.35$ ,  $SD = 1.7$ ,  $t(10) = -8.210$ ,  $p = 0.000$ ). A high positive correlation of 0.84 was shown between initial and final scores, indicating that people score high at the beginning of the program as well as at the end of the program. These results suggest that the program did have a positive effect on increasing students' attitudes towards undertaking graduate school. Results on attitudes towards graduate school also positively correlate with students' interview re-

sponses to the question “Did your research experiences in the REU program encourage you to undertake a graduate degree in physics?” Seven out of 11 respondents indicated “yes” or “definitely yes.” Two indicated they already had the graduate path in mind. One student said “No, once I had a day-to-day experience, like what it was like, then I realized that wasn’t really something that I wanted to do everyday.” Another student said “I am contemplating going to graduate school in mathematics.”

## Summary

The standard established for this evaluation question was met. It was expected that a positive gain in participants’ attitude towards graduate school attendance would be observed over the summer. A significant change was noted overall: The program did influence individual students in their decision of attending graduate school and the majority wanting to go in the physics field. Attitudes towards research were also reinforced: Respondents said the variety of activities offered in REU helped them with their research skills. The results of the extensive qualitative data collected for the purpose of this evaluation counterbalanced the small sample size of our quantitative piece.

## Recommendations and conclusions

### *Evaluation limitations*

- Assessment instruments for attitude measures were suggested by stakeholder. Ideally we would want to find better measures, especially to more accurately measure gains in students’ attitudes.
- Data collection through observations has become a little challenging because of difficulty finding students in their assigned spots. We may see the need to hire one more person to conduct observations.
- Better communication strategies are suggested to be considered between the researcher and the scheduled activities in REU. This may assist the researcher in ensuring that data collection will not be missed. We missed the students’ oral presentation because of a change in schedule.

### *Overall conclusions*

- The BYU REU 2012 successfully achieved its main goal of providing a positive research experience for their participants.
- Overall, students who participated in the BYU REU 2012 program indicated they had a positive experience. They highlighted REU as being a unique opportunity that provided students with meaningful research experience, access to a well-equipped facilities, and high quality of faculty and high levels of student–faculty interaction.
- Even though results of the attitude measures regarding gains in participants’ attitudes were not primarily a direct effect of the program, participants emphatically indicated that the activities in REU reinforced their attitudes towards research.
- After triangulating results from surveys, interviews, and focus groups, the REU program had a positive effect on students’ attitudes towards undertaking graduate school. Students said these positive attitudes were a result of the unique experiences they had while in REU.
- Attendance in mini-classes in 2012 improved significantly compared with 2011. This may be due to making attendance to mini-classes mandatory.
- The effects of the mini-classes on students’ attitudes towards research were not positive for all participants. Some students indicated the mini-classes did not represent a benefit to them. Further examination of participants who disliked this component indicated that the level of presentations did not welcome less-knowledgeable students in that they felt inadequate with the high-level technical vocabulary.
- Results regarding the quality of research proposals are still inconclusive in this study until guidelines and criteria to evaluate these elements are developed. If the stakeholder considers this element to be an essential component of REU, guidelines to evaluate the quality of research proposals should be implemented.
- Students appreciated the opportunity they had to be forced to look deeply doing research and finding out what other scholars have contributed to their field of interest. They appreciated being in the laboratory for long periods

of time learning more about their specific topic of interest.

### *Recommendations*

- Better operationalize “meaningful research experience.” This will enable the researcher to find appropriate assessment instruments.
- Provide sources of information on the program’s website for participants that do not have the expected level of experience prior to participating in the program that can lead the participant to investigate the area of their interest prior to their arrival to the site. This may be beneficial particularly to participants that have different background knowledge in the field.
- Design effective presentations targeted to audiences with various levels of knowledge in the field as a means to attract them in the area.
- Include a presentation that prepares students for research and writing techniques as part of the mini-classes components.
- Findings from oral interviews and the review of research proposal coincide in that students said they are expected to be prepared with writing and presentation techniques. Some students said they struggled with the process of writing their research proposals. These students who struggled with the writing process of their proposal also struggled during the oral presentations.
- Initial and final reports need to be better coached by faculty so these elements are reflected at different stages, e.g., initial and final stages.
- Clear expectations regarding submission of proposals should be implemented to guide the participants regarding the level to which they are expected to perform. Ideally, examples of prior initial and final proposals should be posted on the web as a clear guide for new participants in the program.

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## **Appendix A**

### *Consent to be a Research Subject REU-2012*

#### **Introduction**

This research study is being conducted to evaluate the Physics Research Experiences for Undergraduates at Brigham Young University.

#### **Procedures**

You will be asked to participate in surveys at the beginning and end of the program as well as two months after. You may also be asked to participate in a brief interview. With your permission, interviews will be taped and transcribed. Surveys will last about 15-20 minutes, interviews may last about 15-30 minutes.

#### **Risks/Discomforts**

There are minimal risks for participation in this study. However, you may feel emotional discomfort when answering questions about personal opinions. The interviewer will be sensitive to those who may become uncomfortable.

#### **Benefits**

There are no direct benefits to subjects. However, it is hoped that through your participation researchers will learn more about the effectiveness of the Physics REU program at Brigham Young University.

#### **Confidentiality**

Unless you request otherwise in writing, all information provided will remain confidential and will only be reported without identifying information. All data, including surveys and tapes/transcriptions from interviews, will be kept in a locked cabinet and only those directly involved with the research will have access to them. After the research is completed, the digital audio recordings will be deleted.

#### **Compensation**

There is no compensation for participation.

## **Participation**

Participation in this research study is voluntary. You have the right to withdraw at any time or refuse to participate entirely without jeopardy to your class status, grade or standing with the university.

## **Questions about the Research**

If you have questions regarding this study, you may contact Steve Turley 422-5336, turley@byu.edu.

## **Questions about your Rights as Research Participants**

If you have questions you do not feel comfortable asking the researcher, you may contact Sandee Munoz at sandee\_munoz@byu.edu, IRB Chair, 422-1461, A285.

I have read, understood, and received a copy of the above consent and desire of my own free will to participate in this study.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## **Appendix B**

### *Colorado Learning Attitudes about Science Survey (version 3)*

Using the scale below please rate the degree to which you agree/disagree with the following statements:

Scale: (1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree)

1. A significant problem in learning physics is being able to memorize all the information I need to know.
2. When I am solving a physics problem, I try to decide what would be a reasonable value for the answer.
3. I think about the physics I experience in everyday life.
4. It is useful for me to do lots and lots of problems when learning physics.
5. After I study a topic in physics and feel that I understand it, I have difficulty solving problems on the same topic.
6. Knowledge in physics consists of many disconnected topics.
7. As physicists learn more, most physics ideas we use today are likely to be proven wrong.
8. When I solve a physics problem, I locate an equation that uses the variables given in the problem and plug in the values.

9. I find that reading the text in detail is a good way for me to learn physics.
10. There is usually only one correct approach to solving a physics problem.
11. I am not satisfied until I understand why something works the way it does.
12. I cannot learn physics if the teacher does not explain things well in class.
13. I do not expect physics equations to help my understanding of the ideas; they are just for doing calculations.
14. I study physics to learn knowledge that will be useful in my life outside of school.
15. If I get stuck on a physics problem on my first try, I usually try to figure out a different way that works.
16. Nearly everyone is capable of understanding physics if they work at it.
17. Understanding physics basically means being able to recall something you've read or been shown.
18. There could be two different correct values to a physics problem if I use two different approaches.
19. To understand physics I discuss it with friends and other students.
20. I do not spend more than five minutes stuck on a physics problem before giving up or seeking help from someone else.
21. If I don't remember a particular equation needed to solve a problem on an exam, there's nothing much I can do (legally!) to come up with it.
22. If I want to apply a method used for solving one physics problem to another problem, the problems must involve very similar situations.
23. In doing a physics problem, if my calculation gives a result very different from what I'd expect, I'd trust the calculation rather than going back through the problem.
24. In physics, it is important for me to make sense out of formulas before I can use them correctly.
25. I enjoy solving physics problems.
26. In physics, mathematical formulas express meaningful relationships among measurable quantities.
27. It is important for the government to approve new scientific ideas before they can be widely accepted.
28. Learning physics changes my ideas about how the world works.
29. To learn physics, I only need to memorize solutions to sample problems.

30. Reasoning skills used to understand physics can be helpful to me in my everyday life.
31. We use this question to discard the survey of people who are not reading the statements. Please select agree—option 4 (not strongly agree) to preserve your answers.
32. Spending a lot of time understanding where formulas come from is a waste of time.
33. I find carefully analyzing only a few problems in detail is a good way for me to learn physics.
34. I can usually figure out a way to solve physics problems.
35. The subject of physics has little relation to what I experience in the real world.
36. There are times I solve a physics problem more than one way to help my understanding.
37. To understand physics, I sometimes think about my personal experiences and relate them to the topic being analyzed.
38. It is possible to explain physics ideas without mathematical formulas.
39. When I solve a physics problem, I explicitly think about which physics ideas apply to the problem.
40. If I get stuck on a physics problem, there is no chance I'll figure it out on my own.
41. It is possible for physicists to carefully perform the same experiment and get two very different results that are both correct.
42. When studying physics, I relate the important information to what I already know rather than just memorizing it the way it is presented.

<b>Statements comprising category</b>	
Real-world connection	28, 30, 35, 37
Personal interest	3, 11, 14, 25, 28, 30
Sense making/effort	11, 23, 24, 32, 36, 39, 42
Conceptual connections	1, 5, 6, 13, 21, 32
Applied conceptual understanding	1, 5, 6, 8, 21, 22, 40
Problem-solving general	13, 15, 16, 25, 26, 34, 40, 42
Problem-solving confidence	15, 16, 34, 40
Problem-solving sophistication	5, 21, 22, 25, 34, 40
Not scored	4, 7, 9, 31, 33, 41

(Adams et al., 2006).



# Approximate Analysis of Frames Subjected to Vertical Loads

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## **Abstract**

*In this paper we examine the standard approximate method of analyzing vertical loads on frames. We show that this method is approximately correct only for the beams of the frame; however, it neglects the axial compressive force in the beam. This is a potentially dangerous simplification. We further demonstrate that the standard method is seriously in error for the columns of the structure. We then present our correction of the standard method. For a more general frame, we then present a simplification of the moment distribution method that can be used for a frame with negligible side-sway. This method greatly reduces the computation involved compared to that for a full frame analysis.*

## **Introduction**

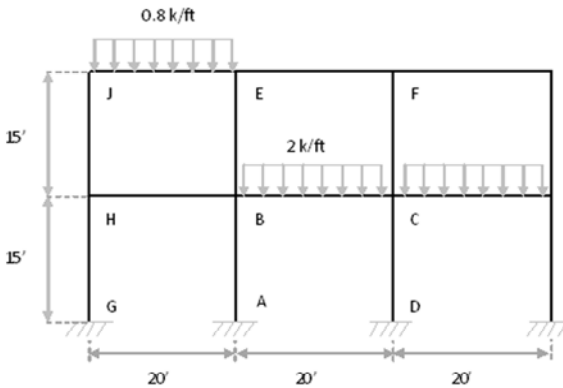
While considering the problem of the approximate analysis of vertical loads on a frame, the authors discovered an error in the standard

structural analysis texts.<sup>1,2</sup> This error has existed since at least 1960 and continues in the latest edition of at least one standard text.<sup>1</sup> Although we do not have sales data, we believe the text in question is the most popular text in Structural Analysis courses. This issue is therefore a significant one.

In this paper, we describe the standard procedure for this problem. We identify the error in the analysis. We present the corrected analysis and compare the results with those from Visual Analysis (VA)<sup>3</sup>—one of the standard finite element packages commonly used for structural analysis.

## Standard Approximate Analysis

The following is the Standard Approximate Analysis technique as presented in two standard structural analysis texts.<sup>1,2</sup> In these texts, the method is presented as an appropriate way to analyze frames with vertical loads and negligible side-sway. At the end of this paper, we will use this approach to analyze the frame shown in Figure 1.

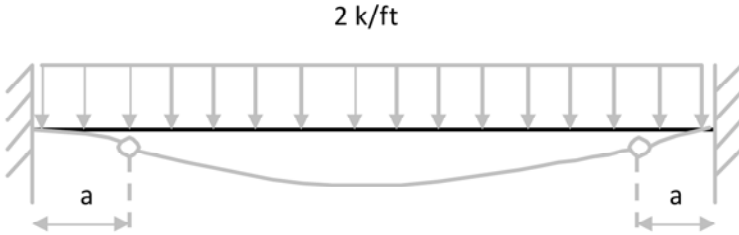


**Figure 1:** Frame subjected to vertical loads.

The first step is to model each girder as in Figure 2. The assumption is made that points of zero moment exist at a distance “a” from the supports. This is equivalent to assuming that hinges exist at these points.

An exact analysis for a girder that is uniformly loaded and with both ends fully fixed will produce points of zero bending moments at a distance of  $a=0.21 L$  from the ends. If we assume that the ends are free



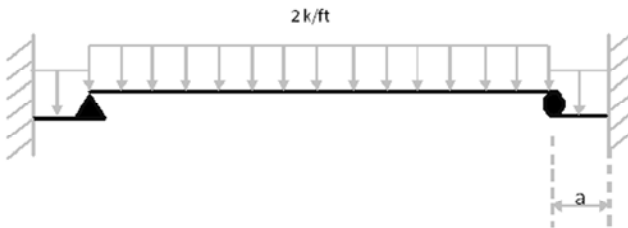


**Figure 2:** Model of a typical girder in the frame.

to rotate, then clearly the points of zero moment will be at the ends. In a realistic case, the columns at the ends of the girder will provide significant resistance to rotation. A reasonable estimate of the distance “a” is the average of these two extremes:

$$a = (0.21L + 0)/2 \cong 0.1L$$

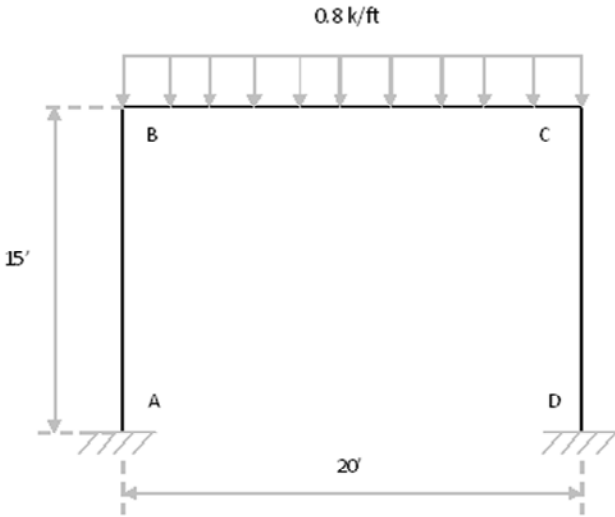
This is reasonable because any real-world beam support will allow some rotation of the beam end. We now further assume that the central portion of the girder in Figure 2 can be modeled as in Figure 3:



**Figure 3:** Final model of typical girder.

## Standard Approximate Analysis Applied to the Simplest Frame

To understand the errors involved with the model of Figure 3, let us consider this procedure applied to the simplest of frames. Consider the frame shown in Figure 4.



**Figure 4:** Simple frame subjected to a uniform vertical load.

We now apply the model of Figure 3 to the beam BC of this frame. This analysis is shown in Figure 5.

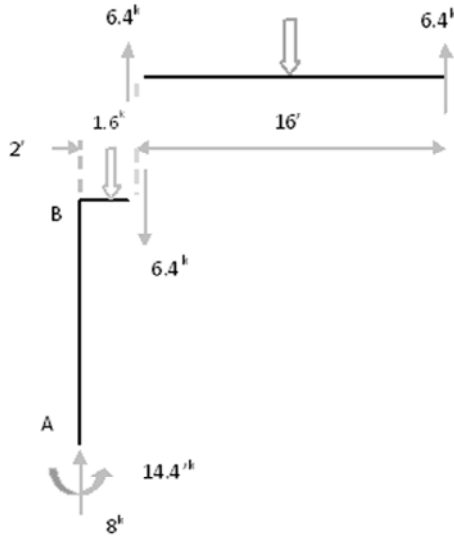
The analysis starts with the free-body diagram of the central portion—which is assumed to be a simply supported beam. We then proceed to the free-body diagram of the left column, AB, and the girder stub. The equations of equilibrium give us the reactions at A. Note carefully the direction of the moment reaction at A.

### Error in the Analysis

The error in the analysis becomes apparent when we consider the deflected shape of the structure that must correspond to the solution presented in Figure 5. It is clear that for the reaction moment, 14.4 ft·k, to be in the counter-clockwise direction, the column must experience side-sway as shown in Figure 6.

However, by symmetry, it is clear that no side-sway can exist in this case.

The error in the analysis arises from the model assumed in Figure 3. This model also implies that no horizontal force exists in the girder.



**Figure 5:** Results using the standard approximate analysis technique.

This assumption incorrectly allows side-sway to exist. It also means that the compressive axial force in the beam is neglected. This is a non-conservative simplification, which could be dangerous if this analysis is used for design purposes.



**Figure 6:** Deflected shape of column corresponding to the standard approximate analysis.

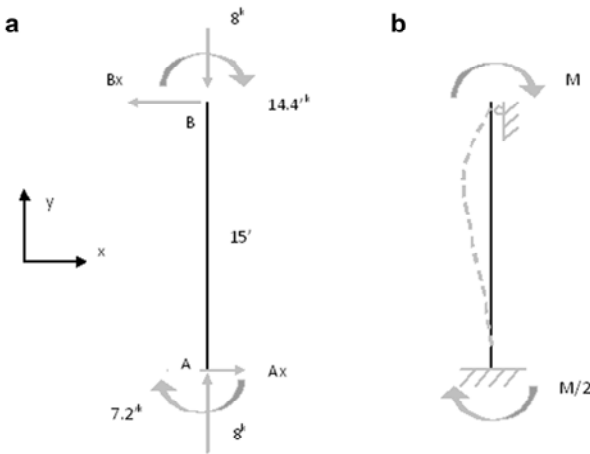
## Corrected Approximate Analysis

The Corrected Approximate Analysis technique we now present in this paper is appropriate for frames with negligible side-sway.

Consider the model in Figure 4 again. Instead of assuming zero axial force in the girder, we observe that since no side-sway exists, we must have an axial force sufficient to prevent side-sway. Now consider the free-body diagram of the column AB in Figure 7a. Here, we have replaced the forces of 1.6 kip and 6.4 kip in Figure 5 with the equivalent force/couple of 8 kip and a moment of 14.4 ft·k located at point B. We also have introduced a horizontal force,  $B_x$ , at B, sufficient to prevent side-sway.

We now solve for the unknown reactions as follows.

The column shown in Figure 7a can be considered to be a propped cantilever beam, with a fixed support at A and a roller support at B, as in Figure 7b. Using a fundamental result of slope-deflection analysis (c.f. Hibbeler, p. 436), the imposed moment  $M$  at B must induce a moment reaction of half this magnitude,  $M/2$ , at A in the direction shown. Thus, the 14.4 ft·k, must induce a moment reaction of 7.2 ft·k at A in the direction shown.



**Figure 7:** a. Results of the corrected approximate analysis. b. Propped cantilever with moment  $M$  applied to the pinned end.

Since the sum of the moments about point A must equal zero, we get the equation:

$$B_x (15) - 14.4 - 7.2 = 0$$

Or

$$B_x = 1.44 \text{ kip.}$$

Since the sum of the forces in the x direction must equal zero, we get  $A_x = 1.44$  kip. This compressive axial force must now be used in the beam design.

## Visual Analysis Results

Visual Analysis (VA) is a finite-element structural analysis package in widespread use.<sup>3</sup> If we input the frame shown in Figure 4, using W18x40 members and neglecting self-weight, we find the results  $A_x = 1.93$  kip in the positive x direction,  $A_y = 8$  kip (upwards) and  $M_A = 9.58$  ft·k in a clockwise direction. These results are in fair agreement with our Corrected Approximate Analysis results above. The error rate is about 25%, which is acceptable for an approximate method. The differences result from our assumption of  $a = 0.1 L$ .

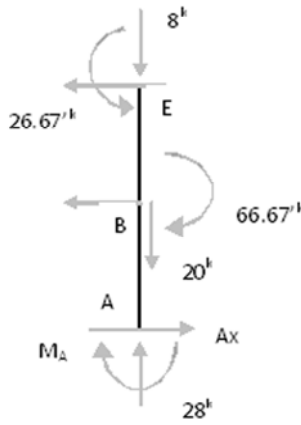
We can tabulate these comparisons as follows in Table 1 for the forces and moments at the support A. We are using the following sign conventions: The x axis is horizontally to the right. The y axis is vertically upwards. Positive moments are in the clockwise direction.

<b>Table 1: Comparison of results for reactions at support A in member AB in Figure 4</b>			
	<b>Standard Approximate Analysis</b>	<b>Corrected Approximate Analysis</b>	<b>VA results</b>
$M_A$ (ft·kip)	-14.4	+7.2	+9.58
$A_x$ (kip)	0	1.44	1.93
$A_y$ (kip)	8	8	8

We can see that the results of the Standard Approximate Analysis differ dramatically from the VA results, whereas the results from the Corrected Approximate Analysis are in much closer agreement with VA.

## Corrected Approximate Analysis of the General Case

We now present our Corrected Approximate Analysis of the more general case of the frame in Figure 1. We term this as the “Corrected



**Figure 8:** Column ABE of Figure 1.

Approximate Analysis” of a frame subjected to vertical loads. This analysis is valid whenever side-sway can be neglected.

Let us suppose that we wish to do a Corrected Approximate Analysis of column ABE in Figure 1.

We follow a truncated form of the standard moment distribution method,<sup>1</sup> where we distribute the moments only between joints A, B, and E. We show that this gives a much simpler solution with results that are acceptably close to the full solution.

Instead of using the approximation,  $a = 0.1L$ , we can now use the fixed-end moments (FEM) of the moment distribution method. Using the standard sign convention for moment distribution, we first calculate the FEM for each loaded span that frames into our column.

$$(FEM)_{EJ} = w L^2/12 = 0.8 (20)^2/12 = 26.67 \text{ ft}\cdot\text{k}$$

$$(FEM)_{BC} = -w L^2/12 = -2 (20)^2/12 = -66.67 \text{ ft}\cdot\text{k}$$

We also compute the distribution factors for each span as follows:

For joint E:

Member Stiffness Factors:

$$K_{EJ} = 4 EI/L = 4 EI/20; K_{EF} = 4 EI/20; K_{EB} = 4 EI/15$$

Distribution Factors:

$$DF_{EB} = K_{EB}/(\text{Sum of } K\text{'s}) = (4/15)/(4/20+4/20+4/15) = 2/5$$

$$DF_{EJ} = DF_{EF} = (4/20)/(4/20+4/20+4/15) = 3/10$$

A similar computation for joint B gives:

$$DF_{BE} = DF_{BA} = 2/7$$

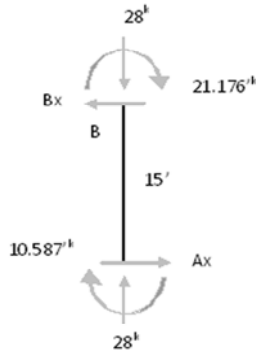
$$DF_{BH} = DF_{BC} = 3/14$$

If we apply these FEMs to the joints of the column and also show the axial forces applied at joints E and B, we have Figure 8.

Using the results from Table 2, the solution for column AB in Figure 1 is given in Figure 9:

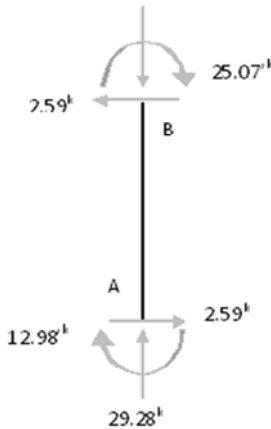
We find the shears by taking the sum of the moments about A, giving  $B_x = A_x = 2.118$  kip.

Table 2: Moment distribution analysis for column ABE								
Joint	A	B	B	B	B	E	E	E
Mbr	AB	BH	BA	BE	BC	EJ	EB	EF
DF		0.214	0.286	0.286	0.214	0.300	0.400	0.300
FEM					-66.667	26.667		
Dist.		14.286	19.048	19.048	14.286	-8.000	-10.667	-8.000
CO	9.524			-5.333			9.524	
Dist.		1.143	1.524	1.524	1.143	-2.857	-3.810	-2.857
CO	0.762			-1.905			0.762	
Dist.		0.408	0.544	0.544	0.408	-0.229	-0.305	-0.229
CO	0.272			-0.152			0.272	
Dist.		0.033	0.044	0.044	0.033	-0.082	-0.109	-0.082
CO	0.022			-0.054			0.022	
Dist.		0.012	0.016	0.016	0.012	-0.007	-0.009	-0.007
CO	0.008			-0.004			0.008	
Dist.		0.001	0.001	0.001	0.001	-0.002	-0.003	-0.002
Sum	10.59	15.88	21.18	13.73	-50.78	15.49	-4.314	-11.18



**Figure 9:** Results for column AB using the Corrected Approximate Analysis technique.

We can compare this solution with a Visual Analysis solution for the frame of Figure 1, using W18x40 members and neglecting the self-weight of the structure. This solution is shown in Figure 10.



**Figure 10:** Visual analysis results for Figure 1 using a W18x40 section for AB.

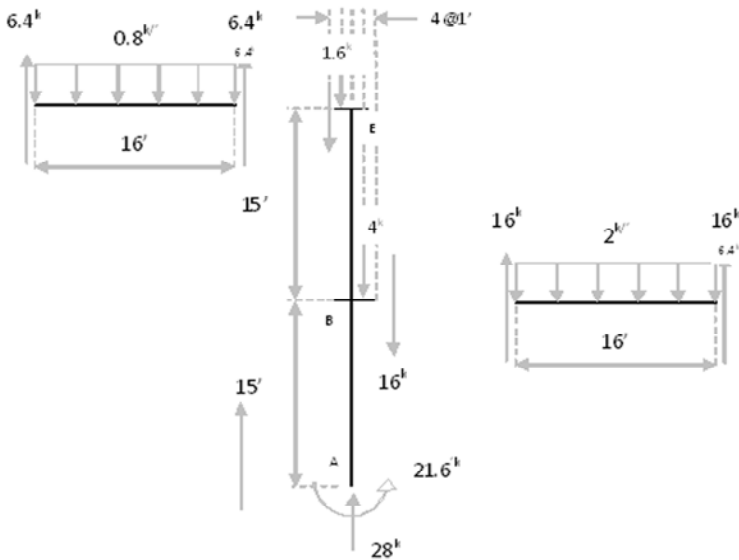
The agreement with Figure 9 is good.



## Standard Approximate Analysis of Column ABE in Figure 1

We conclude by applying the assumptions of the model in Figure 3 to the structure of Figure 1. This is the model recommended by Hibbeler<sup>1</sup> and McCormac,<sup>2</sup> which we are calling the “Standard Approximate Analysis.” We focus on the column ABE. The other columns are analyzed in a similar manner.

Consider Figure 11. We apply the assumptions of Figure 3 to the beams JE and BC as shown. This gives us the loading on the column ABE as shown. By applying the equations of equilibrium to this column we can solve for the reactions at A, which gives a compressive force of 28 kip, no shear, and a counter-clockwise moment of 21.6 ft-k as shown. We can see that this result is in clear disagreement with that of VA. In particular, the moment reaction at A is in the wrong direction.



**Figure 11:** Standard approximate analysis results for column ABE in Figure 1.

We can tabulate these comparisons as follows in Table 3 for the forces and moments at the support A. We are using the following sign conventions: The x axis is horizontally to the right. The y axis is vertically upwards. Positive moments are in the clockwise direction.

<b>Table 3: Comparison of results for reactions at support A in member AB in Figure 1</b>			
	<b>Standard Approximate Analysis</b>	<b>Corrected Approximate Analysis</b>	<b>VA results</b>
<b><math>M_A</math> (ft·kip)</b>	-21.6	+10.59	+12.98
<b><math>A_x</math> (kip)</b>	0	2.118	2.59
<b><math>A_y</math> (kip)</b>	28	28	29.28

Table 3 shows that the results of the Standard Approximate Analysis gives results that differ dramatically from the VA results, whereas the results from the Corrected Approximate Analysis give results that are in much closer agreement with VA.

## Conclusions

The Standard Approximate Analysis method of analyzing vertical loads on frames is approximately correct for the beams of the frame; however, it neglects the axial compressive force in the beam. This is a potentially dangerous simplification. This standard method is seriously in error for the columns of the structure.

The Corrected Approximate Analysis method developed herein will provide acceptable results for both the beams and columns of frames with negligible side-sway.

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2. McCormac, Jack C., *Structural Analysis* (4<sup>th</sup> Edition) Harper & Row, New York, NY.
3. *Visual Analysis*. IES Inc., Bozeman, MT.

# **Being in the Zone: Precedents of Elite Senior Athletes Experiencing Peak Performance**

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## **Abstract**

*Qualitative research methods were used to analyze, compare, and develop insight into just how elite senior athletes experience playing in the zone or performing at a peak level. The investigation will assist in providing a better understanding of just how this unique phenomenon is experienced by elite senior athletes that engage and participate in senior athletic events. A 13- point survey/questionnaire was designed to illuminate the unique characteristics and commonalities associated with the participants. Qualitative components were observed, analyzed, and documented. A variety of questioning techniques were employed, including a Likert scale and fill-in-the-blank/open-ended questions. Participants' psychological responses preferences, likes/dislikes and attitude were tabulated and compared. In conclusion, the overwhelming majority of respondents indicated that at various times during their athletic competition they experienced on many occasions playing in the zone, performing at a peak level, and discovered flow.*

## **Introduction/Purpose**

Our goal was to evaluate what unique examples, patterns, and connections elite senior athletes experience in the exceptional concepts of playing in the zone, achieving peak performance, and finding flow during their athletic/fitness-related activities or competitions. We were also interested to identify any common themes, patterns, or categories in their experiences?

As part of an on-going investigation into the elusive events behind elite senior athletes motivation and an ever-increasing number of elite senior athletes pursuing and participating in organized competitive physical activities; additional research is needed to illuminate some important aspects of just how playing in the zone, performing at a peak level, and encountering flow enhances participation.

We examined the dynamic elements, precedents, and multidimensional components that may exist as an elite senior athlete experiences playing in the zone, performing at a peak level, and finding flow while engaging in organized athletic events or competitions.

## **Definitions**

The phrase “playing in the zone” describes a state of being where an athlete’s performance or physical skills reach an optimal or peak level for a given period of time (Kamata et al., 2002) UrbanDictionary.com defines this concept as a state of mind and body in which a person (athlete) is performing at a peak or optimal performance. Freedictionary.com defines the idiom, “in the zone,” as a state of focused attention or energy so that one’s performance is enhanced. The term flow, according to Wikipedia, is the mental state of operation in which a person performing an activity is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the process of the activity. This total absorption in both the physical and mental performance of an athlete to achieve a high level of performance is what this investigation was designed to examine.

## **Methods**

### *Design of the study*

Data for this case study to develop grounded theory was collected over a 2-week period at the World Senior Games in St. George, Utah, from October 8 through October 20, 2012. The research instrument consisted of a 13-point survey/questionnaire designed to illuminate the unique characteristics or commonalities associated with the participants

(Appendix). Questions on the questionnaire consisted of Likert scale type/degree, fill-in-the-blank/opened ended, and multi-select multiple choice questions. The questionnaires were personally administered by the researchers.

## Results

Data from the study was retrieved from 100 responses to the research instrument (survey/questionnaire). Fifty male and fifty female participants ranging in age from 50 to 79 years of age (35 participants were 50–59 years; 39 participants were 60–69 years; 26 participants were 70–79 years) who were actively engaged in a variety of sports responded. The most popular sports for men were basketball, volleyball, and softball; the most popular for women were volleyball, tennis, and track and field. A series of qualitative questions help illuminate and describe the participants' unique experiences of playing or being in the zone. An overwhelming majority of both male and female participants experienced playing in the zone (92% average; men 88%, women 98%) occasionally or more frequently. Their individual descriptions or explanations were unique and demonstrated a wide variety of verbal expressions to illustrate their individual feelings (Table 1; appendix questions 2 and 4).

Probing questions were used to find out how participants personally felt while playing in the zone (Table 1; appendix questions 6 and 7). Respondents were all asked what they personally did to prepare for competition and to play at their very best. In addition, they were surveyed about what kinds of feelings they experience immediately before, during, and after a great or personal best performance (Table 1; appendix questions 8 and 9) The researchers were interested in knowing more about what the respondents thought playing in the zone personally meant to them. The personal answers to this question illustrated a wide range of responses, but, interestingly enough, there were a number of answers that showed or demonstrated some common themes and patterns related to the basic concept or definition of the unique phrase of "being in the zone" or "playing at a peak or optimal level" (Table 1; appendix question 10). Once again, a high percentage of both male and female participants responded that occasionally, frequently, or almost always (84%; men 84%, women 84%) they had the feeling of total absorption in their given athletic endeavor. Finally, participants were asked to select which from a list of terms best describe their personal feelings. The two most common answers were "on top of my game" (57%) and "totally in control" (56%) (Appendix question 12). Other

most common answers were “zoned in” (49%), “amazing” (39%), “I couldn’t miss” (33%), and “on fire” (29%).

<b>Question</b>	<b>Male Participant Sampling</b>	<b>Female Participant Sampling</b>
2. Please describe or explain what you were feeling or your thoughts while playing in the zone?	“Only focus on the play, nothing outside the court.” “Totally focused – lost in the moment” “Superb – no feeling is quite like it”	“Invincible!” “Exhilaration” “Focused on doing well” “Elation; energy; can do no wrong”
4. Please describe or explain what you were feeling or your thoughts while experiencing flow while participating in an athletic activity?	“Calm, confident, collected” “In command” “In control” “Effortless in my play”	“Thinking clearly” “Clarity and confidence” “Euphoria” “Played really accurate”
6. How did you personally feel when playing at a peak or extraordinary level?	“No better feeling, it’s a high” “Fantastic, outstanding, superb” “A great/positive feeling” “Sweet, I just loved it”	“Self-assured/confident” “Peaceful” “Precise movements” “Thrilled to see what I could accomplish”
8. Is there any one thing, action, or preparation that you do or go through to prepare to play at a peak level?	“Focus on playing well” “Good warm up, both physically and mentally” “Nothing, I just started playing” “Get a good night’s sleep and eat well”	“Warm up, concentrate on the task at hand” “Breathe, smile, and say positive affirmations” “Put clothes and shoes on the same way” “Visualize playing great”

9. How do you remember feeling immediately before, during, and after your best performance?	“Exhilarated – pumped up – hard to slow down and relax” “Boy, this was fun – wish I could do it again soon” “Satisfaction for doing well”	“Excited, happy” “Total bliss” “Contentment, total peace, unbelievable” “Content, satisfied”
10. How often do you feel completely absorbed in your athletic competitions?	“Playing at a high standard” “Everything is in sync/in command” “Totally focused, unaware of distractions” “Top of my game”	“Playing at your peak performance” “Playing my very best” “Completely focused, at peace” “Rejuvenated, focused”

Elite senior athletes, both male and female, who experienced “playing in the zone” were highly motivated to continue to playing in athletic events (see Appendix question 13). On a scale from 1 to 10, 96% of men responded with an 8 or higher and 66% of women responded with 8 or higher and 96% responded with 5 or higher.

## Discussion

This research provided information and insight and helped to develop grounded theory into how elite senior athletes experience playing in the zone or at a peak level. It may serve institutions, organizations, and other senior groups to understand the importance of just how senior elite athletes experience this unique phenomenon of playing in the zone or at a peak level. This valuable information could in turn help motivate more elite senior athletes to enter, compete, and participate in athletic contests such as the World Senior Games.

It also serves to promote an increased awareness with each senior elite athlete about his or her unique motivational characteristics as applied to playing at an exceptional level. This type of encouragement could assist elite senior athletes to seek a healthier lifestyle and enhance their overall motivation to participate in athletics or sporting events. In addition, the information and insights gained could help instructors, coaches, athletes, and seniors understand the unique intrinsic motivational aspects of each senior elite athlete and incorporate plans to motivationally assist them in their quest to achieve their fitness activity and competition goals.

## Conclusion

This study clearly demonstrates an overwhelming percentage of elite senior athletes, both male and female, that experienced a very high level of peak performance, being in zone, or finding flow. This study also illustrated common themes, patterns, and categories as highlighted by the respondents' answers to the questionnaire. There is a dynamic relationship and connection between senior elite athletes and experiencing that powerful phenomenon known as being in the zone.

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## Appendix: Survey

Questions 1, 3, 5, 7, and 11 used the following scale:

- 1 Almost Never
- 2 Seldom
- 3 Occasionally
- 4 Frequently
- 5 Almost Always

1. How often have you experienced playing in the zone while participating in elite senior athletic events or competitions?
2. Please describe or explain what you were feeling or your thoughts while playing in the zone (fill in the blank):
3. How often have you experienced flow (totally absorbed in what you are doing) in elite senior athletic events or competitions?
4. Please describe or explain what you were feeling or your thoughts while experiencing flow while participating in an athletic activity (fill in the blank):
5. How often do you experience playing in the zone?
6. How did you personally feel when playing at a peak or extraordinary level (fill in the blank)?
7. Do you feel totally caught up in the moment, unaware of time, and relaxed while performing at a peak level?
8. Is there any one thing, action, or preparation that you do or go through to prepare to play at a peak level? Please explain:
9. How do you remember feeling immediately before, during, and after your best performance (fill in the blank)?
10. What do think playing in the zone means (fill in the blank)?

11. How often do you feel completely absorbed in your athletic competitions?
12. Which terms best describe the feelings you have while playing in the zone? (Circle all that apply)
  - Unconscious
  - Amazing
  - Surreal
  - On fire
  - Totally in control
  - Out of my mind
  - Zoned in
  - Absolute perfection
  - I couldn't miss
  - On top of my game
  - Unbelievable
  - Other
13. On a scale of 1-10, did experiencing playing in the zone motivate you to continue to play in athletic events or physical activities?



# The Poetic Imperative: The Humanities, Spanish Poetry, and Pedagogies of Hope

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## Abstract

*In his introduction to Poet's Choice, literary critic Edward Hirsch asserts that poetry is "a human fundamental," that "it saves something precious in the world from vanishing," and that it "is a necessary part of our planet." And yet, in both academic and popular discourse in the United States, poetry is slowly becoming extinct. The perceived decline in the value of literature in general is reflected by recent assessments of the humanities in light of the current economic downturn. This paper examines the urgency of a renewed interest in poetry and presents as a case study the transformative power of poetry demonstrated in recent Spanish Poetry courses. In the end, success in teaching poetry is found as one establishes what the educator Ken Bain calls the "natural critical learning environment." Part theory, part pedagogy, this paper examines the various hows and whys of reading poetry, concepts and practices that are all too often foreign to our foreign language students.*

Poetry has intrinsic value, but also extrinsic value, as a means to moral and social effects beyond itself. [...] The product effects human betterment, but only by expressing, hence evoking, those states of feeling and imagination which are the essential conditions of human happiness, moral decision, and conduct. (Abrams 327, 329)

## Poetry and the Humanities

In his introduction to the 2006 anthology of poems, *Poet's Choice*, Guggenheim Memorial Foundation president, poet, and literary critic Edward Hirsch asserts that poetry is “a human fundamental,” that “[i]t saves something precious in the world from vanishing” (xv). Hirsch elaborates on this declaration of a poetic imperative by suggesting that

[p]oetry speaks with the greatest intensity against the effacement of individuals, the obliteration of communities, the destruction of nature. It tries to keep the world from ending by positing itself against oblivion. The works are marks against erasure. I believe that something in our nature is realized when we use language as an art to confront and redeem our mortality. We need poems now as much as ever. We need these voices to restore us to ourselves in an alienating world. We need the sounds of the words to delineate the states of our being. Poetry is a necessary part of our planet. (xv)

Despite the significance that Hirsch notices in the poetic utterance, in both academic and popular discourse in the United States, poetry seems to be slowly becoming extinct. Even for students in the humanities and liberal arts, poetry doesn't seem to be the most popular of disciplines.

This sort of attitude in academia and society is confirmed when one considers recent commentaries on the directions (and struggles) encountered today by the humanities. The perceived decline in the value of literature is reflected by multiple assessments of the humanities in light of the current economic downturn. The February 2009 *New York Times* article by Patricia Cohen, “In Tough Times, the Humanities Must Justify Their Worth,” for example, details the continued efforts by institutions of higher learning to reassert the relevance of the liberal arts within their curricula. According to Cohen, humanities faculty at elite universities such as Yale and Columbia repeatedly confront administrators, parents, and policy makers to underscore the importance

of the humanities in training students in critical inquiry, social engagement, and ethical reasoning. Other recent studies also examine the purpose and importance of the humanities in society and whether or not universities should cut liberal arts programs altogether. Closer to home, Dennis Romboy's *Deseret News* report addresses 2011 assumption by one of our own state legislators that "Utah colleges provide 'degrees to nowhere'."<sup>1</sup>

A defense against those who stand contrary to the humanities abounds in both recent and classical works, and such texts illuminate an understanding of the value of the humanities and the study of poetry in particular. In his Fall 2004 *Modern Language Association Newsletter* column, then Association president Robert Scholes recognizes the decline of reading in America, regardless of race, gender, education, and economic position. Scholes determines that the deterioration of a literary sensibility correlates with diminished participation by Americans in social, civic, cultural, and service engagement. For Scholes, a specialist in narrative, part of the remedy lies in a return to the study of the poetic utterance: "[T]he situation of poetry lies at the heart of this problem and at the heart of literary language itself. If we can do a better job with the pleasures of poetic language, we will give our students something precious and, perhaps, help keep literary reading alive in the years to come" (3).<sup>2</sup> In "A Defence of Poetry," the classic 1821 essay by Percy Bysshe Shelley, the English romantic writer suggests that

[t]he functions of the poetical faculty are twofold: by one it creates new materials of knowledge, and power, and pleasure; by the other it engenders in the mind a desire to reproduce and arrange them according to a certain rhythm and order, which may be called the beautiful and the good. The cultivation of poetry is never more to be desired than at periods when, from an excess of the selfish and calculating principle, the accumu-

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<sup>1</sup> A brief catalog of additional titles of recent discussions on this topic includes the following attacks on humanistic endeavors: Laurie Fendrich's March 2009 *Chronicle of Higher Education* piece, "The Humanities Have No Purpose"; Bernard Ellouk's July 2011 University of Washington newspaper article, "Do We Still Need the Humanities?"; and Peter Cohan's May 2012 *Forbes* essay, "To Boost Post-College Prospects, Cut Humanities Departments." In their article "Confronting the Criticisms," Stéfan Sinclair and Mark Turcato offer an extensive survey of attacks on the humanities from a variety of online media sources.

<sup>2</sup> Other notable contemplations on the subject include P. Winston Fettner's 2011 assessment titled "The Crisis in the Humanities and the Corporate Attack on the University" and Marjorie Perloff's 2000 *Boston Review* piece, "In Defense of Poetry: Put the Literature Back into Literary Studies."

lation of the materials of external life exceed the quantity of the power of assimilating them to the internal laws of human nature. The body has then become too unwieldy for that which animates it.

Poetry is indeed something divine. It is at once the centre and circumference of knowledge; it is that which comprehends all science, and that to which all science must be referred. It is at the same time the root and blossom of all other systems of thought; it is that from which all spring, and that which adorns all. (46-47)

Critic Jay Parini's defense of poetry in his 2008 volume *Why Poetry Matters* centers on the ways in which the poetic text enables humanity to access a deeper and more nuanced consideration of language, personal voice and identity, tradition and originality, freedom, politics, nature, and the divine. Indeed, if those elements are central to the human condition, then poetry is a necessary vehicle that facilitates our contemplation of them. For Parini, poetry "refines our ability to make comparisons," "it allows consciousness itself to emerge," and it "teach[es] us how to speak about our lives, and how—indeed—to live them" (xi-xiv). Without it, Parini continues, "we can live only partially" (xiv). For the German philosopher Martin Heidegger, the essence of aesthetic expression reveals what the Greeks called *aletheia*, an uncovering of the truth of being (35). Heidegger suggests that as the spectator or reader views the work of art before them, they are witnesses to the "happening of truth" (37). The contention here—following the thinking of Shelley, Parini, Heidegger, and others—is that art forms (especially poetry) have a transformative effect on how individuals see the world, how they experience reality, and how they form communities. This restoration of the self to itself through artistic and poetic language enables a renewal of perspective, indeed an enhancement of the experience of living.

There is certainly work to be done regarding the defense of the liberal arts, and this will undoubtedly be the focus of academic leadership and faculty alike in the years to come; but to assume that disciplines in the humanities are useless simply because they are not directly linked to some clear-cut line of employment after graduation reflects an egregious lack of understanding. The truth is that students in the humanities and social sciences engage in disciplines that provide skills that reach well beyond the classroom, and well beyond their fields of study. We could consider, for example, the variety of diverse skills that are emphasized in courses devoted to communication, sociology, for-



eign languages, history, literature, anthropology, English, philosophy, rhetoric, political science, social work, and poetry, to name just a few. In these disciplines, students learn how to think critically, communicate effectively, write persuasively, and reason with those of varied backgrounds and viewpoints. They confront questions ranging from political, social, and historical to cultural, literary, ethical, and philosophical. They engage a community of thinkers interested in the greater good, in reaching out to cultures of difference and embracing the variety and diversity that the world has to offer.

In light of current world tension and economic collapse, perhaps it is *only* an education in liberal arts disciplines like poetry (and a stimulation of a refined relationship with language, ourselves, and others) that can answer the challenges of the present day and age. As students immerse themselves in humanistic and poetic texts—as they consider what poetry is, what poets are, and the hows and whys of reading poetry—they are often surprised to find validity in Hirsch’s statements about the imperative need for literary and poetic expression. Renowned critic Harold Bloom offers an equally urgent sense of what poetry is when he considers what he calls the *inevitable*, that is, “phrasing that cannot be avoided, that *must be*” (36-37). But how can a line of poetry be inevitable, why “must it be,” and just because a given line *must* exist for Bloom, must it necessarily be inevitable for others as well? As students and scholars grapple with these questions the poetic texts come alive, they become meaningful, even instructive and illuminating.

## Pedagogy and Spanish Poetry

In recent semesters, I have sought to address some of these concerns in courses dedicated to Spanish poetry to investigate the accessibility and transcendence of the poetic genre. The challenge to *experience* poetry, along with the continual task to find poems that would prove inevitable, are lofty goals to be sought indeed, and it is perhaps a quixotic undertaking to encourage students along such a quest. Engaging texts with the hope that they could accomplish Parini’s ambitious list of benefits of the poetic genre—including the enhancement of our understanding of language, personal voice and identity, tradition and originality, freedom, politics, nature, and the divine—also requires concerted effort. To these ends, student assignments comprised weekly one-page “mini-analyses” of the poems under consideration. These short response papers focused on the formulation of clear and concise thesis statements that analyzed both rhetorical and thematic elements of the texts. Initially tedious exercises, the papers developed into succinct and poignant “close readings” of the poems as students

effectively managed articulating their ideas with direct and detailed language, all the while supporting their claims by citing relevant poetic lines of interest. Classroom time was spent as a discussion-based forum that offered students an environment in which they could explain, interpret, critique, and engage the form and content of the texts.

Student-centered classroom settings give students a great sense of responsibility for the success of the discussions. With this in mind, students and instructor alike attempted to forge what Ken Bain calls in *What the Best College Teachers Do*, a “natural critical learning environment,” a setting wherein students learn “by confronting intriguing, beautiful, or important problems, authentic tasks that will challenge them to grapple with new ideas, rethink their assumptions, and examine their mental models of reality” (18). Since there was rarely time to consider all of the assigned texts, individual students selected which poems would be discussed in class. Further, the students took turns introducing the poems of greatest interest to them, offering their interpretations, and proposing a starting point for class discussions. As a result, questions such as “Are we really going to have to know the difference between synecdoche and metonymy for the exam?” changed to engaged reflections on particular poets’ masterful employment of rhetorical language to communicate intensified and nearly unutterable thoughts and emotions. As the students allowed themselves to *experience* the poetry, their preconceived positions toward it started to thaw. They gradually understood what Parini asserts when he suggests that “poetry makes it possible for people to live more intensely, with a greater awareness of the life that confronts them” (7). Poetic concepts and sensibilities that are all too often *foreign* to our foreign language students came to light in relevant and meaningful ways as students engaged the material. In the end, the selection of poems rose to the occasion and accomplished many of the lofty goals espoused by poets and critics alike. A handful of illustrations of this understanding warrants our attention.

It became evident early in each semester that the lyric poetry of the Spanish context would provide a multitude of contact points that would greatly enrich any consideration of it. Whether the students found lines that resonated with their loneliness, contemplations of their own mortality, experiences with love, conceptions of self-identity and community, or freedoms of discovery, the poems did not fail in offering splendid profundity. Some highlights for the students included the ecstatic mystical encounter between mankind and the divine Other in San Juan de la Cruz’s “Dark Night”: “Oh night that conjoined / Beloved with lover, / lover transformed in the Beloved!” (Díez and Taboada

174).<sup>3</sup> The liberated emotion and free-flowing communion with nature in José de Espronceda's "Song of the Pirate," for example, provided an exciting consideration of the self living without limits and of pursuing the passions of the heart:

My ship is my treasure,  
 freedom, my only god,  
 my law, nature's force and the wind,  
 my only motherland, the sea. (Díez and Taboada 295)

The omnipresence and darkness of the somber shadow that is all-encompassing in Rosalía de Castro's "Black Shadow" communicated pain and despair, while the resolute firmness in her "They Say the Plants Don't Talk" offered a sense of security and hope amid trial, as the poetic subject there declares, "There are gray hairs in my head, in the fields frost, / but I continue dreaming, poor, incurable sleepwalker, / of the eternal springtime of the life that fades away" (Díez and Taboada 351). The silent and solemn scene of death communicated in Antonio Machado's "At the Burial of a Friend" is joined by a rhythmic structure that imitates the pulsating movement of the coffin being lowered into the earth by ropes. Here, the form and content uniquely meld to offer a cryptic, calculated consideration of life's finality, when "The thud of a coffin laid to rest is something / perfectly serious" (Díez and Taboada 392).

The poems that dealt with love and loss proved particularly relevant, and the students devoured Pedro Salinas's distillment of the lover to her most essential in his lengthy *My Voice Because of You*: "I want you pure, free, / irreducible: you" (Díez and Taboada 425). And the exuberance of desire and overflowing of passion, a constant in Federico García Lorca's 1927 *Gypsy Ballads*, evoked contemplations of the heightened emotions of contact with (and distancing from) the object of desire, indeed the impasse between fulfillment and frustration. A few lines from Lorca's "The Gypsy Nun" capture this tension between reality and desire as one considers the impossible situation of the nun. Further, these lines point out the privileged place of the artistic artifact in the expression of desire:

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<sup>3</sup> Unless otherwise referenced, all poetic texts come from Díez and Taboada's anthology of Spanish poetry. All translations from Spanish to English are mine.

She embroiders so well! And with such grace!  
 Upon the straw-colored fabric,  
 she hopes to embroider  
 the flowers of her fantasy. (García Lorca 241)

Perhaps encountering times of difficulty in their own lives, the readers of Gerardo Diego felt the sense of urgency that resonates throughout “Insomnia,” a poem that uses a complex series of maritime metaphors to communicate emotional and spiritual loneliness. Despite the physical presence evident as the poetic subject lies awake next to his sleeping lover, an antithetical sense of distance and absence permeates the poetic discourse. The lyrical “I” of that text states: “What a horrific slavery is that of the shipwrecked, / I, insomniac, mad, on the cliffs, / the ships are at sea, and you remain in your dreams” (Díez and Taboada 443).

Through both written and verbal commentaries from students, it became evident that these groups of engaged young scholars were particularly intrigued by poems that addressed the idea of community, a topic that highlights the need that all humans have for closeness with others and the fundamental impact that this contact makes in our own self-discovery. In this line of thought, Vicente Aleixandre’s “In the Plaza” offers an instructive consideration of self-identity and fellowship: “Go, go down slowly and find yourself amidst the others. / There they all are, and you among them. / Oh, bare yourself, immerse yourself, and recognize yourself” (Díez and Taboada 451). In this text, the world-as-plaza metaphor is doubled by a simile that compares the individual entering the plaza to a swimmer cautiously stepping into the sea:

But he extends his arms, opens at last both arms and gives himself up completely.  
 And there, strengthened, he recognizes himself, and grows and lunges forth,  
 and proceeds, and splashes up foam, and jumps, and gains confidence,  
 and cleaves to another, and throbs in the life-giving water, and sings, and is reborn. (Díez and Taboada 452)

As a result of contact with others, the self is rejuvenated, reborn. Commenting on the poetry of Walt Whitman, Parini highlights the need for contact with others in terms of an ethical proximity between self and other. For Parini, “[w]e cannot divide ourselves into ‘us’ and ‘them’ but should muck together in the great experience of life. And we must not neglect those in need, those who suffer at the margins of soci-

ety, the poor, the enslaved, the wounded, the jailed, the dying” (123). The idea that the self exists in concert with others, and not at their expense, prevails in modern poetry in a wide array of national contexts. And not only is the *other* infinitely deserving of our recognition and compassion, but as Aleixandre’s poem teaches, s/he is also a necessary part of our own development. For college students contemplating their future and their role in the world, texts of this sort offer insight into the responsibility that each individual has in becoming contributors to their local, national, and international communities.

Poems that stress a sense of the quest for self-identity were also paramount for students continually negotiating their place in the post-modern world. In the poem “Ballad of Black Pain,” Lorca positions the pursuit of one’s path this way:

I want what I want  
so, what is it to you?  
I came for what I came for:  
my happiness and my person. (García Lorca 248)

Lorca’s poem devoted to the pain of the marginalized gypsy population offers a resolute and assertive voice of resilience despite hardship. When considering the journey of life, together with the tribulations, possibilities, and patterns of personal development that are encountered therein, the Ithaca-inspired poem “Pilgrim” by Luis Cernuda gives further detailed direction:

Continue, continue forward and don’t look back,  
faithful until the end of the road and of your life,  
don’t wish for an easier destination,  
your feet upon the earth never before traced,  
your eyes experiencing the elements never before seen. (Díez and Taboada 496)

As a result of an in-depth and nuanced study of these poems and others from the rich Spanish lyrical tradition, students discovered important life lessons related to identity, difference, loss, and community, lessons that will serve them well in any future professional and personal environment. Additionally, the process of becoming a “close reader” of texts helps students develop skills such as thinking critically and openly, writing clearly and persuasively, and communicating complex ideas analytically in both written and oral discussion. The sense that one can have a nearly incommunicable feeling or thought that is in some way captured by a poem leads students to feel that certain texts

were “written for them.” This, indeed, is part of the awakening unto ourselves that Hirsch addresses.

## Outcomes and Cause for Hope

The claim that an interest in poetry is presently waning is still verified by students and others as their skepticism sustains the belief that the poetic utterance can't *do* anything: it doesn't solve climate change problems, it doesn't mend a broken bone, it certainly can't resolve economic adversity. And yet, the findings of the April 2013 Association of American Colleges and Universities report suggest that the humanities and liberal arts are perhaps the disciplines most capable of generating the skills that effect greatest change in the world. The AACU's national survey of business and non-profit leaders reveals that, especially in times of economic downturn, employers are most interested in a variety of key skills, the majority of which are the foundational cornerstones of an education in the humanities: critical thinking, clear communication, complex problem solving, ethical judgment, inter-cultural skills, written and oral communication, and evidence-based analysis—all of which were found to be more important than a potential employees' college major (Hart Research Associates 1-2). The problems studied by students of the humanities amplify their ability to think innovatively, and this greatly aids them as they prepare to contribute to a dialogue that extends much beyond the borders of their college or university classroom. They gain appreciation for, and at times even celebrate, viewpoints that differ from their own.

At graduation, then, students of the humanities are ready for the world. Some humanities graduates have a clear path and know the direction the coming months and years will take. Others will await eagerly and work toward opportunities for the future. The time to come can bring uncertainty and can instill a sense of stress and anxiety; but what is constant is that graduates in the liberal arts are capacitated to confront the realities and challenges of the 21<sup>st</sup> century with insight and an ability to engage in real-world issues. Whether they undertake graduate studies in the humanities, go on to professional degrees, work in the private sector, establish nongovernmental or nonprofit organizations, or simply continue the family business perhaps unrelated to their field of study, the skills learned in the humanities enable them to think beyond traditional frameworks and face the workplace with confidence and poise. We can be hopeful because this increasingly diverse and well-informed cohort of students will be tomorrow's community leaders, teachers, professionals, and politicians. What is more, students trained in the liberal arts understand justice and equality, they seek

paradigms of inclusion and compassion, and they value community and personal connection with others. These tenets, according to feminist critic bell hooks, are the hallmark of a progressive education and the cause for optimism: “Hopefulness empowers us to continue our work for justice even as the forces of injustice may gain greater power for a time. As teachers we enter the classroom with hope” (xiv).

What some might call “degrees to nowhere” are recognized by graduates of the humanities as degrees to anywhere they want to go; indeed to anywhere the passion of their heart will take them. They understand that education is much more than a means to an end, to a job, or to a paycheck. Indeed, it is part of a process of becoming, of developing into an engaged life-long learner that can creatively, intelligently, and ethically negotiate the complexities of the human condition (Sanders 14-18). The words of the renowned American mythologist Joseph Campbell charge each individual to follow the vital urge for learning, discovery, and exuberance. For Campbell, “[i]f you follow your bliss, you put yourself on a kind of track that has been there all the while, waiting for you, and the life that you ought to be living is the one you are living. Wherever you are—if you are following your bliss, you are enjoying that refreshment, that life within you, all the time” (113). As individuals follow their bliss, they actively confront the problems of the world and construct innovative solutions that make lasting impacts. If poetry can accomplish the goals that it sets out to, it is indeed a necessary part of our planet. If it can help us find meaning in a destructive world, allow us to communicate and commune with others, urge us to interpret and experience the world around us in a sensible manner, then it certainly deserves our attention. As poetry opens us to ourselves and to others, to the sensibilities that invite us to contemplate being and living, it more than adequately presents itself as part of a dialogue that is *necessary* and that *must be*, a dialogue that instills hope.

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# Look Who's Talking: Exploring Conference Interactions and Subsequent Revision

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## Abstract

*In composition research, little empirical evidence exists supporting the efficacy of the student–instructor writing conference, a face-to-face meeting between instructor and student regarding an essay draft, and how power dynamics influence conference interactions and subsequent revision. Using audio-recorded conferences and rough and final drafts of a researched argument essay from two students, this study seeks to empirically explore conference outcomes in connection with revision, employing critical discourse analysis. Results suggest that when conferences function more dialogically and less prescriptively—that is, power is more equally distributed and enables the co-creation of knowledge—students may produce more meaningful revision.*

## Introduction

In a 2005 article published in *Written Communication*, Richard Haswell traces the decline of replicable, aggregable, and data-supported (RAD) research methods in the field of rhetoric and composition within the past two decades, a trend at odds with nearly every other academic discipline. He specifically cites the National Council of Teachers of English (NCTE) and the Conference on College Composition and Communication (CCCC), two of the most recognized professional organizations within the field, as “substantially withdrawing their sponsorship of RAD research methods” (200). After systematically tracing the history of NCTE/CCCC professional conferences and publications and lamenting the future of composition research, Haswell reflectively asks, “What happens when a professional organization is at war with its own scholarship?” (220).

A similar concern regarding the problematic state of research methods, partly within composition, is raised in a 2011 article published in *Written Communication* in which Peter Smagorinsky argues that the methods section in countless manuscripts he’s reviewed as a journal editor are methodologically underdeveloped and vague, and subsequently rejected for publication. Although speaking in the broader context of social science disciplines, Smagorinsky’s attention to research methods closely parallels the concerns raised by Haswell. As he recalls his experience reviewing manuscripts, Smagorinsky candidly explains, “I have only the vaguest sense of what the author is doing with the data in order to render it into results. If I don’t know pretty clearly how the researcher is conducting the study, then it doesn’t matter much to me what the results are because I have no idea of how they were produced” (394).

The current study stems partly from Haswell’s and Smagorinsky’s concerns about research methods within social science, specifically composition, and seeks to exemplify a reverse in the declining trend of RAD research practices by employing a qualitative and quantitative approach to data collection and analysis to an area of composition teaching practice that has received little systematic attention, the student–teacher writing conference, a scheduled face-to-face meeting between student and instructor regarding the improvement of an essay draft. We echo the call for more qualitative, data-driven methods and provide our project as an example of how methods like multiple points of data collection, systematic coding of texts, and qualitative data analysis of conversational texts can improve the state of composition research as well as writing instruction. In this paper, we provide the rationale for our project, framing it within existing literature, describe

our methods of data collection and analysis, and discuss a sample of data analysis taken from thesis statements of study participants in the rough and final draft phases of a traditional researched argument essay. We hypothesize that a qualitative methodological approach, as exemplified by our systematic coding and analysis of data, will provide beneficial insights into the functionality and efficacy of the writing conference, which we hope will act as a catalyst toward the adoption of similar methods within the discipline. Specifically, we posit that our qualitative sample analysis of two students' thesis statements—in respect to rough and final drafts—accompanied by the conference transcripts, suggests a subsequent increase in thesis quality, demonstrating that students worked with their instructor to co-create essay improvements during the conference interaction. We conclude with potential implications for research and practice in the field of composition pedagogy, using the teacher–student writing conference as a case study in furthering the shift towards RAD research methods.

## Literature Review

Our study on the writing conference develops from a desire to see whether social construction theory (as described by Linda Flower and applied to composition instruction) is reflected in practice, specifically in the teacher–student writing conference, which is the most conversational of the student/teacher interactions about students' written work.

Current literature on the teacher–student writing conference tends to be anecdotal (Murray) or practical (Harris) more than empirical; however, two published studies on the teacher–student conference vary from this trend: Carolyn P. Walker and David Elias's article "Writing Conference Talk: Factors Associated with High- and Low-Rated Writing Conferences" published in 1987 and *Between Talk and Teaching: Reconsidering the Writing Conference* by Laurel Johnson Black published in 1998. Of the two, Black's work is particularly useful in that she systematically analyzes several student–teacher writing conferences through the lenses of power dynamics, gender, culture, and affect. Ultimately, she argues that conferences are not truly conversational since the teacher's power and societal constructs of gender and culture distort the equality that true conversation entails. Nevertheless, Black remains hopeful for what she calls "'third-generation' conferencing" (148)—which is neither directive (first-generation) or non-directive (second-generation), but where students and teachers focus on the text and evaluate their responses by referring to the text (16).

While we agree with Black that conferencing is not truly conversational and that power dynamics can shape the ways in which knowl-

edge might ultimately be constructed, based on our experiences conferencing with our own students, we nevertheless hypothesize that knowledge can be constructed by seemingly unequal partners, suggesting that truly equal power sharing is not necessarily a prerequisite to knowledge construction. Clearly, personal experience falls in the realm of untested theory, hence the need for our study. Essentially, we seek to determine to what extent our conference practice embodies Black's call for sharing power in the conference and how that distribution of power influences revision effort (162). Additionally, Black highlights multiple transcripts wherein conversation and knowledge-making *do* occur in the writing conference (155-159). Studying these and comparing them to our conferences may help us determine whether socially constructed knowledge about writing and the topics students have chosen is actually happening. In this regard, the research on tutor-student conferences has much to offer writing teachers. While the power dynamics of a teacher-student conference are different than a tutor-student conference as Black makes clear (41), it may be beneficial to use similar methods from Writing Center studies to examine conferences between students and their instructors.

Furthermore, few sources regarding the teacher-student writing conference examine the connection between the conference and the student's essay. Black's analysis of conferences, for instance, is extensive, interesting, and valuable in understanding the dynamics between teacher and student and how those impact the success of the conference itself, but she stops short of evaluating how well the papers under discussion improved (or not) as a result of the conference. One exception to this trend is Suzanne E. Jacobs and Adela B. Karliner's examination of the relationship of talk in a teacher-student conference to changes the students make to their papers. Jacobs and Karliner apply a sociolinguistic functional label to all speech or action: for instance, initiation, evaluation, or response (490). Unfortunately, while Jacobs and Karliner's approach is similar to what we do in our study, they provide little detail about their methodology (possibly because their study was published in 1977), making it difficult to apply and extend their analysis of their transcripts to our own.

The existing empirical work about writing conferences centers largely on writing centers, peer review sessions, and K-12 classrooms (Davis; Eckard; Gannett; Lerner "Teaching and Learning"; MacDonald; Severino). Fortunately, these scholars do link conferences to texts. Our aim is to bring the methods and concepts applied in these other areas into Freshmen Writing Composition studies to better understand the dynamics at play between *teachers* and their students. For example, Cinthia Gannett's article, which appeared in *Usages et Analyses de la*

*Reformulation*, a French book on the concept of reformulation, gets at the heart of revision. In this article, she provides a lens to examine who is doing the reformulating—the tutor or the student—which offers a way for us to examine both the power structure of the conference and the ways in which that power impacts the changes students make to their drafts. The theoretical and practical approaches from the sources mentioned here, among others, will help us examine our student participants' drafts and final papers in relation to what we discover in the conferences and in the surveys.

Although we hypothesize that knowledge can be constructed in nonegalitarian power situations, we believe that power dynamics still play a role in how comfortable students may feel in engaging in knowledge construction, particularly if their ideas are not endorsed or encouraged by their teacher. Theoretically speaking, since critical discourse analysis asks the analysts to be aware of their relative power positions (van Dijk 249), our study's design purposely includes undergraduate students in the design of the study and analysis of the data. So far, except for Walker and Elias's study that asks students to rate their conferences, students' voices are not part of the current literature on the writing conference. Therefore, adding student voices to the study design and analysis offers an important new perspective on the writing conference. Further, we hope to add upon Walker and Elias's analysis of high- and low-rated conferences by using parts of their methodology that use discourse analysis (a precursor to critical discourse analysis) to inform the analysis of our data. Because their study was published almost 25 years ago, it will be interesting to see whether the characteristics of high- and low-rated conferences that Walker and Elias describe in their analysis hold true today, since social construction theory became popular after their article was published. Further, our study continues Black's work by asking what we want conferencing to accomplish, by evaluating and analyzing how conferences meet those purposes, and joining in reflective critical pedagogy so we can ultimately improve our practice (167).

## Methodology

The methodology for our study falls into two areas: data collection and data analysis. Data collection methodology focuses on creating a triangulation of data sources to see conferencing from multiple angles. Data analysis methodology encompasses the theoretical approaches used to put the data points together and provides a way to examine what's happening in the conference.

### *Data collection*

Acting as the starting point for our research, the faculty researchers (Carter and Lee) invited the students from their intermediate-level writing classes to participate in the study. Data collection occurred during two terms. The pilot study and first data collection period was during the last three weeks of a seven-and-a-half-week term. The main study and second data collection period was during a fifteen-week semester. Upon participant consent, the faculty researchers exchanged student information to minimize conflicting interests since study participants were also a part of each faculty researcher's composition course. Students received a pseudonym and a study ID number. Prior to running the study, we received IRB approval to conduct the study. Students who volunteered to participate in the study engaged in the following activities. Participants attended a conference with their classroom instructor for the two papers that were the focus of this study: the Rhetorical Analysis paper (at the beginning of the semester, only for the main study) and a Researched Argument paper (during both study periods). Each conference was recorded. Twenty-four hours after each conference, participants took a survey to assess their perception about the usefulness of the conference and assess their plans for revision (the second and fourth surveys, respectively). The final surveys (third and fifth, respectively) were a post-assessment survey where students answered similar questions to the second and fourth surveys but after they had received a final grade on their papers. This was designed to assess a change in perception (if any) about the conferences' effectiveness after the participants received grades on their papers. During the pilot study, Carter audio-recorded teacher–student writing conferences with seven students, collected their rough drafts and final drafts for the researched argument paper, and had these students take three surveys—a pre-conference survey, a post-conference survey immediately after having the teacher–student writing conference, and a third survey after receiving feedback on their grade. We ended up with a complete data set (all six data points) for two students. During the main study, Carter and Lee added the Rhetorical Analysis paper (drafts, conference, and final papers) to the data collected, ending up with six complete data sets for the Rhetorical Analysis and five for Researched Argument. Each conference was audio-recorded and subsequently transcribed, with transcripts initially structured so as to identify who was speaking at any given point, where pauses in dialogue existed, and where interruptions and back-channeling occurred.



## *Data analysis*

Finally, to examine the data that we collected, we need ways to transcribe and code the data, particularly the conferences. We transcribed the conference audiotapes using an orthographic approach combined with coding for extralingual features (non-speech acts) from Richard A. Dressler and Roger J. Kreuz. Dressler and Kreuz's article titled "Transcribing Oral Discourse: A Survey and a Model System" provides both an argument for a standard approach to transcription and a model for how to transcribe oral communication. We chose this model because it was modular, in that we could use parts of the model but not others. For instance, we use most of the temporal features they describe (for pauses, overlapping speech, and such) while not focusing on breathing markers (since those seem irrelevant to our purposes, at least for now). Dressler and Kreuz's model is also generally easier to read than Black's, particularly for demarcating overlapping speech. Finally, Dressler and Kreuz's approach allows for a uniformity in the transcriptions among transcribers (we have had five so far).

To code data, we used Cheryl Geisler's guidelines on segmenting as described in her book *Analyzing Streams of Language: Twelve Steps to the Systematic Coding of Text, Talk, and Other Verbal Data*. Specifically, we divided our transcripts by speaker turn, topical chain, and exchange. Having specific units to discuss allowed for more uniformity when we applied coding based on critical discourse analysis to the conference transcripts. We chose critical discourse analysis as our main theoretical analytical model because it allowed us to examine the power dynamics within the conferences. Critical discourse analysis employs methods from other theoretical approaches to inform its approach. For instance, we found Jane Melnick's application of speech act theory to the writing conference and her discussion of membership and agenda-setting within the conference (12) as aspects of the very power dynamics that critical discourse analysis examines.

The structure of analysis is broken up into four parts: segmented analysis, topical chains, exchanges, and power dynamics. Segmented analysis breaks up the conference's transcription into topics of conversation such as introduction, thesis, organization, body paragraphs, and conclusion. The goal here is to identify where these topics are discussed in the conference so as to facilitate, in an efficient and reliable manner, our efforts to trace changes between the rough and final drafts of the student's paper back to the conference. Topics of conversation are often revisited multiple times in any given conference. A student's thesis, for example, will be discussed at several points throughout the conference and organizing the transcription into topical chains allows

us to speedily identify all dialogue pertaining to a given topic so that we're not repeatedly combing through an entire transcription each time we compile all related dialogue for segmented analysis.

We were particularly interested in who initiates changes to the topic being discussed. It is important to identify whether it is the teacher or the student who initiates these topical changes because it offers a significant indication of who is influencing the direction of the conference. By further segmenting the transcription into exchanges these initiations were more clearly apparent. As changes to the student's final draft were traced back to what is said in the conference, who initiated the topic of conversation that led to that change being discussed, and how such an environment developed, our analysis began to outline the power dynamics in a particular conference. We asked ourselves who is setting the agenda for the conference, what is the relationship between the student and the teacher, and whether the final draft and the overall objective of the assignment benefit more from the teacher or the student establishing the agenda.

We aggregated the survey data and performed cross-tabulation. That is, we compared one question on a survey to another question either on the same survey or different surveys to evaluate issues of power dynamics and agenda-setting that we also look for in the transcripts. We also looked at individual respondent's survey results and compared them to the transcript to get a sense of how the student felt about the conference. In some ways, the survey stands in for an interview. It is not a perfect method, but given the time constraints and IRB protocol for this initial study, it was the best method available.

## **Analysis**

Qualitative research offers avenues for exploring the writing conference differently than anecdotal observation. Since the writing conference is frequently used by composition teachers (as well as other teachers who assign papers to their students), championing a systematic method of data collection and analysis has the potential to identify key features of beneficial writing conferences that can then be used improve writing across the university.

We currently have two students' conferences and associated rough drafts and final drafts that we have been analyzing and coding as we begin to gain insights. We have segmented the data so that we can focus our analysis starting with thesis because the thesis is, arguably, the most crucial part of a paper. In the literature, most researchers have only analyzed the transcription of an audio-recording of a conference or, in some cases, a video of a conference or classroom. Being able to

compare the actual papers and the changes that are made directly with the conferences enables us to look at specific instances throughout the paper that were influenced by the conference. Although some studies compare actual papers with what occurs during the conferences, those are being done in K-12 education, and we believe that it would be beneficial to move into a freshman composition analysis because the student-teacher dynamics begin to change in college into a more co-constructive atmosphere. Again, since the value of this study is in connecting various pieces of the writing puzzle together, this study demonstrates the value of a triangulated approach to data collection and analysis.

In this paper, we examine the data associated with two students' Researched Argument papers: Michael's and Kim's.

### *Analysis of Kim's conference and drafts*

Below are the rough draft and final draft of Kim's thesis:

#### **Kim's rough draft thesis:**

Health risks are prevalent in accordance with image modification. Because of adverse effects, whether they are mental damages or physical, preventative measures should be taken to inform the youth of what these effect are as well as to raise their self-image.

#### **Kim's final thesis:**

Measures should be taken on behalf of the youth of Utah County, especially girls, to prevent mental damages wrought by the media and society. They should be informed of society's preoccupation with beauty, the influence of it on their self-concept, and the health risks prevalent in accordance with image modification.

Kim's final thesis is more specific than the rough draft version, specifically in the way that it is more concerned with a geographical region. Interestingly, although the conference did not focus on narrowing the thesis to a specific geographical area, during a discussion about the conclusion, Kim's instructor made a suggestion about focusing that Kim applied to the thesis. Kim mentioned the following concern: "I have a feeling that .... (2) if I talk about some sort of fix it needs to be for like the whole country, and I don't really think I have the know-

how to talk about the ins and outs [of that]" [see Appendix A for the transcription key.] At this point, her instructor interrupted her to offer the following suggestion: "[And] you don't need to make a fix that applies to the whole country. I mean you could apply a fix and say we should pilot it, (2) you know, in Orem or, you know, wherever you're from" (Appendix B). Although Kim modified this suggestion to Utah County, it is highly likely that the decision to focus on a smaller geographical area than the nation as a whole in her thesis sprang from this interchange about the conclusion in the conference.

Throughout Kim's conference, her instructor continued to bring a focus back to the thesis statement, which is an example of agenda setting. The instructor's focus on the thesis displays its importance to the paper, which Kim seemed to recognize because she strengthened her thesis after the conference. Just comparing the two theses, changing the placement of the line "measures should be taken" from near the end of her thesis to the beginning creates a stronger claim on which to base the rest of the paper because readers are introduced to it immediately. Further, although the transcript excerpt provided here does not illustrate it, Kim and her teacher discussed how Kim's rough draft was also concerned with body image issues, how those connected with the media, and how body image led to body modification with its inherent dangers. This connection is not clear in the rough draft thesis statement, but Kim added several words and phrases to the final draft thesis statement that make that connection more apparent including "media and society," "society's preoccupation with beauty," the effect of this preoccupation on "[girls'] self-concept," and "health risks prevalent in accordance with image modification." These phrases are more specific instances of the "adverse effects" Kim mentioned in her rough draft thesis. Because similar ideas were addressed during the conference, it is reasonable to conclude that the conference may have had some influence on Kim's decision to make these changes.

The previous two paragraphs suggest some ideas that may guide future conferences as well as future research on the conference. First, focusing on areas of student concern (focusing on the conclusion was a priority for Kim) may also result in material that improves an area of teacher concern (the teacher's focus on the thesis). This is an example of co-constructing knowledge. The student transfers a discussion about one area of the draft to another, making both work better. The analysis of the conference and the drafts makes this connection more readily apparent than it would be through just observation alone. Although the instructor remembered that the geographic change was discussed in the conference, she did not realize until doing a more thorough analysis that the geographic discussion did not occur in relation to the thesis. In

this sense, the changes were co-constructed by the student and the teacher.

### *Analysis of Michael's conference and drafts*

Where Kim's instructor had to help lead Kim to co-creating an agenda to focus the conference on, Michael's conference clearly illustrates that arrived at the conference with a substantial agenda of items that he needed to discuss. During his second turn in the conference, Michael rapidly explored five different items (some mentioned twice) that he wanted to address during the process of the conference. The second item on his list was his thesis statement, which illustrates his understanding of the importance of the thesis statement to his paper. His fifth item was a concern about his argument, which is strongly related to the thesis. By comparing Michael's thesis statement in his rough draft to his thesis statement in his final draft, we can begin to trace areas that seem to be influenced by the conference.

#### **Michael's rough draft thesis:**

Apparently the ACA is the epitome of compromise, for neither side seems to be satisfied. Unfortunately, this compromise seems to be one that will only do more harm than good in the end. With such a focus by so many on repealing or dismantling the ACA, one must remember that reforming the health care system is still the imperative. A careful analysis of the many articles on the failures of the ACA will provide insights on what other reforms may work better in solving the national health crisis.

#### **Michael's final draft thesis:**

The ACA, ultimately, is a failure because it will do very little to resolve the current health care crisis; perhaps, as some argue, even exacerbate the crisis further. By analyzing the varying reasons that the ACA is a failure, one can then decide what other changes need to happen to solve the causes of the health care crisis and not just fix the symptoms of the crisis itself.

Looking at the conference, it is not surprising that Michael chose to make major modifications to the thesis. The topic of his thesis comes up at least four times in varying forms—sometimes in terms of placement, others in terms of the argument he wants to present, and others in

terms of language. His instructor suggested that if he wanted an ideas-based approach he would need to change his language. He apparently agreed with her analysis and decided to change the language of his thesis to reflect his focus on ideas.

Talking about this thesis with someone else really helped him to solidify what he wanted to do with his paper. In the conference, he says,

The thesis, as you've seen, has just been something that has really changed every single time. I've done this and it's still just not ... it's just not where I want it to be and it's helpful now that I have most of the paper done and I ... can go back and reword this to be more precise in what I'm trying to do and then [once] I get that done, then I can edit the rest of the paper to make sure it fits perfectly into that.

The changes that he makes to his thesis seem specifically related to this conference. For instance, the focus of his thesis changes from an attack stance (“The ACA is the epitome of compromise, for neither side seems to be satisfied”) to a resolution stance (“By analyzing the varying reasons that the ACA is a failure, one can then decide what other changes need to happen to solve the causes of the health care crisis and not just fix the symptoms of the crisis itself”). This new change in focus correlates with the discussion that Michael and his instructor had while discussing the direction in which his paper should precede.

Because Michael shifted his focus from everything that the ACA is doing wrong and pointing out every aspect of that in his thesis, we can trace the co-construction of his idea of finding ways to fix the problem and his instructor's idea of creating a set of criteria to fix the problem into his thesis. His instructor asks him to identify his argument. He suggests that he should “pick one and fight for it.” However, his instructor doesn't want him to move too quickly to a solution. Instead she suggests that he create criteria: “If you want people to choose among different options, you can argue for a set of criteria” (Appendix C). Looking for criteria is more of a resolution stance than an attack stance, so the movement toward a more “considering tone” suggests that he has taken his instructor's idea and made it his own.

The analysis of Michael's conference-draft comparison suggests a student who feels more confident in his writing and writing process. On the other hand, where Kim's instructor needed to solicit areas of focus from her, Michael provided the areas of focus on his own. Yet, despite these differences, both students benefited from the conference. The comparison of their thesis statements only suggests that these students

brought areas of concern to the conference, worked with their instructor to address those concerns, and, subsequently, made changes to their papers reflecting their own twist to the conference.

Analyzing these students' draft-conference correlation provides additional insights into the value of the conference approach. Kim and Michael have clearly different ways of approaching their writing. Where Kim required more guidance to determine where she wanted to focus, Michael entered the conference with a laundry list of agenda items. Further, while both Kim and Michael made changes based on the conference, because Kim's conference was not as dynamic as Michael's or because her changes were not as substantive as Michael's, without the additional analysis, it is too easy to conclude that the conference was less successful for her than for Michael. But an analysis of their thesis statements does not support this. Both clearly benefited from the conference. Both made changes based on the dialogue that occurs in the conference. However, prior to analyzing the conferences, as researchers our initial impression (and many teachers might have the same one) was that Michael's conference was successful and Kim's was not because Kim did not talk as much or needed more prompting to share her concerns about her writing.

Exactly how and why these changes to drafts are happening as a result of the conferences requires further analysis; however, the benefit of this partial analysis to teachers is clear. First, conversing with students about their drafts seems to push students toward making substantive changes. Second, additional research in this area may help teachers who assign writing to better understand how to direct conferences to create the conditions where students can produce changes that they would be unable to duplicate on their own. Analysis in this case indicates where the conference was successful for both. It also suggest avenues for additional research that may look at how students' and teachers' personality traits play into how conferences are conducted and how suggestions are offered and accepted or rejected within the conferences. In this case, systematic analysis uncovers additional reasons to adopt similar methods.

## **Conclusion**

When we triangulate this information further by using the survey data, we hope to find more evidence that will guide us more precisely to what is happening in the student-teacher writing conference and eventually lead us to a set of partial guidelines for a better student-teacher writing conference that will enable instructors to conscientiously improve this practice. Currently, we submit partial guidelines

because each student's conference dynamic will be different, seeing as each individual has a unique personality, viewpoint, area of interest, writing concerns, and so forth that impact the writing conference. Our brief review of the surveys indicated that all of the students in the data collection period to which Kim and Michael belong found their conferences helpful. Further examination and triangulation of the data may be able to pinpoint why.

Our purpose in this paper has been to offer this study as a model demonstrating the type of research that can be gathered through a more qualitative methodological approach. Thus far, our results seem to support our hypothesis that knowledge is co-constructed during conferences, as seen in the analysis of Kim and Michael's thesis statements, and yield potentially compelling implications for how writing conferences function, particularly regarding power dynamics. Anecdotal theorizing of such hypotheses, we propose, limits the fruitful findings enabled through qualitative methods. In this regard, we aim to further the conversation about the role and efficacy of the writing conference and assist in moving the trend towards more RAD research methods in composition studies.

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## Appendix A

### Transcription Key

?	Rising intonation
.	Falling intonation
STRESS	Stressed syllable or word
(#)	Pause in seconds
-	Word cutoff
=	Latched talk
{ }	Backchannel
[ ]	Overlapping speech
(( ))	Paralinguistic behavior
(best attempt) or ( <i>unclear</i> )	Unclear or unintelligible speech
[ [ ] ]	Editorial (transcriber) insertion

## Appendix B

### Kim's Conference Transcript Excerpt

I: Um, where else did you want to focus? [3]

K: Um, I suppose [2] well, I don't have a conclusion just yet {I: [Okay. ]} [because] I didn't quite finish up, um but in my last paragraph that I had written, um, {I: okay} I started to form an idea of maybe an action that could be taken to [1] to help inform the youth and [4]. I don't know maybe I have a feeling that. . if [2] if I talk about some sort of fix it needs to be for like the whole country, and I don't really think I have the know-how to talk about the ins-and-outs {I: [Um]} [of that, but]

I: [And] you don't need to make a fix that applies to the whole country. I mean you could apply a fix and say we should pilot it, [2] you know, in Orem or, you know, wherever you're from or somewhere. You don't have to roll it out to the entire country [1] first. You can talk about, you know, what the benefits of a pilot-type program would be,

um, but I think you probably need to deal with this . . . issue sooner. Again, if we go back to your thesis, {K: Um-hum} you're saying that there's "health risks that are prevalent in accordance with image modification." Have you dealt with what those health risks are in your paper?

K: Not yet.

I: Okay, you're going to want to do that.

K: Yeah.

## Appendix C

### Michael's Conference Transcript Excerpt

I: So then let me ask you this: {M: M hm} What's your argument that you're trying to make?

M: Yeah, so that's definitely what I was just thinking there is...so I guess then I should probably move towards picking one and fighting for it.

I: Well, I'm not even necessarily saying that...{M: Uh huh. } I mean, I'm just saying, if, if you want people to choose, um, among different options, **you can argue for a set of criteria...** {M: **M hm.** } **that people would need to have in order to choose the best options.** {M: **Right...Okay.** } **So, you don't necessarily have to choose a plan, but you can choose the criteria that would help us all choose the best [plan.**

M: Right,] [so {I: [K, so that's an option. ]

M: **Okay, so then I could present the criteria. I like that, that a lot better** than that's more in line with (disruptive noise). {I: Right. } So I could do things like, um, ya know, we wanna have coverage for, ya know, as many people as {I: Right. } possible. We wanna maintain a quality of care, though, without, ya know, decreasing the quality as we spread it out... {I: Right. } that kinda thing.



# **Solution-Focused Brief Therapy (SFBT) For Adjustment Disorder: A Case Study\***

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## **Abstract**

*A single-subject practice evaluation case study explored the efficacy of using solution-focused brief therapy (SFBT) to treat a mild form of adjustment disorder at a university-based counseling clinic. The client presented with a history of depression and anxiety, the latter of which had recently been exacerbated by the economic and emotional pressures of graduate study. The anxiety was manifested by poor sleep quality and muscle tension. Baseline measurements were retroactively obtained for the week prior to therapy and again during the period of time between the first and second therapy sessions. The Shewhart Chart and celeration line methods were used to examine the statistical significance of the following two weeks of treatment compared with the*

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\* This paper was submitted for publication in 2003 and was selected as a Best Paper in Social Science that year. The paper was inadvertently omitted from that volume, but is published here.

*baseline measurements. Evaluation and research design have a large impact on application of theoretical principles. Although the client did not improve significantly on one rating according to statistical procedures, his case supported anecdotal evidence that clients are able to make changes by implementing concepts from SFBT. The client was able to learn skills to help him continue to find and enhance his own solutions to life problems. Furthermore, his goals helped establish criteria for ending therapy and client self-determination fit well with SFBT.*

This paper is a summary of a single-subject practice evaluation case study performed at a major university as a requirement of a graduate practice evaluation course. The subject was a voluntary client at the university-based counseling clinic.

## **Presenting Problem**

The client, who will be referred to as “Jay,” is a 25-year-old Caucasian male who has been married for two years and has a young son. At presentation, he was in his second year of study for a Master’s degree in Engineering, with plans to complete his thesis within 6–9 months to avoid additional financial obligations. He is currently taking one class in addition to working on his thesis, although last semester he reported an extremely heavy course load. He also works part time as a Research Assistant. He is the oldest of three children, his parents are still married, and he reports good relations with his parents and two sisters. He has a family history of anxiety and depression, with his father and two paternal uncles taking medication for these problems; Jay has been taking Zoloft® for depression for approximately 9 months. He sought treatment for feelings of anxiety based on the recommendations of his physician, who monitors his anti-depressant medication once every 3 months. Jay saw his treating physician between the first and second sessions of the therapy and reported no physical problems or changes to his medication.

His presenting problem was anxiety-related adjustment to graduate studies, as evidenced by difficulty sleeping and muscle tension, particularly in the face, neck, and shoulders. He indicated that these problems did not interfere with his daily functioning, but he did express significant concern about them. He reported lifelong feelings of generalized anxiety but stated that the specific difficulties became a problem about the time that he began graduate studies. He did not consider the depression to be a presenting concern because he was content with the

current medications. He was not suicidal during the course of treatment, although he reported mild suicidal ideation (no plan or method) approximately 9 months prior to beginning treatment at the clinic.

### *Problem list and priorities*

The client presented at the clinic with several specific problems. His primary concern was poor quality of sleep as manifested by difficulty falling asleep at night. He estimated that it was taking him 1½–2 hours to fall asleep from the time he lay down because his thoughts raced. This resulted in fatigue and not feeling rested, as well as moderate difficulty concentrating during the day. His other primary problem was muscle tension centered in his jaws, neck, and shoulders. He reported that tension was present nearly constantly and that his jaw would grind and “pop” nearly every morning when he ate breakfast. He was concerned that his jaw popping might eventually lead to more serious medical conditions. He saw a jaw specialist approximately one year ago, at which time no physical abnormalities were noted.

### *Client outcome objectives*

During the first session, measurable therapeutic goals were established with the client using a modified version of the Goal Attainment Scaling (GAS) method described by Bloom and associates (1999). The client was asked to imagine that his problems were on a thermometer ranging from 1 to 10 measuring intensity (Nugent, Sieppert, & Hudson, 2001). He described his primary problem of poor sleep quality using the self-anchored scale, with 1 representing falling asleep easily, sleeping soundly, and being able to get up before he needed to the next morning. The top end of the scale was self-anchored to represent 10 as not being able to fall asleep for 3–4 hours, having difficulty focusing during the day, being unable to think clearly about complex problems, and feeling “run down.” The midpoint of 5 was anchored as being able to fall asleep within 1 hour, being able to get up without feeling an overwhelming desire to stay in bed, and being tired by 4 or 5 PM without taking a nap during the day. Using this scale, Jay established a therapeutic outcome objective of 3, meaning he would be able to fall asleep within a ½ hour of lying down, would not feel sleepy, and would be fairly alert and able to function without concentration difficulties throughout the day. The goal was to have an average weekly rating of 3 for two consecutive weeks.

Jay’s secondary presenting problem, muscle tension, was rated on a separate self-anchored scale, with 1 meaning that he would feel relaxed, and 10 representing feeling very tense and experiencing severe

popping in his jaw throughout the day. The midpoint was anchored to represent being tense quite often but being able to relax with conscious effort. He established the therapeutic goal of obtaining a 3, meaning that he would have periods of time throughout the day without tension, and when he did feel tense, that he would be able to relax with little effort. He wanted to have an average weekly rating of 3 for this condition for two consecutive weeks.

### *Measurement*

As previously described, Jay specified his presenting problems using a modified GAS method to determine outcome objectives. This process included establishing separate operational definitions for the sleep quality scale and the muscle tension scale. I instructed the client to record his quality of sleep each morning and his muscle tension at the end of each day, rating them based on the overall quality in a 24-hour period. Jay used a blank index card on which to track his baseline scores between sessions 1 and 2, as well as recording the approximate time that it took him to fall asleep. In addition, beginning with the intervention phase, I provided the client with a sleep diary to record details about his sleep patterns to serve as a triangulation of his self-anchored scale reports (see Appendix A). I collected and recorded the data on a weekly basis to monitor the client's progress.

### *Special Considerations*

From the initial interview, this client seemed very motivated to improve his life. As an engineering student, he also seemed analytical, was conscientious about tracking progress, and was detail oriented. There did not appear to be any relevant ethnic, cultural, religious, or gender issues that would interfere in the measurement or evaluative methods.

## **Literature Review**

According to Gingerich and Eisengart (2000), SFBT includes at least one of the following components: searching for pre-session change, setting goals, using the miracle question, using scaling questions, looking for exceptions, using a consulting break, or complimenting and assigning homework at the end of the session. However, Franklin and associates (2001) indicated that SFBT must include use of all three of the following techniques: the miracle question, scaling questions, and compliments. Hoyt (2001) explained the miracle question as magically waking up one morning and not having the problem.



The client is then asked to identify changes. Other processes described by Hoyt include the crystal ball technique and the first session formulation task.

In addition, Berg and Dolan (2001) and O'Hanlon and Weiner-Davis (1989) emphasized the strengths-based, future-oriented nature of treatment, meaning that the client is viewed as being able to construct solutions based on present resources. De Shazer (1985) and Hoyt (2001) emphasized the underlying importance of constructing meaning based on the client's reality, and Walter and Peller (1992) identified many of the above-mentioned techniques in terms of the philosophical assumptions of SFBT, including an emphasis on small changes. Treatment generally lasts 6–10 sessions and is intended to use strengths to help the client improve life satisfaction (de Shazer, 1985).

According to a meta-analysis by Gingerich and Eisengart (2000), most of the available literature regarding solution-focused therapy is anecdotal in nature; however, researchers showed preliminary empirical support for the efficacy of SFBT when compared with non-treatment control groups. Furthermore, authors of the five available well-controlled studies, each of which focused on different problems, reported client benefits through SFBT. In addition, de Shazer (1985) reported a follow-up study of clients from the Brief Family Therapy Center, with a 72% rate of satisfaction. Araoz and Carrese (1996) specifically suggested the use of brief therapy for adjustment disorders.

I selected the SFBT model for Jay's treatment for a variety of reasons. One of the primary rationales for this model was the strengths-based perspective (Franklin et al., 2001). The client had a family history of anxiety and depression, so focusing on positive changes and a future outlook rather than on the problem would be healthy for this client (Prochaska & Norcross, 1999). Furthermore, using this model, I could focus on empowering the client to be able to continue to make changes in life after therapy (De Jong & Miller, 1995), so the model seemed to fit well with the client's personality and desires, as well as the time-limited nature of treatment at the clinic.

## **Intervention**

Intervention with Jay began during the initial session by presenting a goal-based focus for therapy. According to O'Hanlon (2002), goals are intended to help clients direct the therapy according to their own needs and interests, as well as to set the criteria for knowing when therapy should end. Goals also provide a present and future orientation for therapy rather than dwelling on past "problem talk" (O'Hanlon & Weiner-Davis, 1989; Prochaska & Norcross, 1999; Walter & Peller,

1992). In addition, progress toward the desired goals was discussed at the beginning of each session in a review of the previous week's homework assignments. Homework was a regular aspect of therapy designed to help the client progress toward his stated goals between sessions.

Although the client initially presented with problems, the focus of the therapy sessions centered on looking for exceptions to difficulties (De Jong & Miller, 1995; Prochaska & Norcross, 1999). For example, Jay felt frustrated about lying in bed without being able to fall asleep for hours. When asked how he dealt with the situation, he described getting up after an hour and moving about, fixing a snack, or doing something such as reading. Upon further questioning, he recognized that the few times he had tried moving about after only 30 minutes of lying awake, he had been able to fall asleep shortly thereafter. The exception for Jay was to get up before an hour had elapsed. This process of questioning to look for exceptions, or prior successes (Franklin et al., 2001; O'Hanlon & Weiner-Davis, 1989), proved useful with Jay because he was able to gain insight rather than having me tell him what to do, thus enhancing the relationship.

Other intervention methods included incorporating behavioral and cognitive techniques to help Jay discover and reinforce his positive behaviors and coping methods (Franklin et al., 2001). Borkovec and Ruscio (2001) reported meta-analysis results of cognitive-behavioral therapy (CBT), including the use of relaxation training, for treating generalized anxiety disorder (GAD). They found that CBT was more effective than no treatment or than either cognitive or behavioral therapy alone. Jay had some symptoms of GAD, although he did not meet the DSM-IV-TR (American Psychiatric Association 2000) diagnostic criteria, so I believed this study substantiated the use of relaxation training. Furthermore, Walsh and associates (1998) reported that relaxation helps treat insomnia. Jay had already tentatively explored relaxation methods as a solution to his muscle tension; however, he did not consistently use the technique because he was not sure how to do so. Therefore, one early intervention consisted of providing progressive relaxation and deep breathing training (Bernstein et al., 2000; Smith, 1999). I also gave him handouts for home reference, based on the work of Bernstein and associates (2000) and Hepworth et al. (2002).

Prochaska and Norcross (1999) identified this behavioral technique as an effective component of treatment for both anxiety and insomnia. Smith (1999) stated that progressive muscle relaxation enhances physical relaxation and reduces stress and that it is more effective than other types of relaxation training for reducing somatic symptoms. Progressive relaxation training was used within the solu-

tion-focused model to build upon past successes as well as to chart small changes. Jay was eventually able to consolidate the muscle groupings outside of therapy to make the relaxation techniques less time-consuming and more efficient.

One cognitive approach that I used within the context of the solution-focused model was reframing Jay's self-talk. He had indicated that he sometimes utilized self-talk in an attempt to reduce his muscle tension. However, at times he expressed a need to have additional information, or to see into the future, and to achieve high personal expectations. Discussion focused on small changes leading to larger changes and having realistic expectations, or a basis in reality, for goals. Jay was able to relate to these concepts through questioning and to reframe his previously abstract personal goals. Later discussion centered on teaching Jay how to develop his own goals, in a manner similar to the one employed with him to establish therapeutic goals, with the focus on making his goals specific, concrete, practical, and future oriented.

Another solution-focused technique used in the intervention phase consisted of complimenting the client (Berg & Dolan, 2001; Franklin et al., 2001; O'Hanlon, 2002). The purpose of giving compliments was to place both the responsibility and the success on Jay rather than on the therapist and to motivate him. I used this in conjunction with reviewing the client's goals near the end of several sessions, as well as during sessions when the client shared insights into his problems.

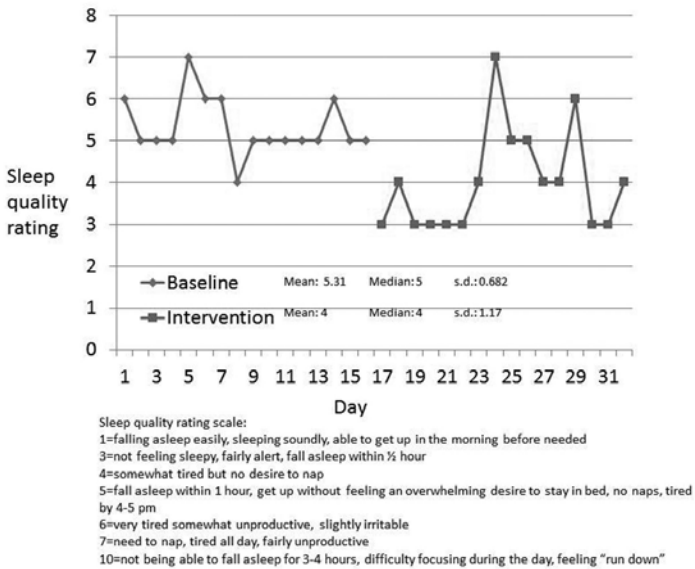
Overall, the intervention consisted of adjusting therapy sessions to address the client's concerns while working within a general philosophical framework (Franklin et al., 2001). Jay was an expert on his own life, so therapy sessions often focused on questions designed to lead him to discover exceptions to his problems. I encouraged him to find what worked for him in the past and to do more of it. Part of this process included asking Jay how he could be more consistent about employing his solutions and providing mutually agreed-upon homework assignments for him to practice during the week.

## Results

The client had a total of 8 sessions, but only the first two weeks of intervention are noted for the analytical purposes of this paper. The baseline phase consisted of 4 retroactive observations in addition to the time period between the first and second therapy sessions.

*Visual analysis for sleep quality*

For the sleep quality ratings, Jay’s overall average during the baseline was being able to fall asleep within just over an hour of lying down, getting up without feeling an overwhelming desire to stay in bed, and being somewhat tired during the day (Figure 1). The trend was basically flat, and his ratings were somewhat unstable, ranging from a high of needing a nap, being tired all day, and feeling fairly unproductive to a low of only being somewhat tired and not needing to nap. Between days 4 and 5, he experienced a large increase in his sleep difficulties, attributable to going to bed late because of slight anxiety from his initial appointment. Similarly, between days 7 and 8, he had a large improvement in his sleep, because he went to bed early.



**Figure 1.** Sleep quality reported by Jay.

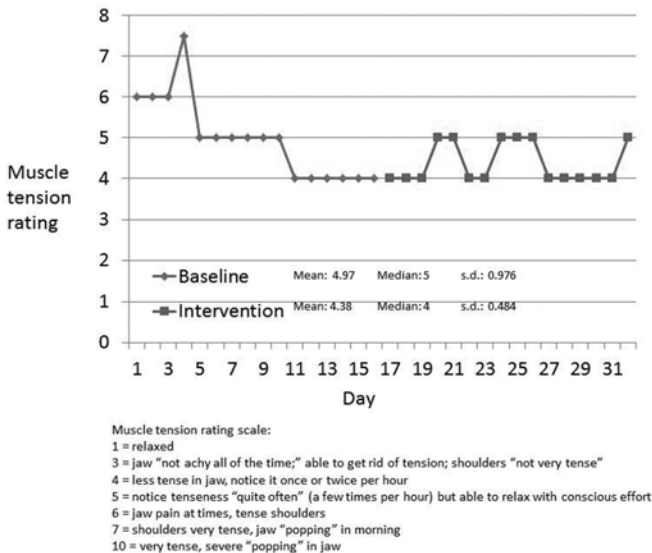
During the treatment phase, Jay had an overall average sleep quality rating of being somewhat tired without a desire to nap; it took him nearly an hour to fall asleep. The treatment phase was characterized by a flat trend with considerable instability. Just as in the baseline, the worst Jay felt was needing to nap and being tired and fairly unproductive all day. There were, however, several days when he reported not feeling sleepy and being able to fall asleep within 30 minutes of lying

down. He had several periods of large fluctuations (days 23–24, 24–25, 28–29, and 29–30). Jay attributed these changes to credit card problems that were resolved the next day, computer problems that were also resolved the next day, and thesis problems.

Overall, both the baseline and treatment phases fluctuated around flat trends, although the baseline was slightly more stable. Jay had an overall improvement in his sleep quality from baseline to intervention, as indicated by his improvement from being tired by 4–5 PM in the baseline to being only somewhat tired during the intervention phase. Using the Shewhart Chart method with two standard deviation bands, there was considerable overlap between the phases. Eight of the 16 data points in the treatment phase overlapped with those of the baseline phase.

### *Visual analysis for muscle tension*

During the baseline phase, Jay's average muscle tension rating was noticing tenseness quite often but being able to relax with conscious effort (Figure 2). His results were relatively stable, with a slight systematic decreasing trend evident between plateaus. He had one outlying data point; on the day of his initial appointment; he was very tense and reported that his jaw had popped several times that morning.



**Figure 2.** Muscle tension reported by Jay.

In contrast, the treatment phase trend was relatively flat yet fluctuating. Jay ranged from noticing tenseness once or twice per hour to being tense quite often but able to consciously relax. In general, however, his average rating for the intervention phase was being slightly tense in his jaw and only noticing body tension once or twice per hour.

Jay went from a slightly decreasing trend in the baseline phase to a somewhat more erratic flat trend in the treatment phase, although his overall average level of muscle tension declined from being tense quite often to being less tense in the jaw and noticing the tension fewer times per hour. Using the celeration line method with two sigma bands, there was only one intervention data point that overlapped with the baseline observations (day 17).

### *Statistical analysis*

The data were not significantly auto-correlated because of the flat nature of the trend. Using the Shewhart Chart procedure for the sleep quality ratings, with the definition of desirable meaning at or below a 3 rating, there were at least two consecutive data points (days 19–22) in the desirable zone during the intervention phase, which was statistically significant ( $p \leq 0.05$ , see Appendix B). Using the d-index and z-table (1.37) to determine the effect size, Jay experienced a 41.74% improvement in sleep quality.

When the client objective of 3 was used to make the data dichotomous for the muscle tension ratings, the effect size was 0 using the proportion-frequency procedure with the g-index, meaning the client made no improvement. However, when the celeration line was used to make the data dichotomous, with desirable outcomes defined as being on or below the celeration line, the effect size using the proportion-frequency and g-index was a 43.75% digression. Based on this test, Jay appeared to get worse during treatment. Therefore, based on the binomial distribution, Jay did not experience statistically significant improvement in his muscle tension ratings.

### *Practical significance*

Using the GAS, Jay did not reach his stated outcome objectives within the first two weeks of intervention discussed in this paper for either of his scales. This was due, at least in part, to external stressors in his life relating to time and finances. However, he did subjectively report improvement regarding sleep quality and muscle tension. Jay reported that the relaxation exercises were beneficial. Although this was not reflected by his self-report score of muscle tension, it did seem to help him sleep better. He clinically seemed more relaxed during later

therapy sessions than he had been during the initial appointment, and he seemed very satisfied and enthusiastic about making relaxation a habit, as well as monitoring his sleep patterns. More importantly, perhaps, was Jay's statement that therapy had not cured his problems, but rather, it had given him the tools he needed to solve his problems and improve his quality of life.

## **Discussion**

Jay was very cooperative and engaged in terms of charting his daily scale scores, but he had some difficulty remembering how he had anchored his scales. Although we discussed his daily self-report scores at the beginning of each session to review progress, it soon became apparent that his scores did not necessarily reflect the initial anchoring. Therefore, I provided him with a graph of his reported scores to date during one of the later therapy sessions, with the key explicitly stating his own reported anchors. Scores following that session were more consistent, but that is beyond the scope of this paper. Perhaps providing him with a copy of his goals and his scale anchors after the first session would have made the data more consistent and reliable overall. In addition, the sleep diary on which he reported not only his anchored scores but also his sleep and exercise habits served as a useful triangulation by providing information that Jay did not voluntarily report otherwise, such as daily stressors.

Effectively evaluating client progress does not need to be difficult. Jay was quite interested in his graph and continued to record his scores on it. This became a useful tool in discussing the realism of his goals when we decided to terminate at the 8<sup>th</sup> session, despite the fact that he had not achieved either of his stated goals. Although we established his objectives based on Jay's presenting problems, it soon became apparent that we were actually charting symptoms of underlying adjustment difficulties. The evaluation process gave meaning to the therapeutic goals in relation to the presenting problems and underlying concerns. Most importantly, however, this project serves to illustrate the importance of considering practical or clinical significance when evaluating client progress. Although Jay did not achieve statistical significance for either of his presenting problems, he felt confident about his ability to address these issues on his own outside of therapy by termination.

## **Conclusion**

Evaluation and research design have a large impact on application of theoretical principles. Although Jay did not improve significantly

according to statistical procedures for muscle tension, his case does match the anecdotal evidence that clients are able to make changes by implementing concepts from SFBT. Jay was able to learn skills to help him continue to find and enhance his own solutions to life problems. Tracking small changes not only fit the theoretical model of SFBT, but it also served as a means of encouraging the client to make meaningful decisions about his treatment. Furthermore, his goals helped establish criteria for ending therapy and client self-determination fit well with the SFBT.

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## Appendix A

### Sleep Diary

Day	1	2	3	4	5	6	7
Bedtime (date/time)							
Rise time (date/time)							
Estimated time to fall asleep							
Estimated number of awakenings & total time awake							
Estimated amount of sleep obtained							
Naps (number, time, & duration)							
Exercise (number & time)							
List stresses of the day							
Relate how you felt today 1=Very tired/sleepy 2=Somewhat tired/sleepy 3=Fairly alert 4=Wide awake							
Irritability level 1=None 2=Some 3=Moderate 4=Fairly high 5=High							
Medications							
Sleep rating (1-10)							
Tension rating (1-10)							

Based on Walsh et al. (1998)

[www.nhlbi.nih.gov/health/prof/sleep/insom\\_pc.htm](http://www.nhlbi.nih.gov/health/prof/sleep/insom_pc.htm)

## Appendix B

### Calculations

Figure 1:

$$\text{Overlap upper boundary} = \text{mean} + 2(\text{sd}) = 5.31 + 2(0.68) = 5.31 + 1.36 = 6.67$$

$$\text{Overlap lower boundary} = \text{mean} - 2(\text{sd}) = 5.31 - 2(0.68) = 5.31 - 1.36 = 3.95$$

$$d = (M_A - M_B) \div SD_p = (5.31 - 4) \div 0.957 = 1.31 \div .957 = 1.37$$

$$SD_p = [(SD_p)^2]^{1/2} = (0.91565)^{1/2} = 0.957$$

$$(SD_p)^2 = \frac{(N_A - 1)(SD_A)^2 + (N_B - 1)(SD_B)^2}{N_A + N_B - 2} = \frac{15(0.68)^2 + 15(1.17)^2}{16 + 16 - 2} = \frac{6.936 + 20.5335}{30}$$

$$= 27.4695 \div 30 = 0.91565$$

Z-table: use 1.37

Figure 2:

Celeration line

$$\frac{1}{2} \text{ half mean} = (6 + 6 + 6 + 7.5 + 5 + 5 + 5 + 5) \div 8 = 45.5 \div 8 = 5.69$$

$$2^{\text{nd}} \text{ half mean} = (5 + 5 + 4 + 4 + 4 + 4 + 4 + 4) \div 8 = 34 \div 8 = 4.25$$

$$\Phi = 2.66 (R) \div 3 = 2.66(0.33) \div 3 = 0.8778 \div 3 = 0.29$$

$$R = (0 + 0 + 1.5 + 2.5 + 0 + 0 + 0 + 0 + 0 + 1 + 0 + 0 + 0 + 0 + 0) \div 15 = 5 \div 15 = 0.33$$

$$2\Phi = 2(0.29) = 0.58$$

$$g = P_B - P_A = 0 - 0 = 0$$

$$= 0 - 9/16 = 0 - 56.25\% = -43.75\%$$

(Using the client objective of 3)

(Using the celeration line)

Binomial distribution:

Vertical column = 0.05, horizontal column = 16; need 3 desirable points (using "3")

Vertical column = 0.55, horizontal column = 16; need 13 desirable pts (celeration)



# Surveillance, the Supreme Court, and Self-government

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## **Abstract**

*Technological advances, in conjunction with a willingness to compromise privacy in order to enhance safety and security, have enabled public and private entities to implement new and ever-more pervasive means of domestic surveillance. This article first explores one of the important reasons why surveillance has expanded, or been allowed to expand, so markedly: the United States Supreme Court's failure to adequately reformulate appropriate judicial standards, or to impose restriction or guidance, regarding new forms and methods of technological surveillance. Second, this article makes observations and raises questions regarding whether pervasive surveillance impacts society's ability to engage in effective self-government.*

## **Introduction**

Surveillance activity by governmental entities as well as private industry is increasing, enabled by new technologies: digital video recording of activity on public streets, parks, transportation facilities,

buildings, and schools; computer tracking of search data, communications, social networking activity, preferences, and financial transactions; location tracking technology built into cell phones; face-recognition and other biometrics; etc.<sup>1</sup> In just one American city, New York, more than 5,000 video cameras monitor the public transportation system alone (Aresty, 2006; New York Civil Liberties Union, 2006). Even more remarkably, computer-based surveillance technology is utilized by government and private entities to gather and sift interminably increasing amounts of personal data and traffic (Landau, 2008). Recent revelations of a vast National Security Agency (NSA) telephone and internet surveillance program pursued under an unprecedentedly aggressive interpretation and implementation of the powers created under Section 215 of the Patriot Act have ignited a firestorm of public concern and criticism (Nakashima, 2013). In short, pervasive technological surveillance is changing the level of privacy available to American society.

This article first explores one of the important reasons why surveillance has expanded, or been allowed to expand, so markedly: the United States Supreme Court's failure to adequately reformulate appropriate judicial standards, or to impose restriction and guidance, regarding new forms and methods of technological surveillance. Second, this article makes observations and raises questions regarding whether pervasive surveillance impacts society's ability to engage in effective self-government.

## **I. Increased Technological Surveillance and the United States Supreme Court**

By way of introduction to the constitutional issues that arise in the area of surveillance, a discussion of the Fourth Amendment to the United States Constitution is useful. The Fourth Amendment generally

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<sup>1</sup> A more expansive list of presently utilized technologies as well as technologies in development could also include voice recognition and data collection; domestic drone surveillance; satellite surveillance; remote scanning and backscatter technologies; DNA storage; school identification cards with location tracking microchips; and even pre-crime abnormal behavioral analysis technology (Elsea, 2011; Thompson, 2012; The American Dream, 2012). An additional emerging category of surveillance activity has been described as "self-surveillance" (Kang et al., 2011), which arises through individuals' utilization of data-storage technologies meant to provide convenience; for example, tracking one's own location, for purposes of accessing mapping applications on a cell phone, creates digitally stored information about a consumer's whereabouts, travel patterns, and points of contact.

requires warrants based on probable cause prior to the conducting of a search, and further requires that any such search not be “unreasonable.” These restrictions, however, only apply to certain areas or items considered to be appropriately within the sphere of the Constitution’s protection; the Fourth Amendment specifically identifies this sphere as including “persons, houses, papers, and effects” as particularly described in the warrant (U.S. Const., Amend. IV), although subsequent jurisprudence has expanded this sphere of protection to include things that fall within persons’ reasonable expectations of privacy, such as conversations conducted over the telephone (*Katz v. United States*, 1967). Applying these constitutional restrictions to new forms and methods of technological surveillance requires reinterpretation of old standards as they apply to concepts such as reasonableness as well as the constitutional sphere of protection and privacy.

The U.S. Supreme Court decided in the 2012 case of *United States v. Jones* that the attachment of a global positioning system (GPS) device to a criminal suspect’s vehicle constituted a search within the meaning of the Fourth Amendment, thereby requiring police to obtain a warrant (*United States v. Jones*, 2012).<sup>2</sup> While some Court watchers who had been waiting for the Court to apply constitutional protections to newly developed surveillance technologies cheered the decision initially (Liptak, 2012; Mick, 2012), others observed that the rationale of the *Jones* decision may have sidestepped any such new application and may have in fact effectuated a step backward for privacy in the technological age (Edwards, 2012; Emas and Pallas, 2012). %o understand why, however, a brief recitation of the history of Supreme Court Fourth Amendment jurisprudence is instructive.

From the ratification of the Fourth Amendment in the 1790s through the 1960s, the Court viewed constitutionally restricted searches as a narrow category limited to governmental officials actually intruding physically into a person’s private space. Even when new technologies began to emerge, the Court held to this early rationale. Thus, in the 1928 case *Olmstead v. United States*, the Court held that warrantless government telephone wiretapping did not violate the Fourth Amendment because no such physical intrusion occurred (*Olmstead v. United States*, 1928). In the 1960s, however, the Court entered an era of heightened scrutiny of the governmental actions and increased concern for personal privacy, which lead to a change in the Supreme Court’s approach. In the seminal case of *Katz v. United*

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<sup>2</sup> The Court’s decision in *Jones* did not actually specify that a warrant would be required, but its holding that the attachment of the GPS device constitutes a search leads to that conclusion, barring exceptional circumstances.

*States*, the Court announced that physical intrusion was no longer necessary for a constitutionally restricted search to have occurred, overruling *Olmstead*. Under *Katz*, if the government engaged in investigative conduct that violated a person's "reasonable expectation of privacy" (such as telephone wiretapping—as was again the issue in the *Katz* case), the Fourth Amendment applied (*Katz v. United States*, 1967) and a warrant based on probable cause would generally be required. This standard has since governed Fourth Amendment cases for approaching 50 years.

In the 2001 case of *Kyllo v. United States*, the Supreme Court found that police utilization of a thermal imaging device operated from a public place to measure the heat radiating from inside the home of a person suspected of cultivating marijuana constituted a search and thus required a warrant (*Kyllo v. United States*, 2001). However, the basis for this decision limited its potential for regulating a wide range of new surveillance techniques; the Court, in its opinion as written by Justice Scalia, reasoned that thermal imaging constituted a search because it in effect physically reached inside the home to essentially measure activity going on inside that home (by way of measuring the heat it produced). Therefore, the reason the thermal imaging constituted a search was because it effected a physical intrusion (*Kyllo v. United States*, 2001). Therefore, this case did not help to redefine or reinterpret *Katz* in the context of new technological forms of surveillance, which, unlike thermal imaging, do not amount to physical intrusion into a home or a direct measuring of physical activity occurring therein. Technologies that observe public activity certainly were not at issue, and even technologies that monitor private activity in the form of electronic or other forms of communication, were not addressed either. Accordingly, the *Katz* standard from 1967 went essentially unexamined and preserved as against any new interpretation or application; thus, *Katz* remains the primary governing case for technological surveillance Fourth Amendment cases for approaching 50 years, but without any up-to-date reexamination vis-à-vis new technologies enabling new levels and modes of surveillance.

While the Supreme Court's most recent surveillance-related decision in *United States v. Jones* did not negate or replace the *Katz* "reasonable expectation of privacy" analysis per se, the rationale of the *Jones* decision focused on the physical attachment of the GPS device to the criminal suspect's car as the key factor that justified application of the Fourth Amendment; the Court's focus on the physicality of the police's intrusion upon the criminal suspect's property hearkened back to the *Olmstead* approach. The irony of the Court's utilization of an older approach, drawing comparisons to the *Olmstead* physicality



approach, in its analysis of police use of a newer technology (GPS) has been noted by several legal scholars (Millcarek, 2012; Emas and Pallas, 2012). More than irony, however, the Court's reliance on what seems to be an outdated mode of analysis represents an unfortunate dodge, leaving a vacuum of legal guidance and authority at a time in which so many new technologies are enabling a diverse array of modes of surveillance, some that involve physical intrusion and many that do not. *Jones* offers no guidance as to the latter category, either by way of privacy protections or police permission.

Of perhaps even greater concern than the Court's failure in *Jones* to lay out a more useful, forward-looking analysis for the constitutionality of modern surveillance technologies, however, is the Court's refusal to consider, via denial of *certiorari*, several other surveillance cases which could have provided vehicles for it to do so. In *American Civil Liberties Union v. National Security Agency*, the Court refused to review the Sixth Circuit Court of Appeals' dismissal of a challenge to warrantless surveillance of a broad range of electronic communications (*ACLU v. NSA*, 2008; Specter, 2009). In *Wilner v. NSA*, the Court refused to review the Second Circuit Court of Appeals' ruling that the NSA was not required to even confirm or deny the existence of electronic surveillance records under the Freedom of Information Act (*Wilner v. NSA*, 2010; Zagger, 2010).

If the Supreme Court is reluctant to take cases through which it can create effective jurisprudential structures for application of Fourth Amendment protections to emerging technologies as utilized by governmental agencies in carrying out actual searches, then the prospects for expansion of the Fourth Amendment protections against noninvasive, nontargeted general surveillance initiatives undertaken by governmental agencies is also dim. Thus, governmental utilization of such methods as internet data mining or video monitoring of public spaces will likely continue proliferate without judicial interference unless the Supreme Court changes course.

Not only has the Supreme Court avoided taking jurisprudential control of new forms of governmental surveillance, but it has also avoided the related issue of governmental utilization of private industry surveillance. The Supreme Court's recent pattern of denying *certiorari* in potentially useful cases holds true in this arena as well; specifically, in *Hepting v. AT&T*, the Court refused to review the Ninth Circuit Court of Appeals' decision upholding immunity—including retroactive immunity—for telecommunications carriers in assisting the NSA to monitor calls and emails (*Hepting v. AT&T*, 2012; Favate, 2012). Although private entities are not restricted by the Fourth Amendment by definition, the ubiquity and quasi-governmental nature of utility and

communication industry giants, as well as governmental partnering with, and reliance on, their special capacities and their customer data, present perhaps an even more compelling scenario as far as Fourth Amendment issues are concerned. Given the Supreme Court's hands-off approach, the government can not only utilize private industry to conduct surveillance—thereby cloaking its activities in private industry's freedom from Fourth Amendment constraints altogether—but it can also grant immunity to its partners in private industry (Andrejevic, 2007).<sup>3</sup>

The Supreme Court's recent decision in *Association for Molecular Pathology v. Myriad Genetics*, in which the Supreme Court ruled that certain DNA sequencing information or processes cannot be patented, is worth nothing. While not a Fourth Amendment case, *Myriad Genetics* does perhaps represent an example of the Supreme Court taking an active role in defining new legal standards for new technology. It will be interesting to see whether this signals a change—whether the same willingness will be shown by the Court in future cases involving new technologies and the Fourth Amendment. To date,

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<sup>3</sup> The prevalence and the broad institutional indifference toward increased surveillance is not merely a judicial phenomenon. Indeed, the judiciary is not the branch of government that authorizes surveillance through legislation nor the branch that carries it out. These tasks fall to the legislative and executive branches, respectively, and the trend within each of these other two branches has been clearly to push the surveillance envelope. Notable examples in the legislative branch include the Foreign Intelligence Surveillance Act (FISA), the USA PATRIOT Act, and the Homeland Security Act (Bazan, 2004; FISA, 1978; Homeland Security Act, 2002; USA PATRIOT Act, 2001). Furthermore, the choice to monitor is not just made by governmental officials; the voting public tends to embrace and support initiatives that favor security and well-being, despite objections to surveillance (Solove, 2011). Indeed some have argued that surveillance—as a part of the state's provision of security—is properly characterized as having a symbiotic rather than a hostile relationship to liberty and freedom (Wittes, 2011). Social contract theory, although undergirding the political philosophy of limited government and the corollary idea of maximum retention of freedom by the people, recognizes security as the fundamental imperative of government (Rousseau, 1761); if surveillance is useful in maintaining security, it is fair to argue that it is a worthwhile and justifiable endeavor and, further, that it is rightly undertaken with a view toward actuating liberty rather than infringing upon it. Additional explanation for governmental as well as societal support for, or at least ambivalence toward, surveillance could be articulated as an adapted version of the Garrett Hardin's theory of the tragedy of the commons, in which shared resources are subject to depletion by self-interested individuals. In such instances, government plays a useful role in protecting the commons and preventing the tragedy (Hardin, 1968). An attempt to adapt the theory to the issue of surveillance would perhaps involve describing the commons as a shared state of security, which public resource is depleted by self-interested individuals who elect to engage in unlawful or otherwise harmful behavior thereby destroying the security formerly shared by all. In such a case, government would be justified in protecting the commons of shared security through such useful means as surveillance.

however, the Court's relative unwillingness to tackle new surveillance technology cases has allowed surveillance to grow unchecked and unrestricted by any new, let alone any restrictive, jurisprudential reformulations of Fourth Amendment standards.

## **II. New Questions—The Impact of Pervasive Surveillance on Society's Ability to Engage in Effective Self-government**

While there is strong evidence that surveillance can contribute to a reduction in crime rates (Nieto, 1997), important questions arise as to the long-term effect of pervasive surveillance on society's ability to engage in effective self-government.<sup>4</sup> For purposes of this discussion,

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<sup>4</sup> Theoretical development of this point could be along the following lines. Despite the seductive efficacy of surveillance as a means to providing at least short-term security, surveillance may undermine self-government. The security that surveillance produces may prove temporary as the failure to perpetuate a self-governing citizenry results in failure of the constitutional system. In other words, pervasive surveillance emasculates the sense of dignity, virtue, and self-control upon which constitutional democracy is based. Developing a sound basis for this theoretical formulation would rightly begin with the founders of American constitutional democracy. Benjamin Franklin wrote, "Only a virtuous people are capable of freedom" (Franklin, 1787), and James Madison wrote, in the course of arguing in Federalist No. 39 for ratification of the Constitution, that "all our political experiments [rest] on the capacity of mankind for self-government" (Madison, 1788). In other words, the American constitutional system depends on a populace that by and large governs itself; the panoply of rights afforded its citizens cannot reasonably be maintained if any more than a few citizens abuse them. For example, in criminal law, the investigating, charging, prosecuting, and punishing of criminal defendants in full accordance with all of the substantive and procedural rights set forth in the Constitution would be too expensive and time-consuming if any more than a very small percentage of the population broke the law and became involved in the system. Thus, the system of rights presupposes and depends upon the virtue of the citizenry; conversely disregard and devaluation of rights is antithetical to that very system and its necessary foundation comprised of a vast majority of citizens being virtuous and self-governing. That is to say, one may either be ruled by the invasive and coercive power of the state or else by virtue and self-government. Rights are not merely restrictions on government, nor do they—properly understood—provide license to people to engage in whatever behavior a person selfishly desires, including anti-social behavior; rather, rights ennoble the individual and thus stimulate a sense of responsibility and duty (Brettschneider, 2007). While it is true that decreased surveillance may enable some additional amount of criminality to go undetected and unpunished, fewer people would be naturally inclined to commit crime in a system that respected and fostered the principles of self-government. Additionally, some of those who may at some point commit crime or engage in other harmful behavior would be more readily and efficiently corrected through informal means, for example through the intervention of an ample supply of other virtuous and self-governing citizens surrounding the wrongdoer or even perhaps by self-reform; in a less surveilled and less coercive society, there is room for such growth and transformation. Conversely, in a society with pervasive surveillance, more crime would be detected and formally

self-government is meant the ability of people within a free, constitutional system to voluntarily regulate their own conduct and perpetuate a prosperous society through the expression of self-imposed virtue. Examining the effect of surveillance on self-government is a large and unwieldy topic. However, in one specific area some useful research has been done and is worth reviewing, namely the effect of surveillance in schools.

### *Potential insights gained from studies of the effects of surveillance in schools*

Some limited insight into the effect of surveillance on self-government can be gained from research and analysis that has been done on technological monitoring of children in school settings. While there are inherent limitations in the ability to extrapolate from observations about specific conditions in which youth are educated to conclusions about the effect of surveillance on society more broadly, nonetheless the research represents a worthwhile starting point.

Peter Kelly, in his article, “Growing Up as Risky Business—Risks, Surveillance and the Institutionalized Mistrust of Youth,” published in the *Journal of Youth Studies*, presents research supporting the hypothesis that surveillance in schools sends a message to youth that they cannot be trusted and that the private details of all their activities and interactions have to be monitored and regulated by the authorities, rather than self-regulated (Kelly, 2003). Surveillance, Kelly explains, creates a sense of distrust in youth that undermines their development into adults who are inclined or even capable of constraining their own behavior (Kelly, 2003). Although additional study and research would be necessary before firm and useful observations in this area could be articulated, this research suggests there may be a link between increased monitoring of youth and the undermining of the societal ethic of personal self-control and self-governance as those youth develop into adults and engage the world more broadly.

The National Association of School Psychologists (NASP) has researched this issue as well and published its collective report and conclusions. First, NASP reports that the dramatically increased

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punished, but this short-term goal must be weighed against the long-term cost of a populace whose dignity and of sense of civic virtue are damaged (Chesterman, 2011; Husak, 2008). Further, informal modes of societal correction as well as self-correction will become less likely in a society that is subject to heavy surveillance and formal imposition of criminal sanctions; the conceptualization of public virtue, and even the logistical opportunity for such an ideal to take hold, will potentially be usurped by an increasingly overactive, invasive, and coercive state.

incidence of monitoring of students through technological devices such as security cameras has not proven effective in preventing school violence (NASP, 2013).<sup>5</sup> Indeed, NASP found that increased security measures corresponded with greater incidents of school crime, disruption, and order. (NASP, 2013). Furthermore, and more importantly for purposes of this article, children in schools with higher levels of surveillance demonstrated higher levels of student behavioral and learning difficulties that link “directly to future criminality,” as compared with the levels of such difficulties found in students at schools with less surveillance (NASP, 2013). Caution should be taken that conditions and factors other than the surveillance itself are possible causes in the differing observations; however, NASP asserts that the surveillance itself is part of the problem because it “implicitly label[s] students as untrustworthy”; diminishes students’ sense of their own rights; diverts intervention efforts away from informal means of correcting misbehavior in favor of more formal intervention such as collection of evidence and prosecution in juvenile court; cultivates a sense among the students that they are part of a “street culture”; and even becomes an “enticement to large-scale violence” because of the desire of misbehaving students to have video of their exploits captured and the potential for others to view the same (NASP, 2013).

In his article in the *Harvard Educational Review* “Surveillance Cameras in Schools: An Ethical Analysis” (Warnick, 2008), Bryan R. Warnick explored the use of surveillance in schools, reaching the conclusion that increased reliance on surveillance cameras undermines the goal of developing self-monitoring and self-regulating youth. Jane Brown reached a similar conclusion in her article, “Citizens Fit for the 21<sup>st</sup> Century? The Role of School Design in Facilitating Citizenship and Self-governance in Young People,” published in *Education, Citizenship and Social Justice* (Brown, 2012), although surveillance was only one small part of her discussion of a host of design elements in schools.

As stated above, additional research would be necessary before it could be stated that surveillance has specific, verifiable deleterious effects on students’ development of self-regulating and self-governing characteristics, or that these phenomena in school settings have direct implications for broader society. However, it is reasonable to hypothesize—to ask the question—whether the education of students in such an environment creates a lasting impact. If surveillance subverts

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<sup>5</sup> This runs contrary to conclusions reached regarding the effectiveness of public surveillance in reducing crime in the general population (Welsh and Farrington, 2004).

students' sense of being trustworthy, incentivizes misbehavior, and cultivates a self-image of criminality or "street" ethics, does this create a lasting impact on those students' perceptions and behaviors as they enter the adult world, particularly if that adult world mirrors the educational environment in terms of ever more pervasive surveillance?

## Conclusion

A system such as that created under the U.S. Constitution provides and protects a large measure of freedom and self-determination, but conversely relies upon the citizenry to exercise that freedom with a high level of voluntary control and self-governance. The U.S. Supreme Court's avoidance of granting *certiorari* and deciding cases involving new forms and increased levels of surveillance in society has created an environment in which surveillance has proliferated, unchecked and unguided by any new reinterpretations of old standards or restrictions. The potential, as has been explored to some degree in the limited context of schools, for surveillance to negatively impact people's tendencies and approaches toward self-governance, calls for further analysis in the general population; moreover, this potential perhaps sharpens the view that the U.S. Supreme Court should more forcefully enter into this arena and consider updating the *Katz* standard to effectuate meaningful limitations on surveillance or at least some jurisprudential guidance as to its constitutional use. Some imposition of newly formulated standards by the Court would create an environment in which a meaningful debate could evolve as to appropriate and constitutional surveillance levels and methods (Andrejevic, 2007), replacing the vacuum of legal constraint that has led to the present atmosphere of license and to the rapid, unregulated expansion of surveillance. Law and social science must both play a role in defining the impact and appropriate boundaries of surveillance in a self-governing society.

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# College/University Policies on Social Media and Technology in the Classroom

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## Abstract

*Student-borne technology in the college/university classroom (e.g., cell phones, laptops, tablets) and the use of social media sites such as Facebook by students and faculty raise important questions in higher education. Given the growing popularity of these tools, and the potential challenges associated with their use, this study examined the existence and content of formal policies regarding student-borne technology in the classroom and the use of social media sites in faculty–student relationships. A sample of 98 two- and four-year colleges/universities was drawn randomly from a list of such institutions in the United States. Deans of Students were asked whether the institution had a formal, written policy regarding student-controlled technology in the classroom (i.e., cell phones and laptops/tablets) and communication between students and faculty using social media. Results revealed that formal policies are rare, although informal policies sometimes exist. Implications of advancing technology in higher education are discussed, and the need for explicit policies is considered.*

## Introduction

In the western world, and even in many developing countries, technology is present in virtually every facet of life. Nowhere is the presence of rapidly advancing technology more evident than in today's college/university classroom. Students arrive in secondary and post-secondary school with significant, even lifelong technological experience (Valentine & Bernhisel, 2008). Chalkboards and overhead projectors have given way to smartboards, computer terminals, and LED projectors. In place of pens, pencils, and college-ruled paper, many students now bring laptops, tablets, and other electronic handheld devices to class. Communication between faculty and students, rather than through handwritten notes, printed announcements taped on office doors, and even verbal instruction now occurs largely through electronic means such as e-mail, text messaging, and posting on social media sites. The classroom of the past, where teachers and learners sat together in the same room at the same time, has been replaced in many cases by online courses, podcasts, and remote simultaneous links to monitors and students in numerous locations in the community, within the state, across the country, and even around the world (Purcell et al., 2013).

There is growing evidence that points to the added value of technology to classroom instruction (Tamim et al., 2011). Many teachers and institutions have seen this technological revolution as an opportunity and are taking full advantage of high-tech tools to promote learning and broaden their educational reach (Brill & Galloway, 2007). Assistive technologies for students with disabilities have evolved rapidly (Kelly, 2011). Online and technology-enhanced instruction are common offerings in both secondary and post-secondary education, and students have reacted positively (Fillion et al., 2009; Kirby et al., 2010; Kirkscey, 2012), especially when effective feedback mechanisms are in place (Espasa & Meneses, 2010). Faul et al. (2004) found that knowledge transfer was similar in a web-assisted research methods course to one taught using traditional instruction, and students were more satisfied with the technology-based class.

Others have shown that students in hybrid courses, which blend technology with traditional instruction, had higher midterm, group proposal, and post-test scores than students in a traditional, face-to-face course taught by the same professor (Renfro-Michel et al., 2010). An e-mail introduction to a course by an instructor has been found to enhance student motivation and attitudes (Legg & Wilson, 2009). E-book readers have the potential of consolidating both the volume and the cost of textbooks, although the upfront expense may be a limitation (Foas-

berg, 2011). Hoekstra (2008) found that the use of a Classroom Response System (“clickers”), which allows students to interact with slide show presentations and lectures, had a positive effect on students’ self-reported sense of engagement and involvement, even in very large college classes (see also Hoekstra & Mollborn, 2012).

Popular social media sites, designed to promote and support more general interpersonal relationships, appear to have potential instructional value as well. Wright (2010) described the use of Twitter, a social networking service launched in 2006 that allows users to send and receive brief text-based messages (“tweets”), as a teaching tool in an educational practicum. The small group of students who participated in the study reported that communicating with one another via Twitter enhanced their learning by giving them the ability to rapidly and instantaneously connect with one another and compare their experiences. Junco et al. (2011) reported similar findings using this same technology, with students who used Twitter for educationally relevant activities showing increased engagement and higher semester grade point averages than controls. In a study of a group of Taiwanese college students, Hsiu-Ting and Chi-Yin (2010) found that the use of a social networking tool to supplement traditional classroom instruction enhanced participants’ sense of community and connectedness. Enriquez (2010) studied ways in which tablets, personal computers (PCs), and wireless technology can be used during classroom instruction to engage students, provide real-time feedback, and enhance student performance. Likewise, Rautenbach and Black-Hughes (2012) demonstrated the value of virtual face-to-face computer programs (e.g., Skype, Facetime) in facilitating collaboration between social work training programs in different countries.

Many instructors are inserting themselves into students’ “personal” technologies to promote learning. Skiba (2011) argued that educators need to embrace mobile devices both inside and outside our classrooms. Noting that mobile phones are now ubiquitous among college and university students, Markett et al. (2006) studied the use of short message service (i.e., instructor-managed text messages) to enhance student interactivity in the classroom. Some teachers are using students’ personal cell phones to enhance instruction through podcasts, field notes, web-based scheduling, assigned data collection, and distributing and collecting homework (Stiler, 2007; Trotter, 2009). Scornavacca et al. (2009) described a learning enhancement system that uses the text messaging function of cell phones. A review of current literature on the subject led Fuegen (2012) to conclude that, with thoughtful consideration and planning, mobile devices can be brought effectively into pedagogy at the distance level.

Technologies that are managed by instructors appear to have almost limitless application and positive potential; however, not every educator has enthusiastically embraced high-tech training (Dedman & Palmer, 2011). Furthermore, along with the advantages that technology brings to teaching and learning, there is another side that may be overlooked, which merits serious consideration (Kulesza et al., 2011). Some forms of technology that are common features on college/university campuses present unique and unanticipated challenges and raise new questions about the role and place of technology in the classroom and as means of communication between faculty and students.

Along with potential benefits of technology in higher education, significant concerns remain. The “bells and whistles” of technological tools may, for example, be as much of a distraction to learning as an enhancement. Isaac et al. (2006) discussed the portable nature of cellular phones (i.e., can be used anytime, anywhere) and examined the impact of mobile phones on social situations. They noted that the use of cellular phones can affect both the user and “co-located” individuals who may be bothered by ringing or buzzing phones, overheard conversations, and clicking keys. Vosloo (2009) examined the common practice of using abbreviated and truncated words in text messages and the possible impact on literacy. Others (e.g., Queris, 2009; Trotter, 2009; Shanahan & Kelly, 2012) have raised additional educational concerns related to the growing popularity of text messaging and advances in technology to deliver text messages, including bullying, cheating, sending inappropriate images and messages, and distracted learning.

The possible negative impact of student-borne technologies in the classroom is now drawing greater attention among educators and researchers. For example, although faculty and students indicate that they generally refrain from using cell phones during class, Burns and Loherty (2010) found that students commonly used the text message feature and checked cell phone messages while class was in session. In addition, student and faculty cell phones rang during class time, and both groups identified cell phones as a source of distraction during class sessions. In similar studies looking at the effects of student-borne technologies, college students reported that they commonly used instant messaging (Junco & Cotten, 2011) and social networking sites (Junco, 2012) during class. In both cases, independent use of technology during class time had a negative effect on student engagement and task completion.

Using a sample of 117 university students, Kay and Lauricella (2011) compared the unstructured versus structured use of laptops in the classroom. Unstructured use resulted in students spending significantly less time on-task (note-taking, academic activities) and signifi-

cantly more time off-task (e-mail, instant messaging, games, movies) than structured use. Confirming the negative impact of students' use of technology during classroom instruction, Froese et al. (2012) found that students who sent and received text messages during a quiz lost 30% of the score they earned without the distraction of technology, which was almost exactly what they estimated they would lose under such circumstances.

In addition to the possible negative effects on learning specifically, the use of technology by students during class time for purposes unrelated to classroom activities may be perceived of by instructors as a type of uncivil (i.e., rude) behavior. In a study of 339 university faculty members, texting and using computers/tablets in class for non-academic activities (e.g., e-mail, social networking, general web surfing) was described as a form of student disengagement and a common incivility behavior in modern classrooms (Goodyear et al., 2010).

The use of social media sites also has negative potential when it comes to learning, professional development, and faculty–student relationships. Crittenden and Klepper (2010) discussed how “private” conversations between students about courses, assignments, textbooks, programs, and instructors can easily find their way into more public discussions, with possible and unanticipated negative outcomes for those involved in the conversation and those about whom they speak. Others have warned about the blurry online boundaries between personal and professional life (Chandra & Chatterjee, 2011; Greysen et al., 2010; Russo et al., 2010). In not-so-rare cases, personal communications and pictures posted on social media sites such as Facebook, Twitter, and Instagram depicting spring break antics, practical jokes, and seemingly harmless fun have been viewed by program directors, graduate admissions committees, and prospective employers with career-altering results. While it may be questionable that “what’s done in Vegas, stays in Vegas,” in the virtual world, what’s done online can go anywhere and may never go away.

Even the language of social media use itself can be dubious and problematic. In their study of pharmacy school faculty members, Metzger et al. (2010) discussed the ambiguity of the social media term “friend” and examined the use of Facebook in the context of faculty–student relationships. Fewer than half of the faculty respondents had an active Facebook profile, and most of those who did (79%) said they were not “friends” with current students. However, results of this study raised questions about the nature of online relationships between faculty members and students and highlighted the ambiguous nature of virtual “friendships” (e.g., a natural extension of classroom learning and mentorship; an indication, real or perceived, of favored-student

status; a level of social relationship akin to fraternization). It is clear that technology now plays a central role in higher education and is here to stay as a part of the academic landscape. Furthermore, if the past is any indication, it seems reasonable to assume that technologies will continue to evolve at a rapid pace and increase in both accessibility and complexity. It is also evident that technological tools have significant positive potential as learning and teaching aids; however, along with the good come important questions and concerns that must be considered and addressed. With the growing use of student-controlled technologies (e.g., cell phone, personal computers, tablets) and the popularity of online social media on college and university campuses, management has become a challenging issue.

As formal organizations, colleges and universities manage many of their operations and day-to-day activities through formal institutional policies and procedures that establish a regulatory framework, including lines of communication and an academic “chain of command” from upper administration to individual instructors, and vice versa. Such policies help the college/university advance its mission, align operations, promote efficiency, set behavioral expectations across the system, and manage institutional risk.

In some sectors of campus life, technology is managed explicitly. Libraries and computer labs, for example, have acceptable-use policies in place. Likewise, as Rowe and Brass (2011) have noted, university media offices have policies to manage academic public communication, directing media campaigns, website development and design, campus-wide e-mail systems, and even approved icons for use in communication on letterhead and other printed material that represents the institution.

Given the ubiquitous nature of technology in the world of higher education today, the rapid pace of technological developments, and the advantages and potential problems associated with these tools in the classroom, college and university administration, staff, faculty, and students might well benefit from institutional direction in this area. In their report of policy issues and distance learning, Gellman-Danley and Fetzner (1998) noted: “Asking the tough policy questions in advance can mitigate future bureaucratic problems and roadblocks.... Policies can provide a framework for operation, an agreed upon set of rules that explain all participants' roles and responsibilities” (p. 1). Kelly (2012) argued that institutions should have clear technology and social media policies for both students and staff. Greysen et al. (2010) recommended a proactive approach, wherein users of technological devices and social media tools in higher education are engaged in setting consensus-based standards for technology use and online professionalism. However this



process occurs, formal policies can help institutions, faculty members, and students alike to navigate in a world of rapidly changing technology (Joslyn, 2010). Having seen in her own undergraduate classroom the potential of students' personal laptops becoming a distraction from learning rather than a service to it, McDonald (2012) concluded that policies on laptop use should be stated clearly in the course syllabus.

### *Research questions*

This exploratory study sought to answer two specific research questions related to technology in the college/university setting. First, to what extent do colleges/universities have formal policies in place regarding student-borne technologies, such as cell phones and laptops/tablets, in the classroom? Second, to what extent do colleges/universities have formal policies in place regarding the use of social media sites in campus relationships, primarily those between faculty members and students?

## **Method**

### *Participants*

The sample for this study was drawn from separate lists of community colleges and universities in the United States, developed and maintained by the University of Texas at Austin ("U.S. Community Colleges by State,"  $N = 1,089$ ; "U.S. Universities by State,"  $N = 1,050$ ). Institutions on each alphabetically arranged list were numbered to facilitate a random selection process. For this sampling pool, 50 schools were drawn randomly from each list, representing 4.7% of the overall number of institutions. Though somewhat small, this sample was a manageable size, provided a fair representation of the overall sampling frame, and was believed to be adequate for this study, which was primarily exploratory and descriptive in nature and involved no inferential analyses.

A research assistant then attempted to locate an e-mail address for the Dean of Students, an administrative position common at U.S. colleges/universities. Although specific responsibilities may vary from one school to the next, this is typically a high-level, executive position directly involved in policy making and enforcement at the institutional level, particularly related to student conduct. As such, the Dean of Students was thought to be the ideal contact for this study. If such a position did not exist at a selected institution, the research assistant sought to identify a comparable administrator thought to be familiar with the

institution's formal policies and procedures, such as Provost, Vice-Provost, or Director of Student Affairs. If contact information was unavailable for a particular school, that institution was deleted from the list and another was selected at random to replace it. A similar process was employed when an e-mail was automatically returned or rejected as undeliverable. A final sample of 98 schools—49 community colleges and 49 four-year colleges/universities—was used as the sample for the purpose of analysis in this study.

In total, responses were received from representatives of 44 schools (45%). Responding institutions represented all regions of the United States, with sizeable minorities within the North Central Association accrediting region (36.4%,  $n = 16$ ) and the Southern Association accrediting region (29.5%,  $n = 13$ ). Four-year colleges/universities and community colleges were fairly evenly represented (45.2%,  $n = 19$  and 42.9%,  $n = 18$ ). The remainder either did not provide an institutional description ( $n = 2$ ) or identified as a seminary, divinity college, Christian college, technical college, or technical/liberal arts college. In addition, 14.3% of respondents indicated that their institutions offered graduate courses of study (e.g., MS/MA, JD, PhD, MD). Schools ranged in size from 130 to 35,000 enrolled students, with a mean of 5454.39.

### *Materials and procedure*

Data collection for this study involved a simple, eight-item, online questionnaire. The survey included three questions about the institution itself (region, size of student population, and type of school) and three questions regarding technology policies (Does your institution have a formal, written policy regarding student use of laptops/tablets in the classroom? Does your institution have a formal, written policy regarding cell phones in the classroom? Does your institution have a formal, written policy regarding communication through social media [e.g., Facebook, MySpace, etc.] between faculty and students?). To these three items, respondents could indicate “yes,” “no, but there is an informal, verbal policy,” or “no.” If the response to any of these items was “yes” or “no, but there is an informal, verbal policy,” the subject was asked to explain the policy in a textbox that was provided for this purpose. An additional item was included requesting a link to formal policies referred to in any of the three preceding questions and a space was provided for respondents to leave an e-mail address if they were interested in a summary of the results.

A link to the survey was delivered to the identified institutional representative in a personally addressed e-mail, which explained the

purpose and nature of the study and how to participate. A follow-up e-mail was sent to all prospective participants two weeks after the initial communication, thanking those who had responded and encouraging those who had not to do so. A similar follow-up message was sent six weeks later as a final effort to solicit participation. Two weeks after the second reminder, data collection was deemed to be complete, at which point responses were compiled and analyzed.

## Results

As Table 1 shows, overall, few schools represented in this study had formal written policies regarding student-borne technology in the classroom or communication through social media between faculty members and students. Regarding student use of laptops/tablets in the classroom, only 7.2% of respondents ( $\underline{n} = 3$ ) indicated that a formal institutional policy existed. An additional 23.8% ( $\underline{n} = 10$ ) noted that there was an informal, verbal policy. Descriptions of these informal guidelines suggested that the establishment of such policies was typically left up to individual faculty members, with specific expectations

<b>Table 1. Percent of institutions with formal policy, informal policy, or no policy regarding student use of laptops/tables, cell phones, and communication with faculty through social media</b>			
<b>Does formal policy exist?</b>			
<b>Technology</b>	<b>Yes</b>	<b>No, but informal policy</b>	<b>No</b>
Laptops/ Tablets ( $\underline{N} = 42$ )	7.1% ( $\underline{n} = 3$ )	23.8% ( $\underline{n} = 10$ )	69.0% ( $\underline{n} = 29$ )
Cell Phones ( $\underline{N} = 43$ )	11.6% ( $\underline{n} = 5$ )	41.9% ( $\underline{n} = 18$ )	46.5% ( $\underline{n} = 20$ )
Social Media ( $\underline{N} = 44$ )	18.2% ( $\underline{n} = 8$ )	15.9% ( $\underline{n} = 7$ )	65.9% ( $\underline{n} = 29$ )

discussed on course syllabi. One respondent noted that a more general policy dealing with computer and network usage, spelled out in the institution's Rights and Responsibilities of Students, was believed to be

applicable to this issue. The remaining 29 respondents (69.0%) said that there was no policy, formal or informal, related to student laptops/tablets in the classroom.

A slightly higher proportion of schools (11.6%,  $n = 5$ ) reported that formal policies were in place to manage student cell phones in the classroom. A sizeable minority (41.9%,  $n = 18$ ) indicated that informal, verbal policies existed. Here again, such policies were often left to the discretion of individual faculty members. The typical policy, whether formally set by the institution or informally defined by faculty members, prohibited the use of cell phones in class. One specific example of a written policy related to cell phones in class combined a formal restriction with instructor discretion: "Disruption from electronic communication devices such as cellular telephones and pagers will not be tolerated in class. Use of electronic communication devices by students in the classroom is up to the discretion of the instructor." Whether this applied to all types of cell phone use (verbal conversations, texting, instant messaging, using Internet features on smartphones, etc.) or was specific to traditional telephone calls was unclear. Still, nearly half of respondents (46.5%,  $n = 20$ ) reported that no policy existed.

Communication between faculty members and students through social media received even more attention in formal institutional policy. Eight schools (18.2%) indicated that formal policies were in place regulating this form of faculty-student interaction, with an additional seven (15.9%) stating that informal, verbal policies exist. One respondent noted a clear expectation that "students will use institution-provided e-mail for official communications," presumably with faculty members. However, based on comments left by respondents, it is possible that such policies are more generic than specific. For example, one respondent stated that the institution's policy only pertained to "conduct online that would violate community standards or HR policy." Another referred to a statement in the Student Handbook that addressed general values that might apply to online interaction between faculty members and students. While 65.9% ( $n = 29$ ) indicated that no policy was in place related to this issue, several recognized the need for clearer and more specific guidelines, indicating that discussions and/or policy development was in process.

## Discussion

Technology is a universal fixture on today's college and university campuses. Students use desktop and portable devices to study, complete assignments, register for classes, and communicate with friends, classmates, and their instructors. Institutions use technology to

deliver course material to students off-campus and in remote locations (Purcell et al., 2013). In the classroom, instructors use a wide variety of technologies to enhance teaching and facilitate learning (Hoekstra; 2008; Legg & Wilson, 2009; Skiba, 2011; Stiler, 2007; Trotter, 2009; Wright, 2010). The added value that technology can bring to higher education is evident (Fuegen, 2012; Tamim et al., 2011).

Along with the benefits, however, educators and administrators are finding that rapidly advancing technologies can have a negative impact as well. Technologies that are controlled by students, such as cell phones, laptop computers, and tablets, can be disruptive to the learning environment (Burns & Lohenry, 2010; Kay & Lauricella, 2011; McDonald, 2012). Similarly, the distinct roles of teachers and students, and the rules that govern relationships between the two in the classroom, can be less clear in the virtual world of social media (Metzger et al., 2010).

As the presence of technology in higher education continues to grow and technological tools become more accessible, sophisticated, and complex, institutional management of these devices can serve to harness the advantages, at the same time anticipating, preventing, and controlling the potential negative impact. As technology becomes an increasingly prominent fixture in higher education, however, results of this study suggest that institutional policies designed to address these issues are rare. For example, slightly more than half of respondents indicated that their institution had some sort of policy regarding cell phones in the classroom, though very few of these guidelines were formalized. Likewise, schools that had written policies regarding faculty–student communication through social media and the use of laptops/tablets by students in the classroom were a small minority.

As a result, college and university faculty and students have little formal direction on these technology issues, a situation that seems to be fairly common. In a study of medical school policies related to technology, Kind et al. (2010) found that 10.2% of the programs they surveyed had formal written guidelines or policies that specifically mentioned faculty–student communication via social media. Even when such policies do exist, they are often vague (e.g., “use institution-provided e-mail to communicate”; students will not engage in conduct that “would violate community standards or HR policy”), with decisions regarding student-borne technology and the use of social media left to the discretion of individual faculty members (e.g., “a faculty member can choose to include such direction on course syllabi”). This is also consistent with the findings of Kind et al. (2010), where only 4% of policies were explicit about what was forbidden, inappropriate, or impermissible and

5% were vague encouragement of thoughtful and responsible social media use.

It is clear from results of this study, and others previous to it, that faculty members are often left to themselves to decide how to manage technology, either by explicit policy direction that allows individual faculty control, or by the absence of formal policy altogether. It is also plausible that faculty members develop and implement their own policies related to these technology issues, formally or informally, even when an institutional policy is in place. Extending this study to an analysis of classroom policies would shed additional light on how portable and communication technologies are managed in higher education at the point of use.

The lack of institutional direction and support in the form of formal policy is troublesome on some levels and may leave faculty members ill-equipped to deal with controversies or disagreements between themselves and their students about the role and place of technology. Malesky and Peters (2012) found that disagreement exists among faculty members, as well as between faculty and students, as to what constitutes appropriate professor–student interaction through social networking sites. Regarding cell phones, which are brought to the college classroom by 95% of students (Tindell & Bohlander, 2012), Baker et al. (2012) found that students differed markedly from faculty regarding in-class use of technology. The fact that communication features of these devices are reportedly used during exams (Tindell & Bohlander, 2012) is yet another concern about their management. The potential for students' personal laptops or tablets to become a distraction has also been noted (McDonald, 2012).

Policies exist in higher education environments regarding all sorts of operational issues from institutional structure (e.g., organizational breakdown, division of programs and departments, academic calendars), to faculty expectations (e.g., faculty participation in governance, hiring practices, tenure and promotion guidelines, etc.), to student conduct (e.g., admissions requirements, behavioral codes, appeals processes, etc.). Among other objectives, these formal guidelines help maximize efficiency and minimize conflict.

According to results of this study, policies regarding technologies on campus and in classrooms are minimal. Kelly (2012) argues that institutions should have clear technology and social media policies for both students and staff. Similarly, Joslyn (2010) has suggested that formal policies can help institutions, faculty members, and students alike to navigate in a world of rapidly changing technology. With technology advancing so rapidly and its role on college/university campuses expanding dramatically, a more proactive approach to policy

development in this regard, giving faculty and students more explicit direction regarding student-borne devices in the classroom and the use of social media tools in faculty-student relationships, would seem to be an appropriate, if not necessary response (Greysen et al. 2010). Asking the tough policy questions now at the institutional level can help colleges and universities avoid even greater problems in the future by providing a clear framework for operation and a set of rules and expectations that define the roles and responsibilities of faculty members and their students (Gellman-Danley & Fetzner, 1998).

### *Limitations*

Although the outcome of this study was not surprising, and results are consistent with what others have found, these findings must nevertheless be interpreted with caution. While the sample was drawn randomly from two fairly comprehensive lists of community colleges and four-year colleges/universities, the small size and the somewhat low response rate limit the ability to generalize findings beyond the institutions that participated. Because the policy questions in this questionnaire required a yes, no, or qualified no answer, it is conceivable that potential respondents who did not know if such a policy existed at their respective institutions simply chose not to return the survey, thus skewing the results. This seems unlikely, however, given the academic and intellectual orientation of participants in this study and the ease of accessibility to such information (i.e., colleges/universities are generally high-tech environments, and institutional policies and procedures are typically available and searchable online). Furthermore, although responses were submitted anonymously, the self-report nature of the questionnaire carries with it possible social desirability factors and the potential for a biased or distorted view of higher education policies related to technology issues. This is compounded by that fact that few specific examples of policies were offered by respondents, in large part because few existed. Nevertheless, results were enlightening and insightful, and provide a good foundation for further exploration of these issues.

### **Conclusion**

The lack of formal policies regarding student-borne technology in the classroom and the use of social media as a means of communication between faculty members and students leaves instructors and class members with little formal direction about technology use in a higher education setting. Faculty members are left to develop and implement such policies on their own, if they even choose to address these issues

explicitly. As a result, students may be confused about the rules, where something that is allowed in one class or by certain instructors is prohibited in other circumstances, and enforcement of individualized faculty policies may appear capricious, inconsistent, or unfair.

Perhaps, as Meloy (2011) has suggested, the entire issue of technology in higher education may simply be too big to monitor. Technology and social media tools, which seem to change in form and sophistication almost daily, may be beyond the ability of individuals or institutions to track, monitor, and manage. Or maybe, as Charles (2012) contends, such issues provide an ideal opportunity for teachers and their students to use logic and the critical thinking skills educators often hope to instill in learners to negotiate rules and boundaries related to technology.

The rapid evolution of technology and the central role it plays in higher education would seem to require the process of policy development related to these issues to be more overt and explicit. What devices and activities are allowable in the classroom when it comes to student-borne and student-controlled technology? How are relationship boundaries in the virtual world of social media similar to and different from those that guide face-to-face interaction between teacher and student? Are the rules flexible? Are guidelines contextual? Are there times, situations, or circumstances where there may be exceptions to the rules? Given that much of the technology that finds its way into the classroom is in the hands and control of students who “own” their devices, should instructors give in to student demands? Or should students expect to have to acquiesce to rigid, authoritative rules about technology use imposed in the classroom by the teacher? Incorporating student-borne technology into pedagogy may be one way to facilitate the management of these issues.

The purpose of this study was to document, in light of rapid advances of technology and its ever-growing presence in the higher education learning environment, the extent to which formal policies exist to guide institutions, faculty members, and students in the use of student-borne technologies and social media. Results of the study confirm that institutional policies have not developed as rapidly as the technologies themselves. In addition, important questions remain unresolved. How such policies develop (i.e., are they reactionary or anticipatory?) and how they are enforced are questions left unanswered by this study and seem worthy of further investigation. Future research should also assess the impact of policies that do exist to better understand their value in managing the use of student-borne technologies in the classroom and social media in the broader virtual world where faculty and students interact. A more detailed analysis could also help



identify “best practices” in college and university policies related to these and other technological developments that are so common on today’s campuses and provide a framework for addressing technological advances that are sure to come.

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# Wildcat Nation: Open to Diversity?

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## **Abstract**

*An abundance of research has been conducted on diversity and its impacts on higher education. Because college campuses increase the opportunity for students to engage in interactions that challenge their beliefs toward diverse issues, such as race, gender, sexual orientation, and religion, it becomes important to identify whether these experiences produce meaningful impacts on student's satisfaction with college and toward their overall growth. The purpose of the current study is to determine Weber State University students' level of openness to diverse interactions. This study attempts to identify the underlying factors that contribute to a student's willingness to participate in such experiences. The instrument was comprised of two sections of the College Student Experience Questionnaire along with 21 demographic questions. This was used in assessing the individual respondent's demographics compared with the scales with openness and experience. Although there was not a significant difference among class ranks, or between traditional and non-traditional students, Weber State University students are generally open to diversity. Yet, while the students are*

*open to diversity, they lack experience with interacting with diverse people and situations.*

Diversity is an important topic in colleges across the nation. The concept of diversity encompasses acceptance and respect. It means understanding that each individual is unique and making an effort to recognize individual differences, such as race, ethnicity, gender, sexual orientation, socioeconomic status, age, physical abilities, religious beliefs, political beliefs, or other ideologies (Queensborough Community College, n.d.). Colleges select students and award scholarships seeking to have a diverse population (Pascarella et al., 2001). Many researchers have linked experiences with diversity with students' ability to critically think (Pascarella et al., 2001). Giving students more experiences with diversity and trying to encourage their openness to diversity may also help minority and oppressed groups have more opportunities and experience less discrimination. With diversity being so important, it is valuable to know whether Weber State University (WSU) students have an open mind toward diverse populations, and what kinds of groups may struggle or be close minded towards diversity. The purpose of this study is to grasp a starting point of where WSU students fall on the spectrum of open-minded to close-minded. We also seek to understand what experiences, classes, and other demographics can lead to more openness to diversity.

## **Review of the Literature**

To gain greater understanding on the topic of diversity among college students, it was necessary to look at other studies that have been done on similar topics. This review of the literature will focus on how diversity plays a role in increasing cognitive growth, the social impact of diversity, and religious impact of diversity.

### *Increasing cognitive growth*

A study that suggested the importance that a diverse student body has on cognitive growth was performed by Pascarella et al., (2001). Estimating the impact that diversity experiences would have on critical thinking, the authors used a sample of undergraduate students among 23 colleges, obtained from the National Center on Education Statistics Integrated Postsecondary Education Data System in YEAR. The sample consisted of 18 four-year colleges and 5 two-year colleges that were selected to represent the various types of available institutions, such as



private, public, liberal arts, and historically Black colleges. These students were asked to participate in lengthy, compensated experience questionnaires and critical skills tests at the end of freshman and junior year.

In comparing the results between the student's first and third year experiences, several indications supported the positive growth in critical thinking skills among the students (Pascarella et al., 2001). For instance, there was a significant positive influence when students engaged in experiences such as discussing social problems or political positions with students of another culture or country. Other experiences, such as participating in diversity courses and making friends of another culture or country, were only shown to be positively related to growth during the first year of college. This shows that the initial growth and understanding largely occurs during the student's first year. The study is applicable to our study because it placed importance on interacting with those who have different perceptions or come from another country, which provides significant insight about student's experience with diversity.

### *Social impact*

In a study conducted at the Kansas State College of Agriculture, Barkley et al. (2005) attempted to explore the students' openness and experience with diversity. A sample, consisting of 724 students, was obtained through the Kansas State Online Survey System. Independent variables, such as the student's gender, size of his or her hometown, and outside work experiences, the amount of credit hours enrolled in, and the desire to obtain an advanced degree, were defined to determine the dependent variables of openness and experience. The authors then administered an online survey, which was posted through the Kansas State system.

By utilizing a regression analysis to analyze the data, the authors were able to gain significant insight that indicated a need for the college to increase diversity awareness and inclusion within the Department of Agriculture. For instance, freshmen and sophomore students were shown to have less experience and understanding with diverse members on campus. Many students also expressed openness to diversity, especially those seeking advanced degrees and those who were not employed. This study provided interesting insight into college student's experience with diversity. Furthermore, the study contained a reliable survey, the College Student Experience Questionnaire (CSEQ), which was used in the current study to measure students' openness and willingness to engage in diverse experiences.

The purpose of the study by Hu and Kuh (2003) was to identify the relationship between diversity experiences and college students' personal development. The authors took their sample from 53,756 students. The students all took the CSEQ between 1998 and 2001. The students were from 124 different colleges and universities. Seventy-seven percent of the students were white. Sixty-three percent were female. Ninety-four percent were traditional students, and 45% were in their first year of college (Hu & Kuh, 2003).

The independent variables in this study were individual characteristics such as race, gender, and age. The dependent variable in the study was the score on the interactional diversity scale. The results found that white non-traditional students majoring in pre-professional fields had less experience with diversity than non-white traditional students (Hu & Kuh, 2003). This relates to our study because WSU has a greater percentage of its students that are non-traditional students and the article could draw important contrasts.

### *Religious influence on involvement*

Schreiner and Kim (2011) conducted a study that addressed Christian colleges. The purpose of the study was to evaluate the involvement of students on campus activity, whether they are becoming more self-identified by being on campus and involved in activities, and to identify the students' outcomes of being involved in the institution. The sample was obtained from colleges that were members of the Council for Christian Colleges and Universities (CCCCU), from which 3,501 students were surveyed. Of these, 34.4% were male and 65.3% were female, while 0.3% chose not to identify with a gender. Furthermore, 88.7% were white, 2.9% were African American, 3.6% were Asian American, 4.8% were Latinos, and 2.8% were another race. The major concepts in the study were student input characteristics or how involved they were on campus and student background characteristics. The independent variables were the preexisting levels of outcomes and the college experience. The dependent variables were self-esteem, interpersonal ability, and social awareness. The method of data collection involved three questions to be answered. The survey questions helped fit into the following categories: the extent of the changes that occurred from year one to four, involvement on campus, and the personal change over the years.

Schreiner and Kim (2011) found that the positive changes of the person over the college experience were higher than those of the national average. The positive changes indicated that the students studied more and were more involved with the professors; however, the stu-

dents were less likely to study a diverse curriculum compared with those included in national studies. This study helped open up a new outlook for our research group's study. A large proportion of the population in Utah is affiliated with The Church of Jesus Christ of Latter-Day Saint (LDS). This study helped show that someone's religion could possibly affect a person's outcomes in college, but also their involvement in diverse studies.

### *Hypotheses*

In reviewing and comparing the literature, several hypotheses were developed to describe the responses our group expected to find from students at WSU:

1. Students at WSU are open to diversity
2. The more education completed the more open to diversity a student will be.
3. The more education completed the more experiences a student has with diversity.
4. There is a difference between traditional and non-traditional students with regards to experiences with diversity.
5. There is a difference between traditional and non-traditional students with regards to openness to diversity.
6. There is a difference between religions with regards to experiences with diversity.
7. There is a difference between religions with regards to openness to diversity.

## **Methods**

### *Measurement*

A cross-sectional survey design was utilized to reach as many respondents as possible. To measure the two dependent scales, our study utilized the CSEQ. The openness scale consisted of seven questions that were used to portray the student's attitudes and beliefs toward diversity. It was rated on a scale of one to four, with an answer of "one" meaning never, and an answer of "four" meaning very often. The questions are listed in the Appendix A. The willingness scale also consisted of seven questions and was used to depict the student's tendencies toward engaging in diverse experiences. The responses were measured on a Likert scale, which included a range of numbers, one through five. An

answer of “one” meant strongly disagree, and an answer of “five” meant strongly agree. This scale indicates the amount of agreement or disagreement the student has with the question or statement (Gonyea et al. 2003). The questions are also included in Appendix A.

The instruments used to measure the dependent variables were selected for several reasons. To avoid “reinventing the wheel,” the CSEQ was chosen for its proven value, Chronbach alpha .893, indicating an acceptable level of reliability (Hu & Kuh, 2003, p. 393). Furthermore, the Likert scale is a beneficial tool that was selected to help explain the contributing factors, or independent variables, that may affect the scales of openness and willingness.

Twenty-one demographic questions used to measure the independent variables were also selected for several purposes. For instance, several variables, such as the student’s age, ethnicity, sexual orientation, potential disabilities, religion, employment, and where the student grew up were selected to obtain a basic background of each individual. Other variables, such as the student’s major or class standing, were important to see how different majors view diversity, and whether college experience has influenced these views over time. The survey also contains questions about international, traditional, and non-traditional students. WSU defines a non-traditional student as being 25 years or older, married, divorced, widowed, or a parent (WSU, 2013). These questions were essential to distinguish the differences in openness and willingness to engage in diversity between the types of students. To view the complete diversity survey tool, see Appendix A.

### *Sampling*

A non-probability sample of available subjects, our study consisted of undergraduate students, ages 18 years and above. By posting a link to the Weber State Online Portal, the students were given access to the online survey for two weeks and four days. The link was also posted to social media sites, such as the WSU Facebook page, Twitter, and Google Plus. All of the prompts provided a brief description of the purpose of our study, and the instructions on how to complete the survey. The prompts also indicated several incentives for the student’s participation. For instance, the first 15 students automatically received a \$15 gift card to the Weber State Bookstore. Moreover, all participants were entered into a drawing to win a \$25 gift card, also to the bookstore.

Although using a sample of available subjects is often considered to be effective, it is important to discuss its advantages and disadvantages. Non-probability samples are effective because they are “usually

less expensive than other methods, and because other methods may not be feasible for a particular type of study or population” (Rubin & Babbie, 2011, p. 171). This is especially true for the current study, as we have limited funds and available avenues for accessing such a large population of students. However, reliance on this type of sampling also has several weaknesses. For instance, some students have limited access to computers. This may introduce potential biases into the study, because it may reduce the number of respondents that are able to complete the survey. The introduction of incentives may also produce bias because of the influence of the student’s true motive in obtaining a gift card, instead of providing thoughtful responses (Rubin & Babbie, 2011).

## Results

A total of 306 persons responded to the questionnaire. Twenty responses were omitted for incomplete surveys or because the respondent was younger than 18 years. After cleaning the data, we used several methods to analyze the demographics with the scales of openness and experience.

### *Descriptive statistics*

From the survey, several basic characteristics were distinguished. For instance, a majority of the respondents were female (65.4%), followed by male (33.9%), then by those who identified themselves as transgender or intersex (0.7%). Most identified with a heterosexual orientation ( $n=265$ ), while others identified with the lesbian/gay/bisexual/transgendered (LGBT) orientation ( $n=14$ ), or were unsure or questioning ( $n=5$ ). The average age of individuals in the sample was 25.65 years ( $SD=7.56$ ). This is comparable to WSU’s total student population, in which most students (31%) are between the ages of 22 and 29 (Department of Institutional Research at Weber State University, 2012). Responses indicated that students were most commonly associated with the Church of Latter Day Saints ( $n=141$ ), and that many others did not associate with a particular religion ( $n=52$ ). Respondents also commonly reported living with a spouse, partner, or significant other and had a household income between the ranges of \$10,000 to \$19,999. Lastly, most of the sample (64.7%) reportedly grew up in Utah and came from a traditional family upbringing (76.9%).

Several school-based characteristics were also distinguished from the survey. For instance, the sample was fairly representative between class ranks, in which 24.5% were freshmen, 21.3% were sophomores, 19.9% were juniors, 25.9% were seniors, and 8.4% were graduate stu-

dents. The representation between the types of students was also comparable, with 140 traditional students and 146 non-traditional students. Next, our group found that most of the students attended the College of Health Promotion and Human Performance (21%), the College of Arts and Humanities (19.2%), and the College of Social and Behavioral Sciences (17.8%). A smaller amount of students were completing their education in Business and Economics (9.1%), Applied Science (8%), Bachelor of Integrated Science (7.3%), Masters programs (7%), Science (5.9%), or Education (4.5%). It is also important to note that a majority of students attended the Main Campus ( $n=243$ ), followed by online courses ( $n=20$ ), then the Davis Campus ( $n=19$ ), and other WSU locations ( $n=2$ ).

### *Analysis of the hypotheses*

The hypothesis of whether WSU students were open to diversity was tested first. To examine this, the overall scores of openness and experience were calculated. The openness scale mean was 27.71 ( $SD=4.61$ ) out of a total possible score of 35. As openness used a Likert scale ranging from one to five, the group found that the average response to each question was about 3.96. Comparing this average with a possible neutral response, in which the respondent answered 3 to each question receiving 21 out of 35, the response of WSU students was statistically significantly higher,  $t(285)=24.652$ ,  $p=0.000$ . The mean of the experience scale was 17.13 ( $SD=4.19$ ) out of a total possible score of 28. Experience received an average response of 2.45 on the Likert scale, which ranged from one to four. When comparing the average to a neutral response, the response of WSU students was statistically significantly higher,  $t(285)=12.630$ ,  $p=0.000$ .

Next, the hypotheses regarding the amount of education completed were compared with the scales of openness and experience. With openness, there was no statistically significant difference between class ranks,  $F(285)=0.691$ ,  $p=0.599$ . There was also no statistically significant difference with experience between class ranks,  $F(285)=1.436$ ,  $p=0.222$ . The hypotheses regarding the differences between traditional and non-traditional students were compared with openness and experience. The mean for traditional students was 27.64 ( $SD=4.44$ ), while the mean for non-traditional students was 27.78 ( $SD=4.78$ ). Comparing these scores with the openness scale, our group found no statistically significant difference between the types of students,  $t(284)=-0.253$ ,  $p=0.801$ . The group also found no statistical significance with the experience scale between traditional and non-traditional students,  $t(284)=0.857$ ,  $p=0.392$ . For the four main hypotheses, we found that

WSU students are open to diversity, but there was no significant relationship among class ranks or between traditional and non-traditional students with openness to and experience with diversity.

### *Other analyses*

After analyzing the hypotheses, we decided to compare other relationships with the openness and experience scales, such as religion. Religion was collapsed into three prominent groups: LDS, other, and none. The group “other” contained religions such as Protestant, Christian, combination, and other. “None” included those that identified with the categories of Atheist, Agnostic, and none. An ANOVA showed that there was a significant difference in openness among the religions, so we conducted a post-hoc test and found that the significance was between groups,  $F(2)=6.559$ ,  $p=0.002$ . Furthermore, when comparing openness between LDS students and those affiliating with other religions, LDS students had a lower score ( $M=-1.896$ ,  $p=0.012$ ). LDS students also had a lower score than those with no religion ( $M=-2.041$ ,  $p=0.007$ ). When comparing religion to experience, LDS students had a lower score than other religions ( $M=-2.508$ ,  $p=0.000$ ). A similar significance level was found in the difference between LDS students and those with no religion ( $M=-2.086$ ,  $p=0.001$ ).

We also evaluated openness and experience based on whether the respondent grew up in Utah. The mean for students that did grow up in Utah with the openness scale was 27.66 ( $SD=4.03$ ), while the mean for those that did not was 27.74 ( $SD=5.55$ ). There was no statistically significant difference between those that grew up in Utah and those that did not in regards to openness to diversity ( $t(282)=-0.135$ ,  $p=0.882$ ). The mean for students that did grow up in Utah with the experience scale was 16.73 ( $SD=4.12$ ), while the mean for those that did not was 17.82 ( $SD=4.20$ ). There was a statistically significant difference between those that grew up in Utah and those that did not in regards to experience with diversity ( $t(282)=-2.107$ ,  $p=0.036$ ).

## **Discussion**

The results provided several implications to our study with diversity. It seems that students are generally open to diversity; however, they do not have a great deal of experience with it. The lack of experience with diversity may be attributable to several reasons. For instance, each student must complete a diversity course as a part of the general education requirements. The problem then may lie within the “diversity” of the diversity courses being offered. Some courses address contemporary issues of diversity, which compel students to either adapt to

or reconcile with the perspectives of others, similar to Bowman and Brandenberger's (2012) study. As students are still forming critical aspects of their social and personal identities as an undergraduate, such challenges to their beliefs provided lasting impacts on attitudes and values. Other types of diversity courses that do not incorporate such material, however, tend to be more popular. For instance, Dance 1010 offers a look into different cultures through documentaries, but the course does not provide actual experience or discussions with those cultures.

Another problem is that many college majors do not require additional diversity courses beyond the one general education course requirement. Such minimal requirements limit the amount of exposure to diverse views that the students receive. This may account for there being no statistically significant difference between class ranks, for students' perspectives are not being challenged. An additional circumstance that is unique to WSU is that it is known for being a "commuter campus," in which most students live off campus and only commute to attend classes. This limits their experience with diverse groups, as they are not participating in extracurricular activities or clubs. According to Fischer (2008), participation in extracurricular activities plays a vital role in fostering meaningful interactions and developing interracial friends. This may account for there being no significant difference between traditional and non-traditional students, for both groups lack participation.

Religion also had a significant impact on openness and experience with diversity. The results indicated that a majority of the students identified with the LDS religion, which makes WSU's campus less diverse. Moreover, many LDS members are influenced to develop relationships and friendships of the same faith. An emphasis on intra-faith interaction fails to challenge one's perceptions. It also hinders participation in diverse friendship groups and clubs. This may ultimately explain why LDS members have less openness and experience with diversity compared with those involved with other religions or those with no religious affiliation.

Another factor that had an influence on openness and experience was whether the respondent grew up in Utah or not. Like WSU, the state of Utah is mostly of the LDS faith. Again, this means that the state is less diverse in its perceptions and interactions. In theory, a student that travels to Utah from another state may receive more exposure to diversity because it could be an environment very different from his or her own. This may explain why those that grew up in the state of Utah have significantly less experience with diversity than those that did not.



## *Limitations*

There were several limitations to our study. As the survey was only available for a short period of two weeks and four days, there was a small number of participants. It would have been more beneficial to offer the study for a longer amount of time to include a broader range of WSU students. The time in which we chose to offer the survey may have also affected the amount of respondents in the study. In fact, the survey was posted right after students returned from Spring Break. This can be a particularly difficult time to obtain participation, as many students return to classes begrudgingly, while others are focused on catching up on their studies. It is also important to note that the survey had limited accessibility because it was only offered online. Students that do not own or do not have easy access to a computer would have difficulty completing the survey. Other limitations with our study would be the integrity of the respondents. Students may have answered questions in a way that makes them look better or viewed themselves as better than they really are.

## *Future studies*

For future study, it would be beneficial to conduct a longitudinal survey to measure openness and experience with diversity over a four-year period. This study would incorporate exams similar to the use by Pascarella et al. (2001) of the Collegiate Assessment of Academic Proficiency (CAAP) and the American College Test (ACT). The exams would be given at the beginning of freshman year and at the end of senior year. Compared with the openness and experience scores, the measure of cognitive growth would show whether the diversity that WSU offers truly fosters positive student outcomes. It may also be useful to offer the survey in paper form. This would provide those with limited access to computers with a viable opportunity to complete the survey. In return, the additional responses would provide the future researcher with more insight into both developmental growth and attitudinal change from diverse environments. A future longitudinal study could be conducted to explore openness and track how it changes over the course of a college career.

## **Conclusion**

By deciding hypotheses, measuring the samples, and conducting our survey, we were able to compare WSU students using the scales of openness to and experience with diversity. We found that WSU students are generally open to diversity. We also found that factors such as

class rank and whether a student was a traditional or non-traditional student did not play a significant role in their openness to and experience with diversity. We did find that people who grew up in Utah had less experience with diversity. Also, those who reported LDS as their religion were less open to and had less experience with diversity. It would be beneficial for future studies to conduct a longitudinal study to observe whether diversity courses have positive effects on students.

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## Appendix A. Survey Used

Please indicate (using 1. Strongly Disagree. 2. Disagree. 3. Neither Agree nor Disagree. 4. Agree. 5. Strongly Agree):

1. I enjoy having discussions with people whose ideas and values are different from my own
2. The real value of college education lies in being introduced to different values.
3. I enjoy talking to people who have values different from mine because it helps me understand myself and my values better.
4. Learning about people from different cultures is very important part of my college education.
5. I enjoy taking courses that challenge my beliefs and values.
6. The courses I enjoy the most are those that make me think about things from a different perspective.
7. I enjoy courses that are intellectually challenging.

For the following set of questions, think over your current college experience. On average, how often (1. Never, 2. Occasionally, 3. Often, 4. Very Often ) have you:

1. Become acquainted with students whose race or ethnic background was different from yours
2. Become acquainted with student from another country.
3. Had serious discussions with students whose philosophy of life or personal values were very different from yours.
4. Had serious discussions with students whose political opinions were very different from yours.
5. Had serious discussions with students whose religious beliefs were very different from yours.
6. Had serious discussions with students who race or ethnic background was different from yours.
7. Had serious discussions with students from country different from yours.

Demographic Questions:

1. What is your class standing?
  - Freshman
  - Sophomore
  - Junior
  - Senior
  - Graduate Student
2. Which college is our program of study in (Drop down menu), what is your major (Drop down menu)?
3. Are you a traditional or non-traditional student (Weber State University defines a non-traditional student as being twenty-five years or older, married, divorced, widowed, and/or a parent)?
  - Traditional student
  - Non-traditional student
4. If you are a non-traditional student, is this your first college experience?
  - Yes
  - No
  - I'm a traditional student
5. Are you employed?
  - Yes
  - No
6. If you are employed, how many hours a week on average do you work?
  - 0-9
  - 10-19
  - 20-29
  - 30-39
  - 40 +
  - Not employed
7. Have either of your parents earned a bachelor degree
  - Yes
  - No

8. How old are you?
9. With which gender do you identify?
  - Male
  - Female
  - Transgender/Intersex
10. With which race/ethnicity do you identify?
  - African American
  - Asian/Pacific Islander
  - Hispanic/Latino or Latina
  - Native American
  - White/European American
  - Other: \_\_\_\_\_
11. Do you have a disability that substantially limits or requires significant adaptation for one or more major life activities? (seeing, walking, learning, working, etc.)
  - Yes
  - No
12. If you indicated yes to question 11, please indicate which type of disability you experience.
  - Physical
  - Intellectual/Developmental
  - Mental Illness
13. What is your sexual orientation?
  - Gay/Lesbian/Bisexual/Queer
  - Heterosexual
  - Unsure/Questioning
14. Do you live on or off campus?
  - On Campus
  - Off Campus

15. What is your current living situation?
  - Alone
  - With Parents/Guardians/Extended Family
  - With Roommates
  - With Spouse/Partner/Significant Other
  - Single parent with children
16. At which WSU campus have you attended most of your courses?
  - Main
  - Davis
  - Online
  - Other
17. What is your household average annual income?
  - \$0-9,999
  - \$10,000-19,999
  - \$20,000-29,999
  - \$30,000-39,999
  - \$40,000-49,999
  - \$50,000-59,999
  - \$60,000-69,999
  - \$70,000-79,999
  - \$80,000-89,999
  - \$90,000-99,999
  - \$100,000 +
  - Unknown
  - Choose not to respond
18. With what religion do you, if any, identify?
19. On a scale from 1 to 5, with 1 being not at all and 5 being very, how important is your religion in your life?
20. Are you an international student?
  - yes
  - no

21. Did you grow up in Utah?
  - yes
  - no. If you answered no, what state/country did you primarily grow up?
22. Did you grow up in a traditional (married mother and father) or non-traditional household?
  - Traditional
  - Non-Traditional



# **‘In the World, but Not of the World’: The Paradox of Plastic Surgery among Latter-day Saint Women in Utah**

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## **Abstract**

*Because of its visibility and capacity for transformation, the body is a powerful symbol of individual and collective identity. Among members of the Church of Jesus Christ of Latter-day Saints (LDS), discipline of the body serves as a testament of religious commitment, yet physical appearance is also employed by Church members to mark acceptance into mainstream society, rendering management of the body and its covering especially important, particularly in cases where the two value systems differ. Given the admonition to be ‘in the world, but not of the world,’ meaning to resist outside practices that challenge church teachings, including prohibitions against other types of body modification, cosmetic surgery appears contradictory. However, Utah, the center of Mormon religion, boasts one of the highest concentrations of plastic surgeons in the U.S., and many Mormon women take advantage of their services. Several cultural factors come together to influence*

*LDS women to have surgery, including the social value placed on marriage and motherhood, and high birth rates that move women's bodies away from the mainstream cultural ideal. Physical beauty is a marker of status for women in both mainstream and Mormon society, rendering plastic surgery a useful tool for gaining and maintaining symbolic capital in both worlds. Perfectionism embedded in the faith further encourages surgery, and proscriptions of modesty that permit tight fitting, but not skin baring, clothing allow for negotiation of post-surgical bodies in accordance with Church doctrine, permitting LDS women to employ surgical technology to fashion a mainstream, yet simultaneously Mormon, identity using the visual language of the body.*

Because of its visibility (Foucault 1979) and capacity for transformation (Gimlin 2000), the body is a powerful symbol of individual and collective identity. Among members of the Church of Jesus Christ of Latter-day Saints (LDS),<sup>1</sup> bodily discipline serves as a public testament of religious commitment. At the same time, appearance is employed by members of the Church to mark acceptance into mainstream society, rendering management of the body and its covering of particular importance. This article draws upon original qualitative and quantitative research with Mormon women in Utah, the cultural and spiritual center of LDS religion, to illustrate the intersection of religion, popular culture, and plastic surgery<sup>2</sup> among members of a culturally conservative faith.

Utah is the only U.S. state in which a single religion comprises the majority of the population. Fifty-seven percent of Utah's population is LDS (Phillips and Cragun 2011), and this percentage is over 80% in Utah County (Canham 2012), where the majority of data collection for this article took place. At the same time, Utah was first in the nation for the number of surgeons per capita in 2007, earning its capital, Salt Lake City, the title of "America's Vainest City" (Ruiz, 2007). It is currently eighth for the same statistic (Lim 2011), and business is booming

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<sup>1</sup> Latter-day Saint (or LDS) is the official Church designation, while Mormon is the colloquial term and the designation most familiar to non-members. They are used interchangeably here. Although there are multiple factions of Mormonism in existence today (Bushman 2008), the term is used here to apply to the largest, which is headquartered in Salt Lake City, Utah.

<sup>2</sup> "Plastic" surgery is the term used by medical professionals, who distinguish between aesthetic surgery, meaning "just for looks," and reconstructive surgery, which restores function (Davis 2002). "Cosmetic" is the lay term for aesthetic plastic surgery. Surgeons used both, while patients and other informants used "cosmetic," rarely referring to surgery as "plastic" (meaning "artificial").

throughout the state, even in the midst of a prolonged economic downturn (Stewart 2011). The number of plastic surgeons is high, in part, because of a residency program in plastic surgery at the University of Utah's School of Medicine. Many of these surgeons stay and open practices in the state, suggesting there are more than enough patients to keep them in business. Unfortunately, because of the manner in which statistics on plastic surgery are kept,<sup>3</sup> it is impossible to determine the number of procedures performed in Utah, let alone which were elective, aesthetic surgeries, and how many of these patients were Mormon (Lim 2011). The popularity of cosmetic surgery among women in the LDS population in Utah, however, continues to be a topic of conversation in the news media (Stewart 2011; Lim 2012), and is readily acknowledged by the local LDS community (Yates 2009) and the Church itself (Holland 2005; Holland and Tanner 2006).

Given the admonition to be 'in the world, but not of the world' (Cullimore 1974), meaning to resist practices from outside the culture that challenge Church tradition, and Church prohibitions against other forms of body modification, plastic surgery appears contradictory for LDS women. As with women everywhere, however, LDS women live in the gaze of multiple 'Others' (Bartky 1988). In Utah, they must maintain a delicate balance between two often oppositional gazes, that of the population of other Mormons they live among and that of mainstream American culture upon members of their faith. The aim here is to explore the cultural work cosmetic surgery performs in bringing these two, often distinctly different, sets of cultural ideals into alignment for LDS women. It will be argued that the pressure to embody both at once promotes the use of plastic surgery among LDS women in Utah and that certain aspects of the faith itself, as they are practiced in the local community, unintentionally come together to enhance the appeal of it.

## Methods

Data for this study were collected through a variety of qualitative and quantitative methods. Initial interview data were gathered in the making of a documentary film on the topic produced by the author. Twenty-two filmed, open-ended interviews of 30–90 minutes each were conducted in 2009–2010. Among these interviews were four with

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<sup>3</sup> The American Society of Plastic Surgeons maintains data on the numbers and types of procedures by region rather than state. Utah is in Region 5, which also includes CA, OR, WA, HI, WY, AK, CO, ID, MT, NV, and NM. The proxy measurement for rates of surgery thus becomes the number of surgeons per capita by location.

local plastic surgeons (two were LDS), two with LDS women who had had surgery, three with LDS women who had chosen not to have surgery, four with LDS men who wished to express their opinions on film, and one with a former Relief Society President.<sup>4</sup> Other interviews were with scholars of religion and/or gender studies and clinicians who offered opinions on the topic. Video footage was coded for prominent themes (Schensel and LeCompte 1999) using the constant comparative method (Glaser 1965). Primary themes that emerged were plastic surgery in relation to marriage and motherhood, perfectionism in the context of the LDS faith, modesty, and the pressure of living in the gaze of multiple ‘Others.’ Transcribed clips from interviews identified as most representative of these themes are included here to illustrate particular points. Additional data were collected through two open-ended focus groups (of 20 to 30 participants each) conducted with members of the Church in the Orem/Provo area. Most had not had surgery, but several knew members of the Church who had, including close friends, spouses, and relatives. To generate additional qualitative data, as well as to test the validity of interview and focus group results in the local community, the documentary film was screened three times on two local university campuses and at a counseling center in 2011–2012, where audiences ranged from a dozen to over 70 people, and in two college courses of 30 students each. Showings on college campuses were advertised and open to the public, while viewings at the counseling center and in classes were not. All audiences were predominantly LDS, and all viewings included open discussion after the film. As it proved impractical to audio record and transcribe these sessions, given the large physical spaces and multiple voices, field notes were taken, including exact quotes. Audience members were also encouraged to correspond with the author privately through email communication, which generated additional personal experiences of surgery, as well as opinions about it. These additional data proved invaluable in refining the concepts discussed herein and comments from these events and communications are included verbatim where relevant.

Quantitative data on attitudes towards plastic surgery among LDS women were collected through a survey administered in 2013 in person and via the U.S. mail. The sample consisted of 100 women who were practicing members of the Church. Respondents ranged in age from 19 to 81 years old, and the mean age was 36 years. Ninety-one percent currently lived in Utah, primarily in Utah County, and nearly two thirds (63%) had grown up in Utah. Most (64%) were married, for an average

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<sup>4</sup>Relief Society is the formal Church organization for women over the age of 18.

of 18 years. Levels of education ranged from high school only (15%) to some college (42%), a bachelor's degree (31%), or an advanced degree of some kind (12%). Average annual household income was \$48,000, lower than both the national (\$50,502) and Utah (\$55,869) median incomes (US Census Bureau 2011), and attributable to the number of respondents from rural areas of Utah County where incomes are lower. Only four women in the sample had had plastic surgery themselves, although 67% knew someone who was LDS and had had elective cosmetic surgery. Measures of religiosity were also part of the survey. Across the sample, women prayed on average twice each day, read scriptures five times per week, attended church once a week, and participated in one other church-related activity each week, results suggesting an average level of religious participation for Mormons in Utah (Hill et al. 2008). This small, convenience sample was intended as a pilot study and was relatively homogeneous in terms of income, reported levels of religious participation, and residency, limiting the ability to explore differences in attitudes towards plastic surgery related to class, religiosity, and between Mormons inside and outside of Utah. These areas will be the focus of future research. Given these limitations, several survey results reinforced themes from the qualitative data and will be mentioned here. Results from all aspects of the research are combined in the following discussion organized around the central themes initially identified in the interview data. In lieu of including a lengthy history and description of Mormonism, beliefs and practices relevant to the use of plastic surgery are instead woven into the discussion itself.

## Body Modification and the LDS Church

Cosmetic surgery among Mormon women is taking place in a religious context in which the prevailing doctrine strongly discourages manipulation of the body other than for medically indicated reasons. In the LDS Church, members are taught that having a physical body is a godlike attribute and the body itself is a sacred gift from God to be cared for and not to be defiled (Spangler 2005). Regarding body modification, a General Conference<sup>5</sup> talk given by then-President of the Church, Gordon B. Hinckley, in 2000 “strongly discouraged” both

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<sup>5</sup> General Conference is a semiannual gathering of The Church of Jesus Christ of Latter-day Saints held in April and October. Church members gather in the conference center in Salt Lake City for a series of two-hour sessions to receive instruction from Church leaders. These are broadcast to members worldwide via television, satellite, radio, and the internet.

genders from tattooing and piercing, although women were allowed one piercing in each ear (Hinckley 2000). Cosmetic surgery is not expressly forbidden, although a General Conference talk given by Elder Holland in 2005 entitled “To Young Women” disparages practices that focus too much on appearance. He also acknowledges the role of non-Mormon media in promoting such a focus,

...You are bombarded in movies, television, fashion magazines, and advertisements with the message that looks are everything! The pitch is, “If your looks are good enough, your life will be glamorous and you will be happy and popular.” That kind of pressure is immense in the teenage years, to say nothing of later womanhood. In too many cases too much is being done to the human body to meet just such a fictional (to say nothing of superficial) standard...And if adults are preoccupied with appearance—tucking and nipping and implanting and remodeling everything...those pressures and anxieties will certainly seep through to children.

There is a high degree of individual agency within the Mormon faith, allowing members to interpret doctrine and enact principles with some variation (Bushman 2008). This talk, and others like it, as they do not explicitly prohibit cosmetic surgery and were not delivered by the President of the Church, the spokesman of the Lord in the Church on earth (Ibid: 51), were not taken up by members to the degree the prohibition against tattooing and piercing was. Informants here disparaged tattooing as “desecrating” one’s “temple,” while plastic surgery was referred to as “beautifying” or “repairing” it. The two practices were rarely recognized as variants of what is essentially the same thing, body modification. Given the divergent history of the two practices and the degree to which the Church actively promotes a positive public image for Mormons in mainstream American culture (Goodstein 2011; Bushman 2008), a prohibition against tattooing, and the lack of one against plastic surgery, makes sense. Tattooing has been associated with the counterculture, even criminality (Demello 1993), in the U.S., while plastic surgery appears in the popular media in association with celebrities, the beauty industry, and the medical establishment (Fraser 2003), entities with considerable cultural capital (Bourdieu 1984) in mainstream American society.

## Marriage, Motherhood, and Cosmetic Surgery

That many Mormon women in Utah engage in plastic surgery is partly attributable to gender roles as defined within LDS religion and the ways these are enacted in the local community. The ‘Doctrine of the Family’ outlines responsibilities for both partners within the context of marriage (Church of Jesus Christ of Latter-day Saints 1995), charging mothers with tasks associated with the home and childrearing. LDS women are strongly encouraged by Church leaders to give domestic roles top priority and, although many must work to supplement family income (Beaman 2001), there is tremendous social pressure not to allow responsibilities outside the home to take precedence over family (Mauss 1994). These values are inculcated at young ages through participation in formal Church organizations and family life and they relate to cosmetic surgery in distinct ways, especially in terms of how LDS women gain and maintain status within their communities.

It is difficult to convey the profound importance of marriage and family for both genders in Mormon theology and culture. The family is believed to be eternal, as are marriages between temple-worthy members of the faith that are “sealed” in a temple ceremony, and “Mormon girls grow up with the expectation that marriage to a worthy Mormon man is the highest form of a good life” (Bushman 2008: 59). Marriage and motherhood remain primary goals for the majority of LDS women in Utah, who undertake both at younger ages than their non-Mormon counterparts across the nation. Median age at first marriage in the U.S. is 29 years for men and 27 years for women, with growing numbers of Americans never marrying at all (Pew Research Center 2011). In Utah, the median age at first marriage is 23 years for men and 21 years for women, with nearly 20% of women marrying at younger than 20 years of age (Center for Health Data 2007). Unmarried Mormons of both genders are encouraged to attend Young Single Adult (YSA) wards (Church congregations), in part to encourage social interaction among members of the faith of similar ages (Wrigley 2011), and bridal fairs are a regular occurrence throughout the Salt Lake/Provo area, including on local high school campuses ([www.bridalresources.com](http://www.bridalresources.com)).

Among the important considerations for Mormon women with implications for plastic surgery are the characteristics Mormon men value in a potential marriage partner. Upon returning from their missions,<sup>6</sup> LDS men (and women, an increasing number of whom are serving missions) are encouraged to begin the next stage of their lives by

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<sup>6</sup> An obligatory term of service proselytizing for the Church, usually two years, typically engaged in at 18–21 years of age.

marrying and having children (“building the Kingdom”). Although dedication to the faith and characteristics that are perceived of as contributing to good mothering (being “sweet” and kind) are important, male and female informants reinforced the importance of female beauty in males’ choice of a marriage partner. One interviewee, a Mormon, male graduate student, emphasized that characteristics that rendered men “marketable” as potential husbands were actions that signaled commitment to the faith, like serving a mission, being a good priesthood holder, and pursuing an education as a means to support a family. He observed that these same actions were not emphasized for women, or even open to them in the case of the priesthood, so it fell to beauty and personality to be their primary means of attraction. A young, single Mormon woman echoed his sentiments, saying, “It’s never been clear to me that a potential husband needs to be good looking,” but that in her experience “physical beauty always trumps inner beauty” when they choose a wife. This conclusion was supported by her own post-missionary experience when her former Mission President told a reunion of sister missionaries that “men are carnal and you all just need to lose a bit of weight,” after which she lost 15 pounds and began wearing make-up and styling her hair to attend university classes.

Many young Mormons attend college in Utah, in part, so they can meet and marry others who share their faith. It bears mentioning that there are two large universities in Utah County, both majority Mormon institutions, resulting in a total of over 60,000 LDS college students within two adjacent zip codes where the average age is 25 years (US Census Bureau 2010). Three other universities of comparable size with substantial numbers of Mormon students are within 100 miles. To compound the problem from the point of view of LDS women, there are also currently three LDS women for every two LDS men in Utah (Phillips and Cragun 2011). This contributes to a high level of competition for marriage partners among female Mormons living in Utah at the ages members of the faith consider appropriate for marriage. LDS women, however, have little agency in initiating dating. One young LDS woman at a film showing was counseled by her bishop after moving from California to Utah not to be “too forward” and ask men out, as she had done before. Instead, women must simply try to look as beautiful as possible to attract the male gaze. Unfortunately, there are indications this gaze may be quite brief, rendering beauty even more important. A recent poll in the national media (Croghan 2013) ranked Salt Lake City “The Most Superficial City in America” based on the number of seconds (7.2, the quickest in the nation) it took people to assess a potential partner’s looks on an internet dating site. Although the site used was not an LDS site, there are several such sites tailored to



the LDS population, and several male informants mentioned “shopping” for dates on such sites where physical appearance is front and center. This focus on female appearance contributes to plastic surgery among women in general (Bordo 2009; Gimlin 2002; Jones 2008; Blum 2003), and appears to do the same here.

Breast augmentation is the most popular surgery among the age group most likely to be searching for marriage partners in Utah (The American Society for Aesthetic Plastic Surgery 2012:12). And, much like elite athletes considering the use of performance-enhancing drugs, many young LDS women related that so many of their peers were getting cosmetically enhanced they felt they would be left out of the competition if they did not do the same. One study conducted by Real Self, “the most visited web site in aesthetics,” suggests they may not be too far off the mark. Results indicated residents of Salt Lake City seek information on getting breast implants 74% more often than the national average ([www.realself.com](http://www.realself.com)). One 22-year-old LDS woman interviewed for the film had just undergone breast augmentation. Several of her friends had also done so, as had her mother when she was her age, while another informant reported being the only woman in three generations of her family (all LDS) who had not yet chosen to have this surgery. Another young LDS woman explained that she and her friends had had breast augmentations after completing high school in Utah in order to “catch better husbands.” Note, none of these women were having or considering surgery simply to be viewed as ‘hot,’ but rather to attract a husband and begin their own progression in the faith by marrying and having children. Although little information related to social class was collected in this study, it is clear this phenomenon is not limited to young women from wealthy families. One young woman had been working part-time and saving money since she was 12 years old to have a breast augmentation and was now doing so at age 19. Also, the high concentration of surgeons in Utah results in lower prices for cosmetic procedures than may exist elsewhere, depending on the surgeon, and the majority of surgeons have payment plans and financing for their services, rendering surgery accessible to those at a variety of income levels.

In addition to the pressure to find a husband, the ages at which LDS women marry in Utah may contribute to surgery later in life. Marrying and having children young provides a disincentive for women to pursue college degrees, rendering Utah last of all states in the U.S. in the percentage of female students enrolled in postsecondary institutions (Utah Women and Education Project (UWEP) 2010). At the same time women are marrying and opting out of college, Utah continues to have the highest birth rate in the nation (Davidson 2008), and family sizes of

four children (double the national average) or more are common. Large families often necessitate two working parents, and over 50% of households with children younger than 6 years old and 63% of households with children 6–17 years old in Utah have two working parents, although women are underrepresented in fields that demand higher levels of education and pay well (UWEP 2010). Relegated to less prestigious, and many times unfulfilling occupations, Mormon women in Utah may look to other means of achieving status. Their primary path is through motherhood, but this is problematic in that being a good mother is not readily observable outside the family or valued in the workplace. At the same time, ‘women’s work’ in the domestic sphere is devalued in many of the mainstream women’s magazines they commonly read (Fraser 2003: 92). Another means of empowerment is beauty, highly visible in the kinds of jobs uneducated women have in the service and retail industries, culturally valued, capable of being artificially enhanced, and heavily promoted in these same women’s magazines. Not surprisingly, beauty is a major industry in Utah, where \$2.5 million is spent on facial cosmetics, \$2.2 million on hair coloring, and \$4.4 million on skin care products each year in Salt Lake City alone, figures over ten times that of other American cities with comparable population sizes (Ruiz 2007).

The simultaneous valuing of beauty *and* motherhood places LDS women in a bind. Although this particular bind is not limited to Mormon culture, it is exacerbated by it because of the numbers of children LDS women have and the ages at which they have them. Beautiful female bodies in Western culture are youthful, preferably thin, with firm, relatively large breasts (Young 2003). Women’s bodies often change as a result of multiple pregnancies and breastfeeding in ways that distance their bodies from this mainstream definition of beauty (Jones 2008). One Utah County plastic surgeon (who was LDS) referred to pregnancy as women “trashing” their bodies, another (also LDS) explained that multiple pregnancies “destroyed” women’s bodies, reinforcing the idea that pre-maternal bodies are the standard by which all others are judged. This provides mothers with only one option if they rely on beauty for status, returning their bodies to a pre-maternal state, a feat often impossible without surgery.

That LDS women in Utah marry younger, have children sooner, and have more of them than their peers in all other states (Maffly 2010) plays a distinct role in the local popularity of ‘Mommy Makeovers’ (Stewart 2011), as one LDS mother of three relates in her interview,

I had my first child at a really young age and got the terrible stretch marks and the saggy tummy, and as I had my other two children it got worse. It got to the point where I had a tummy

that would hang over the belt buckle and the stretch marks would sometimes show through, so I had really wanted to get a tummy tuck for a long, long time...I thought it would be great to go back to that nice, flat tummy that I had back before I had my children...I had a friend [LDS] who had just had breast implants, and I knew a couple of other women [also LDS] who had them too, so I thought I'd just go ahead and have those done too.

The situation she describes, where LDS women who know each other have surgery, in many cases employing the same surgeon, was described often. By virtue of living in communities composed largely of members of their own faith, and participating in gender-segregated Church organizations, Mormon women evaluate each other's bodies on a regular basis. This was referred to many times, with women discussing standards of appearance evidenced by other women in their neighborhoods and wards. It exemplifies the phenomenon described by Bordo (2009) in which one is now forced to compare one's own body not only with celebrities, but with one's neighbors, as beauty ideals in the media are enacted at the local level.

### **Media, Mormon 'Models,' and Modesty**

At the same time LDS women feel pressured to be beautiful, they have few images from within their culture to 'tell' them what physical beauty looks like for women of their faith, arguably leading them to look elsewhere. Seventy-five percent of women in the survey sample reported that being beautiful was important to them, a figure comparable with that for American women in general (Gimlin 2002). However, it is unclear where their ideas about what constitutes "beautiful" for Mormon women come from. A trip to Temple Square in Salt Lake City, the center of Latter-day Saint religion, supplies plentiful iconography of important LDS figures past and present, all of them male. Exceptions are the "goddesses," as one informant described them, female missionaries employed as tour guides at the Temple itself. These young women are gorgeous by beauty pageant standards, normalizing the appearance of Mormon women for what are often tourist audiences. Church publications and General Conference talks, however, more often feature more matronly women, often presented in the context of family life. While such women may be admired for their dedication to family and faith, no women in this sample wished to look like them. At the same time, LDS women are immersed in the same 'mediascapes' (Appadurai 1990) the rest of the world is. As one informant observed,

“You can’t build a wall around the state,” and Mormons have entered into what Appadurai refers to as “an altogether new condition of neighborliness.” Although there is a selection of media content provided locally specifically tailored to Mormon audiences, Mormons watch many of the same television shows, buy the same magazines, are bombarded with same commercials, and access the same internet as everyone else, simultaneously taking in the world at the same time they struggle to abstain from certain aspects of it.

Appadurai (1990) argues the sheer volume of media we are exposed to in modern societies leads to self-imagining as an everyday occurrence. In some cases we model the very images we see (1990:7). One LDS woman in her early twenties who had breast augmentation explained part of her decision to do so was based on the fact that she did not look like the women in a *Sports Illustrated* swimsuit issue she was perusing with her boyfriend and friends, all of whom were LDS:

I got the *Sports Illustrated* swimsuit issue and me and my boyfriend are flipping through it together and I’m thinking, I don’t look like these girls at all. I look like a boy naked. And my friend is saying, “Oh, she looks so good,” and I wanted to look like that too...

To look at a *Sports Illustrated* swimsuit issue and find oneself wanting is not exclusive to this young woman, or to Mormon women in particular. Few women look like those photographs, not even the models who posed for them until the digital images have been perfected for public consumption (Kilbourne 1999). Yet, we increasingly strive to match our three-dimensional selves to such two-dimensional images (Blum 2003). What is interesting in the case of LDS women is that they are admonished to be ‘in the world, but not of the world,’ meaning they should choose to incorporate those things from outside the culture that are in keeping with Mormon values and somehow ignore the rest. This places them in an interesting position *vis a vis* the media. If they value beauty, which they do as it is a means to power (limited as it may be), they take in what is presented by those who market beauty for profit. Yet they must enact it in culturally specific ways. As one informant explained:

It absolutely is about looks and I don’t think Mormon women can resist that. Even when I was at BYU in the 1970’s the notion was that you had to be attractive if you were going to get a husband. There were always these jokes that if you looked like the dumpy sister missionary, you weren’t going to attract

a husband. You had to look fashionable, but you wouldn't look too much like the world...and I don't think today, like then, that you're looking to older Mormon women as the models, but you are looking to...not conservative, but not to the Britney Spears kind of thing or the pop singers or anything like that, but you might look to Victoria's Secret.

And they look to each other.

The number of Mormon women who have had surgery and serve as visible models of its success is impossible to ascertain, but 67% of the survey sample reported knowing someone personally who is LDS and has had surgery, and this was common in interviews as well. One young, recently married woman knew for a fact (because they told her) that every single other woman in her small ward had had aesthetic surgery of some kind. Another, a middle-aged mother with three children, brought up the topic with a group of friends, all LDS mothers, and was astonished to find out everyone other than her had already had surgery. Another informant in her fifties related that nearly all of the women in their thirties and older in her stake (a collection of LDS wards and branches, similar to a diocese) have had some type of cosmetic surgery. Likewise, one of the surgeons recalled telling a patient who was considering surgery and concerned about its impact on her Church membership to "go to the Temple and have a look around," so she could see for herself how many wives and daughters of prominent Church officials have been surgically enhanced. This situation is intensified by Utah Mormon culture. Religious services and Relief Society meetings may function like weekly motivational meetings at Weight Watchers (Heyes 2006) in that they present 'leaders,' literal 'models' of success. Unlike dieters though, who can refrain from attending without penalty, LDS women risk strong social censure should they choose not to participate in these activities, and while there, they often unknowingly gaze upon many LDS women who have been surgically improved, presenting a standard of perfection that appears natural, that other women then feel they must match.

Part of what has allowed the mainstream beauty ideal to become the Mormon one is the manner in which LDS women who have had surgery display their post-surgical bodies. Mormons wear 'garments' (sacred underclothing) beneath their everyday attire, meaning they must keep certain parts of their bodies covered, both with a layer of sacred clothing and a layer of everyday clothing on top of it. For women, these garments resemble tight-fitting, cap-sleeved tee shirts and long, close-fitting shorts similar to bicycling shorts, although they are usually both white. This makes revealing one's surgically enhanced body culturally

challenging. LDS women must uphold religious standards of modesty, which 91% of the survey sample strongly agreed or agreed was important. These include proscriptions against baring too much skin (as in the wearing of two-piece swimsuits, shorts, or tops that reveal the shoulders or cleavage). Breast enhancements and abdominoplasty map well onto these restrictions as one can cover larger, firmer breasts and smaller, tighter waists with form-fitting clothing, allowing the results of the surgery to remain visible. The paradox that *having* cleavage (or purchasing it if you do not) is sanctioned, but *showing* it is an abomination is managed through fashion choice. One interviewee who has lived in Utah for over a decade describes the local “Cult of Modesty,”

You certainly don’t have a lot of actual skin being exposed, but you have more than enough curves being exposed. It’s not as if the population is in any way above wearing skintight clothing that really accentuates their shape. It’s true that you’re not going to have cleavage, but you’re going to have a very tight sweater that’s going to show everything that can be shown. That is a form of modesty. You’re not showing epidermis. But it is, in a certain sense, a seductive form of modesty where you are beckoning desire. The jeans aren’t exactly loose, there are high heels...it is a full-on presentation of the physical body.

Journalist Robin Wright (2011) recounts a similar duality in her descriptions of young Egyptian women “wanting to be very 21<sup>st</sup> century, yet wanting to respect the modesty of their faith.” Egyptian women accomplish this by wearing brightly colored *hijabs* while donning ‘what everyone else wears’ underneath. It works differently for Mormon women in that their sacred garments do not serve as covering, but must be covered with clothing instead, meaning it is ‘what everyone else wears’ that is open to censure. Unlike the *burqa*, a voluminous sheath that camouflages body shape, Mormon ‘garments’ are skintight clothing in and of themselves. This makes the selection of clothing challenging for those who wish to look simultaneously mainstream and Mormon. The task of dressing appropriately is made easier by the proliferation of local stores, including Mod Bod, Down East, and Sexy-Modest, who cater to LDS women who want to look as contemporary as their religion allows. These stores provide a wide selection of close-fitting knit clothing, including t-shirts and leggings, to wear underneath more provocative clothing to allow it to technically match LDS standards of modesty.

## Care of the Self: Perfectionism, Discipline of the Body, and Plastic Surgery

The focus on perfectionism in Utah Mormon culture has been called “toxic” and linked to high rates of depression and eating disorders among local LDS women (UVU Depression Study, 2011; Marostica 2011). Scriptures such as “Be ye therefore perfect, as even as your Father which is in heaven is perfect,” are “taken very literally here,” especially by women (Marostica 2011), and provide the impetus for near-constant striving to do better in all aspects of life, including with regard to one’s physical appearance. American women are often made to feel via the popular media that any physical flaw is a sign of moral weakness (Gimlin 2002), and there is near-constant pressure to achieve physical perfection through the use of technology (Morgan 2009). Add the pressure of living among those who judge your degree of perfection on a daily basis, and it is easy to see where the perfected corporeal body becomes surface evidence of inner perfection and righteousness. This is reflected not just in the appeal of plastic surgery, but in the high rates of eating disorders and depression evident among LDS women in Utah as they struggle with the pressures of perfection (Marostica 2011).

Another aspect of perfectionism related to cosmetic surgery involves discipline of the body. Religions that demand a high degree of conformity, like Mormonism, have social mechanisms in place to evaluate the public performance of individual behavior, meaning one is regularly subjected to the scrutiny of others whose opinions matter. The situation is only exacerbated among Mormons in Utah, where there are large numbers of believers on hand to bear witness to one’s conformity. The situation resembles Foucault’s discussion of the Panopticon<sup>7</sup> (Foucault 1979) in that, like inmates who never know if they are being watched in a given moment and become constant guardians over their own behavior, the religious faithful act before a public gaze and implement discipline over themselves, including discipline of the body. Members of the LDS Church already enact bodily discipline in abstaining from certain foods, beverages, and tobacco. Add to this restraint over language (no swearing), television and film viewing (no R-rated material), and clothing (modesty and the wearing of ‘garments’), and cosmetic surgery is but one more means of manipulating the body to

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<sup>7</sup>The Panopticon was a type of institutional building designed by Jeremy Bentham in the 18<sup>th</sup> century consisting of a circular structure with a guard tower (or “inspection house”) in the center surrounded by a perimeter of rooms or cells. The design creates conditions of surveillance where patients or inmates never know if they are being watched, encouraging appropriate behavior at all times.

conform to norms imposed from outside the self. In this case, the bodily standards encouraged by the Church are intended to aid in the growth of a healthy spiritual, or inner, self (Spangler 2005). In contrast, the types of bodily discipline promoted in women by the mainstream media, including dieting, excessive exercise, and plastic surgery (Gimlin 2002), are intended to affect the physical appearance of the body, the outer self, which women in general, not just Mormon women, internalize as a marker of their inner worth (Blum 2003; Bordo 2009; Jones 2008). Women in this sample did not make such distinctions, but experienced both sets of standards as a kind of overwhelming pressure to embody perfection, inside and out, pressure already associated with negative self-image, depression, and eating disorders among local LDS women (Marostica 2011).

There is also the idea that one must care for one's "temple." With regard to plastic surgery, this concern plays out in accordance with Foucault's work referencing the care of the self as an enabling experience (Foucault 1988). Locally, plastic surgery is often marketed as "wellness." One surgeon referred to having surgery as a "health maintenance plan," another explained it was part of "taking charge of your health, taking care of yourself physically and psychologically." Indeed, visits to surgeons' offices resembled visiting a spa or retreat, complete with soft lighting, fresh flowers, aromatherapy, candles, facials, and services provided by estheticians, all of which, including surgery, were promoted as self care. Surgeons also employed the rhetoric of restoring bodies "destroyed" or "trashed" by pregnancy and breastfeeding, suggesting women had not cared for their bodies by choosing to have so many children in rapid succession, but were now taking matters (and bodies) in hand.

## **The Gaze of the (Multiple) Other**

Women spend their lives in the gaze of the Other, under the surveillance of men (Bartky 1988), other women (Bordo 2009), and society in general (Morgan 2009). This is especially true for Mormon women in Utah who, by virtue of their living in the cultural center of their faith, are readily visible to other Church members (Yates 2009). It becomes a kind of competition. Competition for status based on appearance was recognized as a factor that promoted surgery and was discussed vociferously by participants in discussion sessions after film showings. One young LDS woman volunteered that she and her husband had recently found out they were unable to have children, a tragedy for many couples, but one that is even more so in a profoundly family-oriented culture like Mormonism. She stated that since her sis-



ters-in-law were “already winning” on that front (competition through motherhood), she was “going to be the hottest” of them instead (competition through appearance). She had breast augmentation some weeks later, emailed to let me know, and stopped by my office as well. Reflecting such attitudes were references to female–female competition in local plastic surgery advertising. One prominent example were billboards along Interstate 15 between Salt Lake City and Provo in which several infants in diapers appeared seated side-by-side gazing up in admiration at something unseen. The caption read, “Be the envy of your neighborhood.” The implication, as this was a billboard for breast augmentation, was that these hungry babies were gazing up in rapt amazement at the size of the breasts displayed off screen, a clear reference to female–female competition among mothers in particular, as the billboard also implied breastfeeding.

There is also the concern of the Church for its public image to consider. Hence, the “I’m a Mormon” national advertising campaign, an attempt to mark the normality of Church members to other Americans (Goodstein 2011). Unfortunately, Mormons are often portrayed in American popular media in ways members of the Church find objectionable. One example is the case of fundamentalist polygamist groups who are not sanctioned by the Church, but who are associated with it because of media coverage with no clear distinction drawn between the two groups (*NY Times* 2011). Other examples include popular television shows like *Sister Wives* and *Big Love*, which depict polygamist family life, real and fictional, again with no distinction between such groups and the official LDS Church. Such portrayals place Mormons outside of mainstream American culture, something LDS beliefs and practices already do, but usually not in ways that so blatantly challenge the dominant culture.

Plastic surgery plays a role in establishing the “normality” of LDS women. Given that Mormons may not wish to *act* like other Americans, but would prefer to be accepted by them (Bushman 2008), they often prefer to *look* as much like other Americans as Church proscriptions allow. One informant, a former member of the Mormon Tabernacle Choir, was encouraged to go through with aesthetic surgery by other members of the choir so she would “look better on television,” presumably out of concern for the gaze of an imagined audience outside of Utah. Another said half jokingly that maybe so many Mormon women in Utah have surgery “because they don’t want to look like those polygamist ladies you see on TV,” who look, by another’s account, “like a rerun of *Little House on the Prairie*.” Looking “normal,” meaning mainstream American, is arguably an easier task for LDS men in that most casual and work attire for men worn in the United States

meets with Mormon standards of modesty. Mainstream women's fashion, however, often sexualizes female bodies with tight, skin-baring clothing that renders it more challenging for Mormon women to dress like their non-LDS peers. Plastic surgery helps to mediate that boundary by normalizing body shape, albeit to an artificially enhanced standard, but one that is coming to define 'normal' inside and outside of Mormon culture (Blum 2003).

## Conclusion

The challenges for women of balancing the demands of LDS religion with the lure of mainstream popular culture are perhaps best summed up in the slogan of the nearest SexyModest© boutique, 'Who Says You Can't Be Both?' One of a number of retail outlets in Utah servicing Mormon women attempting to be 'in the world, but not of the world,' it is representative of the many paradoxes of life in a traditional, conservative culture immersed in the flow of 21<sup>st</sup> century media.

The body is a medium for expressing cultural beliefs (Gimlin 2002) and 'body work,' including cosmetic surgery (Gimlin 2000), is often central to managing the cultural contradictions of competing value systems. As Durkheim pointed out over a century ago, our selves are "individual manifestations of collective ways of thinking...that are external to the individual and invested with coercive power" (as cited in Cahill 1998:132). The perceived mismatch between one's physical self and the global beauty ideal is widely recognized as a driving force in many women's decisions to go under the knife (Davis 1995; Bordo 2009; Morgan 2009; Gimlin 2000). For Mormon women, there is also the perceived pressure to literally embody mainstream American cultural ideals *and* be Mormon at the same time. This is experienced by Mormon women in Utah perhaps to a greater degree because they live amid so many members of their faith. Their status among their Mormon peers rests on the appearance of perfection in all aspects of life, while the symbolic capital of their faith rests on their appearing as mainstream and modern as possible. By not tattooing or piercing, they disassociate themselves from 'alternative' cultural groups, at the same time they mark their bodies (by not marking them) as sacred vessels to members of their faith. By observing Mormon proscriptions of modesty, they again send a message of membership to other Mormons, although they do so by employing mainstream contemporary clothing styles to the greatest extent possible. Their surgically sculpted bodies, whose form is visible even if their skin is not, also match mainstream ideals. In this way, LDS women balance opposing value systems, managing to embody both simultaneously. Structural factors in Utah, in-

cluding a large concentration of plastic surgeons, coupled with the impetus to marry and have children at younger ages, set the stage. LDS ideals related to gender, perfectionism, and the body accomplish the rest, rendering a group of women admonished to be ‘in the world, but not of the world’ very worldly indeed.

## Acknowledgments

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# Abstracts

## ARTS

### **Growing Racism and Violence: Dangerous Stereotypes Perpetuated Through Late Nineteenth-/Early Twentieth-Century African-American Minstrel Troupes and Vaudeville Shows**

**Anne Turner**

*Brigham Young University*

The growth of racism in the United States towards African Americans following the Civil War spilled over into many different aspects of life, in both the Southern and Northern parts of this country. Of particular interest is the growth of racism and violence in the late nineteenth and early twentieth centuries because of African-American musical performances, vaudeville acts, and traveling minstrel troupes. During this tumultuous time period, a rise in racist and violent acts towards African-American performers was not only manifest inside of the theaters, but outside as well. While this racism and stereotyping existed through white perpetration, African-American entertainers unconsciously stimulated stereotyping through their performances, resulting in violence against themselves and other innocent African Americans.

## BIOLOGICAL SCIENCES

### **Investigating *Rhacodactylus* Gecko Adhesion Using Computer Image Analysis**

**Holly Jeanne Flann**

*Utah State University*

Geckos have developed one of the most versatile and effective adhesives known. They can run up a wall or ceiling because their remarkable toes are covered by microscopic hairs, called setae. The goal of

this project was to determine whether gecko adhesion occurs by Van der Waals (VdW) dispersion forces or capillary attraction. Capillary attraction implies stronger adhesion with hydrophilic surfaces than with hydrophobic surfaces; VdW implies no difference. To test this, the geckos were placed onto vertical glass surfaces of varying properties and climbing was recorded. The videos were then processed by two object tracking programs, one that measured limb movement and another that recognized and highlighted the geckos' feet. No hydrophilic–hydrophobic adherence differences were detected on the trial videos. This demonstrated VdW as the suggested mechanism. Knowledge about this remarkable adhesive ability of geckos will be instrumental in the pursuit of new and better inventions.

## **BIOLOGICAL SCIENCES**

### **Vision and Change in Undergraduate Biology Education 2009-2013**

**Ruhul Kuddus**

*Utah Valley University*

I was one of the 500 fortunate biology teachers invited to attend the 2009 conference on Vision and Change in Undergraduate Biology Education organized by the American Association for the Advancement of Science and the National Science Foundation. The conference final report came in 2010, and it placed the responsibility of changes almost entirely on the shoulder of the biology teachers. It is unclear how many biology teachers actually studied the report and changed (themselves and their students, administrators, and institutions). The 2013 conference on the same subject will assess the outcomes. This article is a self-assessment of an assumed representative of the open-enrollment educational institutions (community colleges, junior colleges, and four-year teaching-centered public universities) on the 2010 report and the three major goals of the report—integration of the core concepts and competencies throughout the curriculum, student-centered learning with research emphasis and multi-faceted assessment tools, and promoting campus-wide commitment to changes.

## BIOLOGICAL SCIENCES

### **Comparison of Enumeration Methods for Probiotic Bacteria**

**Colleen Fisher, Ashley Badley, Enoch Brempong, Caden Hall,  
Kristi Russell, Dexter Snyder, William Lorowitz**  
*Weber State University*

Enumeration of probiotic cultures is important in dietary supplements. The de facto enumeration method utilizes colony counts with MRS agar plates. It was hypothesized that different media or growth conditions could produce higher counts in less time. Colony counts with two different probiotic mixtures were higher with MRS than three other solid media, RCA, M17, and SPY2. There was no significant difference in colony counts between MRS plates incubated in an anaerobic jar, candle jar, or aerobically. Colonies were larger and easier to count on plates incubated in the anaerobic jar. Most probable number (MPN) enumeration (5-tube) using MRS broth displayed slightly higher numbers than colony counts with MRS plates. The addition of a metabolic indicator, 2,3,5-triphenyl tetrazolium chloride, to the broth resulted in higher MPN estimates in less time than the broth alone. The data suggested advantages to using broth with a metabolic indicator over the MRS plate method.

## BIOLOGICAL SCIENCES

### **Determination of Microbial Populations in a Synthetic Turf System**

**Jason Bass, David Hintze, Karen Nakaoka, Craig Oberg**  
*Weber State University*

There is growing concern regarding the contribution of infilled turf fields on athlete infections. This study compared the occurrence of microbial populations on two infilled turf fields (one-year-old turf in stadium vs. 6-year-old turf in practice field) in three locations on each field. Infill material from both fields was sampled weekly at each site over 5 months during football season, with microbial enumeration done using three selective media. Means at each site were determined and compared both for each sample time and over the test period. Higher microbial populations using TSA were found on the older turf field

than the newer turf for each of the 14 sampling times. A high number of salt-tolerant bacteria isolated using MSA (likely *Staphylococcus*) were found with an average microbial load higher on the sidelines of the old turf than the average load on the sidelines of the new turf. Coliforms, isolated using EMB, followed the same pattern. These results indicate that infill material can serve as a source for the spread of pathogens among athletes and that these organisms accumulate over time, posing a greater risk if proper cleaning is not routinely performed.

## **BIOLOGICAL SCIENCES**

### **Stability of Low-Molecular-Weight Protein Biomarkers for Preeclampsia**

**Kellen A. Christiansen, Dustin V. Hofheins, Swati Anand, MeiHwa Tanielle Bench Alvarez, Craig D. Thulin, Stephen W. Graves**

*Utah Valley University*

Preeclampsia, a pregnancy-related disease and significant cause of maternal and fetal mortality, is usually undetectable until about 32 weeks into pregnancy. We previously reported the discovery of biomarkers using a blood serum proteomic approach that could potentially be used for earlier detection of preeclampsia. Abundant large proteins were depleted with acetonitrile precipitation, and the remaining proteins analyzed by cLC-ESI-QTOF-MS. In an attempt to evaluate the stability of biomarkers, we analyzed compromised samples that were allowed to thaw for longer than normal periods of time. Some of the biomarkers found in the original evaluation were no longer present in the compromised samples; however, some candidates were still statistically significant biomarkers in the compromised samples. The biomarkers that were common to both the properly handled samples and the compromised samples are potentially more stable and could possibly be used for early detection of preeclampsia providing more reliable test results.

## BIOLOGICAL SCIENCES

### **Antibiotic Resistance of Enterococci from the Different Water Sources**

**Amanda Zaugg, A.K. Zaugg, A.K. Banning, J.L. Jorgenson, A.M. Badley, Colton Stokes, W.H. Lorowitz, M. Sondossi, K.G. Nakaoka**  
*Weber State University*

*Enterococcus*, a bacterium inhabiting animals' gastrointestinal tracts, causes urinary infections and other diseases in humans. One important complication of *Enterococcus* infections is difficulty in treatment since they are highly resistant to antibiotics. Although *Enterococcus* is a normal inhabitant of the gastrointestinal tract, it can survive outside its host, even in adverse conditions, such as hypersaline environments. In this study, isolates of *Enterococcus* from the Great Salt Lake (GSL) and from two freshwater sources, an irrigation pond and a retention pond, were analyzed. The isolates were examined for phenotypic characteristics including their antibiotic resistant to ciprofloxacin, erythromycin, tetracycline, vancomycin, and gentamicin. The results of the disk diffusion assay revealed a significant difference ( $p < 0.05$ ) in resistance to at least one antibiotic between isolates from the Great Salt Lake (46%) and the two freshwater sources (16% and 26%). These findings may have implications for those using the GSL recreationally and occupationally.

## BIOLOGICAL SCIENCES

### **Isolation of Novel Bacteriophages from the Great Salt Lake that Infect Halomonas**

**Lauren Johnson, Jayk McMillan, Craig Oberg, Mathew Domek, Michele Culumber**  
*Weber State University*

The bacterial genus *Halomonas* thrives in the dynamic environment of the Great Salt Lake (GSL), but the ecology of these organisms is poorly understood. Seven strains of *Halomonas* were isolated from GSL water and identified using 16S rRNA gene sequencing. Standard soft-agar plaque assays were used to culture and isolate *Halomonas*-specific bacteriophage from filtered GSL water for these bacterial strains. A *Halomonas* phage (LJ17) was found to infect four of the *Halomonas* strains.

LJ17 produced very small plaques, sometimes barely visible. Electron micrographs of LJ17 indicate it has a small icosahedral head and perhaps a very short tail. There are no reports of *Halomonas* phages isolated from the GSL, although phages for marine *Halomonas* strains have been found. Successful isolation and characterization of novel GSL *Halomonas* phages is important for the development of a host/phage model for saline environments and provide information for ecological studies of the GSL.

## **BIOLOGICAL SCIENCES**

### **Chytridiomycosis-resistant *Hyla arenicolor* Populations in Southern Utah**

**Nick Hadley, Chancen Hall, Curt Walker**

*Dixie State University*

*Batrachochytrium dendrobatidis* (chytrid fungus) is prevalent worldwide, and the resulting chytridiomycosis has contributed to at least 168 amphibian species extinctions. In 2010, *B. dendrobatidis* was discovered in the greater Zion National Park area of southwestern Utah. Because few populations have shown resistance to chytridiomycosis, we decided to explore the effects of this disease on populations of *Hyla arenicolor* (canyon tree frog). We tracked the spread of *B. dendrobatidis* by testing skin samples taken annually from several different canyons and monitored population sizes. During the three years of our study, infected populations did not show subsequent population declines. This suggests that *H. arenicolor* population size in this region is unaffected by *B. dendrobatidis*. In the future, testing hypothesized explanations for surviving infection could help us identify populations not at risk and thus allocate conservation resources more efficiently.

## **BUSINESS**

### **The Role of Age in Innovation**

**Richard Parsons**

*Westminster College*

Driving and incorporating innovation is considered a key survival ability of organizations. Models in the literature explore innovation from

the corporate culture and organizational perspective. However, history tells us the most key innovations start at the individual level. This paper proposes a model of individual innovation based on the foundational economic principles of cost and benefit. In this context the age of the employee becomes critically important to understanding innovation advancement. Age becomes important not because of the prejudices and preconceptions that often occur in older workers but because of the life cycle of the career and the simple leveraging impact of time. Understanding the role of age in innovation is critical given the changing demographics impacting our human resources.

## **BUSINESS**

### **Macroeconomic Volatility and Economic Globalization**

**Ari Farshbaf**

*Westminster College*

This paper challenges the current empirical findings in the literature regarding the destabilizing impact of economic globalization, especially in the dimension of trade, on macroeconomic volatility and considers a potential non-linearity in the relationship as well as the existence of complementary factors that mitigate the volatility-trade openness link. More importantly, we argue that a better measure of integration and globalization must take into account diversification across international commercial partners. The main findings of this paper are as follows. The destabilizing impact of de facto trade openness diminishes at higher levels, and this variable turns into a stabilizing factor for output volatility beyond a relatively high threshold. Financial openness, domestic financial system development, and democracy are among complementary factors, the coexistence of which mitigates the volatility-openness relationship. Finally, we show that a more comprehensive measure of economic globalization that includes geographical diversification in international trade, namely global trade, is capable of smoothing both output and consumption volatilities. Most importantly, this highly diversified trade can reduce relative volatility of consumption to that of output, in accordance with international risk-sharing theory. This corresponds to levels of diversification enjoyed by the top 25 percentile of countries in our panel of 133 countries over 1962–2006.

**BUSINESS****Public Policy and the Location of Economic Activity****Michael Mamó***Westminster College*

How do state tax and expenditure policies affect the location of economic activities? This paper uses annual state finance data for the years 1998 through 2010 to estimate the effects of budget policies on the location decisions of firms. New business formations vary significantly across states and over time, and they reflect in part the location decisions undertaken by businesses. A number of factors explain the decision to locate in particular areas. From an analytic point of view, these factors can be broadly divided into policy and non-policy variables to emphasize the role of active state intervention in shaping location outcomes. The non-policy variables involve the relative abundance of mainly immobile factors of production such as favorable climate, geographic proximity, and other location advantages. These factors cannot be changed by direct policy action. On the policy side, several regions and jurisdictions are engaged in fiscal competition to sway business decisions in their favor. States offer incentives for new business investment, including lower taxes and favorable regulatory environments. Apart from luring businesses, these policies also serve to reverse existing disparities among states stemming from an underlying process of economic agglomeration. Given these forces, this paper examines how tax and spending policies at the state level interact with other factors to affect the location of economic activities. As with many previous inter-state studies, this paper employs basic unobserved effects models for panel data. The fixed effects model is formulated as:

$$\begin{aligned} \ln(y_{it}^f) = & \alpha_i + \gamma_t + u_{it} = \beta_2 x_{2it} + \dots + \beta_k \\ & x_{kit} + \alpha_i + \gamma_t + u_{it} = \beta_1 + \beta_2 x_{2it} + \dots + \beta_k x_{kit} + \gamma_1 \quad \text{[[SFE]]} \\ & \gamma_1 + \dots + \gamma_{49} \quad \text{[[SFE]]} \quad i^{49} + \delta_1 \quad \text{[[TFE]]} \quad t^1 + \dots + \delta_{(T-1)} \\ & + u_{it} \quad \text{[[TFE]]} \quad t^{(T-1)} u_{it} \end{aligned}$$

where,  $\log(y_{it})$  is the growth of economic activity (measured by the growth of industry employment, for example) in the  $i$ th state in the  $t$ th period and  $x_{it}$  is a vector of policy and non-policy variables affecting business formations in the state. These variables are in two categories, one representing industry factors such as the costs of labor and the



other representing state fiscal variables. Unobserved state- and time-specific factors are controlled for by  $\alpha_i$  and  $\gamma_t$ , respectively, where SFE and TFE refer to state and time fixed effects, respectively.

## **BUSINESS**

### **Decision Making in Higher Education as a Possible Barrier to Change**

**Charla Brown, Mike Alexander**

*Westminster College*

In an increasingly competitive environment, institutions of higher learning can no longer repeat what has worked in the past. Major catalysts demanding change include relentlessly advancing technology, the removal of spatial boundaries, and the dismantling of time itself, all of which have allowed for unlimited asynchronous learning. Despite these factors, colleges and universities continue to follow procedures, established over 240 years ago with 16<sup>th</sup>-century roots, for making decisions. This study will explore the relationship between faculty decision-making practices (independent variable) and a measure of institutional success (dependent variable). By sampling private and public business schools in the United States, quantitative and qualitative data will be collected and a regression analysis will be performed to determine the predictive nature of the independent variable. By understanding how institutionalized barriers can impede change, academicians may then denounce long-held tradition in favor of putting into practice what is taught to their students regarding change management.

## **BUSINESS**

### **Corporate Attention Deficit Disorder**

**Douglas Peterson, Michael Alexander**

*Westminster College*

Measurement at the granular level using longitudinal data and structured equations can support and show operations that are moving out of control as well as "best predictors" for performance. This study, based upon Arnoldo Hax's original work, tests 20-year Fortune 500 data from

selected companies to show how quickly blips in performance can emerge and suggest corrective action.

## **BUSINESS**

### **Corporate Life Through the Eyes of a Dog**

**Douglas Peterson, Nicholas Raoux**

*Westminster College*

Dogs are known to have empathetic ability and social consciousness. Bradshaw contends that thousands of years of domestication have led the dog to eschew the pack mentality and become bonded with the human companion. This is the insight provided by the dog as he domesticates his managers through the human tendency to show submissive behavior to the pack (or group), avoid fights and gnarling of teeth, and tempers social mobility in relation to the pack leader...among others.

## **BUSINESS**

### **Migration and Population Churning Rates in Mountain States Counties, 2005-2010**

**L. Dwight Israelsen,<sup>1</sup> Ryan D. Israelsen<sup>2</sup>**

*<sup>1</sup>Utah State University and <sup>2</sup>Indiana University*

Studies of migration typically examine migration between countries, or, in the United States, migration between states. Recently, there have been several studies investigating the determinants of migration at the county level. These studies have examined the determinants of gross in-migration, gross out-migration, net in-migration, and the migration turnover rate. The current study extends this analysis to include the 2005–2010 period and utilizes a new concept in the migration literature: the population churning rate (PCR). The PCR is the percentage of the population of an area that moves in or out of the area during a given period of time and is measured as the sum of gross in-migration and gross out-migration as a percentage of the population of the area at the beginning of the period. Just as laying off, replacing, and adding new employees creates costs for the employer, in-migration and out-migration creates costs for society. Hence, understanding the determinants of PCR will be useful in predicting and preparing for the associ-

ated costs. The study identifies PCRs by county for the Mountain States for the 2005–2010 period and uses an econometric model to identify the importance of economic, demographic, social, environmental, and geographic variables in influencing the size of PCR.

## **BUSINESS**

### **Culture and Cuisine: Breaking Political Boundaries of Culture**

**Bryan Conrad, Douglas K. Peterson**

*Westminster College*

It is popular to define culture as political artifact isolated within national boundaries. This paper seeks to test 369 subjects in 180 countries looking to validate House's Project Globe and learn about nationally recognized drink, food, and entertainment practices. The contention is these practices will cross national boundaries and present counter-examples to politically based cultural typology.

## **BUSINESS**

### **Political, Economic, and Labor Transformations in Post-Soviet Belarus, 1990–2012**

**Jonathan H. Westover**

*Utah Valley University*

It has been argued that the collapse of the former Soviet Union and the transformation of political and economic systems in post-Soviet Belarus resulted in a decline in the material circumstances of households, reduced social integration and social cohesion, and a led to a decline in the ability of people to take control over their own lives. Furthermore, previous research has shown that labor management practices in Belarus are more negative for workers than those under the previous Soviet system. As Belarus has been faced with new political and economic realities in the two decades since the fall of the Soviet Union, these new realities have impacted other aspects on Belarusians' day-to-day lives, including their experiences in the workplace. Building on previous studies, this research uses attitudinal data from multiple waves of the

World Values Survey and other and country-contextual data from various secondary sources to explore the political, economic, social, and labor transformations impacting changes in societal and work values and attitudes, labor management practices, and working conditions in post-Soviet Belarus from 1990 through 2012.

## **BUSINESS**

### **A Curriculum Model For Teaching Network Administration**

**Andrew Drake, Zhuolin Yu, Ed Harris**

*Weber State University*

This paper presents a unique model and course template for teaching a networking course for IS majors. The IS 2010, OSRA/OEIS 2004, and ABET 2009–2010 curricula models are used for a basis for the course and its contents. We have found this course structure a very effective process for teaching these critical concepts. Student feedback has also been the best the authors have seen. The basic concept starts with the hardware setup using removable hard drives for both servers and client workstations so each student can preserve exactly what was accomplished from their last laboratory session. Virtualized access is also presently being implemented. A materials list with details about switches, routers, wireless components, wiring diagrams, and other needs are included. A series of 15 step-by-step labs, suggested textbooks, case studies, examinations, security suggestions, course structure with calendar, instructional strategies, and teaching suggestions are available upon request.

## **BUSINESS**

### **Gen Y-ers As Consumers Of Good Causes Through Cause Marketing**

**Annie Paul**

*University of Utah*

Many companies are increasingly engaging in corporate social responsibility (CSR) efforts to both enhance their reputation among consum-

ers and grow sales and revenues. These corporations often seek to promote their commitment to charitable causes through cause marketing (CM). Although the literature shows CM to be gaining ground as a promotional tool, little is known about undergraduate students' perceptions toward it. This study compared undergraduate Business students' attitudes, knowledge, and behaviors regarding CM, company–nonprofit partnerships, and cause-linked products to those of other undergraduate students at a large public university. Results show that Business students responded less positively toward CM as a business tactic compared with other students, but they still viewed it favorably. Since today's Business undergraduates might become tomorrow's business managers, this study aims to show the importance of training undergraduate Business students in CM and CSR so that they can more effectively address the current and future purchasing needs of their Millennial counterparts.

## **BUSINESS**

### **The Determinants of Wage Inequality in Several Organisation for Economic Co-operation and Development Countries**

**Yunji Lu**

This research examines how international trade, technology, population, labor market institutions, and the unemployment rate have affected wage inequality in 21 Organisation for Economic Co-operation and Development (OECD) countries from 1995 to 2008. These countries are divided into three groups: the English-speaking countries, the European Union, and Latin America. Using panel data analysis and linear regression model, the empirical results show that the international trade, represented by trade as percentage of GDP and outward foreign direct investment stock, has significantly reduced wage inequality in these OECD countries, which are different from other results in previous literature. However, countries with increasing demand for high technology from outside of OECD countries, decreasing trade union density in labor force, and increasing population growth rate and unemployment rate have experienced bigger wage gaps between skilled workers and unskilled workers. This research suggests that governments in these 21 OECD countries should improve the labor market

institutions, for example, trade union density, to protect the interest of unskilled workers.

## **BUSINESS**

### **Moral Agency, Strong Relationality, and Negotiation**

**M-C Ingerson**

*The Wheatley Institution, Brigham Young University*

In this paper, I propose that Gerald Williams' (1996) "Negotiation as a Healing Process," when appropriately interpreted and supported, is the best available ethical perspective of negotiators and negotiations. I make this assertion based on two facts. First, the work provides an alternative ontology of negotiation that is more morally pragmatic and less psychologically egoistic than the two main paradigms in business today. And second, it allows for a metaphysics of strong relationality wherein persons, including negotiators, are moral agents and not simply stimulus-response meat-machines. I corroborate these two facts by using a careful historical and philosophical analysis of the negotiation literature. This analysis draws on the philosophical works of Levinas and Buber. Finally, I conclude the paper by exploring some initial implications for re-understanding the possibilities of the negotiation relationship.

## **BUSINESS**

### **Entrepreneur Alumni Needs After Graduation**

**Peter B. Robinson, Jeffrey Peterson**

*Utah Valley University*

Eight-five alumni from the entrepreneurship program at Utah Valley University were surveyed to determine their business development needs after graduation. The survey was conducted as a first step in developing outreach programs to remain connected to the alumni and as a way of helping them with their business careers. It is anticipated that between 20 and 40% are starting businesses with needs related to the start-up process. Results of the survey and implications for program development will be discussed.

**BUSINESS****A Quantitative Analysis of Corporate Payouts and Macroeconomic Factors****Lauren LoRe,<sup>1</sup> Mahfuz Raihan<sup>2</sup>***<sup>1</sup>Westminster College, <sup>2</sup>University of Utah*

Corporate payouts are a heavily researched area of corporate finance; however, the emphasis for over 50 years has been on examining firm-specific characteristics as the primary determinants of payout policy and payout activity. This research enhances these findings and examines corporate payouts through a macroeconomic lens. More firms are becoming aware of the importance of macroeconomic factors and express concern about these influences. In hand-collected data from annual reports of the DOW 30 firms, the mention of macroeconomic factors has increased significantly in the last decade. This motivates an interest in examining a variety of corporate finance activities within the context of the macroeconomy. We find evidence that there are simultaneous and short-run relations among the variables and we use a vector error correction model (VECM) to examine these interactions. The error correction portion also allows for the examination of long-term relations. The implications of this study are to show that it is an oversimplification to assume that there is a direct cause-and-effect relation among firm-specific factors and payout activity. The endogeneity of macroeconomic and firm-specific characteristics should be taken into account.

**BUSINESS****Workplace Technologies: A Quest Towards Efficiency and the Struggle for Meaning****Jared Teerlink***Utah Valley University*

The methods of nearly all paid labor are determined by technological change; yet the impact of technological advancement is vastly understudied in traditional meaningful work literature. This interdisciplinary research combines organizational psychology with business technology and seeks to identify the ramifications of technological change as it relates to the meaningfulness of work. It examines historical and cur-

rent perspectives and also suggests implications of emerging technologies. Employing the theoretical framework for meaningful work as prescribed by Lips-Wiersma and Morris, this research examines how technology has and will affect the following workplace characteristics: unity with others, developing and becoming self, expressing full potential, and serving others. Without defining technological change as inherently good or evil, this research advocates awareness and responsible implementation of workplace technologies with the intent to preserve and foster meaningful workplaces.

## **EDUCATION**

### **Importance of Essential Questions in Instruction**

**Ray Brooks, Jim McCoy**

*Southern Utah University*

For over a decade, schools across the nation have been adopting the Understanding By Design Framework as a model for increasing student understanding and academic achievement. At the heart of this framework, developed by Grant Wiggins and Jay McTighe, is the use of Essential Questions. Unfortunately, teachers adopting the framework frequently fail to use, or minimize, Essential Questions in their instructional delivery. Failure to create and use Essential Questions in lesson planning routinely places artificial ceilings on student learning and achievement. In this presentation, the presenters will demonstrate the importance and use of Essential Questions in the learning process.

## **EDUCATION**

### **UVU Structure Learning Assistance Program-- Effect on Grades and Retention Rates**

**Royal Weakly, Laura Snelson**

*Utah Valley University*

In this article, we report findings regarding the effectiveness of the Structure Learning Assistance Program at Utah Valley University (UVU). The goal of this program is twofold: (1) increasing student retention rates, and (2) increasing students passing rates by providing students who are enrolled in developmental math with supplemental



mandatory math tutoring. Students must be enrolled in any of three classes: Math 990, Math 1010, or Math 1050. We look at one-semester retention rates as well as one-year retention rates. Passing rates and retention rates are compared with results of students enrolled in similar math classes without the tutoring component. A self-reported measure is also used to evaluate the overall student satisfaction with the tutoring program, student attendance rate, and the effectiveness of tutors or facilitators at delivering the course content. One-semester retention is defined as the student being enrolled again one semester after taking the Math class. One-year retention rate is defined as the student re-enrolling at UVU one year after taking the Math class.

## **EDUCATION**

### **Case Studies of Learning Through Evaluation**

**David Williams, Melissa Hawkey, Jacque Johnson**

*Brigham Young University*

As part of a large on-going study of people's evaluation lives, we have discovered that evaluation is an important part of their learning lives, too. In this presentation, we will share some of the experiences of learners using evaluation to enhance learning and to shape how they learn to evaluate, choose, decide, and judge formally and informally. Implications for education will be explored.

## **EDUCATION**

### **Assessing the Effectiveness of the Research Experience for Undergraduates at BYU**

**Henry Jimenez, Laura Snelson, Steve Turley**

*Brigham Young University*

In this article, we report findings regarding the effectiveness of the Research Experience for Undergraduates (REU) program at Brigham Young University. This program's goals are (1) to provide undergraduate students with meaningful research experience; (2) to attract students to the field of physics; and (3) to encourage students towards undertaking a graduate path in the field of physics. This article reports the program effectiveness in these three areas. Meaningful research experience

is defined as student participants experiencing the satisfaction of being involved in all aspects of a research project from proposal presentation, research performance, and findings presentation. The ability of the REU program to attract students to the field of physics is measured by students' increased interest toward physics through a self-reported measure survey. The program's ability to encourage students to pursue graduate study in physics is measured by a structured phone interview one semester after participating in the program.

## **EDUCATION**

### **Use of Toys to Reduce Test Anxiety**

**John Hill,<sup>1</sup> Brianne Hill<sup>2</sup>**

*<sup>1</sup>Salt Lake Community College, <sup>2</sup>Ocean County College*

The researchers have been using toys in an experiment to reduce test anxiety among college students by way of designed deflection and/or diversion.

## **EDUCATION**

### **The Critical Need for Providing Early Visual Language to the Deaf Child**

**J. Freeman King**

*Utah State University*

Research has indicated that the language areas of the brain have no preference for language input and that the most accessible pathway for full access to linguistic information for many deaf children is through the visual channel. A visual language, such as American Sign Language, is a natural language system, functions independently from spoken language, and has a fully developed grammatical system. Delay in acquiring a first language produces poorer overall language performance, and without complete access to language during early development, it is difficult for deaf and hard of hearing children's language acquisition to be on par with that of hearing children. There is no evidence that using American Sign Language with deaf and hard of hearing children hinders or prevents spoken language development; in fact, proficiency in ASL has been shown to positively influence spoken lan-

guage development and the development of English literacy in deaf students. Language is the driving force that facilitates spoken language, not the mode of communication.

## **EDUCATION**

### **Working with Diverse Parents**

**Vessela Ilieva**

*Utah Valley University*

Teachers and administrators have recognized that family participation in education has positive effects on students' academic success. Parental involvement results in increased student interest, participation, and achievement. At the same time, scholars report that parents of ethnically and linguistically diverse students are less likely to communicate regularly with their children's schools and are perceived by both teachers and administrators as being less involved and willing to be involved. These parental behaviors are strongly attributed to lack of interest, lack of motivation, and lack of value associated with education. The conflicting findings force an exploration of the discrepancy between the professed willingness and interest for involvement of immigrant parents and the perceived absence of such interest according to school faculty and officials. The presentation will explore barriers and offer solutions to the effective involvement of immigrant parents in the education of their children.

## **EDUCATION**

### **The Impact of the Advanced Placement Program on Utah Students' ACT Scores**

**Russell T. Warne, Braydon Anderson, Alyce O. Johnson**

*Utah Valley University*

The Advanced Placement (AP) program is an educational program that permits high school student to take introductory college-level courses and receive college credit by passing a standardized end-of-course examination. Data were obtained from a statewide database of two high school graduating cohorts (total n = 90,044). We used a series of propensity score analyses of ordered categories to examine the impact of

the AP program on students' academic achievement as measured by ACT scores. Results indicate that merely enrolling in an AP course produces very little benefit for students. Students who take and pass the AP examination, however, obtain higher ACT scores, even after controlling for a wide variety of academic, socioeconomic, and demographic variables. We conclude by discussing aspects of the AP program that remain unanswered.

## **EDUCATION**

### **Improving PBL in Creative Communities Through Effective Group Evaluation**

**Greg Williams, Richard E. West, David D. Williams**

*Brigham Young University*

In this article, we report findings from an in-depth case study of a highly acclaimed student community using predominately problem-based learning (PBL) and associated evaluation strategies to help students produce award-winning animated films. After reviewing literature on the critical role of evaluation in both PBL and collaborative innovation frameworks, we present and explore several examples of students and faculty using evaluation to enhance PBL learning in an innovative collaboration. We conclude with recommendations for future research and practice.

## **EDUCATION**

### **English Exclusivity: ESL Concerns of English Only**

**Benjamin Carter**

*Utah Valley University*

Despite the substantial efforts that have been made to oppose the English-Only movement and to advocate the importance of a bilingual approach in English as a Second Language (ESL) education, there is still support for the exclusive use of English with ELLs in the classroom. Examples of institutions that still support this pedagogical methodology include California schools under Proposition 227 and Brigham Young University, supporting English instruction as the preferred teaching method in the classroom. Though these sources suggest that English-

Only instruction is the sensible and effective way for English learners to gain fluency, this essay argues that not only is the evidence for English-Only efficacy not conclusive, but recent research suggests that bilingual and heritage language instruction are both beneficial and more effective. The essay supports findings on the importance of bilingual instruction and argues that the use of a student's heritage language in instruction is not only important to English learning and curriculum understanding, but is an essential part of a multicultural approach to education.

## **EDUCATION**

### **Educating the Next Generation of HRM Practitioners Using Experiential Methods**

**Bernd Kupka, Jonathan Westover, Connie Bird**

*Utah Valley University*

Utah Valley University (UVU) states in its mission its effort to educate its students via experiential education. The UVU faculty dedicated to revive business education with a focus on human resource management (HRM) at the Woodbury School of Business have developed a plan to follow the university's mission, build a sustainable support program with local companies, help students gain practical experiences that are easy to transfer to future work assignments, and make UVU the educator of choice in the region for HRM. This paper describes the suitability of HRM for experiential education, the anticipated advantages for HRM students and the local business community, the skills and knowledge HRM students are supposed to develop to generate a higher readiness for full productivity of UVU HRM program graduates, and the rewards, satisfaction, and reputation for teachers and the university.

## ENGINEERING

### **Global Productivity Potential of Microalgae for Biofuel Scalability Assessment**

**Jason Quinn, Jeff Moody, Byard Wood**

*Utah State University*

Traditional terrestrial crops are currently being harvested as a feedstock for biofuels, but sustainable and scalability issues limit the resource. Third-generation feedstocks such as microalgae address these shortcomings through higher solar energy efficiencies, integration with waste carbon dioxide, and utilization of poor quality land. Previous productivity and scalability assessments of microalgae-based biofuel systems have extrapolated laboratory-scale data because of the immaturity of the technology. This study integrates a validated biological growth model with hourly historical weather data to critically assess the productivity potential of microalgae in various global locations. A map of the lipid productivity potential around the world was created based on simulating 1007 global locations. The average lipid yields for Australia, India, and Brazil are  $20.69 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$ ,  $20.46 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$ , and  $21.48 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$ . A scalability assessment has been performed highlighting the potential impact of microalgae-based biofuels for various countries.

## ENGINEERING

### **Approximate Analysis of Frames subjected to Vertical Loads**

**Arlo Fawson, Desmond N. Penny**

*Southern Utah University*

In this paper, we examine the standard approximate method of analyzing vertical loads on frames. We show that this method is approximately correct for the beams of the frame; however, it neglects the axial compressive force in the beam. This is a potentially dangerous simplification. We further demonstrate that the standard method is seriously in error for the columns of the structure. We then present our correction of the standard method. Our corrected method is then extended to a more general example that works for both the beams and columns for frames with negligible side-sway.

**HEALTH, PHYSICAL EDUCATION, AND RECREATION****Precedents of Elite Senior Athletes Experiencing Peak Performance****M. Vinson Minder, Brock Halladay***Utah Valley University*

As part of an on-going investigation into the elusive and complex motivational behavior of elite senior athletes and an ever-increasing number of elite senior athletes pursuing and participating in organized competitive physical activities, new research is warranted and would help illuminate important aspects of just how an elite senior athlete experiences a peak performance. The purpose of this research study is to examine the dynamic elements, precedents, and multidimensional components that may exist as an elite senior athlete experiences playing in the zone/finding flow (performing at a peak level), while engaging in organized athletic events or competition. The guiding question for this qualitative study is what unique examples, patterns, and connections do elite senior athletes experience in the exceptional concepts of flow and playing in the zone during their athletic/fitness-related activities or competitions and are there any common themes, patterns, or categories?

**LETTERS—FOREIGN LANGUAGE, HUMANITIES, PHILOSOPHY****The Lost Children of the Spanish Civil War****Jorge Nisguritzer***Utah Valley University*

According to the vast majority of historians and researchers, the Spanish Civil War is one of the causes that led to the beginning of World War II. This is, perhaps, the most important aftermath of this historical event. It is also common to argue about the deteriorating economic, political, and social development of the Spanish society caused by this cruel fight; however, there is one unexplored factor that affected a specific part of the Spanish society. I am referring to the children who lived during the bloody Spanish Civil War. The aim of this paper is to discuss the strong effect the war and the post-war period had on the children of that generation and the crucial impact in Spain as a whole in

the years following the war. Many of these children emigrated to other European countries such as Russia, France, and England, leaving behind their parents either because they were dead or they could not take care of them. Some prematurely became adults because they were forced to support themselves.

**LETTERS—FOREIGN LANGUAGE, HUMANITIES,  
PHILOSOPHY**

**The Poetic Imperative: Pedagogical Musings on  
Teaching Spanish Poetry**

**David F. Richter**

*Utah State University*

In the introduction to *Poet's Choice*, the literary critic Edward Hirsch asserts that poetry is “a human fundamental,” that “it saves something precious in the world from vanishing,” and that it “is a necessary part of our planet.” And yet, in both academic and popular discourse in the United States, poetry is slowly becoming extinct. The perceived decline in the value of literature in general is reflected by recent assessments of the humanities in light of the current economic downturn. This paper examines the urgency of a renewed interest in poetry and presents as a case study the transformative power of poetry demonstrated in recent Spanish Poetry courses. In the end, success in teaching poetry is found as one establishes what the educator Ken Bain calls the “natural critical learning environment.” Part theory, part pedagogy, this paper examines the various hows and whys of reading poetry, concepts and practices that are all too often foreign to our foreign language students.

**LETTERS—FOREIGN LANGUAGE, HUMANITIES,  
PHILOSOPHY**

**Fatal Symptoms**

**Grant Burton**

*University of Utah*

Various governing authorities in Southeast Asia have historically used the opium trade to generate extra revenue. This trade was burdensome



to local peasants and tended to associate colonial governments with opium corruption. When French control in the Vietnam region began to break down around 1945, the opium trade network connecting local poppy farmers, local government officials, and French officials allowed corruption to develop in and around what became, after 1954, the government of the Republic of Vietnam. Despite multiple U.S. efforts to solve the opium problem in South Vietnam, the drug trade flourished. The highest levels of the government of Vietnam remained implicated in the opium-related corruption. This climaxed with the GI heroin epidemic in Vietnam during the later years of the U.S. war effort. The drug problem was the result of embracing a corrupt government and was a major factor in the eventual collapse of the South Vietnamese government.

## **LETTERS—FOREIGN LANGUAGE, HUMANITIES, PHILOSOPHY**

### **The Myth of the Eternal Return and Its Reflexes in Medieval German Literature**

**James W. Harrison**

*Southern Utah University*

In his book, *Cosmos and History: The Myth of the Eternal Return*, Mircea Eliade argues that primitive societies viewed time much differently than we do today. In these societies, in order for any event to be significant, it has to be part of sacred time. Sacred time is defined as that time in which those actions that led to the birth of that society occurred. Any event that is not at least in part a reactualization of those actions is deemed unimportant and will not find its way into history. One of the most important aspects of this model is that it argues for a cyclical rather than a linear concept of time. Only those things that recur are important. That which is new has no place in primitive man's mythology. Human acts do not derive their meaning from their crude physical datum but from their property of reproducing a primordial act, of repeating a mythical example. What we do as humans has meaning only insofar as it recalls what mythic heroes of the race did to establish that race's being and identity. "In the particulars of his conscious behavior, the primitive man acknowledges no act which has not been previously posited and lived by someone else, some other being who was not a man. What he does has been done before. His life is the ceaseless repetition of gestures initiated by others." While this concept of time

begins to change with St. Augustine, who argued for a linear modal of time, the change does not occur all at once, and there are many medieval works that still incorporate, at least to some extent, this primitive cyclical concept of time. One of those works is *Das Annolied* composed at the end of the 11<sup>th</sup> century in Cologne. The work extols the life of Anno II, the archbishop of Cologne, and was probably used to help convince the Church that Anno should be sainted. It is a unique work in many ways. It is one of four or five works written just before the beginning of the High Middle Ages that reintroduces the German language into the literature of Europe. During the 10<sup>th</sup> century and most of the 11<sup>th</sup> century, all literature written in the German-speaking countries was written in Latin. Now just before the 12<sup>th</sup> century, the German muse suddenly finds its voice and within 80 years gives birth to the first classical age of German literature. The work itself is a double history of the world. It recounts both the secular and the sacred from the beginning of civilization to the events which lead up to Anno's tenure as Archbishop of Cologne. In the work, there are repeated references to a double, i.e., cyclical, history. This paper will attempt to explain why this concern with cyclical history is important at this time and how Eliade's work might be used to understand the deep structure of this kind of temporal phenomenon in the literature of this epoch.

## **LETTERS—FOREIGN LANGUAGE, HUMANITIES, PHILOSOPHY**

### **A Throne of Bayonets**

**Andrew O. Pace**

*University of Utah*

My paper explains how the failure of the Hard-Liner's Coup on 19-21 August 1991 signaled the demise of the Soviet Union. Although dozens of factors influenced the outcome of the coup d'état, the most important explanation is that the Soviet military refused to follow the orders of reactionary communist officials. Restructuring the Soviet system gave soldiers new freedoms that they were reluctant to surrender. Personal appeals from government and military officials and popular opposition from their own countrymen also caused them to question the legitimacy of their orders. Finally, members of the military and KGB personally assessed their own values and determined that they could not in good conscience support the communist conspiracy. This failure accelerated the fall of the Soviet Union to an unbelievable degree. The critical mo-

ment, which reactionary forces hoped would rescue the communist regime, instead exacerbated its flaws and plunged the USSR to its death.

## **LETTERS—FOREIGN LANGUAGE, HUMANITIES, PHILOSOPHY**

### **Religion, Public Policy, and Compromise**

**Jason Goltz**

*Westminster College*

In this paper, I propose reasons for thinking that certain kinds of religious beliefs should be morally prohibited from the making of public policy. There is in the United States a long-standing tradition surrounding “the separation of church and state,” but many religious believers (like Stephen L. Carter) have complained that in recent years this is being unfairly interpreted to imply that one must give up one’s deeply held religious beliefs to participate in the democratic process. I argue that this is not necessary, but one must at least be willing to compromise on those beliefs since democracy by its very nature implies the possibility of compromise. The conclusion is that religious beliefs based on faith alone are incompatible with democracy; however, there is no reason why religious beliefs based on arguments and evidence cannot be a part of the public dialogue in forming public policy.

## **LETTERS—FOREIGN LANGUAGE, HUMANITIES, PHILOSOPHY**

### **ACTFL Guidelines and CEFR, False Friends?**

**Luciaa G. Cano**

*Dixie State College*

For more than 30 years, the American Council on the Teaching of Foreign Languages (ACTFL) and the Council of Europe have defined language proficiency levels; however, there is no agreement on their correspondence. A qualitative analysis of these main language level descriptors may not be enough to set the equivalences between both sides of the Atlantic. In this presentation, I will focus on a quantitative analysis of Spanish oral proficiency interviews that I am conducting.

Using computerized language analysis, I analyze some fluency features of the learners' speech to explain the correspondence in the lower and higher levels and the lack of correspondence in the middle levels of proficiency. As teachers, language coordinators, or supervisors, we try to define our students' levels, but this is hard, especially when setting language outcomes based on different theoretical systems. After this presentation, we will be able to understand these frameworks, their correlation, and how to use them in our language programs.

## LETTERS—LITERATURE

### Is Displacement a Bad Thing?

Lawrence Bohne

*Weber State University*

Given the rise in transnational literature, the question once again arises of the impact displacement has on an individual. Several authors give us insight into what life is like for those who leave their native land and people, whether by choice or force, and how they cope with that transition and form their identity in a foreign land. Caryl Phillips in *Crossing the River* gives us three characters of African descent who have seemingly different, yet fundamentally similar, trials to undergo to live in a new world. It was found that displacement, to some degree, is necessary for a person to individualize himself and mentally mature. It is from this growth we can find inspiration to make a similar transformation as individuals and as a society and to develop a greater sense of brotherhood. Through diversity we can find unity?

## LETTERS—LITERATURE

### Identity, Journey, and Mirage in J.M.G. Le Clézio's *Desert*

Catherine C. Harris

*Weber State University*

In 1980, J.M.G. Le Clézio won the Nobel Prize in Literature for his novel *Desert*, a novel framed in two alternative narratives, which tells the story of the Tuaregs, the ancient tribes of the Sahara Desert and their descendants. The search for identity, the quest of journey, along

with magic and mirage lies in the story of their challenges. Relying on their seers, blind faith led them into a disastrous uprising against the French military. Decades later, driven by spirituality, the protagonist, Lalla, is shown disorientated when she is forced to face the meaninglessness and absurdity of the modern world. This paper discusses how Le Clézio's insightful prose in *Desert* urges the reader to reflect about the sufferings of the displaced and marginalized people on the global stage, and their struggles to adapt to the demanding issues of the modern world.

## LETTERS—LITERATURE

### Formation of Identity in *The Cat's Table*

**Amanda Riter**

*Weber State University*

Transnational literature is bound up in the notion of identity, raising questions about how a person is supposed to understand who they are when they have been stripped of the typical expression of the foundational notions of home and country. When dealing with the issue of identity, many scholars theorize that transnational people and literature cannot ever truly have an identity in the way that comes naturally to those who possess one, definitive home. In *The Cat's Table*, however, Michael Ondaatje espouses the notion that homeland and family are not what develop our identity. Instead, identity is formed by our experiences. Ondaatje explores this concept through the experiences of Michael, and how the novel follows his path towards discovering his own personal identity through the experiences on his voyage—experiences that would later define the sort of man he will grow to be.

## LETTERS—LITERATURE

### Look Who's Talking: Exploring Writing Conference Interactions and Revision

**Chris Lee, Angie Carter, Deanna Ashworth, Ryan Krage**

*Utah Valley University*

Common among Freshman Composition course instructional practice is the writing conference, wherein student and instructor meet face to face

to discuss how a draft of an essay can be improved. While anecdotal evidence abounds regarding the efficacy of the writing conference, little to no empirical data exist. Furthermore, virtually all of the existing literature explores the writing conference from an instructor perspective. The current project seeks to address these gaps by employing more systematic and qualitative methodology, including critical discourse analysis, as well as including a student perspective in both data collection and analysis. Of particular focus is how the distribution of power—who speaks more and who sets the agenda—influences subsequent revision. This paper will examine the connection of students' perceptions about the writing conference, as well as the conference interaction itself, to their final essay drafts.

## **LETTERS—LITERATURE**

### **Kafka's New Kabbalah of Acquittal**

**Jennifer Large Seagrave**

*University of Phoenix, University of Utah*

This paper presents an analysis of the kabbalistic elements of Kafka's *The Trial*. It suggests that Kafka's studies of Jewish mysticism gave him a particular understanding of the impossibility of "acquittal" or redemption by God. Instead, he offers his protagonist K. two options: "apparent acquittal" and "protraction." These two prospects offer acceptance of innocence by the community or a ritualistic appeasement of the Judge. In neither case is an actual reunion with God, the purpose of kabbalah, effected. The paper offers this reading as an illustration of Kafka's growing concern with man's existential predicament: the inability to access the Law or the God who will be the final Judge.

## **LETTERS—LITERATURE**

### **Power and Consequence: Subversive Gender Roles in Allende and Levinson**

**Nicole Wardell**

*Weber State University*

Within Latin American literature, the reality of everyday life and the fantastic of the supernatural often collide to form magical realism. The

tales of magical realist writers are often used to reframe the conceptualization of accepted cultural norms. Female Latin American magical realists often use their texts to challenge gender roles of the traditional Latino culture. Isabel Allende and Luisa Mercedes Levinson use their short stories, “An Act of Vengeance” and “The Cove,” to reject the oppressive patriarchal societies. Their female protagonists subvert gender roles and break from tradition to assert a power that is historically withheld from them. Although breaking from the accepted culture empowers Allende’s Dulce Rosa Orellano and Levinson’s unnamed woman, it also has consequences. The subversion of gender roles in Allende’s and Levinson’s stories empower the female characters while simultaneously destroying Dulce Rosa Orellano in “An Act of Vengeance” and the unnamed woman in “The Cove.”

## LETTERS—LITERATURE

### **Narration for Salvation: The Narrative Therapy within Norman Maclean’s Novella**

**Taylor Mountford**

*Utah Valley University*

In my analysis of Norman Maclean’s *A River Runs Through It*, I argue that the author’s self-discovery through retelling his story is an example of narrative therapy. Although some critics claim that *A River Runs Through It* is not a historically accurate autobiography and therefore is not considered the truth about the author, my essay asserts that in testimony, the statement or declaration of an event by a participant, historical accuracy is unimportant relative to the teller’s psychological healing through recounting their perspective during the occurrence of a traumatic event. To effectively cope with his loss, Maclean immortalizes and edifies his brother Paul, by morally elevating his brother’s memory to salvation through prose. The piscatorial prose used in *A River Runs Through It* exhibits Maclean’s profound love for his brother by demonstrating Paul’s beauty and prowess in fly fishing, the skill that the Macleans practice as a method to glorify God and nature, thus attaining salvation.

## LETTERS—LITERATURE

### **The Chameleon Effect: A Survival Instinct in *The Bad Girl***

**Alana Faagai**

*Weber State University*

For a transnational individual crossing over into foreign borders and cultures, the ability to adapt proves instrumental to his or her survival. In Vargas Llosa's *The Bad Girl*, the protagonist, Lily, is a young woman with a natural flamboyance, who seems to shape-shift into different people depending on the country she lives in—an exiled Cuban activist living in Paris, the wife of a wealthy Englishman, and even a mistress to a Japanese businessman in Tokyo—each disguise bringing her money and power, the foundation of Western thought. In this paper, I will explore Lily's chameleon-like persona, a characteristic seen in most transnationals, who can change their personal appearance, speech mechanics, and even their principles to blend in with the dominant society. To survive in the West, one must sometimes hide his or her true identity, which may create a feeling of disconnect with the rest of the world.

## LETTERS—LITERATURE

### **Seas, Shores, and Surfaces: Anti-colonialism through the Oceanic in *Winesburg***

**Anne Turner**

*Brigham Young University*

Sherwood Anderson's *Winesburg, Ohio* reveals small-town America during the tumultuous colonial era following the Civil War. While the United States practiced colonialism abroad, anti-colonial movements occurred within the continental borders of the United States. Movement from the war-torn South to the industrial North sparked a desire for movement in many Americans; however, this desire was not localized by geographic region, and while Anderson's novel is based in a Northern state, the yearning for movement manifests itself in the character of George Willard. The apparent disconnectedness of other characters in the novel amplifies George's desire to leave Winesburg "someday." Willard's desire to physically break from Winesburg's disconnected-



ness is in fact a manifestation of his mental desire to break from the collective mass and become an individual. This paper examines historical anti-colonialism through this idea of the collective as it relates to oceanic imagery in Winesburg.

## **PHYSICAL SCIENCES**

### **Towards Permanent Data Storage**

**Matthew R. Linford, Barry M. Lunt, Robert C. Davis**

*Brigham Young University*

Most digital data is not permanent. Hard drives, recordable CDs and DVDs, and flash drives all have lifetimes of about 10 years. In contrast, messages written in stone centuries or even millennia ago may still be legible, and documents written on acid-free paper are often readable 500 years after they are produced. For the past few years, we have been studying various methods of permanently storing digital data. These efforts have led to the formation of a company, Millenniata (see [www.mdisc.com](http://www.mdisc.com)), which sells a recordable DVD that lasts 1000 years. Millenniata will soon introduce a Blu-ray product. In parallel with the active research and development efforts at Millenniata, we have been working at BYU to (i) develop permanent optical tape and solid-state data storage alternatives, and (ii) thoroughly characterize the materials in these devices. This contribution will focus on the science and technology behind these advances.

## **PHYSICAL SCIENCES**

### **Synthesis of Deep Chiral Resorcinarene Cavitands and Their Application**

**Tayyebah Panahi**

*Brigham Young University*

Chiral discrimination of amino acids and amine drugs is an important target for molecular recognition by artificial host compounds. A chiral host molecule will be synthesized for chiral recognition and development of a stationary phase in ion chromatography. The upper rim of the resorcinarene host will be elongated with four chiral glutamic acid groups. Pure chiral drugs are necessary and their separation critical to

our health. The new molecules will be characterized by nuclear magnetic resonance, mass spectrometry, and elemental analysis. Chiral host will be used to discriminate between enantiomers of chiral amino acids and chiral amine drugs by binding these to the cavitands. After binding constants have been measured by  $^1\text{H}$  NMR titration, the molecule will be used in ion chromatography separations of amino acids and amine drugs. This cavitand, with carboxylic groups concentrated on the upper rim, will predictably be able to separate amino acids because of the different substituents on the amino acids.

## PHYSICAL SCIENCES

### Can You Teleport the Smile of a Cheshire Cat?

**Prashanna Simkhada, Jean-Francois Van Huele**

*Brigham Young University*

Teleportation and Cheshire cats are two concepts from quantum information theory: Quantum Cheshire cats disembodied physical systems across space, using the technique of post-selection to separate the “smile” from the “body” of the cat. Quantum teleportation re-creates unknown physical systems across space. We use a quantum optical polarization interferometric scheme and introduce post-selection in the description of teleportation to explore the possibility of reconciling these two different manifestations of quantum nonlocality.

## PHYSICAL SCIENCES

### Bound Quantum System of Electron or Proton Orbiting a Small Black Hole

**Daniel Gray, Alexander M. Panin**

*Utah Valley University*

Mini black holes (BHs) of various mass could be left over in space from the early expansion Big Bang phase (so-called primordial BHs). As a result of interaction of those BHs with interstellar hydrogen, they could form a bound system with an electron or a proton (or both). What would such system look like? Would it be stable, metastable, or quickly consume the orbiting particle? How much is the life time of such “gravitational atoms”? If such system is stable, then what is the size of

it; how much is the bonding energy of its ground state (=ionization potential energy), and how much are the energies of its excited states? Are those “gravitational atoms” observable? What other properties do they have? Based on known physics, we try to analyze the behavior of such an exotic system and answer the above questions for black holes of various masses.

## PHYSICAL SCIENCES

### **Impact of Efficiency of a Photon Engine on a Relativistic Travel**

**Jeremy Redd, Alexander Panin**

*Utah Valley University*

Future space propulsion systems will likely use annihilation of matter and antimatter in propulsion systems. Annihilation of matter and antimatter is not only the energy source of ultimate density  $9 \times 10^{16}$  J/kg but also allows use of ultimate exhaust speed—the speed of light  $c$ —thus potentially allowing acceleration of a payload to relativistic and even ultrarelativistic velocities. Because of time dilation and length contraction, such velocities may make interstellar and even intergalactic travel possible in the lifetime of one generation of crew only (20–30 years). However, the feasibility of achieving relativistic velocities with annihilation-powered photon engines strongly depends on the engine efficiency—the fraction of photons—contributing to the thrust. In this presentation, we analyze the relationship between the engine efficiency and achieved velocity (and distance traveled) for various engine setups.

## PHYSICAL SCIENCES

### **Chemical Compositions in the Young Outer Halo Star Cluster NGC 1261**

**Dan Filler, Inese I. Ivans, Jennifer Simmerer, Ian Roederer**

*University of University*

Our galaxy, the Milky Way, is home to about 150 globular clusters (GCs), dense stellar systems that contain anywhere from 10,000 to 10 million stars. Most GCs are roughly 13 billion years (Gyr) old; how-

ever, the GC NGC 1261 is different. It is relatively young at about 8 to 10 Gyr old and might not have been born in the Milky Way. We will present chemical abundances of individual stars from the first-ever high-resolution spectroscopic analysis of this cluster. Our results indicate that the star-to-star abundance variations with respect to sodium are larger than those from any other GC reported to date. These abundances, considered along with its age and possible extragalactic origin, may make NGC 1261 a vital piece of information in understanding the evolution of our galaxy. We will also present the abundances of magnesium, silicon, calcium and titanium, framed in the context of galactic evolution and nucleosynthetic history.

## **PHYSICAL SCIENCES**

### **Characterizing InGaAs Quantum Dot Chains Using Transmission Electron Microscopy**

**Tyler Park, John Colton, Haeyeon Yang, Jeff Farrer**

*Brigham Young University*

Quantum dot chains grown by a new epitaxial technique have been studied. The new growth technique seeks to reduce indium segregation and intermixing, compared with the conventional method, for higher-quality dots. These quantum dot chains may have potential application in optoelectronics, detectors, lasers, and quantum computing. Our recent efforts have been to characterize the quantum dot chains by using transmission electron microscopy to answer morphological questions that photoluminescence spectroscopy could not. Using this method, we've been able to observe a temperature dependence of dot flattening, minimal segregation and intermixing, and little influence of a capping layer on the structure of the dot-chains.

## **PHYSICAL SCIENCES**

### **Surface Roughness of Thin Uranium Oxide Films**

**Holly Stewart**

*Brigham Young University*

The surface roughness of uranium oxide film is important because of its potential use in extreme ultraviolet mirrors. Such mirrors would have

applications in deep space observation, high-resolution microscopy, and homeland security. Smoother mirrors can reflect higher frequency light with minimal scattering. Using atomic force microscopy, the surface roughness of three uranium oxide films of approximate thicknesses 44 nm, 114 nm, and 412 nm was found to be 16.3 nm, 2.37 nm, and 7.74 nm, respectively. The thinnest and roughest 44-nm film was found to exhibit crystal-like formations. These crystal-like structures were less prevalent in the films that underwent longer periods of deposition, yielding thicker films with smoother surfaces. X-ray photoelectric spectroscopy was then used to determine the compositional integrity of each film, and the 114-nm film was found to be contaminated with fluorine.

## **PHYSICAL SCIENCES**

### **Search for Life-Supporting Environment**

**Chin-yah Yeh**

*Utah Valley University*

The necessary components of a life-supporting milieu are explored, using terrestrial lives as a model. Is the Gaia Hypothesis scientific? Where does Earth's water come from? Are there other life-supporting media? What environment raises lives better?

## **PHYSICAL SCIENCES**

### **Spectacular Chelyabinsk Meteor**

**Alexander Panin**

*Utah Valley University*

On March 15, 2013, at about 9:20 a.m. local time, a small asteroid entered the Earth's atmosphere at a shallow angle and after ~700 km of travel exploded at about 20-km altitude near Chelyabinsk, Russian Federation, with the peak brightness dwarfing the sun. The generated shock wave blasted windows in thousands of buildings injuring several hundred people (mostly by flying glass and debris) and was detected all around the globe. Numerous videos of propagating bolide were recorded by dash and security cameras. We model numerically a propagation of such asteroids through the atmosphere and present here the results of the modeling (such as asteroid trajectory, air drag, generated thermal power, shock wave intensity, damage areas, etc). Using our

model, we will also discuss the possible impact of such an asteroid were it to enter the atmosphere at different entry angles and at different locations, as well as the possible impact of various other asteroids ranging in size from a few meters to a few kilometers in diameter.

## **PHYSICAL SCIENCES**

### **Determining Thin Film Roughness from EUV Reflection Measurements**

**Codie Petrie, R. Steven Turley, Greg Hart, Holly Stewart, Lexi Bach, Stephen Harman, Jordan Bell**

*Brigham Young University*

Well-designed extreme ultraviolet (EUV) optics are crucial in the study of astronomical EUV sources, EUV lithography, and some medical radiation tools. The performance of EUV optics depends largely on their roughness. When reflecting EUV light from thin films, surface features (roughness) scatter the incident light. We measured the reflection of EUV light from two  $\text{UO}_2$  thin films with thicknesses of 44 and 412 nm. We have also measured the roughness of these surfaces on an atomic force microscope. Lastly, using the Fulton Supercomputer at BYU, we have calculated the reflection from rough surfaces similar to the surfaces that we measured using geometrical optics, physical optics, and direct calculations. We found that measuring roughness optically was, in some cases, more sensitive to certain surface features.

## **PHYSICAL SCIENCES**

### **Elementary Quantum Operations in Quantum Information**

**John Gardiner**

*Brigham Young University*

Quantum information is the application of principles of quantum physics to information theory. A basic tool in the field of quantum information is the quantum operation. A quantum operation is a mathematical description of a quantum process. Quantum operations can provide a description of the behavior of quantum systems that interact with their environment. Specifically, they can model processes subject to noise or

decoherence. I show how quantum operations on single qubits can be seen as compositions of operations from a set of elementary operations and work out quantum circuits for these elementary quantum operations. I present an example of a quantum operation and its decomposition into elementary operations for a spin 1/2 system.

## PHYSICAL SCIENCES

### Exploring Norbornenyl Solvolysis Rates with Computational Methods

**Byron Millet, Barry Lloyd, H. Laine Berghout**

*Weber State University*

Understanding relative solvolysis rates of norbornenyl derivatives remains an area of significant research interest. Through-space interactions between  $\pi$ -bonds are thought to play a significant role in stabilizing the transition state for anti-7-norbornene solvolysis. However, through-space interactions do not account for the similar observed solvolysis rates of nearly identical compounds both with and without  $\pi$ -bonds. Studies have shown that the stability of these compounds is significantly affected by  $\sigma$ -bond interactions. This study evaluates the relative energies of several norbornenyl compounds with and without  $\pi$  bonds to determine both  $\pi$ -bond and  $\sigma$ -bond effects on the stability of norbornenyl cations. Additionally, we analyze the effect of addition of a ketone functional group on the relative stability of cation. Correlation between literature solvolysis rates of various derivatives and the stability of their respective cations is evaluated. Modern electronic structure methods are used to determine the energy of each derivative and its cation. Good correlation is found between the stability of a derivative's cation and its respective rate of solvolysis.

## SOCIAL SCIENCE

### Cold War to Holy War: The Soviet-Afghan War

**Nina Cook**

*Utah Valley University*

From the American perspective, post-WWII concerns about Communism resulted in the Cold War. The United States hoped to blunt Soviet

expansion worldwide using the principle of containment. Fearing the spread of Communism to Afghanistan in 1978, the U.S. began to support rebels based in Pakistan. Those rebels, the Mujahedeen, began Jihad against the Communists. Supplied with weapons and money, the Mujahedeen became a useful American tool throughout the 1980s. This aid was crucial in the Soviet decision to withdraw from Afghanistan. Yet, many of the radical Mujahedeen interpreted this triumph as a victory for concepts of Jihad. The significance of the Soviet–Afghan war lies in unintended consequences for the United States; Cold War containment of the Soviets in Afghanistan created a catalyst for ideas of radical Jihad, which in turn targeted American interests in a global holy war against the U.S. and the West.

## **SOCIAL SCIENCE**

### **Using the Internet as a Mobilizing Structure for Pressure Groups**

**Giancarlo Panagia, RJ Maratea**

*Westminster College*

An important distinction exists in social problems theory between claims-makers that must advance issues in public forums and those that have close ties to the policymaking process. Typically, outsider claims-makers, such as local environmental groups, are most recognizable because they rely on the press to disseminate their claims to the general public. Of course, it is through these instances of community activism that local environmental groups receive the most news coverage through which most people learn about claims-making campaigns. Many activist groups simply lack the necessary infrastructure and available assets needed to coordinate high-profile events. Nowadays, the Internet provides any claims-makers with a cost-effective networking structure that allows for the distribution of environmental claims to widespread audiences and facilitates communication with constituents. Some authors argue that this power to make information directly available to the public is reflective of a larger trend wherein online technology effectively connects the web with the environmentalist community, providing claimants with a dynamic vehicle for engaging in grassroots mobilization. Generally, coordinating this type of mobilized action is rather expensive and time-consuming, requiring both a great deal of organization and sufficient financial resources. Many local environmental groups lack the available assets and base of support to carry out



a successfully claims-making campaign to conclusion. Of course, not all claims-makers are created equal. There exists another group of claimants, which comprise what we refer to as the Group of Ten, that may influence government decisions and at the same time ensure that their constituency interests are duly represented in each stage of the decision-making process. Still other groups that maintain local chapters in different areas of the country must obtain the bulk of their assets for their local community challenges from donations made by members, supporters, and other advocates.

## **SOCIAL SCIENCE**

### **Implications of the Arab Spring: The Response of the United States to Egypt**

**Katie M. Blake**

*Brigham Young University*

This paper examines the 2011 uprisings in North Africa commonly referred to as the “Arab Spring.” This paper specifically analyzes the response of the United States to the Egyptian revolution and the ousting of long-time president, Hosni Mubarak. I discuss the U.S interests in the Middle East, how they relate to the Egyptian uprisings, and how the U.S can protect these interests under the subsequent Muslim Brotherhood regime. I describe the current administration’s policy towards Egypt and then continue to prescribe possible policy options that can maintain U.S influence in the region. This paper tries to explain that in spite of Obama’s ambivalence in creating foreign policy in the Middle East, the United States still has the ability to influence Egyptian political developments.

## **SOCIAL SCIENCE**

### **Wildcat Nation: Open to Diversity?**

**Lindsey Bonney, Nick Berg, Kaitlin Oliver, Heidee Miller, Whitney Hendershot, Valerie Larkin, Brett Bartruff, Kerry Kennedy**

*Weber State University*

An abundance of research has been conducted on diversity and its impacts on higher education. Because college campuses increase the op-

portunity for students to engage in interactions that challenge their beliefs toward diverse issues, such as race, gender, sexual orientation, and religion, it becomes important to identify whether these experiences produce meaningful impacts on student's satisfaction with college and toward their overall growth. The purpose of the current study is to determine Weber State University students' level of openness to diverse interactions. This study attempts to identify the underlying factors that contribute to a student's willingness to participate in such experiences. The instrument was comprised of two sections of the College Student Experience Questionnaire (CSEQ), along with 21 demographic questions. Results will compare demographic group membership with openness to diversity as well as willingness to engage in diversity.

## **SOCIAL SCIENCE**

### **The Mountain West Is Becoming Less Segregated**

**L. Dwight Israelsen,<sup>1</sup> Ryan D. Israelsen<sup>2</sup>**

*<sup>1</sup>Utah State University and <sup>2</sup>Indiana University*

In the United States, much of the recent national discourse has been centered on “the politics of division,” with the implication that the U.S. is becoming increasingly divided along racial/ethnic lines. We find that there has been a significant reduction in segregation and racial concentration in Mountain West states and counties between 1990 and 2010, with most of the effect showing up by 2000. We also identify the economic, social, educational, and demographic variables that have contributed to this reduction. The current study examines the pattern and determinants of racial/ethnic segregation by Mountain West county and state, based on census tract data for Non-Hispanic Whites, Hispanics, Blacks, Asians (Asians/Pacific Islanders), American Indians (Indians and Alaskan Natives), and All Other. The two most commonly used measures of segregation, the “isolation index” and the “dissimilarity index” are calculated for each racial/ethnic group in each Mountain States county for 1990, 2000, and 2010. Based on these individual indices, racial/ethnic-population-weighted segregation indices are calculated for each county for these years. In addition, county-population-weighted segregation indices are calculated for each Mountain West state and for the Mountain West as a whole. This study also utilizes a new measure of segregation, the “racial concentration ratio,” or RCR. The RCR is a one-parameter measure of the racial (ethnic, ancestral) composition of an area (county, state) relative to the racial composition

of the entire Mountain West and is similar to a Gini coefficient. RCRs are based on the percentages of county (state) population in six groups: Non-Hispanic Whites, Hispanics, Blacks, Asians (Asians/Pacific Islanders), American Indians (Indians and Alaskan Natives), and All Other. Changes in isolation index, dissimilarity index, and RCRs at the state and county levels are identified for 1990–2000, 2000–2010, and 1990–2010. Results of this analysis show that the Mountain West is becoming increasingly less segregated with reductions in all three measures of segregation over the entire period and over each sub-period. An econometric model including economic, social, education, demographic, political, and location variables is developed and used to identify the determinants of the change in county segregation indices and racial concentration ratios between 1990 and 2010.

## **SOCIAL SCIENCE**

### **Surveillance and Self-Government**

**Randall Allen**

*Southern Utah University*

This paper examines the relationship between surveillance and self-government. Technological advances, in conjunction with a willingness to compromise privacy to enhance safety and security, has enabled public and private entities to implement new and ever-more-pervasive means of domestic surveillance. On a philosophical level, surveillance undermines important foundations of a self-governing society, including not only freedom and self-determination, but also the status of virtue and self-imposed restraint as necessary preconditions of the American constitutional system; surveillance also preempts the vital processes of self-correction and informal (non-systematic) enforcement of legal and moral standards. Policy makers should weigh these concerns against the utility of new surveillance opportunities. Further, as a matter of constitutional law, the Supreme Court should engage the surveillance issue robustly, not only in terms of technical Fourth Amendment analysis, but also in terms of the threat surveillance poses to the foundational principles of self-government.

## **SOCIAL SCIENCE**

### **Social Contract Conflict: Combat Veterans Perception and Social Reintegration**

**Daniel Poole, Roger Johnston**

*University of Utah*

This study seeks to understand what obstacles combat veterans face when reintegrating back into civilian society after deploying to combat zones. Survey data supplemented with follow-up interviews are used to explore the perceptions of combat veterans and to measure demographic, military experience, combat exposure, and various social cohesion variables. It appears that a conflict exists between veterans' perception of their social contract obligations and the fulfillment of this contract, which has both formal and informal components, by society as a whole. This study seeks to understand the mechanisms causing this disconnect and the impact that these issues have on social reintegration of veterans in a post-combat environment.

## **SOCIAL SCIENCE**

### **Increasing Sex Ratio Imbalance among Utah Mormons**

**Rick Phillips,<sup>1</sup> Ryan C. Cragun<sup>2</sup>**

*<sup>1</sup>University of North Florida, <sup>2</sup>University of Tampa*

This paper uses a large, multi-wave census of U.S. religious denominations to examine the distribution of male and female members of The Church of Jesus Christ of Latter-day Saints (the LDS, or Mormon Church) in Utah. Like other major Christian denominations in the United States, the LDS church has a surplus of women; however, in recent years, this surplus has been increasing among Mormons in Utah. In 1990, sex ratios among Utah Mormons were only slightly imbalanced, but by 2008 LDS women in Utah outnumbered LDS men by a ratio of 3:2. Outside Utah, sex ratios within Mormonism have been stable over this time period. We discuss reasons for this increasing gender ratio imbalance and discuss the impact it might have on the Mormon marriage market and other aspects of religious culture in Utah.

**SOCIAL SCIENCE****The Paradox of Plastic Surgery among Latter-day Saint Women in Utah****Joylin Namie***Utah Valley University*

Among Latter-day Saints (LDS), bodily discipline is a sign of religious commitment, yet physical appearance is also used to mark acceptance into mainstream society, rendering bodily form culturally significant. Given the admonition to be “in the world, but not of the world,” meaning to resist “worldly” practices that challenge church teachings, and prohibitions against body modification, cosmetic surgery appears contradictory. However, Utah, the center of Mormon religion, has a high concentration of plastic surgeons, and many Mormon women employ their services. Several factors encourage this practice, including the social value placed on motherhood and high birth rates that move women’s bodies away from the mainstream ideal. Religious perfectionism and proscriptions of modesty that permit tight-fitting, but not skin-baring, clothing allow for negotiation of post-surgical bodies in accordance with church doctrine, permitting LDS women to use surgical technology to fashion a mainstream, yet Mormon, identity employing the visual language of the body.

**SOCIAL SCIENCE****Adaptable Dads: Latter-day Saint Fathers Feeding the Family****Joylin Namie, Hillary Timmons, Shannon Ricks, Bowdrie Clawson***Utah Valley University*

American fathers are under pressure to become more involved with childcare and domestic work. Studies suggest they are doing so, although fathers’ work in the home is rarely equal to mothers’. Resistance by fathers to becoming more involved with “women’s work” is attributed to gender roles that mark such work as feminine; at the same time, provisioning through paid labor continues to be closely associated with masculinity and fatherhood. This project examined fathers’ contributions to food-related work within Latter-Day Saint (LDS) families, a subset of the American population in which traditional gender divisions

are reinforced by religious doctrine. Interviews with LDS fathers whose wives work suggests considerable flexibility with regard to practice of the doctrine, and that LDS fathers are more involved with food work than might be expected.

## **SOCIAL SCIENCE**

### **College/University Policies on Social Media and Technology in the Classroom**

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Student-borne technology in the college/university classroom (e.g., cell phones, laptops, tablets) and the use of social media sites such as Facebook by students and faculty raise important questions in higher education. Given the growing popularity of these tools, and the potential challenges associated with their use, this study examined the existence and content of formal policies regarding student-borne technology in the classroom and the use of social media sites in faculty–student relationships. A sample of 100 2- and 4-year colleges/universities was drawn from a list of such institutions in the United States. Deans of Students were asked whether the institution had a formal, written policy regarding student-controlled technology in the classroom and communication between students and faculty using social media. Results revealed that formal policies are rare, although informal policies sometimes exist. Implications of advancing technology in higher education are discussed, and the need for explicit policies is considered.