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Chief Editor
Ahmad Tootoonchi
College of Business
Frostburg State University
101 Braddock Road
Frostburg, MD 21532
Tel: 301-687-4740
tootoonchi@frostburg.edu

Associate Editor
Carolyn Ashe
College of Business
University of Houston-Downtown
320 North Main Street
Houston, Texas, 77002-1001
Tel: 713-221-8051
ashec@uhd.edu

Editor
Jill A. Morris
Department of English
Frostburg State University
101 Braddock Road
Frostburg, Maryland 21532
Tel: (301) 687-4238
jamorris@frostburg.edu

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Selection process

The December 2014 issue of the *International Journal of Interdisciplinary Research (IJIR)* has been the result of a rigorous process in two stages:

- Stage 1: all papers that were submitted to the 2014 IABD conference went through blind reviews, and high quality papers were recommended for presentation at the conference.
- Stage 2: approximately ten percent of the articles which were presented at the conference and one invited manuscripts (originally reviewed by the Chief Editor) were selected for possible publication in *IJIR*, and the respective authors were contacted and asked to resubmit their papers for a second round of reviews. These manuscripts went through a rigorous blind-review process by the editorial board members and external reviewers. In the end, three articles were recommended for publication in the December issue of *IJIR*.

IJIR is listed in *Cabell's* Directory of peer-reviewed publications. The Editorial Board members are committed to maintaining high standards of quality in all manuscripts published in *International Journal of Interdisciplinary Research*.

Ahmad Tootoonchi, Chief Editor

VARIATIONS IN THE RETURN TO SKILLS ACROSS BACHELOR'S DEGREE OCCUPATIONS

David B. Yerger, Indiana University of Pennsylvania
yerger@iup.edu

ABSTRACT

Utilizing a data set created by the author that merges data by detailed occupation on employment, earnings, educational attainment, and the importance of 35 separate job skills, the relationship between the importance of each of these skills and average salary in the private sector is explored for 84 different occupations identified as bachelor's degree dominant occupations. The analysis reveals that several job skills commonly regarded as important do not correlate across the selected occupations with private sector average salary. The largest impact skills are those which involve extensive abstract reasoning and mathematical rigor. For several of these skills, there are substantial differences in forecasted average salary for an occupation if the skill's importance rises from the 25th to the 75th percentile of its ranking across occupations. These results help to explain the observed large differences in average salary across occupations associated with bachelor's degree workers.

INTRODUCTION AND LITERATURE REVIEW

One factor contributing to rising income inequality in the U.S. economy has been a widening gap between the earnings of college-degree holding workers and workers with just a high school diploma, often referred to as the college wage premium. Acemoglu and Autor (2011) carefully document the rise in the college wage premium. They estimate the earnings of the average college graduate exceeded earnings of the average high school graduate by about 49.2% in the late 1970s. This premium trended upward strongly the past 30 years, however, and as of 2008 they estimate the college premium to have grown to 97.4%. They comprehensively review several potential causes of the widening inequality, a more concise summary can be found in Steelman and Weinberg (2005).

The rapid growth of the college earnings premium is due less to strong college earnings growth in and of itself, however, and more to the flat or declining real earnings for workers with only high school diploma or less. Greenstone and Looney (2011) concisely summarize the losses and stagnation in earnings since the 1970s for males without a bachelor's degree. Since the early

1970's the inflation adjusted earnings of the median wage high-school dropout who works full time has declined by 38%, and the inflation adjusted earnings for the median male with only a high school diploma has declined by 26%. These declines actually understate the declines in earnings for less educated males since it compare full-time workers over time and there has been a substantial decline in labor force participation for males with no education beyond high school. Since the early 1970's, the share of completely unemployed men without a high school diploma rose 23% points from 11% to 34% (Greenstone & Looney, 2011). The rate of exit from the labor force was also large for males with high school diplomas only as the share of them not working at all rose 18% points from 4% to 22%. The combined impact of declining real wages for full-time workers, and much higher rates of exit from the labor force, results in a 66% decline since the early 1970's in median real earnings for all high school dropout men. High school graduate males have fared only slightly better; the median earnings for all high school only (no other schooling) males fell 47% since the early 1970's (Greenstone & Looney, 2011). Julian and Kominski (2011) construct synthetic work-life earnings estimates by race/ethnicity, education, and gender and find large differences in estimated lifetime earnings by educational attainment. For full-time year-round workers, they estimate white non-Hispanic males with a high school diploma have work-life earnings of $1.7 million while white non-Hispanic males with bachelor's degree only have work-life earnings of $2.8 million. The same comparison for white non-Hispanic females is $1.2 million versus $2.0 million, and similarly large gaps by education are estimated for other race/ethnicity groups (Julian & Kominski, 2011).

The large declines in earnings for less than college educated males accounts for much of the growth in both the college earnings premium, and the large widening of earnings distribution across full-time workers. Acemoglu and Autor (2011) track over time the inflation adjusted real earnings for high wage workers, defined as the wage at the 90th percentile for full-time workers in each year, and find it has risen approximately 50% since the early 1970's. Real earnings when evaluated at the median across full-time workers, however, only rose by about 16% and real earnings evaluated at the 10th percentile only rose about 9%. While the premium for college educated workers over high school graduate only workers has risen in recent decades, another contributor to the widening gap between earnings at the median and 90th percentiles is the dispersion in earnings across bachelor's degree holding workers. One consequence of this dispersion has been increasing concern that college graduates are taking "high school" jobs.

Hecker (1992) estimated that 20% of college graduates in the 1980s accepted jobs that did not require a college degree for entry into that work. Shelley (1994) also concluded that there likely would be more college graduates in the 1990s and early 2000s than there would be net new jobs requiring a college degree for entry into the work. This viewpoint was contested by Tyler et al. (1995), who examined the data at a more detailed level and concluded that 25-34 year old male college graduates in 1989 were doing as well as their 1979 counterparts and that 25-34 year old female college graduates in 1989 were doing better than their 1979 counterparts. Fortunately for college graduates in the latter 1990s, the strong labor market at that time reduced concerns about underemployment of college graduates. The substantial weakening of the labor market since 2007, however, has restored this issue to a more prominent position. Barton (2008) and Bennet and Wilezol (2013) are representative examples of recent work questioning the wisdom of many students pursuing a college degree.

One factor widely agreed to play a role in the widening earnings inequality has been the evolution over time of the skill requirements for jobs in the U.S. economy. Better understanding

this issue has been of long-standing interest to economists, business leaders, and government officials. The large shifts in the composition of employment that began in the 1970s and accelerated in the 1980s led to considerable research as seen in the works of Rumberger (1981), Howell and Wolf (1991), and Katz and Murphy (1992) with more recent empirical work including Jones (2009). Examining changes from 2002 to 2008 in earnings by occupation, Jones (2009) clearly documents a positive correlation between an occupation's 2002 earnings level and its wage growth. The higher an occupation's 2002 percentile ranking on wages, the higher its wage growth from 2002 to 2008. The role of variation in skill intensities across higher and lower wage growth jobs is discussed in general terms by Jones (2009), but no analysis is done matching skill requirement measures to earnings.

One reason to examine the impact of various skill's importance in explaining earnings variation across occupations is the growing concern with labor market mismatches between workers and their jobs. Yakusheva (2010) finds that the quality of the match between an individual's degree field and his/her occupation impacts the size of the college earnings premium. People whose occupations better match their degree fields earn significantly higher returns to post-secondary schooling. Kalleberg (2008) identifies several types of potential mismatches including skills mismatches. Over the 1993-2002 period Kalleberg estimates that 20.3% of males and 19.8% of females were over qualified for their jobs where over qualified is defined as having an educational attainment three or more years greater than the requirements for the job held. Similarly, by defining under qualified as an educational attainment three or more years less than the requirements for the job, Kalleberg (2008) estimates 7.2% of males and 6.7% of females were under qualified for their jobs. Kalleberg (2008) also discusses several options for obtaining a better sorting of workers to jobs. One option is to improve the information set for workers so they more efficiently sort themselves. The findings presented here will be useful to recent, or soon to be, bachelor's graduates as they can be used to identify occupations that require a bachelor's degree and utilize skills the job candidate believes are part of his/her relative skill set.

Another reason to examine skill requirements by occupation is the recognition that individuals with different skill sets may prefer different types of organizational career fields. Mayrhofer, et al. (2005) find that business school graduates displaying high flexibility, self-promotion, and self-monitoring attributes are more likely to aspire to post-organizational careers while individuals less skilled in these attributes are more likely to prefer a more traditional organizational career pattern.

This research contributes to the literature on the impact of skill requirements upon earnings, and to the literature on "Is College Worth It?," by focusing the analysis solely upon linkages between various skill requirements and average salary in the private sector just for those occupations designated as jobs held primarily by bachelor's degreed only individuals. A better understanding of the variations in returns to these skills across jobs accessible to recent bachelor's graduates will contribute to our analysis of the causes of earnings dispersion and provide potentially valuable guidance to students as they select major fields of study as different fields of study emphasize the development of different skills.

METHODOLOGY AND FINDINGS

From the U.S. Department of Labor sponsored Occupational Information Network (O*NET, 2012), measures of the importance of 35 different skills for successfully working in each of several hundred specific occupations was obtained. To ease comparisons across skills, the skills data was converted into its percentile equivalents. As an example, consider the occupation "Advertising and Promotion Managers." This occupation has a reported value in the data set for the skill Active Learning of 66.3. This means that the Active Learning skill is more important to Advertising and Promotion Managers than it is to 66.3% of the 648 occupations in the constructed data set, and less important than it is to 33.7% of the 648 occupations. So, for any of the 35 skills a rise of one point in the skill's value for an occupation is interpreted as a one percentile point increase in the importance of that skill for that occupation versus all 648 occupations (O*NET, 2012).

This skills data by occupation then was then matched with U.S. Bureau of Labor Statistics data on the educational distribution by occupation. Lastly, that merged data file was merged with U.S. Bureau of Labor Statistics data on employment and earnings by occupation (BLS, 2012). The final data file contained for each of 648 different occupations the data on 2011 employment and the distribution of annual salaries for full-time workers, the educational attainment distribution, and for each of the 35 skills that occupation's percentile rank for that skill versus all 648 occupations.

In order to focus most closely upon the linkages between the importance of various skills and the earnings for occupations accessible to bachelor's degree graduates, this research confines itself to a subset of 84 of the 648 occupations. These 84 occupations were designated as "Bachelor's Degree" occupations by the Bureau of Labor Statistics. This designation means that across the categories of Less than High School Diploma, High School Diploma, Some College, Associate's, Bachelor's, Master's, and Doctoral or Professional, the largest percentage of workers in the occupation have a bachelor's degree and no higher educational degrees.

Summary statistics from the Bachelor's Degree data set for variables relevant in the analysis to follow are presented in Table 1. The variable Bachelors is the percentage of workers in the occupation with a bachelor's degree and no higher degree. LessBach is the percentage of workers with less than a bachelor's degree while MastersPlus is the combined percentage of workers in the Masters and Doctoral or Professional education categories. Total Employment is self-explanatory and Average Salary is the annual private sector average salary. For each occupation, there also is data on private sector earnings at the $10^{th}/25^{th}/50^{th}/75^{th}/90^{th}$ percentile within that occupation. Lastly, for each of the 35 skills, the value at various percentile ranks across the 84 occupations for that skill is provided. For instance, consider the reported skill values by percentile rank for the skills Critical Thinking and Repairing. If the 84 Bachelor's occupations are ranked in descending order based on their value for the skill Critical Thinking, the occupation at the 10^{th} percentile (occupation ranked 76^{th} of 84) has a value of 50.2. This value means that when this occupation is compared against all 648 occupations in the data set, the importance of Critical Thinking is larger for that occupation than it is for 50.2% of the 648 occupations. Critical Thinking for a "bottom tenth" bachelor's occupation is found to be more important than for approximately half of all occupations. Contrast this result with the skill Repairing, where the reported skill value at the 10^{th}, 25^{th}, and 50^{th} percentiles = 0. When a skill is

of no importance at all to an occupation, it receives a score of 0. This means that when the 84 Bachelor's occupations are ranked in descending order based on importance of the skill Repairing, the bottom half the occupations have a zero value. Repairing is not a skill associated with the Bachelor's occupations.

TABLE 1: DISTRIBUTION OF VALUES ACROSS THE 84 "BACHELOR'S DEGREE" OCCUPATIONS

Variable	90th Pctl	75th Pctl	50th Pctl	25th Pctl	10th Pctl
Bachelors	57.0%	51.6%	46.6%	39.1%	30.3%
LessBach	50.0%	42.1%	25.0%	18.6%	11.9%
MastersPlus	47.2%	33.9%	23.8%	14.7%	8.3%
Total Employment	182,484	93,240	35,280	13,680	5,050
Average Salary	$96,463	$85,568	$67,465	$50,410	$43,511
SKILLS					
Active Learning	90.1	84	75.7	66.3	58.2
Active Listening	90.1	79.4	67.8	59	49.4
Complex Problem Solving	96.1	88.7	81.7	67.3	58.1
Coordination	90.33	80.2	64.6	50	34.4
Critical Thinking	94.4	87.3	78.5	60.2	50.2
Equipment Maintenance	62.1	42.3	0	0	0
Equipment Selection	67.6	52.3	34.4	0	0
Installation	80.8	59.5	0	0	0
Instructing	95.2	85.1	70.7	57.8	32.7
Judgment and Decision Making	92.5	87.1	74.3	64.2	53.1
Learning Strategies	95.74	83.6	65.6	51.9	39.7
Management Financial Resources	94.1	86.7	70	49.3	14
Management Material Resources	94.36	85.4	57	36.6	17.4
Management Personnel Resources	89.59	85.1	69.2	50.2	38
Mathematics	96.4	92.7	81.1	43.2	24.4
Monitoring	89.4	80	60.1	42.975	18.2
Negotiations	87.6	78.2	69.7	51.1	39.2
Operation and Control	60.67	45.675	32.4	14.8	0
Operation Monitering	66.7	55.4	41.1	19.6	8.43
Operations Analysis	97.2	92.7	80.6	54	26.08
Persuasion	88.8	78.6	71.5	51.1	41.8
Programming	94.4	89.3	73.3	40.6	40.6
Quality Control Analysis	83.6	65.8	41.4	14.5	2.6
Reading Comprehension	93.8	87.6	79.4	72.1	59
Repairing	62.94	46.6	0	0	0
Science	95.5	90.2	79.2	42.6	26.79
Service Orientation	89.6	73.125	46.6	36.9	25.42
Social Perceptiveness	91.4	81.2	60.2	38.3	22.8
Speaking	88.2	80.2	65.2	57	41.2
Systems Analysis	97.32	90.1	81.4	69.7	56.7
Systems Evaluation	95.5	90.775	81.4	68.4	53.9
Technology Design	98.1	90.5	66.1	34.3	24.1
Time Management	88.5	81.7	73.1	49.1	38.39
Troubleshooting	79.5	61.6	34.35	0	0
Writing	93.36	85.9	79.7	68.1	54.76

The considerable heterogeneity across occupations is seen in the dispersion of values for the variables in Table 1. While all 84 occupations are designated as Bachelor's dominated, the occupation at the 90th percentile (8th of 84) when ranked by percent of workers with only Bachelor's is just 57.0%, implying that 43% of workers in one of the most Bachelor's dominated occupations do not have a Bachelor's education classification. If the educational attainment values at the 50th percentile of the Bachelor's occupations rankings are used to represent a typical such occupation, then we see that the typical Bachelor's occupation has approximately half the workers with a terminal bachelor's degree and a quarter each with less than or more than a Bachelor's degree. When sorted on share with Bachelor's degree, the median occupation has 46.6% of its workers with a Bachelor's degree. When sorted on share LessBach, the median occupation has 25.0% of its workers with less than bachelor's degree, and when sorted on MastersPlus the median occupation has 23.8% of its workers with more than a bachelor's degree. Total employment and private average salary variables show much more variation with 25% of the 84 occupations having fewer than 13,680 employees nation-wide, while the top 25% of the 84 occupations have more than 93,240 employees in each occupation.

Private average salary at the 10th percentile for these occupations is $43,511, less than half the 90th percentile value of $96,463. The wide dispersion of average salaries is shown in Figure 1. There is a steep decline in average salary within the top decile to just under $100,000 by the 90th percentile. Next, there is a steady decline from the 90th to 60th percentiles with salary in the upper $60,000's by the 60th percentile. From the 60th to 30th percentile, private average salary is nearly flat. The average salary then steadily declines from the 30th percentile to the lowest earning occupation at just under $40,000. Clearly, there is a wide range of average salaries across these 84 occupations. As seen in the values for each of the skill variables in Table 1, there also is considerable variation in the importance of these skills. To demonstrate, consider the skill Coordination which has a value of 50 at the 25th percentile of the 84 occupations. The 75th percentile value for Coordination in Table 1, however, is 80.2. Comparing the 25th to 75th or 10th to 90th percentiles for each of the 35 skills in Table 1, wide variation in the skills' importance is evident.

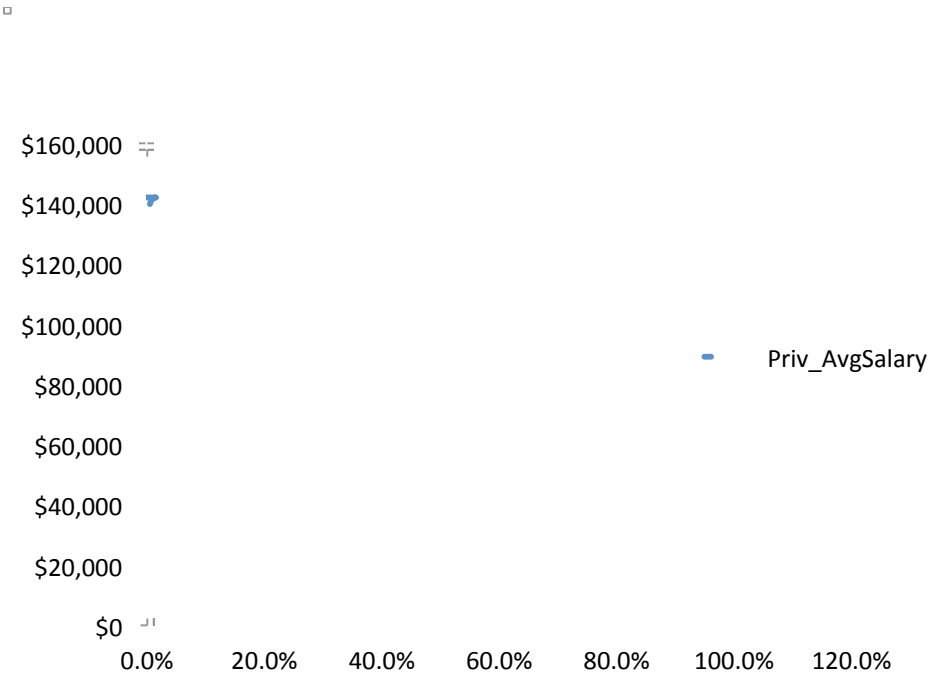

FIGURE 1: PRIVATE AVERAGE SALARY BY CUMULATIVE % TOTAL EMPLOYMENT FOR 84 BACHELOR'S DEGREE OCCUPATIONS

To investigate the impact of variation in a skill's importance on average salaries, the occupations were first sorted from highest to lowest based on average salary and then divided into quartiles. For each skill, t-tests for differences in sample mean values across each of the possible quartile pairings were done and the p-values for each of these t-tests are reported in Table 2. The null hypothesis always is that mean skill values are equal across the two income quartiles being compared. A p-value < 0.10 implies rejection of the null hypothesis which then supports the view that there are differences in the importance of that skill between the two income quartiles.

TABLE 2: P VALUES FOR TESTS OF DIFFERENCE IN SAMPLE MEAN VALUES FOR SKILL VARIABLE BY PRIVATE AVERAGE INCOME QUARTILE

	Qtl1 vs Qtl2	Qtl1 vs Qtl3	Qtl1 vs Qtl4	Qtl2 vs Qtl3	Qtl2 vs Qtl4	Qtl3 vs Qtl4	# of p<.10
Active Learning	0.027	0.000	0.016	0.075	0.354	0.167	4
Active Listening	0.251	0.329	0.070	0.129	0.148	0.035	2
Complex Problem Solvings	0.012	0.000	0.000	0.096	0.004	0.072	6
Coordination	0.404	0.179	0.022	0.119	0.011	0.137	2
Critical Thinking	0.036	0.000	0.000	0.014	0.018	0.330	5
Equipment Maintenance	0.144	0.219	0.102	0.397	0.384	0.301	1
Equipment Selection	0.050	0.131	0.008	0.308	0.168	0.081	3
Installation	0.159	0.010	0.013	0.090	0.106	0.472	3
Instructing	0.279	0.417	0.202	0.365	0.125	0.181	0
Judgment and Decision Making	0.153	0.002	0.001	0.023	0.014	0.421	4
Learning Strategies	0.476	0.228	0.215	0.240	0.202	0.100	1
Management Financial Resources	0.311	0.154	0.003	0.290	0.010	0.040	3
Management Material Resources	0.186	0.268	0.039	0.397	0.170	0.118	1
Management Personnel Resources	0.440	0.204	0.306	0.177	0.360	0.116	0
Mathematics	0.079	0.007	0.000	0.168	0.000	0.005	5
Monitoring	0.154	0.183	0.395	0.417	0.258	0.306	0
Negotiations	0.311	0.458	0.466	0.291	0.319	0.498	0
Operation and Control	0.432	0.472	0.466	0.404	0.467	0.439	0
Operation Monitering	0.040	0.027	0.002	0.443	0.086	0.101	5
Operations Analysis	0.025	0.003	0.000	0.118	0.005	0.070	5
Persuasion	0.375	0.448	0.296	0.328	0.218	0.332	0
Programming	0.321	0.172	0.000	0.344	0.002	0.002	3
Quality Control Analysis	0.126	0.173	0.002	0.389	0.050	0.018	3
Reading Comprehension	0.223	0.009	0.004	0.083	0.024	0.161	4
Repairing	0.121	0.100	0.058	0.441	0.321	0.379	2
Science	0.011	0.020	0.000	0.489	0.117	0.148	3
Service Orientation	0.043	0.176	0.001	0.269	0.034	0.016	4
Social Perceptiveness	0.385	0.467	0.012	0.369	0.010	0.021	3
Speaking	0.220	0.170	0.181	0.403	0.071	0.057	2
Systems Analysis	0.042	0.030	0.000	0.337	0.005	0.025	5
Systems Evaluation	0.024	0.028	0.000	0.369	0.020	0.067	5
Technology Design	0.119	0.038	0.043	0.290	0.301	0.492	2
Time Management	0.384	0.479	0.257	0.358	0.180	0.262	0
Troubleshooting	0.026	0.009	0.002	0.357	0.122	0.184	3
Writing	0.180	0.303	0.178	0.396	0.416	0.338	0
NOTE: Qtl1 is Top Quartile of 84 Bachelor's Occupations when sorted by Private Average Salary, Qtl2 is 2nd highest, etc…; Null Hypothesis is = Mean Skill Values Between Quartiles							

Of the 35 skills, Complex Problem Solving is the only one for which the null of equal mean skill values is rejected for each of the six possible pairings of income quartiles. The null of equal mean skill values between two income quartiles also is rejected in five of the six possible pairings for several skills. These skills are Critical Thinking, Mathematics, Operation Monitoring, Operations Analysis, Systems Analysis, and Systems Evaluation.

In contrast 11 of the 35 skills have p-values < 0.10 for none or only one of the six possible income quartile pairings, which does not support the view that there are meaningful differences in the importance of these skills across the income quartiles. The skills showing no to minimal linkage with average salary differences across the 84 occupations are: Equipment Maintenance, Instructing, Learning Strategies, Management Material Resources, Management Personnel Resources, Monitoring, Negotiations, Operation and Control, Persuasion, Time Management, and Writing. While these 11 skills clearly are important in many occupations, they do not appear

on average to be more important in the higher paying occupations than they are in lower paying occupations.

To better quantify the association between variation in a skill's importance and private average salaries across the 84 Bachelor's occupations, the following simple regression was conducted for each of the 35 skills:

$$\text{Private Avg. Salary} = b0 + b1*\text{LessBach} + b2*\text{MastersPlus} + b3*\text{Skill}$$

The variables LessBach and MastersPlus are included to capture the variations across occupations in the share of workers with less than or more than a bachelor's degree. The main focus of this analysis is on estimates of b3, but Table 3 contains the estimates of b1 and b2 as well. There is an almost exact match between the 11 skills in Table 2 with no or one rejection of the null of equal mean skill values and the 12 skills in Table 3 for which we cannot reject the null that b3 = 0. Management of Material Resources is the only of the 11 skills from Table 2 for which the null that b3 = 0 is rejected in Table 3. Active Listening and Speaking are the two of 12 skills in Table 3 for which we cannot reject b3 = 0 that were not identified in Table 2 as having no linkage with average salary. The 23 skills for which the null of b3 = 0 is rejected are shown in descending order based on size of b3. Note that for skills Social Perceptiveness, Coordination, and Service Orientation, a rise in the importance of these skills is associated with a decline in private average salary as a one percentile point rise in the skill's importance is associated with a decline in private average salary of $163, $186, and $264 respectively. For the 20 skills having a positive association between the importance of the skill to an occupation and the occupation's average salary, there is wide variation in the b3 estimates. Each percentile point rise in the importance of Complex Problem Solving is associated with a $689 rise in average salary, while Critical Thinking, Systems Analysis, and Judgment and Decision Making all have b3 estimates larger than $450. In contrast, the bottom several positive b3 skills have values close to, or below $200.

Since it is possible that some of the skills with large b3 values in Table 3 are associated with skills showing minimal variation across the 84 Bachelor's occupations, the forecasted impact upon an occupation's private average salary from moving the skill's value from the 25th to 75th percentile ranking across these 84 occupations is computed. These results are presented in Table 4. The rank ordering in Table 4 is similar to Table 3, but Programming, Troubleshooting, and Mathematics now are the top three skills. Raising these skills' importance from the 25th to 75th percentile value for the 84 Bachelor's occupations increases forecasted average salary by more than $16,000. These gains are roughly twice the gains estimated for the skills in the bottom range of positive values: Repairing, Active Learning, and Reading Comprehension. The lifetime impact of the salary gains associated with increasing the skill's importance from the 25th to 75th percentile is approximated by assuming a 5% discount rate and that the annual salary change occurs for 40 years. The highest salary gaining skills add more than $250,000 in present value to lifetime earnings while the lowest salary gaining skills add less than $150,000 in present value.

TABLE 3: SUMMARY OF REGRESSIONS OF PRIVATE AVERAGE SALARY ON EDUCATION AND SKILL

Private Avg Salary = b0 + b1*LessBach + b2*MastersPlus + b3*Skill							
		b1		b2		b3	
Skill	b1 =	p-value	b2 =	p-value	b3	p-value	R2
none	-581.0	0.009	-389.9	0.110			0.09
			Sorted on Values for b3				
Complex Problem Solvings	-279.0	0.164	-235.2	0.272	688.5	0.000	0.31
Critical Thinking	-428.8	0.037	-319.0	0.153	547.0	0.000	0.25
Systems Analysis	-511.0	0.012	-408.9	0.068	466.6	0.000	0.25
Judgment & Decision Making	-460.9	0.032	-382.1	0.101	457.7	0.003	0.18
Reading Comprehension	-339.2	0.150	-223.4	0.363	432.5	0.017	0.15
Systems Evaluation	-500.0	0.017	-407.2	0.075	410.6	0.001	0.18
Active Learning	-485.7	0.028	-398.0	0.095	395.8	0.025	0.14
Programming	-458.0	0.028	-225.4	0.325	354.9	0.000	0.23
Operation Monitering	-512.6	0.013	-323.4	0.151	353.0	0.000	0.23
Mathematics	-388.9	0.053	-242.0	0.268	331.5	0.000	0.29
Operations Analysis	-409.4	0.055	-146.5	0.539	283.8	0.001	0.20
Troubleshooting	-483.2	0.020	-287.5	0.205	273.3	0.000	0.23
Mngmt Financial Resources	-577.8	0.006	-340.6	0.139	251.1	0.001	0.20
Science	-506.1	0.018	-449.8	0.056	240.3	0.004	0.14
Quality Control Analysis	-476.0	0.027	-300.6	0.201	214.5	0.004	0.17
Installation	-576.7	0.006	-379.1	0.098	210.7	0.001	0.21
Equipment Selection	-535.5	0.014	-342.5	0.149	205.1	0.017	0.15
Technology Design	-579.3	0.007	-395.3	0.094	191.3	0.011	0.12
Mngmt Material Resources	-603.5	0.006	-404.5	0.089	188.3	0.017	0.15
Repairing	-585.1	0.007	-408.2	0.088	173.8	0.030	0.11
Social Perceptiveness	-540.4	0.014	-322.5	0.184	-162.5	0.068	0.12
Coordination	-621.3	0.005	-427.1	0.078	-185.7	0.074	0.12
Service Orientation	-438.6	0.044	-211.4	0.380	-263.7	0.005	0.17
	Skills For Which Fail to Reject Null That b3 = 0						
Equipment Maintenance	-577.9	0.009	-387.9	0.110	120.4	0.139	0.11
Active Listening	-576.2	0.010	-362.1	0.138	-177.9	0.208	0.10
Instructing	-571.4	0.011	-349.5	0.160	-88.5	0.391	0.09
Speaking	-595.8	0.008	-382.9	0.118	-110.8	0.393	0.09
Persuasion	-577.5	0.010	-393.1	0.108	-100.1	0.414	0.09
Time Management	-621.7	0.007	-440.0	0.085	-85.2	0.482	0.09
Operation and Control	-576.6	0.010	-379.8	0.122	70.9	0.506	0.09
Negotiations	-595.5	0.008	-406.5	0.100	-66.7	0.566	0.09
Learning Strategies	-576.0	0.010	-368.7	0.137	-57.8	0.573	0.09
Mngmt Persnl Resources	-565.3	0.012	-379.9	0.123	54.6	0.609	0.09
Monitoring	-570.4	0.011	-392.9	0.110	43.6	0.649	0.09
Writing	-579.9	0.012	-390.0	0.113	3.4	0.983	0.09

DISCUSSION AND CONCLUSION

By confining the analysis to the 84 occupations identified by the Bureau of Labor Statistics as being bachelor's degree dominated, this research provides insights into the sources of variation

in private sector average salaries in occupations accessible to bachelor's graduates who do not go on to obtain advanced degrees. This approach, however, means that the findings from this study cannot be generalized to occupations classified as being less than, or more than, bachelor's degree dominated. Another limitation of this study is that since it is entirely cross-sectional, no analysis can be done on the trends in the returns to different skills over recent decades. Nonetheless, there are several findings that add to our understanding of the associations between the skill characteristics of occupations and workers' earnings.

First, the study establishes the wide variation in private sector average earnings across the 84 bachelor's dominant occupations. This results helps to explain that Acemoglu and Autor's (2011) findings of widening earnings gaps between the 90^{th} and 50^{th} percentiles of full-time workers is a function of more than just differences in educational attainment across workers. These findings provide more detailed insights on the links between skill intensities and wages than is found in other recent literature such as Jones (2009). Second, the sizable variation in private average salary across these occupations is shown to correlate strongly with the perceived importance to an occupation of several skills that emphasize abstract reasoning and mathematical skills. Third, other skills widely regarded as important, such as Active Listening, Speaking, Persuasion, and Negotiations, are not found to correlate significantly across these 84 occupations with private sector average salary. While these skills undoubtedly matter for success in many occupations, the variation in their perceived importance for an occupation does not help explain variation in average salaries for this set of occupations.

Assuming there is a correlation between the measured perceived importance of the skills in this data set to higher paying occupations, and the actual importance of individuals having these same skills in order to be successful in these higher paying occupations, then the findings can provide some guidance to students. Individuals not interested in pursuing advanced degrees, but interested in achieving higher salaries, would be advised to focus upon improving their capabilities with the skills listed in the upper regions of Tables 3 and 4. For current or prospective undergraduates, this suggests analyzing prospective major fields of study in part by how well these majors will help students develop the higher return skills identified in Tables 3 and 4.

Future extensions of this work could include analyzing these occupations for different years to see if there are any discernible trends in the returns to different skills. Also, the returns to different skills could be examined for other educational attainment categories identified by the Bureau of Labor Statistics such as Associate Degree, Long-Term on the Job Training, and/or Moderate-Term on the Job Training. The returns to skills estimated for occupations in these categories could be helpful to individuals deciding between pursuing a bachelor's degree or an alternate career path.

TABLE 4: PREDICTED CHANGE IN PRIVATE AVERAGE SALARY IF MOVE FROM 25TH TO 75TH PERCENTILE FOR SELECTED SKILL

Private Avg Salary = b0 + b1*LessBach + b2*MastersPlus + b3*Skill				
		Change from	Forecasted Change	40 Year
		25th to 75th Ptile	Private Avg Salary	Annuity
	b3 =	in Skill Value	From Skill Change	Value
Programming	354.9	48.7	$17,285	$296,587
Troubleshooting	273.3	61.6	$16,837	$288,907
Mathematics	331.5	49.5	$16,410	$281,585
Critical Thinking	547.0	27.1	$14,822	$254,340
Complex Problem Solvings	688.5	21.4	$14,734	$252,824
Operation Monitering	353.0	35.8	$12,637	$216,842
Installation	210.7	59.5	$12,536	$215,108
Science	240.3	47.6	$11,439	$196,280
Quality Control Analysis	214.5	51.3	$11,006	$188,856
Operations Analysis	283.8	38.7	$10,984	$188,481
Technology Design	191.3	56.2	$10,753	$184,506
Equipment Selection	205.1	52.3	$10,725	$184,038
Judgment & Decision Making	457.7	22.9	$10,482	$179,863
Systems Analysis	466.6	20.4	$9,519	$163,345
Mngmt Financial Resources	251.1	37.4	$9,392	$161,156
Mngmt Material Resources	188.3	48.8	$9,190	$157,688
Systems Evaluation	410.6	22.4	$9,188	$157,661
Repairing	173.8	46.6	$8,101	$139,001
Active Learning	395.8	17.7	$7,005	$120,196
Reading Comprehension	432.5	15.5	$6,703	$115,024
Social Perceptiveness	-162.5	42.9	-$6,970	($119,597)
Coordination	-185.7	42.9	-$7,966	($136,693)
Service Orientation	-263.7	36.2	-$9,552	($163,908)
NOTE: Analysis Reported Only for Those Occupations Where Null of b3 = 0 was Rejected				
Annuity Value Computed Using r = 5%, T = 40 yrs, & the Given Forecasted Salary Change				

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COMPETITIVENESS: THE NATIONAL FOOTBALL LEAGUE VERSUS MAJOR LEAGUE BASEBALL WITH AN APPLICATION TO INDUSTRY COMPETITIION

Anthony Stair, Frostburg State University
astair@frostburg.edu

Daniel Mizak, Frostburg State University
dmizak@frostburg.edu

ABSTRACT

This paper attempts to measure the level of competitiveness in Major League Baseball, the National Football League, and the cell phone industry using an index titled the churn. This analysis found that the difference in the level of competitiveness between the NFL and MLB is smaller than anticipated. The results also indicate that the level of competitiveness varies greatly across divisions in the NFL. The churn was also successfully applied to the cell phone industry. However, the use of the churn to measure industry competitiveness may be limited to mature oligopolistic industries.

INTRODUCTION

Over the past several decades, competitive balance has become an increasingly prominent topic in the economics of professional sports. One of the factors likely contributing to a lack of competitive balance in professional sports leagues is the absence of a salary cap. In Major League baseball, teams like the Yankees spend much more on players' salaries than other teams. Logic suggests that this would lead to competitive disparity. In an attempt to alleviate the competitive disparity in MLB due to the lack of a salary cap, the league has instituted limited revenue sharing between teams. If a team spends more on team payroll than a specified limit, that team must pay a percentage payroll tax which is distributed to lower payroll teams.

The National Football League, on the other hand, does employ a salary cap which limits the payroll disparity across teams. As a result, the competitive disparity in the National Football League should be less than the competitive disparity in Major League Baseball. This may lead to more fan interest in the National Football League than in Major League Baseball. This article uses the adjusted churn index introduced by Stair et al. (2004) to examine the level of competitive disparity in MLB and the NFL. Finally we introduce the use of the adjusted churn to measure the degree of competition in industry by applying it to the cell phone industry.

In this paper, we propose a measure of competitive balance that captures these changes in the final standings of a league or division from season to season.

LITERATURE REVIEW

Many of the studies of competitive balance in sports leagues focus on the dispersion of winning percentages among teams during a particular year. This dispersion is measured in a number of different ways, including the standard deviation (SD) of winning percentages (Schmidt & Berri, 2002); the Gini coefficient (Utt & Fort, 2002) (Schmidt & Berri, 2002, 2003); the Hirfindahl-Herschman index (HHI) (Eckard, 2001); and the index of dissimilarity (Mizak & Stair, 2004). These measures fail to capture changes in competitive balance that manifest themselves across seasons. Several other articles have attempted to measure the changes in competitive balance across seasons.

Butler (1995) measured the correlation between each team's winning percentage between consecutive seasons. Humphreys (2002) created a new "Competitive Balance Ratio" (CBR)—the ratio of the average standard deviation of each team's won-lost percentage across seasons to the average standard deviation in won-loss percentages across teams in each season. Hadley, Ciecka, and Krautmann (2005) focus on final team standings to measure competitive balance. Their analysis is based on which teams make the play-offs. Borooaha and Mangan (2012) utilized a general measure of competitive balance based on the Generalized Entropy (GE) approach to measuring inequality. They applied this technique to the results [from the 2006 - 2007] season of the English Premier League (EPL). They used the results of their analysis to determine how competitive balance affected league welfare. Owen (2010) found that using ordinary standard deviations as a measurement of competitive balance is flawed. He found that ordinary standard deviations have an upper bound that varies based on the number of teams and games played. He found that making an adjustment to ordinary standard deviations based on this upper bound provided additional insights into competitive balance. Although these articles attempt to measure changes in competitive balance over several years, only Stair, Mizak and Neral (2007) have attempted to develop an index which serves as an indicator of competitive balance in major league sports over time.

ANALYSIS

Background

The adjusted churn is an index which attempts to measure the degree of competitiveness in sports by measuring the turnover in standings from one year to the next. The adjusted churn for 2014 measures the change in standings from 2013 to 2014. This index was first introduced by Stair et al. (2006). The information that follows is based on that article.

Let C denote the league's year-over-year average team movement in the standings, where C_t (Churn) is computed as:

$$C_t = \sum_{i=1}^{n} \left| f_{i,\,t} - f_{i,\,t-1} \right| \Big/ n$$

FIGURE 1

Where: Ct = the churn in team standings for year t, $|f_{i,t} - f_{i,t-1}|$ is the absolute value of the i-th team's change in finish from season t-1 to season t, and n is the number of teams.

What follows is a simple example to illustrate how the churn is calculated.

TABLE 1: EXAMPLE CHURN CALCULATION

Team	2013 final rank	2014 final rank	lfi,t – fi,t-1l
A	1	4	3
B	2	3	1
C	3	2	1
D	4	1	3

In the above data $\sum|f_{i,t} - f_{i,t-1}| = 8$ The churn for 2007 = 8/4 = 2 This is the maximum value of the churn given a league size of 4 teams. It can be shown that in a league with an even number (n) of teams, C will vary between 0 and .5n. For leagues with an odd number (n) of entries, C varies between 0 and $(n^2 - 1)/2n$. Note that years involving league expansion (or contraction) must be excluded since there will be insufficient data for the team(s) in question.

One problem is that the maximum potential value of the churn varies depending on league size. Since league size (and hence the coefficient's upper bound) varies over time, and even across divisions in some leagues, inter-temporal and interdivision comparisons require that the churn coefficient, C, be divided by its maximum value. In the above example, the churn divided by its maximum value would equal 1. Henceforth, in this paper the term *churn* will mean this adjusted version, and it will be the measure that we will use to indicate the degree of change in league

standings over time. It allows us to compare the degree of competitive balance in leagues or divisions with differing numbers of teams.

A churn = 0 indicates no change in league or division standings from one year to the next and implies a complete lack of competitive balance in that league or division. A churn =1 indicates the maximum possible change in league standings from one year to the next and implies maximum possible competitive balance over time.

Analysis for Football

Below is the churn calculated for the NFL for each division, conference, and total for 2003–2013. Larger churns indicate greater turnovers in standings from year to year and by implication a greater level of competition. Based on this analysis, the AFC East has been the least competitive division in the NFL over this 10 year period. The NFC South has been the most competitive division in the NFL over this 10 year period. The Churn also indicates that there has been greater turnover in the standings in the NFC than the AFC over this 10 year period.

TABLE 2: CHURN DATA FOR NFL

NFL	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Churn											
AFC East	0.63	0.50	0.50	0.50	0.25	0.63	0.38	0.00	0.00	0.38	0.13
AFC North	0.50	0.50	0.50	0.50	0.63	0.50	0.38	0.63	0.25	0.25	0.13
AFC South	0.50	0.50	0.25	0.25	0.25	0.75	0.50	0.38	0.88	0.50	0.75
AFC West	0.50	0.63	0.50	0.50	0.13	0.25	0.38	0.75	0.88	0.63	0.50
NFC East	0.50	0.38	0.63	1.00	0.75	0.38	0.50	0.38	0.50	0.75	1.00
NFC North	0.00	0.25	0.75	0.50	0.63	0.63	0.25	0.63	0.63	0.50	0.25
NFC South	0.75	0.75	1.00	0.75	0.50	0.75	0.75	0.50	0.50	0.63	0.50
NFC West	0.50	0.50	0.00	0.25	0.50	0.50	0.00	1.00	1.00	0.63	0.38
Churn	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AFC	0.53	0.53	0.44	0.44	0.31	0.53	0.41	0.44	0.50	0.44	0.38
NFC	0.31	0.34	0.59	0.56	0.47	0.44	0.38	0.38	0.41	0.47	0.44
Overall	0.42	0.44	0.52	0.50	0.39	0.48	0.39	0.41	0.45	0.45	0.41

C. Analysis for Baseball

Below is the churn calculated for the MLB for each division, league, and total for 2003–2013. Larger churns indicate greater turnovers in standings from year to year and by implication a greater level of competition. Based on this analysis, the AL West division has been the most competitive division in the MLB over this 10 year period. Its average Churn of .57 is larger than the second highest Churn of .50 for the NL Central. The NL East has been the least competitive

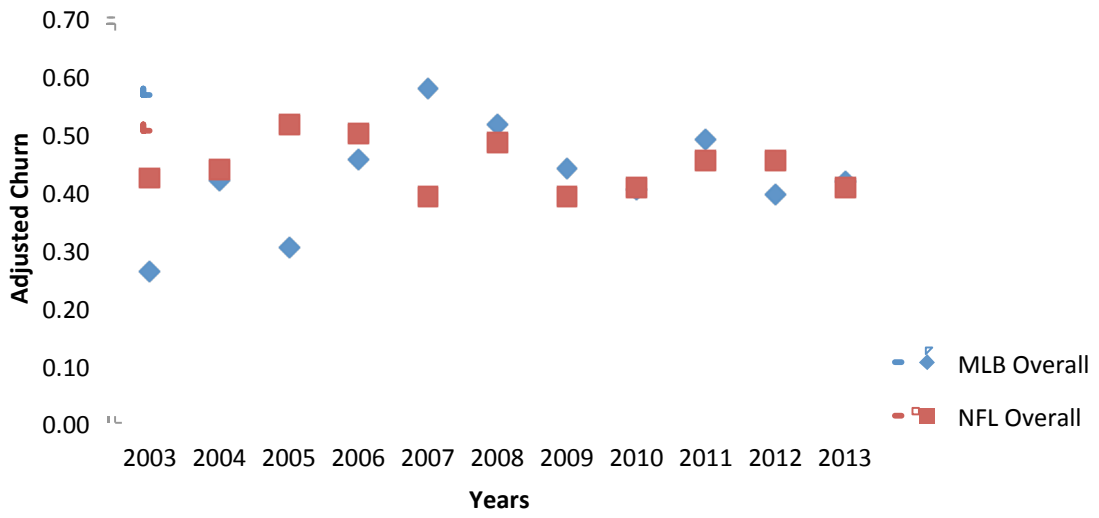
division in the MLB based on average Churn over this 10 year period. The Churn also indicates that there has been greater turnover in the standings in the National League than the American League over this 10 year period. The National League has a 10 year average churn of .43 and the American League average churn for the same period is .42.

TABLE 3: CHURN DATA FOR MLB

MLB	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	10 year Avg
Churn												
AL East	0.00	0.33	0.33	0.33	0.33	0.67	0.33	0.33	0.17	0.50	0.67	0.36
AL West	0.20	0.40	0.40	0.80	0.60	1.00	0.80	0.20	1.00	0.33	0.50	0.57
AL Central	0.21	0.63	0.00	0.21	0.63	0.42	0.21	0.63	0.21	0.42	0.00	0.32
NL East	0.33	0.33	0.00	0.50	0.33	0.33	0.33	0.17	0.33	0.33	0.33	0.30
NL West	0.56	0.42	0.42	0.42	0.97	0.14	0.56	0.56	0.56	0.28	0.50	0.49
NL Central	0.27	0.40	0.67	0.47	0.60	0.53	0.40	0.53	0.67	0.50	0.50	0.50
Churn												
AL	0.14	0.45	0.24	0.45	0.52	0.69	0.45	0.39	0.46	0.42	0.39	0.42
NL	0.39	0.38	0.36	0.46	0.64	0.34	0.43	0.42	0.52	0.37	0.44	0.43
MLB Overall	0.26	0.42	0.30	0.45	0.58	0.51	0.44	0.40	0.49	0.39	0.42	0.42

Comparison of the Churn for MLB to the Churn for the NFL

In this article we initially speculated that the competitive balance in the NFL would be greater than the competitive balance in MLB due to the salary cap that exists in the NFL, and therefore the churn for the NFL should be greater than the churn for MLB. As indicated by the graph below, this has not been consistently true over the past 10 years. From 2007 until 2009 the churn was greater for MLB than the NFL. This was unexpected. Conventional wisdom suggests that there is much greater turnover in the standings in the NFL than MLB. Perhaps this indicates that the revenue sharing tax used by major league baseball is significantly enhancing competitive balance in MLB. In fact, the overall average churn for MLB over this 10 year period is .42 and the overall average churn for the NFL is .44. This indicates over this 10 year period there is no apparent difference between the competitive balance in MLB and the NFL.



Adjusted Churn for MLB and NFL 2003 -2013

FIGURE 2

An Application to Business

The churn can be applied to industries to measure the competitive balance as indicated by the turnover in rankings based on total revenue or net revenue. As an initial example, we calculated the churn for the top 5 firms in the cell phone industry based on total revenue and net revenue. The churn indicates that in 2010 and 2013 there was a greater change in the rankings of the firms in the cell phone industry than in 2011 and 2012.

TABLE 4: GROSS INCOME FOR THE TOP 5 PUBLICLY TRADED CELL PHONE PROVIDERS

Gross Income					
Phone Companies	**2009**	**2010**	**2011**	**2012**	**2013**
Verizon	48,970,000,000	46,010,000,000	48,500,000,000	53,150,000,000	59,060,000,000
T-Mobile	934,250,000	1,100,000,000	1,300,000,000	1,400,000,000	1,530,000,000
AT&T	52,430,000,000	52,620,000,000	50,970,000,000	54,080,000,000	58,890,000,000
Sprint		32,563,000,000	33,679,000,000	35,345,000,000	35,493,000,000
US Cellular	2,100,000,000	2,000,000,000	2,060,000,000	1,960,000,000	1,350,000,000

TABLE 5: CHURN BASED ON GROSS INCOMEFOR THE TOP 5PUBLICLY TRADED CELL PHONE PROVIDERS

Gross Income				
Phone Companies	**2010**	**2011**	**2012**	**2013**
Churn	0.00	0.00	0.00	0.42

TABLE 6: NET INCOME FOR THE TOP 5 PUBLICLY TRADED CELL PHONE PROVIDERS

Net Income					
Phone Companies	**2009**	**2010**	**2011**	**2012**	**2013**
Verizon	3,650,000,000	2,550,000,000	2,400,000,000	875,000,000	11,500,000,000
T-Mobile	149,440,000	176,160,000	192,400,000	298,580,000	391,810,000
AT&T	12,120,000,000	19,090,000,000	3,940,000,000	7,260,000,000	18,250,000,000
Sprint		3,465,000,000	2,890,000,000	4,330,000,000	3,020,000,000
US Cellular	216,010,000	132,320,000	175,040,000	111,010,000	140,040,000

TABLE 7: CHURN BASED ON NET INCOME FOR THE TOP 5 PUBLICLY TRADED CELL PHONE PROVIDERS

Net Income				
Phone Companies	**2010**	**2011**	**2012**	**2013**
Churn	0.42	0.00	0.00	0.42

CONCLUSIONS

The churn indicates that the difference in the level of competitiveness between the NFL and MLB is smaller than anticipated. This indicates the competitive outcome of revenue sharing in MLB may be similar to the competitive outcome of a salary cap in the NFL.

Within the NFL, the churn indicates a varying level of competitiveness across divisions. The Eastern Division in the American Conference has been much less competitive than the National Conference South Division. This may be partly due to stability or lack thereof at quarterback in these respective divisions.

We found the churn can be applied to industries to measure the level of competitiveness. However, the churn may be best applied to industries where there is not much change in the firms involved in the industry. It therefore would be somewhat ill-suited for either highly competitive industries or industries still maturing. It is perhaps best suited for mature oligopolistic industries, but even here the possibility of mergers (or bankruptcies) weakens its usefulness.

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PROBLEMS WITH SOCIAL MEDIA IN PUBLIC RELATIONS: MISREMEMBERING THE PAST AND IGNORING THE FUTURE

Michael Kent, University of Oklahoma
MKent@ou.edu

Maureen Taylor, University of Oklahoma
MTaylor@ou.edu

ABSTRACT

Technology scholarship is now the biggest area of study in public relations, accounting for more journal submissions than any area—even crisis. This essay argues for a more reflexive approach to social media and new technology in public relations. Using the results of a recent Delphi study of new technology as a guide, this essay explores the implications of some of the trends in new technology and offers suggestions for communication professionals and scholars regarding how to safeguard stakeholders and publics while still moving forward with social media and technology tools as they evolve.

INTRODUCTION

For senior public relations academics and professionals, technological changes seem to have happened so fast that we tend to forget when it was once acceptable to send out professional documents typed on a typewriter, or pick up a telephone rather than sending a text message or email to communicate with someone. The early days of computers and the Internet were filled with critiques and warnings to be cautious about digital technologies. In the early 90s, there were regular discussions questioning how personal information stored in private databases might be used by corporations or the government to undermine democracy and personal privacy (Burnham, 1984; Mosco & Wasco, 1988; Postman, 1993; Vallee, 1982).

Unfortunately, as a study from the Annenberg Center for the Digital Future reports, younger professionals (for example millennials, 18–34 years old), who have grown up immersed in new technology and social media, are more comfortable sharing personal information with corporations and the government than older professionals (University of Southern California, 2013). Younger people are simply more trusting of technology and more willing to share personal information.

As public relations scholars, we view social media as only one relationship building tool among many. As we look at how public relations scholars and industry practitioners treat social media, we are concerned that many scholars are misremembering the past, and ignoring the future. Business and public relations educators have a role in rectifying this situation. This essay tries to

remedy the situation by examining the results of a recent Delphi study of new technology conducted with communication and technology professionals from seven countries.

Only someone who has lived through the halcyon days before social media and the Internet can appreciate the difference. Blind trust in the present, and a belief that technology is a panacea, poses grave dangers for the future. Blind trust in anything is usually a bad idea, and technology—for all the wonders it brings—also includes risks and hurdles. To serve the needs of the majority of stakeholders, stakeseekers, and publics will require a more critical and detailed understanding of technology and its role in society.

This essay will first briefly review some of the historical issues of technology and show that in the past a healthy skepticism generally accompanied new technological advancements. Second, the essay reports the results from a Delphi study of technology professionals that identified the implications of some of the trends in new technologies on relationships in society. We offer suggestions for public relations scholars and public relations professionals regarding ways to safeguard stakeholders and publics while still integrating evolving digital communication tools into their communication strategy.

QUESTIONING TECHNOLOGY

Computers have revolutionized almost every aspect of modern life: agriculture, commerce, dating, education, health, mass media, publishing, science, transportation, and war. Similarly, the Internet has shaped almost every aspect of modern life as a result of information sharing and retrieval, connectivity, and ubiquity, making many of our public and private interactions quick and easy. The early discussions about computers and the Internet were filled with critique and warnings, as computer technology evolved over the last half-century. Citizens were warned to be cautious about how we used our technologies. Critics sought to protect individuals' privacy, ensure democracy and political economy, and most importantly, to avoid manipulation (cf., Burnham, 1984; Mosco & Wasco, 1988; Postman, 1993; Vallee, 1982).

Something similar has occurred with the evolution of the Internet and social media as early critics asked questions about our technologies like whether "Google makes us stupid" (cf., Anderson & Rainie, 2010; Carr, 2008) or whether social media friends actually translate into happiness and real-world success (Hampton, Goulet, Rainie, & Purcell, 2011; Kross et al., 2013). Historically, advances in technology were accompanied by skepticism of the tools (cf. Mosco & Wasco, 1988), the next issue to be explained.

Healthy Skepticism of Technology

The study of new technologies, in particular computer technologies, goes back almost as far as the "media effects" research about television (almost half a century) to the work of computer scientists, philosophers, and media scholars like Brand (1988), Burnham, (1984), Lasch (1979),

Levinson (1997), Mosco and Wasco (1988), McLuhan (1964), Negroponte (1995), Postman (1984, 1993), and Vallee (1982). Many early technology scholars were truly ahead of their time, understanding the dangers of the vast databases of information that had already been compiled by the early '80s, and warning academics and citizens not to be taken in by the technology snake oil salesmen selling the Internet as a panacea for the ills of society (cf. Stoll, 1995, 1999). Vallee (1982), for example, argued in the early '80s:

> …you cannot store information in a computer in the first place! All you can ever store in a computer is DATA, and the relationship between data and information is a fundamental mystery…. it follows that we cannot talk about data bases [sic] in any abstract way. We need to· specify exactly what we are doing: what we have in mind to store, how often the data base will change, what the purpose of the system is, who will use it, and what other processes it will affect within the organization it serves and within the society at large. (p. 48)

For more than three decades, we have known that "data" is not trivial, and that the people who control data have an obligation to safeguard it, and not exploit it. Indeed, Vallee drives this point home when he writes: "Real power resides with those who set up the structure for others to think about because they define what is available and what is not, what is recorded and what is forgotten" (1982, p. 87).

More than two decades before the HTML based World Wide Web came online in 1993, computer scientists like Vallee (1982) and Burnham (1984) already understood what was at stake:

> The overwhelming influence of computers is hard to exaggerate. Linked computers have become as essential to the life of our society as the central nervous system is to the human body. Industries engaged in the processing of information by computers now generate about half of the gross national product of the United States. The Social Security Administration, AT&T, the Internal Revenue Service, the insurance industry, the Pentagon, the bankers and the federal intelligence agencies could not function without the computer. Access to a computer is one way to define class, with those who cannot or will not plug themselves into a terminal standing on the bottom rung of the social ladder. (Burnham, 1984, p. 7)

Unforeseen by most lawmakers and policy experts today, but well understood for decades, has been the privacy risks from our technologies. Indeed, three decades ago, Burnham described the emergence of the current NSA spying operations:

> Privacy, however, is far more than the aesthetic pleasure of Charles Dickens. And the gradual erosion of privacy is not just the unimportant imaginings of fastidious liberals. Rather, the loss of privacy is a key symptom of one of the fundamental social problems of our age: the growing power of large public and private institutions in relation to the individual citizen [p. 9] …Once a government agency or corporation has invested its expertise and capital in creating a surveillance system to track a single segment of the

> population that society agrees needs watching, it is hard to resist the temptation to extend the surveillance to other classes. (1984, p. 33)

The critique of technology is a healthy part of the diffusion of technology in our education, business, and political lives. Understanding the past prepares us for the future. Ignorance of the past is a second problem in our current understanding of technology.

History of Diffusion and Cumulative Effects

The statement "technology moves so fast that no one can know it" is inaccurate at best. As Hannemyr (2013) explained, one of the key academic urban legends about technology is the "how long it took..." story and the often cited (but specious) statistic that "It took 37 years for radio to reach 50 million listeners, 34 years for the telephone to have 50 million customers, 13 years for television to reach 50 million viewers and 4 years for the Internet to reach 50 million subscribers" (p. 111). Unfortunately, the fifty million as a percentage of the population (i.e., diffusion) is not comparable. The U.S. population in 1878 (when the telephone was introduced), was just 38.5 million (a seventh of what it is today). Henry Ford had not invented the moving assembly line yet. No large infrastructure existed to publicize or produce the technology. And no one really needed it (much like the Internet when it was introduced). Thus, as Hannemyr points out, "the early adoption rates for all three media are roughly of the same order of magnitude…. This becomes even more obvious if instead of plotting the absolute number of users, we plot usage as a percentage of the total population" (p. 116).

Understanding the cumulative effect of the diffusion of technologies is not actually very difficult. Cellular telephones, an indispensible multifaceted device today, follow a very straightforward development pattern. The First generation (1G) cellular technology appeared in 1983, the second Generation (2G) cellular technology appeared in 1991, the third Generation (3G) cellular technology appeared in 2001, and the fourth Generation (4G) cellular technology appeared in 2011. While these dates are approximate, we have seen a fairly consistent ten-year cycle for about thirty years (cf. Woyke, 2012).

The cellular phone diffusion example can also be applied to social media. A phone that was "state of the art" in 1991 is considered a museum piece in 2014. Likewise, we argue that the social media tools of today are destined for the museums of the future. It is public relations theories and frameworks that will ultimately influence social relations, not social media tools. Yet, we wonder if public relations scholars are aware of the diffusion of technologies and ready to provide a healthy skepticism of today's tools? The next section explores how the field of public relations has embraced the idea of social media as a new communication technology tool and asks why so few scholars are critiquing social media's dominance as a communication tool.

PUBLIC RELATIONS EMBRACES, NOT QUESTIONS, NEW TECHNOLOGIES

Kent (2014) noted that "over the last decade, interest in new technology research has increased tenfold, and technology related submissions to *Public Relations Review* now represent one of the top three areas of interest" (p. 1). In public relations, the scholarship on computer technologies is less than 20 years old. Johnson (1997) first asked practitioners in 1995 about how they used the World Wide Web as part of their communication with publics. Her findings foreshadowed many of the issues faced by practitioners today as they seek to use all types of communication technologies to communicate with publics. A special issue of *Public Relations Review* (1998) on Mediated Public Relations, edited by Clare Badaracco, included articles about the use of the Internet in crisis, issues management, and dialogue.

In the late 1990s, public relations scholars' interest in technology coalesced around the World Wide Web, and today, scholars' interest is directed toward the newest or youngest communication technologies: social media (Facebook, Twitter, WeChat, Weibo, etc.). In reality, social media are only one tool among many useful communication tools available to organizations for raising their mass media and social media visibility (Yang & Kent, 2013), communicating information to stakeholders and publics, problem solving, collaboration, and increasing sales and brand recognition. Indeed, many tools are more useful than social media. For example, email is still used more than social media, and is a top value for social sharing and as a marketing tool. As Morrison (2014) explains, the per-recommendation value of an email post is significantly higher than other social media:

> According to the 2013 Social Commerce Breakdown, a Facebook "like" is worth $1.41 and a share is worth $3.58. Twitter and Pinterest are neck and neck with shares worth $.85 and $.87 respectively. Shares on "other" networks, which includes sites such as Polyvore and Tumblr, rank lowest at $.67 in social commerce value. Top value for social sharing goes to email at $12.10 and Google ranked second with a G+ share valued at $5.08. (para. 2)

Yet, research on new technology in public relations continues to ignore most other digital technologies. As Zerfass and Schramm (2014) suggest:

> The potentials and limitations of online and social media platforms in public relations as well as the actual use in the profession have been a focus of research during the last few decades …At the same time, consultants, agencies and authors of business books have not rested to propagate the implementation of nearly every channel and technology that has emerged. (para. 1)

Technology scholars in public relations are rarely critical of the tools that they use (cf. Kent 2008, 2010; Taylor & Kent, 2010 for exceptions), and most scholars seem unfamiliar with the extant critiques, or at least rarely cite any critical research in their own studies. In order to address the imbalance of theory and practice and the imbalance in criticism and practice, the next section discusses the results of a recent Delphi study of technology professionals. The findings

have real implications for public relations practice, theory building and the next generation of practitioners.

THE FUTURE OF TECHNOLOGY IN PUBLIC RELATIONS: LESSONS FROM A DELPHI STUDY

Public relations scholars have followed an unreflective approach to the study of new technology and social media, focusing on simple uses rather than on larger issues of communication, community, power, etc. As the discussion about the history of technology criticism above suggested, public relations scholars' approach to research has ignored many of the important social aspects of our new technology and social media tools, such as privacy, personal and professional risks, economic, physical, and psychological harms to stakeholders, creating user friendly, convivial, interfaces (cf. Kent, Saffer, & Pop, 2012, 2013), and the democracy and social capital building potential of new technologies (cf., Kent, 2013). A Delphi study by Kent et al. (2012) was conducted to address these problems.

The Delphi Method

The Delphi method is a research technique originally developed by the RAND Corporation in the 1950s and 1960s. The idea of the Delphi is to engage geographically dispersed experts, as well as to minimize power dynamics and Groupthink errors (cf. Janis, 1982). The Delphi method has the ability to spot trends and identify future issues, make informed decisions about complex, often contentious issues, and build commitment and consensus among participants about an agreed upon course of action. A Delphi study consists of a series of waves, or iterations, of data gathering. In the initial data-gathering step, a survey instrument often gathers open-ended or directed answers, followed by more focused ranking data. Delphi studies often ask experts to make predictions about the future.

Kent et al. (2012) identified a dozen themes and several dozen sub-themes regarding the future of technology. While previous studies have explored some of the major new technology themes, no study has examined the significant sub-themes that predict future public relations opportunities and challenges in technology.

Participants and Methodology

The Kent et al. Delphi study sought the insights of 14 influential technology professionals and academics (cf. Kent & Saffer, 2014). The Delphi group studied included experts with a range of 5-30 years of experience (mean=15) in studying new technology, and who came from 6 countries (Australia, Greece, Finland, Israel, Romania, and the United States). The panelists came from an assortment of professional backgrounds that included technology professionals, academicians,

administrators, and entrepreneurs. Their expertise in new technology included, art, engineering, communication, public relations, professional writing, organizational communication, computer science, and other areas.

The first wave of the Delphi study asked three questions of participants: (1) "What do experts, such as yourself, know about Internet communication technologies or social media that no one else knows?" (Kent & Saffer, 2014) (2) What Internet communication technologies, social media innovations, or trends might prove to be the most important over the next decade and why? And (3) What do technology experts believe will happen with technology over the next 10 years?

As mentioned previously, 12 themes were identified from the answers, and each theme was informed by from 4–11 subthemes. The subthemes are important because they reveal the subtleties of the major themes and point to important questions for public relations professionals to be aware of. All of the themes and subthemes were reported in the Kent and Saffer (2014) article, but only the major themes were examined in detail in the article. Six of the subthemes have been singled out for in-depth analysis in the next section.

Toward A More Engaging Use of Technology in Public Relations

The content of the sub themes can help public relations professionals understand social media better and integrate them into meaningful relationship building. The six themes examined below include: (1) Fragmentation, not integration, will characterize the Internet and society; (2) Remote collaboration technology will be the norm for professionals; (3) The cliquishness of the Internet and social media is making people increasingly partisan and insulating people from the views of others; (4) The democratizing potential of the Internet becomes/or may become, more diluted and less valuable as more people add their voice to the mix; (5) Location and context data will allow us to seamlessly integrate with fellow members of our communities; and (6) Social media has and is changing our perception of what "friends" are. Each theme is explored below.

Theme #1: Fragmentation

The Delphi panelists predicted that fragmentation, not integration, will come to characterize the Internet and society. One of the early metaphors of the Internet was that it would connect people together (cf. Kent, 2001) because it was a "world wide web." Indeed, the addressing system for the Internet still uses "WWW…." to connect users to web sites. But research has gradually emerged telling scholars and professionals that the dream of connectivity is not happening. Reports by The Pew Internet and American Life Project have shown that social media do connect people together but only tenuously. The connections mimic cheerleaders or sycophants rather than genuine relationships. Social media users who question the political or social views of their "friends" are simply jettisoned or unfriended (Rainie & Smith, 2012).

Similarly, membership in corporate friend networks like Starbucks' or Nordstrom's Facebook page are comprised almost exclusively of strangers. Indeed, the sheer number of "friends" makes it virtually impossible for members who know each other to interact on the space. Nordstrom has more than 2.4-million likes, while Walmart has more than 34-million likes, and Starbucks has 36-million likes. In reality, these "likes" are meaningless in terms of providing evidence that a relationship exists.

Basically, then, what we have seen over the last decade is a decline in genuine social interaction among human beings communicating in real time and space (Baer, 2012; Twenge, 2014). Virtual social interaction, often among strangers, is taking place in asynchronous time-shifted segments. But, to what end? Important questions are raised from the fragmentation subtheme in terms of online educational experiences (which are increasingly being pushed on students by administrators seeking to increase revenues); job performance (as group interaction increasingly takes place via mediated exchanges and virtual office spaces); and, more importantly, democratic participation (as people no longer identify with coherent ideologies, party labels, or symbols). The fragmentation that we see as technology evolves may be as inevitable as the rising tide, but the important question is what will communication professionals who seek to build relationships do about it?

Theme 2: Collaboration

The Delphi panelists noted that remote collaboration technology might eventually become the norm for professionals. Remote collaboration is already very common among segments of society. Professionals working in the aid community and government have used tools like Skype for remotely holding meetings with employees for a decade. VOIP (voice over Internet protocol) technology as a means of reducing telecommunication costs has been a common tool for two decades. And many educational experiences are taking place via online, mediated tools. Unfortunately, very little is known about best-practices when it comes to holding virtual meetings, making virtual decisions, and engaging in virtual collaboration. The field of communication has almost a century of experience studying human communication in its various forms, but only about a decade trying to understand how things are different when we use digital/electronic channels.

If the predictions are true about how much professional interaction will take place online, a lot more research needs to be conducted about how those experiences should be structured and organized. If important decisions will be made by people who only engage each other virtually, then organizations need more than a list of "best practices" to guide these decision making interactions.

Theme 3: Cliquishness

The Delphi panel suggested that cliquishness of the Internet and social media is making people increasingly partisan and insulating people from the views of others. Rainie and Smith (2012) observed that the hope that social media could be a tool for integration has now become the reality that social media is a tool that separates. As people struggle to maintain multiple relationships using dozens of professional and private social networks, they inevitably fall back into tightly knit cliques rather than diverse networks. A typical student or communication professional probably has multiple email accounts (work and private), accounts on LinkedIn, Twitter, Facebook, Pinterest, and other social media, as well as an obligation to keep in touch with teachers, organizational members, and external stakeholders and publics. The sheer amount of virtual communication that individuals navigate and engage in on a daily basis dwarfs anything that has ever existed—and expectations for connectivity only keep growing.

Additionally, the abundance of social media and other media mean people have little time left for considering the views of others. In the past, when communication professionals read the major newspapers each day as a means of keeping up-to-date on local, state, and national affairs, some level of journalistic balance existed. This balance was achieved through the editorial staff of major newspapers, and moderated by the ideological prisms that dominated each news source. Although the principle of "balanced news coverage" has probably not existed for at least two decades (Bagdikian, 2004), before the Internet shifted individual citizens into being both news creators and news editors, most people shared similar cultural frames of reference. Today, individuals follow people, rather than parties, groups, or ideas, as we interact in self-selected friend networks, follow individual bloggers, and have control over what new ideas we expose ourselves to. That insularity means reduced access to new or novel ideas (Granovetter, 1973), and a reduced ability to understand long-term issues and trends.

Theme 4: Democratization

The Delphi panelists also noted that the democratizing potential of the Internet becomes/or might become more diluted and less valuable as more people add their voice to the mix. More voices entering discussions does not mean better quality discussions, as small group theorists discovered decades ago (Janis, 1982).

One of the more compelling comments that emerged from Kent and Saffer's (2014) Delphi study came from Rob ("CmdrTaco") Malda, who founded the influential technology blog SlashDot. As Malda explained,

> I have a pretty good understanding of how on-line communities form, how to manage them, and better yet, how to build systems that they can use to maximize their collective gains. I think most people tend to oversimplify the problem and sort of miss the point. The first problem is to weed out the noise, and that's actually not too hard. But after that you need to start raising the best stuff up out of the primordial soup. (2014, p. 574)

In practice, many organizations treat social media as an extension of customer service. The powerful, interactive, social media tools available on the Internet are used as one way, information dissemination tools, or as two-way asymmetrical tools. To our knowledge, they are not being used for planning, decision-making, or relational purposes. The primary reason for this is the assumption that having *more* people affiliated with an organization is inherently better. The belief that more likes on a social media page will translate to more sales, or in some cases, more support following an organizational crisis, is flawed.

The job of public relations is broader than sales, and organizations that use social media as primarily sales tools are taking a myopic focus to social media. The debate over who should have primary control over web sites goes back more than a decade to Grupp and Margaritis (2000) who first argued in *Public Relations Strategist* that public relations should have control over a website that was focused on organizational content, while websites that were used for online sales should be maintained cooperatively by advertising, marketing, and sales staff. At the time of this debate, there were no social media yet except for blogs, and those were still individual, not corporate organs. Organizations can now be visible on any number of thousands of social media sites. Social media have a lot more power than simply another advertising channel.

Theme 5: Location data

Location and context data will allow us to seamlessly integrate with fellow members of our communities. We may, for example, while looking at a menu in a restaurant, see information about what dishes our friends had and what they thought of them.

Although most people probably do not fantasize about living in an infinitely wired and connected world, the fact is that society and technology are moving in that direction. Public relations professionals should be on the cutting edge of technology, not the trailing edge. When we look around at what kind of research has been conducted in public relations, which primarily focuses on how and whether people use social media, we see a very unsophisticated understanding of new technology in general, and of social media in particular.

Contrast this with the work that is being done in non-communication/public relations areas and we have to ask why our approach is so simplistic. Consider for example recent studies by Mitra and Gilbert (2014) studying "Phrases that Predict Success on Kickstarter," and Xu, Yang, Rao, Fu, Huang, and Bailey (2014) who studied the value of project updates on crowdfunded campaigns. Consider examples such as Microsoft researchers studying how to diagnose depression using Twitter; Chinese firms studying how to use location-based-services to anticipate the needs of their publics; and health and crisis researchers, cartographers, and meteorologists developing applications to help people communicate during and after crises and natural disasters. Each of these examples suggests that innovative use of social media can help individuals and organizations to better achieve their goals.

But the value of the relationship between information and location has been ignored in public relations' consideration of social media. The examples noted above recognize the link between location and information and are designed to serve the needs of stakeholders *and* publics, rather than solely the needs of organizations. Much of the research conducted outside of professional communication areas represents more ethical and more sophisticated research agendas than trying to understand how to sell more products to consumers. The final theme discussed is related to friendship.

Theme 6: Friendship

Social media has and is changing our perception of what "friends" are. This last theme gets at the heart of what "social media" really are. On the most basic level, social media are tools that connect people. But, as discussed above, social media are evolving into narcissistic information tools wherein people shy away from contradictory ideologies and are unwilling to confront the views of the very people they call "friends." Friends who only click on your "like" buttons can hardly be called friends in any technical definition. Indeed, even Webster's dictionary has a more sophisticated definition of it: "a person who you like and enjoy being with" (Merriam-Webster's Online Dictionary, 2014). If an individual's friendship with another person is so tenuous that s/he will unfriend someone over a political comment that questions his/her ideology, clearly the word is being used here is only the loosest fashion.

More importantly, however, we know so little about the overall social, psychological, and political impact of the vast friend networks that billions of people have adopted. Organizations should be concerned. As individual loyalty to other human beings becomes an unfamiliar concept, the kind of identification that organizations hope to engender with their stakeholders and publics will also be threatened.

Public relations scholars and professionals need to expand their awareness of what scholars in other disciplines are doing and begin asking more sophisticated questions. The kinds of issues that are currently being studied in social media have focused on diffusion and media effects theories. Overall, the findings of the Delphi study provide public relations scholars and practitioners with an early warning system of the issues that they will face in the future. The themes provide a reality check as well as a road map for how to use social media to build relationships in the future.

CONCLUSION

We are advocates for social media as one tool in the public relations and communication toolbox that seeks to build relationships. Yet we are concerned that many scholars misremember the past as something where technology seemed to already exist in its present form, and in doing so ignore the impact of technology on the future. Two decades from now, what many consider to be the cutting edge of social media will be quaint examples. The diffusion of past technologies and the cumulative effect of their adaption can help us prepare for future technologies, future relationships, and future innovations. A healthy skepticism allows scholars, practitioners, and

students to better understand how communication creates social reality and has the power to build relationships.

By knowing what happened in the past, we can make predictions about the future. One trend that came out in Kent et al. (2012) Delphi study was a sense that the future of technology was unknowable. It is not. As argued earlier in this paper, technology experts in the 1980s saw what was coming today. Professional communicators need to open ourselves up to the bigger picture of technology. We need to consider more than just the latest social media craze and learn to make predictions about the future. We should focus our research on *anticipating* the emerging trends and *creating the tools and trends* that others will adopt. By knowing the past we can build the future for the profession.

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