ASSESSING THE STATE OF MATH EDUCATION IN ACEJMC ACCREDITED AND NON-ACCREDITED UNDERGRADUATE JOURNALISM PROGRAMS

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL
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Although the importance of mathematical skills in the newsroom has been the focus of previous research, little attention has been given to the math education provided in collegiate journalism programs. To assess journalists' math education in the United States, 341 department chairs from both ACEJMC accredited and non-accredited journalism programs were surveyed. Results indicated that few programs offered a math course specifically for the journalism major. Instead, most relied on general education requirements and segments of core journalism courses to provide students with math skills. Math general education requirements were typically satisfied with a minimal amount of credit hours. The mathematical skills of the average journalism student were rated as "poor" or "fair" by 70.2% of journalism chairs in the study. A lack of room in the curriculum was the most commonly cited constraint to the implementation of math education, although constraints such as conflicts with the math department and the limiting effect of accreditation standards on the curriculum were also documented. Strategies are proposed for future implementation of math education in journalism programs.

CHAPTER 1
INTRODUCTION

> *"If you don't know the difference between a noun and a verb, you could never get a job as a reporter or editor. But newsrooms are full of people who don't know how to calculate a percentage."*
>
> *-Chip Scanlan, 2004, p. 1*

When it comes to math, students in the United States are often described as lagging behind their international peers. Ginsburg, Cooke, Leinwand, Noell & Pollock (2005) found in an analysis of three international surveys from 2003 that United States high school students were rated below average in math—ranking eighth or ninth out of 12 countries. Following this study, the United States Department of Education (2006) increased focus on math education, described as "critical" for high school graduates who need math skills in a world where "employers seek critical thinkers and practical problem-solvers fluent in today's technology." In 2006 President Bush focused on improving elementary and middle school math education with the $260 million Math Now program, part of his No Child Left Behind Education Initiative (The United States Department of Education, 2006). Continuing this trend, Bush's fiscal year 2009 budget proposal set aside an additional $95 million to help prepare students for high school math (The United States Department of Education, 2008).

Such attention to math education is important because it can prepare students for the job field. As Fahy (2005) described, math skills are required in 60% of 21st century jobs, although only 20% of the workforce possesses them. The journalism job field seems to reflect a similar pattern. For example, as Livingston (2005) suggested, journalists need math skills in order to comprehend reports on taxes, medical and scientific research, budgets and box-office receipts. Meyer (1991) suggested that as technology allows more information to be available to a journalist, the skills required to be a journalist increase, stating that "a journalist has to be a

database manager, a data processor, and a data analyst" (p. 1). Furthermore, Rosenstiel (2005) recognized the importance of journalists' statistical skills when comprehending political polls.

However important such skills may be, research suggests that journalists largely do not possess them. In a focus group on the use of math in newsrooms, Maier (2002) described a "frazzled copy editor" who "pleaded almost tearfully for a reference book she could consult on journalistic use of numbers just as she turns to the AP Stylebook for guidance on language" (p. 108). In a 2002 case study of a metropolitan newspaper, Maier found errors involving elementary mathematics about every other day. Furthermore, Trombly (2004) distinguished errors in journalists' understanding of public opinion polls. Such problems could stem from journalists' high level of anxiety over their math skills (Maier, 2003).

Journalistic innumeracy can cause inaccurate reports and, consequently, distrust in the media. Dentzer (2000) illustrated such a case in 1999 when the Institute of Medicine, which serves to advise the nation on health matters, released a report on medical errors to the press. Instead of taking advantage of a press embargo that allotted journalists extra time to analyze the document before publication, NBC's health correspondent released the story two days early, reporting "dramatic conclusions—especially the projection that anywhere from 44,000 to 98,000 Americans would die in 1999 from errors in hospitals" (Dentzer, 2000, ¶ 1). This caused a dramatic surge in coverage of the issue, including many flawed reports. Dentzer (2000) attributed the majority of these mistakes to the media's misinterpretation of the number of Americans killed by medical errors in hospitals. Sources and methods were misjudged, as few reporters clarified that numbers were taken from two studies, one of which was 15 years old. Furthermore, many news sources only mentioned the higher projection that 98,000 Americans could die, omitting the lower estimate of 44,000 (Dentzer, 2000).

Dentzer (2000) suggested that the “news media struggles to digest and convey the nuances of medical stories,” which, she noted, include numbers (¶ 19). If American students, as well as journalists, have been shown to be generally weak at math, the problem could lie in education. Solmon (1981) as well as Scotland, Frith and Meech (2007) suggested that adequate college preparation is important for the workplace. With improvements in math education at the collegiate level, journalistic numeric literacy could increase. This study assessed the current level of mathematical education offered in journalism programs at colleges and universities across the United States to gain perspective on this aspect of journalism education.

CHAPTER 2
LITERATURE REVIEW

Math Literacy in the Newsroom

Innumeracy, a term defined by mathematician John Paulos as "an inability to deal comfortably with fundamental notions of number and chance," is a problem in today's newsrooms (Scanlan, 2004, p. 1). Yet math is unavoidable when journalists are reporting on a multitude of issues, including, "local tax rates, medical research reports, school district budgets, environmental impact reports, and box-office receipts," among many others (Livingston, 2005, p. 1). Maier (2002) found in a case study of a North Carolina newspaper that approximately half of the stories analyzed involved mathematical calculation. Despite the need for math skills, however, journalists seem to be reluctant to work with numbers (Livingston, 2005).

Journalistic innumeracy leads to inaccurate reports and distrust in the media. Maier (2002) suggests that mathematical errors in the media are so common and "legendary" that the public is wise to be skeptical (p. 507). Through a three-month accuracy audit of a North Carolina newspaper, Maier identified a new type of mathematical error roughly every other day. Problems included rounding, tallying and comprehension of numbers.

Innumeracy can often result in misleading perceptions of the world. Berger (2001) found that data used to depict "threatening trends" involving accidents and crime and health news were often filled with statistical errors, making threats seem worse than they actually were. Although Berger suggests that journalists are fond of playing up worsening conditions, he acknowledges "some reporters' and editors' ineptness in presenting quantitative trend data itself" (p. 675). Similarly, Hewitt (1996) found that the media tend to misrepresent homelessness, being more likely to cite high estimates due to bias and problems distinguishing the "good" research from the "bad."

Journalistic innumeracy is especially prominent when dealing with public opinion polls. Trombly (2004) asserted that journalists often misinterpret polls because they misunderstand the sampling margin of error, a statistic that represents the reliability of an estimate in relation to a sample size. She cited the 2000 presidential election as an example, where "misunderstanding the margin of error caused reporters to proclaim losers and winners when in fact there was a statistical tie" (p. 10). In this case, the difference between measurements fell within the sampling margin of error, indicating that the results were not statistically significant. Rosenstiel (2005) recognized that sampling margin of error is a common problem for journalists, describing a 2004 assessment that "understanding and use of polls may be more of a problem than many journalists imagine" (p. 713).

The Poynter Institute (2007) began encouraging journalistic math literacy through a segment in its free online education program, "News University," which was launched in 2005. The program, intended to provide "interactive, inexpensive courses that appeal to journalists at all levels of experience," includes a free course titled "Math for Journalists" (p. 1). The course, designed to "make routine math routine," offers journalists practice with fractions, percentages, means, medians, modes, ratios, ranks and rates, among other skills.

In 1998, the faculty at the Poynter Institute ranked numeracy among the top 10 abilities (Figure 2-1) needed for competent journalists and newsrooms, stating that

> Journalists who fail to master math are missing one of the key building blocks of excellence. They lack a basic skill needed to decipher much of the information in the world around them, such as crime statistics, pollution standards, real estate taxes, and unemployment figures. Without math skills, journalists are bound to fall short in their quest for accuracy (p. 2).

The Poynter Institute asserts that competent journalists can calculate percentages, ratios, and rates of change; have knowledge of arithmetic; are familiar with statistics; know the difference between median and mean; understand margin of error and probability theory; can translate

numbers into easy to understand terms; and understand graphs and pictorial representations of numbers.

Just how "competent" journalists currently are in this respect is questionable. Maier (2003) tested the mathematical skills of journalists at *The News* & *Observer* in Raleigh, N.C., by administering the "Mathematics Competency Test for Journalists" (p. 924). The 25-question exam, which encompassed only junior-high level math, was given to reporters, graphic artists, editors and news researchers. Results showed that the staff averaged a score of 68%, with one in five reporters missing more than half the questions. Copy editors scored significantly higher overall than the other groups.

Maier (2003) also tested the mathematical confidence of journalists at *The News & Observer* through the "Fennema-Sherman Confidence in Learning Mathematics Scale." Results showed that even those who scored relatively high on the math competency test had low confidence in their math skills, suggesting, as Maier describes, that "problems that journalists experience with numbers may be as much as matter of perception as they are of math ability or knowledge" (p. 931). However, Maier's finding that journalists' math scores increased with higher levels of math education suggests that education may be vital in improving journalistic competency.

The Transfer of Learning Theory

When discussing math education for journalism students, the transfer of learning theory may be relevant. Cormier and Hagman (1987) describe transfer of learning as a situation where previously acquired knowledge affects the way new knowledge is gained and skills are performed. Therefore, it may be important to consider the transfer of learning from student's

previous math education—high school and general education courses—to their work in journalism courses and the workplace.

Perkins and Salomon (1992) suggest there are two types of transfer. There is positive transfer, which "enhances a related performance in another context," negative transfer, which "undermines" it (p. 3). Furthermore, the authors differentiate near transfer from far transfer. Perkins and Salomon (1992) describe near transfer as "between very similar contexts" such as "when a garage mechanic repairs an engine in a new model of car, but with a design much the same as prior models" (p. 3). Far transfer, which the authors suggest occurs less often, is between "remote and alien" situations, such as the application of chess strategy to investment decisions, politics or campaigns (p. 3).

The transfer of mathematical concepts to journalism could then be considered a positive transfer of learning, since it would enhance the individual's performance as a journalist. It could also be classified as a far transfer, as math and journalism are academically distant in most aspects. However, they have to be somewhat related for transfer to occur, as Pea (1987) suggested, "transfer of knowledge or learning will occur between two tasks insofar as the tasks share identical elements" (p. 641).

Simons (1999) examined how education can aid in the transfer of learning in one situation to another. He suggested that students "tend not to use much of their prior knowledge actively" because they have problems recognizing which knowledge is applicable in certain situations (p. 580). He stated,

> Using prior knowledge may require a great deal of work, it may create confusion, it may distract you from the main points, and it may make your learning too idiosyncratic. Thus, from the perspective of the learner, the problem is when to use prior knowledge actively and when to protect oneself from its influences (p. 580).

When transfer does occur, Perkins and Salomon (1992) suggested, it is propelled by two different forces. The first, low road transfer, involves activation of routines by a stimulus. The second, and more relevant to this study, is high road transfer, which involves searching for connections between two contexts in a deliberate way (Perkins and Salomon, 1992). Simons (1999) suggested that a far transfer, such as the transfer of math skills to journalism, is best facilitated by the high road mechanism.

Perkins and Salomon (1992) suggested that bridging, an instruction technique, encourages the high road transfer and a connection between far reaching contexts. Bridging, the authors suggested,

> Encourages the making of abstractions, searches for possible connections, mindfulness, and metacognition. For example, a teacher might ask students to devise an exam strategy based on their past experience, a job counselor might ask students to reflect on their strong points and weak points and make a plan to highlight the former and downplay the latter in an interview. The instruction thus would emphasize deliberate abstract analysis and planning (p. 7).

Therefore, bridging could be considered a successful technique in facilitating the transfer of math education to journalism studies.

In this way, the transfer of learning theory could aid in the implementation of math education in college journalism programs, which could be considered an important step in preparing journalists for the work field.

Bridging Through a Course on Math for Journalists

The Indiana University School of Journalism's Statistical and Mathematical Methods for Journalism course (Appendix A) is particularly relevant to this discussion, in that it could be used as a mechanism to encourage the high road transfer, facilitating a connection between math and journalism. The course, developed by former professor Paul Voakes, was designed to

remedy student problems in translating what they learned in math courses to their work in journalism. As Voakes (2005) described,

> It was as if the information was coming in one ear and going out the other because they were not applying it once they got back to the journalism school. It was as if there were no connection between that math and the kind of numeracy that we have to have in journalism (Voakes, 2005, video clip).

In developing the course, which was taught by the math department, the journalism and math departments collaborated in order to not only teach journalists math skills, but also to incorporate those skills in reporting (Indiana University School of Journalism, 2005). Voakes (2005) explained,

> Because it's a course for journalism students only, the goals are slightly different than the goals of a typical statistics course. Our goals are to enable students to understand the statistical research that other professionals produce and to ask appropriate numerical questions but also to convey to a public audience the meaning of those numbers (video clip).

The Indiana University School of Journalism's online convergence forum lists multiple problems faced with the implementation of such a course. For example, many students expected the course to "indulge their math phobias" rather than cure them (Indiana University School of Journalism Convergence Forum, 2005, ¶1). Administrators also faced challenges in transferring the skills learned in the single course throughout the journalism curriculum, stating that "At present, little has been done to broaden the impact of statistics on reporting and writing in advanced skills courses" (Indiana University School of Journalism Convergence Forum, 2005, ¶8). The fact that the math department controlled the course, although beneficial in that it did not affect the budget of the journalism department, also meant that its journalistic focus was diluted. Therefore, the Indiana University School of Journalism Convergence Forum (2005) recommended that future courses be taught under the journalism department with a text designed by both journalism and math departments.

Math Education in Journalism Programs

Numerous studies indicate that college preparation is important in acquiring skills for the workplace (Solmon, 1981; Scalan, 2004; Frith & Meech, 2007). Solmon (1981) cited a 1974 study that found that even after nine years in the industry, many graduates still used knowledge gained in college. Furthermore, in a survey of journalism graduates in Scotland, Frith and Meech (2007) found journalism education to be "an effective preparation for a successful journalism career" (p. 142). The authors argue, however, that the job skills offered in college can be "restrictive," stating "there is rarely any discussion of why journalism students should be required to study law and government but not, say, economics, statistics or basic science" (p. 157).

Horn (1995) identified "generic" knowledge, skills and abilities desired by employers that "cut across occupations," including interpersonal skills, communication, critical thinking, motivation and personal attitudes, ability to work with data and information and, most relevant to this study, the ability to apply mathematics. However, he argued that in many cases there is a gap between the qualities employers desire and what is taught in the classroom. Similarly, Redmond (1994) described a divide between job skills and college preparation, finding that core journalism courses often do not incorporate skills desired by news directors. In this case, there was a difference between the "understanding of theories of mass communication to carry on philosophical debate in the academic world" and "understanding how people engage with mass media to argue principles with a pragmatic television station general manager" (Redmond, 1994, p. 40). Such "gaps" could be relevant in the case of journalistic math literacy, which may be largely ignored in school but particularly important on the job.

Therefore, the roots of journalistic innumeracy could lie in journalists' education in academic programs. Indeed, the Accrediting Council on Education in Journalism and Mass

Communications (ACEJMC) took a step to improve journalists' math skills at the college level by including "basic numerical and statistical concepts" as part of their accreditation standards. Authors such as Livingston (2005) and Wickham (2001) have also acknowledged journalists' need for math education with the publication of mathematical reference books designed specifically for journalists.

Denham (1997) suggested that research methods should be taught at the undergraduate level in mass communication programs to remedy basic weaknesses in math comprehension. He stated that a course in research methods could help students improve critical thinking and aid in the comprehension of polls, measures of central tendency, ratings, and shares. Such improvements could make stories more accurate, as he explained,

> Before completing the course, a student might take a tragic news story, such as a child burning down his family's mobile home and killing his sister after viewing MTV's "Bevis & Butt-Head," and attempt to make general statements about the relationship between television exposure and anti-social behavior. After completing the course, the student might be more conservative in considering the problem and may question whether a relationship would be present if data were aggregated across many children (p. 55).

Denham warned, however, that while students should be taught the basic mathematical skills needed for journalists, higher-level skills such as the derivation of formulas for multivariate statistics could repel students and should be avoided.

Chip Scanlan (2004) of the Poynter Institute Faculty acknowledged the lack of numerical education in journalism programs in his essay "Why Math Matters." Scanlan cited Max Frankel, former executive editor of *The New York Times*, as complaining that some journalism schools "let students graduate without any numbers training at all...the media's sloppy use of numbers about the incidence of accidents or disease frightens people and leaves them vulnerable to journalistic hype, political demagoguery, and commercial fraud" (p. 2).

Skinner, Gashner and Compton (2001) asserted that journalism education is stuck in a dichotomy between theory and practice. To the researchers, this clash is caused by differences in faculty, as “those who have taken the time to hone professional skills rarely hold graduate degrees and, because of the time required to earn a PhD, those with advanced degrees are not often sufficiently familiar with the more practical demands of the craft” (p. 344). Undergraduate studies, they assert, are primarily focused on the practice rather than theory. Therefore, the researchers argued, students are taught the skills required to be a journalist but not “the impact that the tools they utilize have on depictions they render” (p. 345). In this sense, the implications of journalistic innumeracy would pass unrealized to undergraduate students, who may not consider the detriment that a misinterpreted numerical value could have on a news story.

Furthermore, funding and departmental permission for expanding journalism programs is not always easily obtained. Hynes (2001) suggested that campus arguments over the academic value of journalism and mass communications can lead to such programs being “targeted for reductions or elimination” (p. 10). Budgets are also a factor. In a survey of journalism program administrators in 1993, Kosiki and Becker (1994) found that decreased undergraduate enrollment led to cuts in purchasing power and “considerable budget stress” (p. 13).

In addition, the process of curriculum change can be cumbersome. Manns and March (1978) found that college curriculum change was correlated to changes in financial conditions. The process can also be lengthy, as curriculum change typically takes 18–24 months (Tanner, 1995). Mawn and Reece (2000) outlined the process in a case study of university curriculum change from a individual to a community-based nursing program. The first steps in the process included the formation of a curriculum committee, evaluation of the curriculum through surveys of alumni, faculty, staff, students and other programs and a review of United States trends in

nursing curriculum. After this, an outline of a new curriculum had to be generated, as well as new courses. The authors mentioned that throughout this process, it was rare that unanimous approval was reached on any issue.

2007 Curriculums

In order to better understand how math is currently being implemented in college journalism programs, a cursory review of the 2007 curriculum requirements of various schools is appropriate. For this purpose, the top 10 intercollegiate winning schools of the 2006–2007 Hearst Journalism Awards Program were selected for review. The program, founded to "provide support, encouragement, and assistance to journalism education at the college and university level," offers scholarships and awards to students that demonstrate "outstanding performance" in journalism (Hearst Journalism Awards Program, 2007, p. 1). A journalism school itself is deemed a winner in the Overall Intercollegiate Competition when students within that school accumulate the highest number of points. Winners from the 2006–2007 Overall Intercollegiate Competition, in order from the first to 10th place, were Arizona State University, University of Missouri, University of Florida, Western Kentucky University, University of North Carolina (Chapel Hill), Pennsylvania State University, University of Nebraska-Lincoln, University of Montana, Syracuse University, and the University of Kansas (Hearst Journalism Awards Program, 2007, p. 1). By reviewing top-ranking schools in this program, a sense of math education efforts in "top" journalism schools can be derived.

Arizona State University

Arizona State University's Walter Cronkite School of Journalism and Communication, the first-place winner of the 2006–2007 Overall Intercollegiate Competition, requires only the "Mathematical Studies" requirement needed for students of all majors (The Walter Cronkite School of Journalism and Communication, 2007). To satisfy this requirement, students must

complete one course in basic mathematics and one course in computer/statistics/quantitative applications, for a total of six credit hours (Arizona State University, 2007).

However, The Walter Cronkite School of Journalism and Communication at Arizona State stands out among other Hearst Journalism award-winning schools reviewed on the basis of math education. Though they are not required, two courses, Science Writing and Precision Journalism, have analytical concentrations largely missing from other programs. Science Writing, which is offered once a year, focuses on "writing, interviewing, reporting skills, and an understanding of key concepts in science" (Arizona State University, 2007, p. 1). Precision Journalism, a lecture and lab offered in both the fall and spring, focuses on "reporting polls and surveys and other numerically-based stories as well as on understanding the concepts that underlie polls and surveys" (Arizona State University, 2007, pg 1).

University of Missouri

As part of general education at the University of Missouri, students must complete both college algebra and a math reasoning proficiency requirements. The college algebra requirements can be fulfilled with the actual course (three credit hours), or waived by scoring a minimum of 26 on the math section of the ACT or a 600 on the math section of the SAT. The math reasoning proficiency requirements are fulfilled after students complete one statistics course (three credit hours) with the grade of a "C" or better (Missouri School of Journalism, 2006, p. 1).

The University of Missouri also offers a journalism course in "Science, Health and Environmental Writing" (Missouri School of Journalism, 2006, p. 1). Although this course may incorporate numerical skills, it is not required.

University of Florida

The University of Florida requires six hours of general education math courses, and additional math courses beyond this are not required for students in the College of Journalism

and Communications. Students do, however, have the choice between a quantitative option, where the student chooses eight credit hours from a list of statistics, computer and accounting courses, and a foreign language option, satisfied by a placement test or one year of college language. (The University of Florida College of Journalism and Communications, 2008). The University of Florida College of Journalism and Communications requires a course in Fact Finding aimed to teach students how to "apply basic statistical databases (such as Excel) and techniques to analyze numerical data" (University of Florida College of Journalism and Communications, 2007, ¶ 2).

Western Kentucky University

The only required math courses for students at the Western Kentucky University School of Journalism and Broadcasting are fulfilled with general education requirements (Western Kentucky University, 2005). This math requirement is satisfied with only one three credit hour basic math course of the student's choice, with options such as General Mathematics, Fundamentals of College Algebra, Trigonometry, Fundamentals of Calculus and Statistics. However, Western Kentucky University does require journalism students to complete a course in macroeconomics. The University also offers a course in advanced reporting involving "interviewing, observation and public computer records research skills coupled with survey research and team and assisted reporting" (Western Kentucky University School of Journalism and Broadcasting, 2005, p. 1).

The University of North Carolina (Chapel Hill)

The University of North Carolina's School of Journalism and Mass Communication does not require journalism students to complete any math courses outside of general education requirements. However, the journalism department recommends, but does not require, that

students choose the “Basic Concepts of Statistics and Data Analysis” course to satisfy the math portion of their general education requirements (University of North Carolina, 2007, p. 1).

Pennsylvania State University

The College of Communications at Pennsylvania State University only requires math courses that satisfy the University’s general education requirements. Six credits of “quantification” courses are required that “teach the students to work with numbers so as to measure space, time, mass, forces, and probabilities; to reason quantitatively; and to apply basic mathematical processes to daily work and everyday living” (Pennsylvania State University, 2007, p. 1).

The University of Nebraska-Lincoln

The University of Nebraska-Lincoln’s College of Journalism and Mass Communications has “group requirements” aimed to “provide a good introduction to the knowledge upon which our civilization is founded” (University of Nebraska-Lincoln, 2007, p. 342). Examples include Foreign Language, Arts, Historical Studies, and other general education groupings. In the Mathematics or Statistics group, students that did not receive four years of math education in high school are required to satisfy such “deficiencies” with three credit hours of courses such as Geometry I and II, Intermediate Algebra, College Algebra and Trigonometry (University of Nebraska-Lincoln, 2007, p. 342).

The University of Nebraska-Lincoln College of Journalism and Mass Communications offers a “Science Writing” as an elective designed to teach students how to write science articles aimed at the general public (University of Nebraska-Lincoln, 2007, p. 344), which could involve the interpretation of numerical data.

The University of Montana

The University of Montana requires that journalism students take no more math courses than dictated by general education requirements. Students are expected to fulfill coursework enabling them to "possess the ability to accomplish basic algebraic manipulations and achieve mathematical literacy at a level typically presented in college mathematics courses" (University of Montana, 2007, p. 1). The number of credit hours taken for mathematical literacy is determined by placement testing. (University of Montana, 2007).

Syracuse University

At Syracuse University, journalism students must complete general education math requirements including one course in "quantitative skills" and two courses in "natural sciences and mathematics," equating to approximately nine credit hours (Syracuse University, 2006).

The University of Kansas

At the University of Kansas, the only math courses that journalism students are required to take are also fulfilled under general education degree requirements. To satisfy this requirement, students must take both a first-level course in Algebra or Pre-calculus and a second-level course, unless they "demonstrate eligibility for second-level mathematics courses" through high test scores and are able to skip the first course, thus influencing the number of credit hours that must be taken. On the second-level, students are given a choice between Introduction to Topics in Mathematics; Introduction to Finite Mathematics; Matrix Algebra, Probability, and Statistics; Calculus I; Calculus I Honors; Elementary Statistics and Introduction to Biostatistics. Journalism students with high SAT or ACT test scores may therefore be required to take only one math course at the University of Kansas. (William Allen White School of Journalism & Mass Communications, 2006).

In review, most of these award-winning journalism programs do not offer courses on math for journalism students, instead depending on general education to cover the subject. Again, the cursory analysis only provides a cursory look at the math education in journalism programs. Further research into the subject could paint a different picture.

The Purpose of General Education Requirements

As most journalism programs in this review relied on general education to cover math, it is important to take a deeper look at general education requirements themselves. Research suggests that general education courses provide students with the core education needed before entering a specialization. Ratcliff, Johnson, La Nasa and Gaff (2001) described general education as a core aspect of a degree, that "assures that all students—regardless of specialization or intended career—become acquainted with history and culture and with science and mathematics" (p. 6). Furthermore, in an evaluation of student learning in general education courses, Donald and Denison (1996) found that students attributed skills such as critical thinking, responsibility and organized work habits to general education courses.

However, Ratcliff et al. (2001) described problems with general education curriculum, such as concerns regarding its size. A summary of two national surveys from 2000 revealed that in a 120-credit program, the average general education units required accounted for 37.6% of the degree, or 45.1 credit hours. This figure, compared with the average of 33.5% in 1974, suggests that focus on general education may be increasing, although not without a struggle (Ratcliff et al. 2001). As the authors suggest, "the role, structure, and importance of general education at individual institutions continues to be an area of increased priority and heated debate" (p. 14).

The Accrediting Council on Education in Journalism and Mass Communication

As of the 2007–2008 school year, the Association for Education in Journalism and Mass Communications (AEJMC) has accredited 109 institutions in the United States through the

Accrediting Council on Education in Journalism and Mass Communications (ACEJMC) (Smith, 2007). Since accredited schools represent a portion of the study population, it is important to examine what it means to be accredited.

ACEJMC accreditation is a voluntary process in which an institution is examined by the Council to determine if the program follows standards set out by the Council (AEJMC, 2008). According to The Commission on Public Relations Education (2006), nine standards are used to assess the program, including

- mission, governance and administration;
- curriculum and instruction;
- diversity and inclusiveness;
- full-time and part-time faculty;
- scholarship: research, creative and professional activity;
- student services;
- resources, facilities and equipment;
- professional and public service;
- assessment of learning outcome (The Commission on Public Relations Education, 2006, ¶ 7).

The second standard, Curriculum and Instruction, requires that 80 hours of the degree program are completed outside of the journalism and mass communications program (The Commission on Public Relations Education, 2006). Ratcliff et al. (2001) suggested that a typical program requires about 120 credit hours; consequently, if such a program was accredited, only 40 credit hours would be taken in the actual journalism school.

Furthermore, the ACEJMC requires that students graduating from the program should be educated in the 11 competencies and values, including

1) understand and apply First Amendment principles and the law appropriate to professional practice;

2) demonstrate an understanding of the history and role of professionals and institutions in shaping communications;

3) demonstrate an understanding of the diversity of groups in a global society in relationship to communications;

4) understand concepts and apply theories in the use and presentation of images and information;

5) work ethically in pursuit of truth, accuracy, fairness and diversity;

6) think critically, creatively and independently;

7) conduct research and evaluate information by methods appropriate to the communications professions in which they work;

8) write correctly and clearly in forms and styles appropriate for the communications professions, audiences and purposes they serve;

9) critically evaluate their own work and that of others for accuracy and fairness, clarity, appropriate style and grammatical correctness;

10) apply basic numerical and statistical concepts;

11) apply tools and technologies appropriate for the communications professions in which they work (AEJMC, 2008,¶ 2).

In light of the current state of journalistic innumeracy it is important to look more deeply into the implementation of math education at the collegiate level. Therefore, this study aimed to assess the current level of mathematical competency education offered in journalism programs at colleges and universities across the United States to gain perspective on the state of journalism education.

Research Questions

RQ1. What is the overall state of math education in United States journalism programs? Is math only taught in general education courses? Are special courses specifically designed for math in the context of journalism available?

RQ2. How important do the chairs of journalism programs feel that math education is in the journalism curriculum?

RQ3. Are there any constraints on math education in the journalism curriculum?

RQ4. How do administrators describe the math skills of students and educators within their journalism program? Are students prepared for the math skills required in the field?

RQ5. Do differences in the perception of importance and implementation of math education in the journalism curriculum differ between AEJMC accredited and non-accredited programs?

Figure 2-1. Poynter journalistic competency pyramid [Reprinted with permission from the Committee of Concerned Journalists. (2007). Competency in the newsroom. Retrieved August 10, 2007, from http://concernedjournalists.org/competency-newsroom-forum-summary]

CHAPTER 3
METHODOLOGY

An online survey of chairs of journalism departments in colleges and universities across the United States was conducted in order to assess the current state of math education in these programs. Numerous studies have cited the influential role of the department chair (Gmelch Parkay & Forrest, 1999; Adduci Woods & Webb, 1990; Seagren, Creswell & Wheeler, 1993). Gmelch, Parkay and Forrest (1999) asserted that the responsibilities of department chairs lead them to be "viewed often as the most important administration position in postsecondary education" (p. 3). Adduci, Woods and Webb (1990) described these responsibilities, including budgeting, curriculum development and committee leadership. Furthermore, Seagren, Creswell and Wheeler (1993) noted that chairs serve as a connection between administrators, faculty and students. If there was no official "chair" of the journalism institution, the questionnaire was directed to the highest administrator of the program. An online survey was chosen for this assessment for its ability to reach such a wide population.

Journalism colleges and universities for this study were chosen based on the sampling method set out by the Grady College of Journalism & Mass Communication's yearly survey of journalism and mass communication graduates. The survey, which has been conducted since 1964, is based on a sample of schools found from a combination of the Dow Jones Newspaper Fund's Journalism Career and Scholarship Guide and the Journalism and Mass Communication Directory, published by the Association for Education in Journalism and Mass Communication (Becker et al., 2005). The AEJMC Directory lists any school that lists itself, all schools accredited by the Accrediting Council on Education in Journalism and Mass Communications and all U.S. members of the Association of Schools of Journalism and Mass Communication (Becker et al., 2005).

The Dow Jones Newspaper Fund Guide lists schools that offer “at least 10 courses in news-editorial journalism and those courses that include core courses, such as an introduction to the mass media and press law and ethics, as well as basic skills courses such as reporting and editing” (Becker et al., 2005, p. 16). Through this selection process, a diverse group of both accredited and non-accredited schools were represented. All schools from the combination of these lists were surveyed. The initial sample consisted of 380 programs, 109 which were accredited and 271 which were not (Appendix B). In the case that the e-mails were undeliverable and returned, the researcher attempted to find a correct address on the institution’s Web site and resent the e-mail. After this process, 39 e-mail addresses were still undeliverable or unattainable, so the corresponding institutions were omitted from the survey sample, leaving a final sample of 341 programs.

The questionnaire was administered online in February 2008. It was created with and hosted by SurveyMonkey (www.surveymonkey.com), and links to the questionnaire were e-mailed to department chairs (Appendix C). E-mails were personalized by the researcher using the names of the department chairs listed in the directories. As suggested by Babbie (2007), a second e-mailing was administered one week after the first to thank those who did participate and promote participation from those who did not. A third and final e-mail was sent one week after the second to encourage further participation. Responses to the questionnaire were anonymous in hopes of eliciting honest responses from those influencing journalism programs in the United States. Respondents were advised in the e-mail not to reveal their identity or the identity of their institution. In the case that a respondent did not answer all of the questions provided, missing data for continuous variables was replaced by the mean answer of all other respondents.

A week after the third e-mail notification, 121 responses had been collected, resulting in a 35.4% response rate. This is comparable to other response rates for online surveys. For example, Cook, Heath and Thompson (2000) found in a meta-analysis of online survey response rates that the mean response rate for 68 surveys in 49 studies was 39.6%. Furthermore, Shannon and Bradshaw (2002) found in a comparison of postal and Internet surveys that of 126 respondents, 66.7% responded to mail surveys and 33.3% responded to electronic surveys.

Measures. Participants were asked 16 questions designed to assess the state of journalism math education at the collegiate level (Appendix D). To operationalize the overall state of math education in journalism programs, participants were asked questions such as “Does your undergraduate journalism program incorporate math content into major courses?” and “does your undergraduate journalism program offer a course focusing specifically on math skills within the context of journalism?” Respondents were also asked if such courses were required and if plans were underway for such courses. The survey also gauged the department chairs’ view on the importance of math education with questions such as "how important do you feel that math education is overall as part of the curriculum for undergraduate journalism students?” and “how important do you feel it is for journalists to possess basic math skills?” with options on a Likert scale ranging from 1, “very unimportant, to 5, “very important.”

Constraints on math education in journalism programs were measured with questions such as “are there any constraints to the addition of a mathematical focus in your journalism programs,” and if yes, participants were be able to choose from options such as lack of school financial support, lack of student interest, lack of qualified faculty, lack of time, or “other.”

Finally, department chairs’ opinions on the level of preparation students receive regarding math education for the job field were measured with questions on a Likert scale, such

as “how would you rate the mathematical skills of the average journalism student at your institution?” and “how prepared do you feel the average journalism student at your institution is for the math skills required on the job?”

This survey gauged the state of math education in 2007–2008, the department chair’s view of the importance of the issue, constraints on math education, chairs’ view of student preparation when it comes to math education for the field and differences between ACEJMC accredited and non-accredited programs.

CHAPTER 4
RESULTS

To address the first four research questions, descriptive statistics and open-ended responses were used. For questions answered in Likert scale form, points were given for each response so that a mean value could be calculated. Research Question 5 was investigated using a one-way analysis of variance (ANOVA).

RQ1: What Is the Overall State of Math Education in United States Journalism Programs? Is Math Only Taught in General Education Courses? Are Special Courses Specifically Designed for Math in the Context of Journalism Available?

Research Question 1 addressed the overall state of math education in United States journalism programs, including how math was implemented within individual programs. When asked how many credit hours of mathematical courses journalism students were required to complete with general education requirements, 78% of the 121 respondents responded between "0–3" credit hours (Table 4-1).

When asked if math content, such as fractions, percentages, means, medians, modes, ratios, ranks and rates, was incorporated into major courses within the journalism program, such as reporting or editing courses, 71.7% said "yes," while 28.3% said "no" (Table 4-2).

The majority (87.6%) of programs did not offer a course focusing specifically on math for journalists, while 12.4% did. Of the 15 programs that had a special course, 66.7% said that the course was an elective. Among the programs with no special course, only 7.5% said they had plans for such a course underway (Tables 4-3, 4-4 and 4-5).

When asked to describe the basis of the journalism program, 59.5% of the chairs described their program as "theory and practice based," while 39.7% said chose "practice based" only (Table 4-6).

RQ2: How Important Do the Chairs of Journalism Programs Feel that Math Education Is in the Journalism Curriculum?

Research Question 2 addressed the perceived importance of math education in the journalism curriculum. On a scale of 1–5 ranging from "very unimportant" through "very important," the mean score was of 3.72 (*SD* =.859). Overall, 66.1% of department chairs rated math education in the journalism curriculum as "important" or "very important," while 6.6% selected "very unimportant" to "not important" (Table 4-7).

When asked how important it is for journalists to possess basic math skills on a scale of 1-5 from "very unimportant to very important," a mean score of 4.14 was derived (*SD* =.674). The majority of respondents, 90.8%, said that it was "important" or "very important" for journalists to possess basis math skills. Only one department chair stated that it was "very unimportant" for journalists to have basic math skills (Table 4-8).

Participants were also asked to rate how common they thought mathematical errors were in published reporting on a scale of 1–5 from "very rare" to "very common." The mean score was 3.74 (*SD* = .797), with more than half (54.5%) responding "common" or "very common." No respondents chose "very rare" as an answer (Table 4-9).

RQ3: Are There Any Constraints on Math Education in the Journalism Curriculum?

Research Question 3 investigated the constraints on math education in the journalism curriculum. Most respondents (64.2%) stated that there were constraints on math education in their program. Of those, 68.4% chose "lack of room in the curriculum," while "lack of faculty support" was cited least often (12.7%). The remaining 21.5% chose "other," stating reasons such as "student resistance," "opposition of the math department on campus" and "accrediting council-imposed credit limits" (Tables 4-10 and 4-11).

RQ4: How Do Administrators Describe the Math Skills of Students and Educators within Their Journalism Program? Are Students Prepared for the Math Skills Required in the Field?

Research Question 4 focused on department chairs' perception of the math skills of students and instructors within their programs, as well as student preparation for math skills demanded in the work field. The mean rating of mathematical skills of the average journalism student, on a scale of 1-5 from "poor" to "excellent," with 6 as an option for "don't know," was 2.41 (*SD* = .104). Most chairs (70.2%) rated the math skills of the average journalism student as "poor" or "fair," while no respondents rated the average journalism student's math skills as "excellent" (Table 4-12).

When rating the mathematical skills of the average journalism instructor, on a scale of 1–5 from "poor" to "excellent," the mean score was 3.84 (*SD* =.101). Most chairs (66.1%) rated the mathematical skills of the average instructor as "good" or "excellent." Only two respondents (1.7%) rated the skills of the average instructor as "poor" (Table 4-13).

Despite low ratings for the math skills of the average journalism student, most chairs rated students as ready to handle math skills on the job. On a scale of 1–5 from "very unprepared" to "very prepared," the mean score 3.21 (*SD* =.076). Most respondents, 44.6%, rated students as "neutral," followed by 35.5% rating them as "prepared." Only two respondents (1.7%) rated students as "very unprepared." No chairs ranked students as "very prepared" (Table 4-14).

RQ5: Do Differences in the Perception of Importance and Implementation of Math Education in the Journalism Curriculum Differ between AEJMC Accredited and Non-Accredited Programs?

The perception of importance as well as the implementation of math education in journalism curriculum between AEJMC accredited and non-accredited programs were investigated in Research Question 5. Of those who completed the survey, 29.2% were from

accredited programs while 70.8% were not (Table 4-14). Analysis of variances (ANOVAs) were performed to compare the means of certain variables between accredited and non-accredited schools to determine the presence of a statistically significant difference. This revealed that there is a significant difference (F(df,1) = 4.44, p <.05) between the mean scores for the department chairs' evaluation of the overall importance of math education in journalism curriculum for accredited ($\bar{x}$ = 3.97) and non-accredited ($\bar{x}$ = 3.61) programs (Table 4-15). ANOVAs were also performed to compare the means of other variables between accredited and non-accredited programs, including how chairs perceived student preparation for math skills needed on the job (F(df,1) = .029, p = .866), how important it is for journalists to possess basic math skills (F(df,1) = .336, p = .563), how common math errors are in journalism (F(df,1) = 3.63, p=.06), the math skills of the average student at the institution (F(df,1) = .320, p = .573) and the math skills of the average instructor at the institution (F(df,1) = 1.82, p = .18). These p-values indicate that there was no significant difference between accredited and non-accredited schools for these variables. Although accredited schools are differentiated from non-accredited schools by certain standards, this finding indicates that the views of department chairs regarding math education are similar in both types of program, other than the perception of the overall importance of math education.

Table 4-1. Required number of math courses, in credit hours, that journalists must complete as part of general education requirements

Credit hours	Percent
0	5.0
1–3	59.5
4–6	24.0
7–9	3.3
Unsure	5.8
Other	2.5

N=121

Table 4-2. Undergraduate journalism programs that incorporate math content, such as fractions, percentages, means, medians, modes, ratios, ranks and rates, into major courses within the program

Incorporate math courses	Percent
Yes	71.7
No	28.3

N= 120

Table 4-3. Undergraduate journalism programs that offer a course focusing specifically on math skills within the context of journalism

Math skills within context of journalism	Percent
Yes	12.4
No	87.6

N= 121

Table 4-4. Requirements for courses focusing specifically on math skills within the context of journalism

Option	Percent
Required	33.3
Elective	66.7
Total	100

N= 15

Table 4-5. Plans for a future course focusing specifically on math skills within the context of journalism

Plans for course	Percent
Yes	7.5
No	92.5

N= 107

Table 4-6. The basis of the journalism program

Basis	Percent
Theory	0
Practice	39.7
Both	59.5
Unsure	0.8

N= 121

Table 4-7. Perceived importance math education overall as part of the curriculum for undergraduate journalism students

Perceived overall importance	Percent
Very unimportant	4.1
Not important	2.5
Neutral	27.3
Important	52.9
Very important	13.2

N= 121 (M = 3.72, SD = .859)

Table 4-8. Perceived importance of journalists' possession of basic math skills

Importance of basic math skills	Percent
Very unimportant	.8
Not important	1.7
Neutral	6.7
Important	63.9
Very important	26.9

N= 121 (M = 4.14, SD = .674)

Table 4-9. Perceived frequency of mathematical errors are in published reporting

Frequency of math errors	Percent
Very rare	0
Rare	11.6
Neutral	33.9
Common	47.1
Very common	7.4

N= 121 (M = 3.74, SD = .797)

Table 4-10. Constraints to the addition of a mathematical focus in the journalism program

Constraints	Percent
Yes	64.2
No	35.8

N=120

Table 4-11. Constraints to the addition of a mathematical focus in the journalism program

Constraint options (respondent chose as many as applied)	Percent
Lack of room in the curriculum	68.4
Other priorities	32.9
Other (please specify)	21.5
Lack of qualified faculty	20.3
Lack of school financial support	20.3

N= 79

Table 4-12. Perception of the mathematical skills of the average journalism student at the respective institution

Avg. math skills of student	Percent
Poor	15.7
Fair	54.5
Neutral	9.1
Good	17.4
Excellent	0
Don't know	3.3

N= 121 (*M* = 2.41, *SD* = .104)

Table 4-13. Perception of the mathematical skills of the average journalism instructor at the respective institution

Avg. math skills of instructor	Percent
Poor	1.7
Fair	14
Neutral	12.4
Good	47.9
Excellent	18.2
Don't know	5.8

N= 121 (*M* = 3.84, *SD* = .101)

Table 4-14. Perceived preparation of average journalism student at the respective institution for the math skills required on the job

Preparation for workplace math skills	Percent
Very unprepared	1.7
Not prepared	16.5
Neutral	44.6
Prepared	35.5
Very prepared	0
Don't know	1.7

N= 121 (*M* = 3.21, *SD* = .076)

Table 4-15. Institutions accredited by the Accrediting Council on Education in Journalism and Mass Communications (ACEJMC)

Accredited	Percent
Yes	29.2
No	70.8

N= 120

Table 4-16. Analysis of Variance (ANOVA) for accredited and non-accredited schools of perceived importance of math education overall as part of the curriculum for undergraduate students

Importance of math education overall	N	Mean	Std. Deviation
Accredited	35	3.9714	.89066
Non-accredited	85	3.6118	.83230
Total	120	3.7167	.86173

N=120, F(df,1)= 4.44, p <.05

CHAPTER 5
DISCUSSION

Trends in Math Education in College and University Journalism Programs

Overall, this study indicated that math education in nationwide journalism programs is primarily covered with minimal general education credit hours and some segments of major journalism courses. Most respondents (59.5%), however, said that students were required only to complete 1–3 credit hours of mathematical courses to fulfill such requirements. Many said that it was the responsibility of general education requirements to provide journalism students with math skills. As one respondent commented,

> Students should be prepared before they get to our program (i.e., through high school and general education college courses) to deal with the math they encounter in our journalism courses and thus in journalism careers— that is where the problem should be solved, rather than in journalism courses.

Although researchers such as Ratcliff, Johnson, La Nasa and Gaff (2001) described the purpose of general education as providing students with the core education needed before entering a specialization, Maier's (2003) research on journalistic numerical competency suggested that such education is not preparing journalists for the workforce. This could be because, as this study found, the amount of math that journalists receive in general education courses is minimal, and not adequate to prepare journalists for the skills required on the job.

Other department chairs stressed that math skills should be developed at the high school level. One respondent felt "the problem is the high schools," suggesting that journalism programs could "bring high school journalism teachers to campus to work out a program to benefit journalism students at the secondary level." Another said "the poor math preparation students receive in their K-12 education leads to their poor math skills in college."

Seventy-one percent of respondents said that math content, such as fractions, percentages, means, medians, modes, ratios, ranks and rates, were incorporated in the major journalism

courses. In this category, commonly cited courses included News Writing/Reporting, Research Methods, Editing, Public Affairs Reporting and Electronic Journalism courses. However, because respondents were not required to specify (and it was assumed they may not be sure of) the time spent on math education in these courses, it is unclear just how much math content was incorporated into these courses. For example, while one respondent commented that approximately four weeks of their program's News Writing and Reporting course was "devoted to the use of numbers in journalism and reporting," another said their program's Editing course had a "minor math component," while another said the topic was covered "a little bit in Public Affairs Reporting." Some chairs found incorporating math into the journalism curriculum to be an adequate technique, such as one who stated that math content is "best integrated into reporting, writing and editing classes; a one size-fits-all math class would be torture."

Although program chairs suggested that math content is incorporated at least somewhat into journalism courses, few programs (12.4%) offered a course focusing specifically on math skills within the context of journalism—such as exemplified by the Indiana University School of Journalism's Statistical and Mathematical Methods for Journalism course (Appendix C). Further information makes these results more distressing, since of those that do, 33.3% do not require that the course is taken. Of those that do not, math education does not seem to be on the agenda, as 92.5% do not have plans for such a course underway.

The value of such a course can been seen through the Transfer of Learning Theory discussed earlier. Transfer of learning occurs in a situation where previously acquired knowledge affects the way new knowledge is gained and skills are performed (Cormier and Hagman, 1987). In this case, a transfer of math skills to journalism coursework would be a positive, far transfer, since it would link two remote subjects, in turn enhancing a journalism student's learning

experience (Perkins and Salomon, 1992). Perkins and Salomon (1992) suggest that transfer between distant contexts, such as math and journalism, occur by a mechanism called high road transfer, in which connections between the two contexts are deliberately searched for. Bridging, the authors suggest, is a form of instruction that encourages this high road transfer by promoting "the making of abstractions" and "searches for possible connections" (p. 7).

In this way, Indiana University School of Journalism's Statistical and Mathematical Methods for Journalism course (Appendix A) could serve as an instructional "bridge" between the learning of math and journalism skills. Voakes (2005) noted that part of the problem his students faced was a lack of "connection between that math," referring to isolated math courses, "and the kind of numeracy that we have to have in journalism" (Voakes, 2005, video clip). The Mathematical Methods for Journalism course worked to "bridge" that gap, which could, according to the Transfer of Learning Theory, facilitate learning transfer. Viewing such a course through this theoretical basis makes a stronger case for the implementation of such courses in the future.

Constraints

The reason for a lack of such planning/implementation of courses can be somewhat explained by the constraints cited by respondents. Lack of room in the curriculum was cited by 68.4% of respondents, a constraint that was described by some as a result of accreditation requirements. As described earlier, the Curriculum and Instruction standard of ACEJMC accreditation requires that 80 hours of the degree program are completed outside of the journalism and mass communications program (The Commission on Public Relations Education, 2006). Since Ratcliff et al. (2001) suggested that a typical program requires about 120 credit hours; journalism courses could only take up 40 hours of the curriculum, or roughly 15 courses. As one respondent from an accredited program commented, such programs "must have a

balanced focus on all ACEJMC competencies and do so within limits of required hours." This problem could also possibly relate to the 32.9 % of respondents who cited "other priorities" as a constraint on math education—if such priorities include maintaining or achieving accreditation. A respondent from a non-accredited school pursuing accreditation explained such priorities, stating "I don't know how you could possibly do an adequate job of preparing students for all of the things they need to know, and still stay under the hour requirements for ACEJMC."

Other constraints were listed by respondents under the open-ended "other" response. For example, a few respondents cited problems dealing with their institution's math department. One respondent described the potential clash between departments,

> I think there would be a huge battle in our University's academic council over a course dealing with math education for journalists. The math department owns "math" at this University and would fight any attempt from another department to use that term in a course name. At the same time, they would want to make sure anyone teaching that class had the 18 hours of graduated credits in math, as required by the Southern Association of Colleges and Schools. This is a battle we cannot win, so we have modules on math concepts buried in existing classes.

Another respondent described a similar hostile situation between departments,

> The Math department here is very narrow. They really don't see themselves as teachers; they are Mathematicians. They won't let anyone else do anything that looks like math that they are not teaching.

Others cited student resistance toward math education. Lack of student interest was originally considered as a constraint when planning this research, but was disregarded due to the assumption that student preferences would not have much influence on the curriculum. However, seven journalism chairs took student opinion into account, as they answered in the open-ended response category for constraints on math education. Comments including "student preparation and attitude," "lack of math-orientation," and "student avoidance" were listed in this category. Journalism students' common aversion to math was often cited, as one remarked, "Traditionally, the students who choose to major in journalism are uncomfortable with math and avoid classes

that incorporate math." However, others were not as willing to cater to such avoidance, such as one respondent who said of their program, "We should not be a haven for math-phobias."

Perception of the Department Chair Regarding Math Education

A department chair holds some influence over a program. Gmelch, Parkay and Forrest (1999) noted that chairs are seen as serving a vital administration role. Adduci, Woods and Webb (1990) described the many responsibilities entailed by this position, including budgeting, curriculum development and leadership. Since chairs often hold some authority over a curriculum, their opinion on the importance of math education in journalism programs was a necessary component in this study.

Findings suggest that department chairs are aware of the need for math education in the journalism curriculum, despite problems with its implementation. Math education in the journalism curriculum was most commonly described by chairs as "important" (52.9%). On the job, math skills were described as "important" by 63.9% of respondents for journalists to possess basic math skills. Furthermore, most respondents described mathematical errors in published reporting as "common."

Most chairs recognized that the math skills of the average journalism student were lacking—as 70.2% rated their students' math skills as "poor" or "fair." It was surprising, however, that despite this low rating, most chairs rated students responded "neutral" (44.6%) and "prepared" (35.5%) when asked how prepared their students were for the math skills required on the job. Such logic seems contradictory—can students with "fair" math skills be prepared for these skills required in the workplace? However, this could be attributed to chairs' want to shed a positive light on the competency of their program. It could also reflect a lack of awareness regarding program deficiencies. Another possibility could be that employers do not commonly expect journalists to possess math skills, and thus chairs suspect that students are ready to handle

the skills required for the job. In either case, this subject is worthy of the attention of future researchers.

ACEJMC Accredited vs. Non-accredited Institutions

As the ACEJMC accredited institutions in the survey sample are required to oblige by certain standards, differentiating them from the rest of the population, it was interesting to investigate whether accreditation correlated with different responses. A one-way analysis of variance (ANOVA) revealed that the mean scores for overall importance of math education in journalism curriculums were statistically significant *($p = .037$)* between accredited ($\bar{x} = 3.97$) and non-accredited ($\bar{x} = 3.61$) programs. The fact that chairs of accredited programs rated math as more important could be a reflection of the ACEJMC accreditation standards, which mandate that students should be able to "apply basic numerical and statistical concepts" (AEJMC, 2008, ¶ 2). Three other ACEJMC standards—to "understand concepts and apply theories in the use and presentation of images and information," to "conduct research and evaluate information by methods appropriate to the communications professions in which they work," and to apply tools and technologies appropriate for the communications professions in which they work" also involve math components (AEJMC, 2008, ¶ 2). Thus, programs accredited by the ACEJMC are forced to consider the implementation of math in the journalism program, and this may have increased their perception of the overall importance of math education—as implementation affects accreditation. However, as discussed previously, some chairs have found these same accreditation standards to be a limiting factor in their programs, as they require a balance of different standards within a limited amount of credit hours.

CHAPTER 6
CONCLUSION

Solmon (1981), among other researchers, suggested that college preparation is important for the skills demanded in the workplace. Although numerous researchers, including Hewitt (1996), Trombly (2004) and Livingston (2005), have demonstrated the dire need for math skills in the newsroom, others, such as Maier (2003) and Rosentiel (2005) have shown that journalists largely do not possess these skills. Therefore, this study provided a necessary and much-needed first step of the investigation of math skills being taught to journalism students at the collegiate level.

This research indicated that few programs offer a course on math specifically for the journalism major. Instead, most rely on general education requirements and segments of core journalism courses, such as editing and reporting, to provide their students with the math skills needed to be a journalist. However, this study shows that minimal math general education credit hours are required. The extent to which programs incorporate math education into major journalism courses is not known at this time.

Chairs of journalism programs, whom have some influence over the curriculum, largely recognize the prevalence of math errors in published reporting, the overall importance of math education in journalism programs and the need for journalists to possess basic math skills. However, they also state that their students have deficiencies in math skills. This research shows that constraints such as lack of room in the curriculum partially prevent this problem from being solved. This research also points to the limitations of AEJCMC accrediting standards as a possible reason for this constraint. Other constraints found in this study included conflicts with the institution’s math department as well as the influence of student resistance toward math.

When journalists report on issues involving math, including, as Livingston (2005) suggests, health care, medical and scientific research and budgets, it is important that they comprehend the numbers they work with. An increase in math education for journalism students could result in higher journalistic numeracy, which could in turn result in fewer math errors in journalism. This study suggests that the state of math education in journalism programs should be improved in order to achieve this goal.

A few suggestions can be made to improve math education in collegiate journalism programs. Foremost, the transfer of learning theory points to bridging, through the implementation of a math course specifically within the context of journalism, as a technique to facilitate the transfer of math education to journalism studies. Courses such as that implemented in Indiana University's School of Journalism could serve as an excellent model for future efforts.

However, this research suggests that in many cases, lack of room in the curriculum is a constraint to the addition of such a course. A possible solution to this problem could be exemplified in the case of Indiana University, where the math department controlled the course, leaving the budget of the journalism program untouched (Voakes, 2005). However, this also diluted the journalistic focus of the course, which is why the Indiana School of Journalism Convergence Forum (2005) recommended that future courses are taught under the journalism department.

Since this study suggests that a lack of room in the curriculum is a major constraint to the addition of a new course, a better, more-easily implemented solution could be to increase the impact of math in core journalism courses, such as reporting and editing. Although 71.7% of respondents indicated that they already implement some math education in major journalism courses, the 70.2% of respondents that rated their institution's average journalism student as

having “poor” or “fair” math skills suggest that more math should be added the curriculum. To aid in the addition of a math focus to these courses, instructors could benefit from the resources texts such as Livingston and Voakes’ (2005) *Working with numbers and statistics: A handbook for journalists*, as well as Wickhams’ (2002) *Math skills for journalists.* The Indiana University School of Journalism’s Convergence Forum, which offers free tools and tip sheets on the types of statistics and mathematical models needed in journalism and how to implement them into courses without repelling students, could also be of aid (Indiana University School of Journalism Convergence Forum, 2005). Such resources could help educators implement important math concepts into journalism education, including

- margin of error;
- sampling;
- probability;
- correlation;
- measures of central tendency (mean, median, mode);
- standard deviation;
- averages, percentiles, ranges;
- measurements and conversions;
- simple and compound interest;
- graphical and pictorial representation of data;
- basic knowledge of arithmetic.

It is a journalist’s responsibility to understand stories involving math and to put numbers into context in order to accurately report information. However, students with “poor” or “fair” math skills, as alluded to in this study, may not be able to correctly convey such information to the public. Through higher quality math education for journalism students, journalistic numeracy would increase. It is clear through this research that the quality of math education in journalism programs is a subject worthy of much further attention.

Limitations

Some of the major limitations of this study are inherent in any survey research. Since surveys rely on self-reporting, bias such as misinterpreting the question, purposeful dishonesty, and accidental reporting of misinformation can occur, causing errors in data.

Another limitation of this study could be the low response rate (35.4 %), although multiple studies have suggested that such a rate is common for online survey research. Still, a larger sample would ensure more accurate results. The survey pool in this study was limited due to many incorrect or no longer functional e-mail addresses on the contact lists used, which may have affected the response rate.

Considerations for Future Research

Future research could examine journalism departments' perception of skills required on the job to determine if there is a "gap" between instruction and practice.

Further research could also consider the effect of ACEJMC accreditation on the implementation of math education in journalism programs, which was alluded to in this study but not the main focus. It would be useful to investigate in-depth whether ACEJMC accreditation inspires more math education, due to numeracy requirements, or prevents its implementation due to credit restrictions. Interviews with the ACEJMC could be particularly effective in this research.

It could also be useful to expand on the various methods used to educate journalism students in math that were described in this study, including high school education, general education requirements, the incorporation of math into core journalism courses and math courses specifically for journalists. Since this study shows that journalism students, for the most part, are expected to complete minimal math general education requirements, future research could examine why this is. Further research could also expand on the connection between the Transfer

of Learning theory and courses designed specifically to teach math skills to journalists, as was alluded to in this study. Furthermore, the extent that math content is incorporated into major journalism courses, such as editing and reporting, could be examined.

Future research could also examine what type of math skills are most beneficial to journalists, such as the math skills required on the job. For this purpose, researchers could examine the math required on entry-level journalism job tests, such as the Dow Jones Newspaper Fund editing test. Other research could examine the type of math skills needed for journalists through a content analysis of prominent texts focusing on math for journalists, or an analysis of what types of math appear most frequently in the news. These suggestions could provide deeper insight into the state of math education in journalism programs than was within the scope of the current study.

APPENDIX A
MODEL SYLLABUS FOR A COURSE ON MATH FOR JOURNALISTS

The following syllabus, from the Indiana University School of Journalism Convergence Forum (2005), offers an example of a course designed to teach students math specifically within the context of journalism. The course was developed by a journalism instructor, Paul Voakes, and a math instructor, Charles Livingston, both of the Indiana University School of Journalism, and was first implemented in 1999. In 2005, the course was being taught by graduate students in Indiana University's math department.

MODEL SYLLABUS FOR A COURSE ON MATH FOR JOURNALISTS
(Indiana University School of Journalism Convergence Forum, 2005)

SYLLABUS

K305: Statistical and Mathematical Methods for Journalism

Indiana University

Overview

Welcome to Statistics and Mathematics for Journalism! This course has been developed with a grant from the National Science Foundation as part of a multi-year, campus-wide project to expand and enhance mathematics instruction across the university curriculum.

This course is dedicated to the proposition that a truly prepared, competent and professional communicator is one with basic skills in math and statistics. A large part of your professional responsibility will be to gather information independently and to present it accurately in a meaningful context. Without skills in math or stats, journalists constantly have to rely on the calculations and interpretations of their sources, and they constantly hope and pray that the numbers they use in their writing are appropriate and correct. That situation presents a picture of neither independence nor accuracy. However, journalists armed with some logic, some technique and some interpretive skills can analyze research, ask appropriate questions and understand the data well enough to tell readers and viewers clearly what the numbers mean.

How is this section different from other sections of K300? This course will deal with statistical and mathematical techniques that are most relevant to journalism, and the assignments and readings will be more directly related to the experiences of journalists. The topics in statistics will include probability, the normal distribution, estimation, hypothesis-testing, sampling methods, and survey and experiment design. We will also cover descriptive statistics, with a focus on the graphical presentation of data. Mathematical topics will include a review of the more basic arithmetic procedures commonly encountered in reporting. The course will include written assignments involving the interpretation and explanation of data, in addition to the computations more commonly assigned in statistics courses. We will also learn how to crunch, interpret and graphically display data by using Microsoft Excel. By the end of the semester, we want each of you to be able to do the following:

1) Understand the basic logic and concepts of statistics and the mathematical challenges journalists most often encounter;
2) Interpret the results of statistical analysis in ways that make sense to viewers and readers;
3) Perform basic statistical and mathematical procedures on a calculator and with Microsoft Excel; and,
4) Use the Web to find, download and manipulate relevant data sets.

The prerequisite for this course is M118 (Finite Mathematics) or its equivalent. While we won't spend much time reviewing the work of M118, we will operate on the assumption that everyone

is able to recall that course's basic concepts and techniques. If you haven't taken M118 and haven't talked to me already, please see me immediately.

Readings

There is one required textbook:

Brase, Charles Henry, and Corrinne Pellillo Brase. *Understanding Basic Statistics: Concepts and Methods*. 6th ed. Boston: Houghton Mifflin Co. 1999.

We will often refer you to the class Web site, for additional readings, assignments and a guide to useful data on the Web. In addition, we will occasionally assign readings from the following books and Web sites. The books will be placed on reserve in the Journalism Library:

http://more.abcnews.go.com/sections/science/whoscounting_index/whoscounting_index.html
("Who's Counting," on the ABC News site)

http://www.dartmouth.edu/~chance/chance_news/current_news/current.html
("Chance News," the newsy part of Dartmouth's "Chance" course on probability and general math)

Paulos, John Allen. *A Mathematician Reads the Newspaper.*

Almer, Ennis C. *Statistical Tricks and Traps.*

Course Activity

Class itself

Although you will not be graded for your attendance *per se*, it will become obvious quickly that attendance is a key to success in K300. As with many other courses, statistics doesn't make a lot of sense if you pop in only from time to time. However, if you keep up with readings, homework and attendance, you'll probably find the topics easy to understand and maybe even enjoyable. Class on Monday and Wednesday will consist of a combination of lecture, discussion and exercises. On Fridays we will meet in a computer lab to crunch numbers in Excel.

Weekly homework

Each week you will be responsible for an assignment that will likely include some or all of these components:

1. *Math/Stats problems:* This is the math assignment you've known since 2nd grade: completion of a few selected problems from the end of a chapter, or problems we've invented in a handout.
2. *Excel exercises:* Often at the conclusion of a Friday lab you will be given an Excel-based problem or two to reinforce the concepts covered earlier.
3. *Writing Stories*: Yes, even in math class we'll be writing! Just as every good reporter must be able to gather and interpret data accurately, every good writer must be able to explain clearly what the data mean. At times your assignment will not end with the calculation of a statistical result, or the reading of a table of results, but with your writing of a short news story (or section of an imagined larger story) that explains to readers or viewers the meaning of the numerical result.

Quizzes

Just to make sure that everyone is keeping up with the concepts and procedures, we will have several short (one or two questions) quizzes nearly every time the class meets. We will usually go over the solutions immediately as a way of reviewing material before moving on. We will drop your two lowest quiz grades, so please don't ask to make up a quiz if you miss a day.

Journals

You will be expected to read the news each day not only for its general content, but now also for its math content – and to evaluate the journalists' use of math. To help us assess your assessment of the math you're reading in the news, you will be expected to keep a journal. This is your collection (in notebook form) of articles you've read that involved math or statistics, and your brief commentaries on these articles. The journals will be collected *without prior notice,* so you must bring your journal to class every day and be prepared to have it graded. Details will follow in a handout on Wednesday.

Projects

You will be expected to develop (and write the first several paragraphs for) two feature stories based on your own discovery of some current and interesting data. The choice of stories will be entirely up to you, but I must approve your story idea before you can proceed with the project. You will find, manipulate and analyze the data, and present a graphic illustration as well as a written story. The first project will be due [insert date], the second [insert date].

Exams

There will be two exams during the semester and a final exam at the end. They will cover both the statistics topics we've covered in the text and the mathematics (non-text) and logic material presented in class. The final will be cumulative; that is, it will cover the material from day one.

<u>Grading</u>

Every exam and major assignment will be returned to you with two grades: a raw numerical score, and a letter-grade resulting from a curving of the class scores.

Your final course grade will be determined by these proportions:

Quizzes and homework		20%
Journal		10%
Two exams @15% each	30%	
First project	5%	
Second project	10%	
Final exam	25%	

<u>Deadlines and other policies</u>

Written assignments outside class are due at the beginning of class.

Deadlines are important in any field of endeavor, but especially important for journalists and other communicators. Assignments can be turned in late ONLY with the prior approval of one of us. An excuse is valid only if it is discussed with me BEFORE the assignment is due, and only if I agree that it's a valid excuse. Any work turned in late without an approved excuse will receive zero points.

Please keep in touch with us. Call or e-mail one of us if you have deadline concerns or any other questions or problems. Take advantage of the "or by appointment" phrase in our office hours.

Academic honesty

Honesty is vitally important in any journalism or math course. Please consult the "Policy on Academic Misconduct" at http://campuslife.indiana.edu/code/index1.html — especially the sections on cheating and plagiarism. It is extremely important to do your own work. Even in collaborative work, “sharing” of words and ideas is permissible only with your team partner(s). Submitting someone else's work as your own is blatant academic dishonesty.

The penalty for academic misconduct will range from the lowering of the grade for that assignment to the automatic designation of "F" for the course, depending on the severity of the misconduct.

Course outline

(“B&B” refers to Brase & Brase, the course textbook; the numerals refer to chapter and section numbers.)

Date	Topic	Readings/Assignments due
Jan. 10	Introductions; First Gathering of Data	
Jan. 12	Discuss Monday’s data; Descriptive, Inferential Statistics; Writing with Numbers	B&B 1.1; Handout
Jan. 14	Excel Lab: Intro to Excel	
Jan. 17	(No class: Martin Luther King Day)	
Jan. 19	Charts and Graphs	B&B 2.2
Jan. 21	Excel Lab: Graphing	
Jan. 24	Percentages and Percentage Change	(Handout)
Jan. 26	Histograms, Frequency Distributions	B&B 2.3
Jan. 28	Excel Lab: Frequencies, Histograms	
Jan. 31	Measures of Central Tendency: Mode, Median, Mean; Adjusting for Inflation	B&B 3.1; Handout
Feb. 2	Quartiles, Percentiles, Boxes and Whiskers	B&B 3.4
Feb. 4	**FIRST EXAM**	
Feb. 7	Measures of Variation:	B&B 3.2
Feb. 9	The Standard Deviation; Reporting with Rates	Handout;

		Project 1 proposal due
Feb. 11	Excel Lab: Averages, Percentiles, Ranges	
Feb. 14	Probability Theory	B&B 4.1
Feb. 16	Random Variables and Probability Distributions	B&B 5.1
Feb. 18	Excel Lab: Dressing up the Data	
Feb. 21	Binomial Probabilities; Reporting on Interest and Compounding.	B&B 5.2; Handout
Feb. 23	The Normal Distribution, in pictures	B&B 6.1
Feb. 25	Excel Lab: Binomial Distribution	
Feb. 28	Z-scores and raw scores	B&B 6.2; **Project 1 due**
March 1	Areas under the normal curve; Writing with Numbers II	B&B 6.3, Handout
March 3	Excel Lab: Exploring the Normal Distribution	
March 6	Sampling Distributions	B&B 7.1
March 8	Central Limit Theorem	B&B 7.2
March 10	*Excel Lab: Random Selection, Central Limit Theorem*	
March 13-19	*SPRING BREAK!*	
March 20	Estimating the mean; confidence intervals	B&B 8.1
March 22	Estimating proportions with confidence intervals	B&B 8.3
March 24	**SECOND EXAM**	
March 27	Estimating differences in means, proportions	B&B 8.5
March 29	Choosing a sample size; Reading and Reporting on Budgets	B&B 8.4; Handout; **Project 2 proposal due**
March 31	Excel Lab: Confidence Intervals	
April 3	Hypothesis-testing; p-values	B&B 9.1, 9.3
April 5	Linear Regression	B&B 10.1, 10.2
April 7	Excel Lab: Finding a trend line	
April 10	The Correlation Coefficient	B&B 10.3 (pp. 596-605)
April 12	Analyzing r and r^2 (AE)	B&B 10.3 (pp, 605-608)
April 14	Excel Lab: Regression and correlations	
April 17	Analyzing Contingency Tables	B&B 11.1; **Project 2 due**
April 19	Survey Design and Confounding Factors	(Handout)
April 21	Excel Lab: Building a contingency table	
April 24	Designing Experiments	(Handout)
April 26	Statistical Fallacies	(Handout)
April 28	No lab: Final Exam review	
May 1-5	**Finals Week**	

APPENDIX B
SCHOOLS DERIVED FROM COMBINATION OF AEJMC AND DOW JONES DIRECTORIES

1. Auburn University
2. University of Alabama
3. University of Alaska Anchorage
4. University of Alaska Fairbanks
5. Arizona State University
6. University of Arizona
7. Arkansas State University
8. University of Arkansas
9. California State University, Chico
10. California State University, Fullerton
11. California State University, Northridge
12. San Francisco State University
13. San Jose State University
14. University of California, Berkley
15. University of Southern California
16. Colorado State University
17. University of Colorado
18. University of Connecticut
19. American University
20. Howard University
21. Florida A&M University
22. Florida International University
23. University of Miami
24. University of South Florida
25. University of South Florida-St. Petersburg
26. Savannah State University
27. University of Georgia
28. Eastern Illinois University
29. Northwestern University
30. Southern Illinois University Carbondale
31. Southern Illinois University Edwardsville
32. University of Illinois at Urbana-Champaign
33. Ball State University
34. Indiana University
35. University of Southern Indiana
36. Drake University
37. Iowa State University of Science and Technology
38. University of Iowa

39. Kansas State University
40. University of Kansas
41. Murray State University
42. Western Kentucky University
43. University of Kentucky
44. Grambling State University
45. Louisiana State University
46. Nicholls State University
47. Northwestern State University
48. Southern University
49. University of Louisiana at Lafayette
50. University of Maryland
51. Central Michigan University
52. Michigan State University
53. St. Cloud State University
54. University of Minnesota
55. Jackson State University
56. University of Mississippi
57. University of Southern Mississippi
58. Southeast Missouri State University
59. University of Missouri-Columbia
60. University of Montana
61. University of Nevada, Reno
62. New Mexico State University
63. Hofstra University
64. Iona College
65. New York University
66. Syracuse University
67. Elon University
68. North Carolina A&T State University
69. University of North Carolina at Chapel Hill
70. Bowling Green State University
71. Kent State University
72. Ohio University
73. Oklahoma State University
74. University of Oklahoma
75. University of Oregon
76. Pennsylvania State University
77. Temple University
78. University of South Carolina
79. Winthrop University
80. South Dakota State University
81. University of South Dakota

82. East Tennessee State University
83. Middle Tennessee State University
84. University of Memphis
85. University of Tennessee
86. University of Tennessee at Chattanooga
87. University of Tennessee at Martin
88. Abilene Christian University
89. Baylor University
90. Texas Christian University
91. Texas State University
92. Texas Tech University
93. University of North Texas
94. University of Texas
95. Brigham Young University
96. University of Utah
97. Hampton University
98. Norfolk State University
99. Virginia Commonwealth University
100. Washington and Lee University
101. University of Washington
102. Marshall University
103. West Virginia University
104. Marquette University
105. University of Wisconsin-Eau Claire
106. University of Wisconsin-Oshkosh
107. University of Wisconsin- River Falls
108. Alabama State University
109. Samford University
110. Spring Hill College
111. Troy University
112. University of Alabama at Birmingham
113. University of North Alabama
114. University of South Alabama
115. Northern Arizona University
116. Arkansas Tech University
117. Harding University
118. Henderson State University
119. John Brown University
120. Ouachita Baptist University
121. University of Arkansas Little Rock
122. University of Central Arkansas
123. Azusa Pacific University
124. California Polytechnic State University

125. California Polytechnic State University, Ponoma
126. California State University, Bakersfield
127. California State University, Fresno
128. California State University, East Bay
129. California State University, Long Beach
130. California State University, Sacramento
131. Humboldt State University
132. Pacific Union College
133. Pepperdine University Seaver College
134. Point Loma Nazarene University
135. San Diego State University
136. Santa Clara University
137. Stanford University
138. University of La Verne
139. University of San Francisco
140. University of the Pacific
141. Adams State College
142. Metropolitan State College of Denver
143. University of Denver
144. University of Northern Colorado
145. Colorado State University, Pueblo
146. Southern Connecticut State University
147. University of Bridgeport
148. University of Hartford
149. University of New Haven
150. Western Connecticut State University
151. Delaware State University
152. University of Delaware
153. George Washington University
154. Florida Southern College
155. Jacksonville University
156. University of Central Florida
157. University of North Florida
158. University of West Florida
159. Berry College
160. Brenau University
161. Clark Atlanta University
162. Fort Valley State University
163. Georgia College and State University
164. Georgia Southern University
165. Georgia State University
166. Morehouse College

167. University of West Georgia
168. University of Hawaii
169. Boise State University
170. Idaho State University
171. University of Idaho
172. Bradley University
173. Columbia College of Chicago
174. Illinois State University
175. Lewis University
176. Loyola University of Chicago
177. Northern Illinois University
178. Roosevelt University
179. University of St. Francis
180. Western Illinois University
181. Indiana Anderson University
182. Butler University
183. DePauw University
184. Franklin college
185. Indiana State University
186. Indiana University Ernie Pyle Hall
187. Purdue University
188. Saint Mary of the Woods College
189. University of Evansville
190. University of Indianapolis
191. Valparaiso University
192. Grand View College
193. Loras College
194. Morningside College
195. Baker University
196. Benedictine College
197. Fort Hays State University
198. Fort Hays State University Director
199. Pittsburg State University
200. Washburn University
201. Wichita State University
202. Eastern Kentucky University
203. Morehead State University
204. Northern Kentucky University
205. Louisiana College
206. Louisiana State University-Baton Rouge
207. Louisiana Tech University
208. Loyola University New Orleans
209. McNeese State University

210. Southeastern Louisiana University
211. University of Louisiana At Monroe
212. Xavier University of Louisiana
213. University of Maine
214. Columbia Union College
215. Hood College
216. Loyola College
217. Towson University
218. American International College
219. Boston University
220. Emerson College
221. Massachusetts College of Liberal Arts
222. Northeastern University
223. Simmons College
224. Suffolk University
225. University of Massachusetts
226. Andrews University
227. Eastern Michigan University
228. Grand Valley State University
229. Madonna University
230. Oakland University
231. University of Detriot-Mercy
232. Wayne State University
233. Western Michigan University
234. Bemidji State University
235. Minnesota State University, Mankato
236. Minnesota State University, Moorhead
237. Northwestern College
238. University of St. Thomas
239. Winona State University
240. Alcorn State University
241. Mississippi State University
242. Rust College
243. College of the Ozarks
244. Culver-Stockton College
245. Evangel University
246. Lincoln University
247. Lindenwood University
248. Missouri Southern State University
249. Missouri State University
250. Park University
251. Saint Louis University
252. Stephens College.

253. University of Central Missouri
254. Webster University
255. Creighton University
256. Hastings College
257. Midland Lutheran College
258. Union College
259. University of Nebraska at Kearney
260. University of Nebraska at Omaha
261. Wayne State College
262. University of Nevada, Las Vegas
263. Keene State College
264. College of New Jersey
265. Rider University
266. Rowan University
267. Rutgers, the State University of New Jersey
268. Rutgers, the State University of New Jersey, Newark
269. Seton Hall University
270. William Paterson University of New Jersey
271. Eastern New Mexico University
272. University of New Mexico
273. Baruch College
274. Fordham University
275. Ithaca College
276. Long Island University, Brooklyn Campus
277. Long Island University C.W. Post Center
278. Mercy College
279. Pace University
280. St. Bonaventure University
281. St. John Fisher College
282. St. John's University
283. State University College of Buffalo
284. State University of New York at New Paltz
285. State University of New York College at Westbury
286. State University of New York at Plattsburgh
287. Utica College of Syracuse University
288. Campbell University
289. East Carolina University
290. Johnson C. Smith University
291. University of North Carolina at Asheville
292. University of North Carolina at Pembroke
293. Western Carolina University
294. Wingate University
295. Winston-Salem State University

296. North Dakota State University
297. Ashland University
298. Franciscan University of Steubenville
299. Marietta College
300. Miami University
301. Ohio State University
302. Ohio University
303. Ohio Wesleyan University
304. University of Akron
305. University of Dayton
306. University of Toledo
307. Youngstown State University
308. Cameron University
309. East Central University
310. Northeastern State University
311. Oklahoma Baptist University
312. Oklahoma City University
313. Southern Nazarene University
314. University of Central Oklahoma
315. University of Tulsa
316. Southern Oregon University
317. University of Portland
318. Bloomsburg University of Pennsylvania
319. Cabrini College
320. Duquesne University
321. Indiana University of Pennsylvania
322. Lehigh University
323. Lock Haven University
324. Mercyhurst College
325. Point Park College
326. University of Scranton
327. University of Rhode Island
328. Benedict College
329. Austin Peay State University
330. Belmont University
331. Southern Adventist University
332. Tennessee State University
333. Tennessee Tech University
334. Angelo State University
335. Hardin-Simmons University
336. Midwestern State University
337. Prairie View A&M University
338. Sam Houston State University

339. Southern Methodist University
340. Stephen F. Austin State University
341. Texas A&M University-Commerce
342. Texas A&M University-Kingsville
343. Texas Southern University
344. Texas Wesleyan University
345. Texas Woman's University
346. Trinity University
347. University of Houston
348. University of Texas at Arlington
349. University of Texas at El Paso
350. University of Texas of the Permain Basin
351. University of Texas at Tyler
352. West Texas A&M University
353. Southern Utah University
354. Utah State University
355. Weber State University
356. Castleton State College
357. St. Michael's College
358. Emory & Henry College
359. James Madison University
360. Liberty University
361. Radford University
362. Regent University
363. University of Richmond
364. Virginia Polytechnic Institute and State University
365. Virginia Wesleyan College
366. Central Washington University
367. Eastern Washington University
368. Gonzaga University
369. Pacific Lutheran University
370. Seattle University
371. Walla Walla College
372. Washington State University
373. Western Washington University
374. Bethany College
375. University of Wisconsin-Madison
376. University of Wisconsin-Milwaukee
377. University of Wisconsin-Stevens Point
378. University of Wisconsin-Superior
379. University of Wisconsin-Whitewater
380. University of Wyoming

APPENDIX C
COVER LETTER

University of Florida
College of Journalism & Mass Communications
E-mail Letter

To the Chair or highest administrator in the affiliated journalism & communications program:

You have been randomly selected to participate in a research project designed to assess the state of mathematical competency education in United States journalism programs. I hope you will take the time to complete this questionnaire. As an educator, your input would be of great value in this research. I am a graduate student at the University of Florida's College of Journalism & Communications, and this survey is being conducted as part of my thesis.

Accompanying this e-mail is a link to a short questionnaire that asks a variety of questions about journalist's math education. If you are willing, please follow this link to complete the questionnaire. The questionnaire should take no more than 15 minutes to complete.

Through your participation I hope to understand more about a journalist's math education at the collegiate level.

You do not need to put your name or the name of your institution on the questionnaire. Your participation is completely voluntary.

If you have any questions or concerns about completing the questionnaire or about participation in this study, you may contact me at any time. Your response would be greatly appreciated.

If you choose to follow this link to the questionnaire, the first item you will view is an informed consent document that will provide all the information reasonably needed to decide whether or not to participate.

Sincerely,

Christine Cusatis
Graduate Student

College of Journalism & Mass Communications
University of Florida
1225 SW 1st Avenue, Apt 301
Gainesville, FL 32608
cc202@ufl.edu

APPENDIX D
SURVEY INSTRUMENT

Thank you for your participation in the "Assessing the State of Math Education in Journalism Programs" survey. This survey is being conducted in order to help understand the status of math education in United States journalism programs at the undergraduate collegiate level. Please *click* the radio button corresponding with your answer choice. Your time and candor are greatly appreciated.

Questionnaire

Please answer the following questions honestly and accurately. Please *click* the letter or number corresponding to your answer choice (see example below). Thank you for your participation.

1. How many credit hours worth of mathematical courses are students in the undergraduate journalism program in your college required to complete as part of their general education requirements?

Circle one:

a. 0
b. 1–3
c. 4–6
d. 7–9
e. other (please list) ____
f. unsure

2. Does your undergraduate journalism program incorporate math content, such as practice fractions, percentages means, medians, modes, ratios, ranks and rates, into major courses within the program, such as reporting or editing courses, for example?

1	2
Yes	No

↓

If Yes, please list the names of the course(s) that incorporate math.

_____

3. Does your undergraduate journalism program offer a course focusing specifically on math skills within the context of journalism?

Circle the number corresponding with your answer:

1	2
Yes	No

↓

If Yes, is this course required for:

Circle the number corresponding with your answer:

1	2
All majors	It is an elective

If No, are any plans underway for such a course?

Circle the number corresponding with your answer:

1	2
Yes	No

4. If you could generalize your institution's journalism program, would it be considered (circle one):

a. theoretically based
b. practice based
c. both
d. unsure

5. How important do you feel that math education is *overall* as part of the curriculum for undergraduate journalism students?

Circle the number corresponding with your answer:

1	2	3	4	5
Very Unimportant	Unimportant	Neutral	Important	Very Important

6 How important do you feel it is for students in the undergraduate journalism program to take a course on math specific to journalism?

Circle the number corresponding with your answer:

1	2	3	4	5
Very Unimportant	Unimportant	Neutral	Important	Very Important

7. Are there any constraints to the addition of a mathematical focus in your journalism program?

Circle the number corresponding with your answer:

1	2
Yes	No

↓

If Yes, please check all of the following constraints that apply:

__ lack of school financial support
__ other priorities
__ lack of faculty support
__ lack of qualified faculty
__ lack of room in the curriculum
__ other (please list) _____

R4 Questions: graduate preparation

8. How would you rate (in your opinion) the mathematical skills of the average journalism student at your institution?

Circle the number corresponding with your answer:

1	2	3	4	5
Poor	Fair	Neutral	Good	Excellent

6
Don’t Know

9. How would you rate (in your opinion) the mathematical skills of the average journalism instructor at your institution?

Circle the number corresponding with your answer:

1	2	3	4	5
Poor	Fair	Neutral	Good	Excellent

6
Don't Know

10. How prepared do you feel the average journalism student at your institution is for the math skills required on the job?

Circle the number corresponding with your answer:

1	2	3	4	5
Very Unprepared	Unprepared	Neutral	Prepared	Very Prepared

6
Don't Know

11. How important do you feel it is for journalists to possess basic math skills?

Circle the number corresponding with your answer:

1	2	3	4	5
Very Unimportant	Unimportant	Neutral	Important	Very Important

12. How common do you feel that mathematical errors are in published reporting?

Circle the number corresponding with your answer

1	2	3	4	5
Very Rare	Rare	Neutral	Common	Very Common

13. Is your institution accredited by the Accrediting Council on Education in Journalism and Mass Communications (ACEJMC)?

Circle the number corresponding with your answer:

1	2
Yes	No

14. Do you have any comments regarding math education in journalism programs?

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BIOGRAPHICAL SKETCH

Christine Cusatis was born July 9, 1984 in Hazleton, Pennsylvania and is the oldest of three children. Although she lived in Virginia and North Carolina, she grew up mostly in Jacksonville, Florida, graduating from Bartram Trail High School in 2002 with a Florida Bright Futures Scholarship. She briefly attended the University of North Florida before transferring to the University of Florida to pursue a degree in wildlife ecology. However, her interest in writing lab reports and passion for reading and writing led her to soon transfer to the University of Florida's College of Journalism and Communications.

While pursing her undergraduate education, Christine worked as a freelance writer, reporting lab tutor, and held an internship at the Independent Florida Alligator. She also held part-time jobs to support her education.

In 2006, Christine graduated from the University of Florida with a B.A. in journalism and began to pursue a master of arts in mass communication with a specialization in journalism from the University of Florida.

Upon completion of her M.A.M.C. degree, Christine will pursue a career in editing where she may utilize the vast array of skills and knowledge she has gained through her education.

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