

Rochester Institute of Technology

RIT Digital Institutional Repository

Theses

12-12-2016

Framing of Skill Problems

Kirk M. Winans
kmw2513@rit.edu

Follow this and additional works at: <https://repository.rit.edu/theses>

Recommended Citation

Winans, Kirk M., "Framing of Skill Problems" (2016). Thesis. Rochester Institute of Technology. Accessed from

This Thesis is brought to you for free and open access by the RIT Libraries. For more information, please contact repository@rit.edu.

Rochester Institute of Technology

School of Communication

College of Liberal Arts

Framing of Skill Problems

by

Kirk M. Winans

A Thesis presented

in partial fulfillment of the Master of Science degree

in Communication & Media Technologies

Degree Awarded:

December 12, 2016

The members of the Committee approved the thesis of
Kirk M. Winans presented on August 11, 2016.

Andrea Hickerson, Ph.D.
Director and Associate Professor of Communication
School of Communication

Kelly Norris Martin, Ph.D.
Assistant Professor of Communication
School of Communication
Thesis Advisor

Benjamin M. Zwickl, Ph.D.
Assistant Professor of Physics
School of Physics and Astronomy
Thesis Advisor

Grant Cos, Ph.D.
Associate Professor of Communication
Director of Graduate Programs
School of Communication

Acknowledgements

This work could not have been completed without the contributions and support by others. First, I would like to thank my advisors Dr. Kelly Norris Martin and Dr. Benjamin M. Zwickl for their insightful comments and discussions we had regarding the subject matter as well as other things. Also, a major thank you is in order for bringing me in on the POWER project and allowing me to contribute to the project in my own way. Without this, I would not have been able to complete the degree program in such an expedited manner and, presumably, I would not be where I am today.

I also thank P. Deyo for serving as the second coder for inter-rater reliability that allowed me to reflect on the code definitions and helped to make this work higher quality.

Finally, I thank my wife for her dedication and encouragement to finish my studies at RIT including this work. Also for putting up with the many late nights of study, research, and writing and the late nights of much needed relaxation needed to maintain sanity.

This work was partially supported by NSF DGE-1432578.

Table of Contents

Abstract..... 6

Framing of Skill Problems 8

Literature Review..... 10

 Framing Theory 10

 Skills Gap Reports 15

 Academic Research on Skill Problems 20

 Research Questions and Hypotheses 25

Method..... 26

 Identification of Sources of Data 26

 Procedures for Collecting Data 28

 Treatment of Data for Purposes of Analysis 31

Results..... 32

 Identified Frames..... 33

 Authorship and Publication Venue 36

Discussion 37

 Workforce Report Influences on Salient Frames 38

 Academic Critics..... 41

Sources of Frames..... 42

Limitations..... 43

Conclusion 43

References 46

Tables 52

Figures 61

FRAMING OF SKILL PROBLEMS

Kirk M. Winans

School of Communication

College of Liberal Arts

Master of Science in Communication & Media Technologies

Term Degree Awarded: Fall Semester 2016 (2161)

Abstract

More frequently since the Great Recession, various concerns about a “skills gap” have been raised by industry leaders and organizations, politicians, and some economists. The most basic definition of a “skills gap” is that the workforce does not possess the skills required by employers. The most prominent concerns have been with STEM education and “middle skills” occupations, those that require more than a high school diploma but less than a 4-year degree. However, the various causes and solutions to these issues are widespread. Much of the alarm has been stimulated by reports published by industry and trade organizations asserting specific skills gaps present in the workforce. However, workforce experts refute these claims and are concerned that the public discussion is being driven by such alarmist reports. Many studies on framing code for the presence of full frames; this study instead identifies the presence of individual frame elements and implements a hierarchical cluster analysis to identify the most salient frames regarding skill problems in U.S. newspapers. Results indicate that

the frames present in the public discussion largely align with the alarmist frames, concerning inadequate STEM education and preparation for “middle skills” jobs, present in the workforce reports published by industry and trade groups. Given that the majority of articles were written by journalists, these findings confirm the hypothesis of framing theory that journalists tend to use frames suggested by political actors, interest groups, and elites.

Keywords: skill problems, skills gap, workforce, framing

Framing of Skill Problems

In the past few years, especially since the Great Recession, many organizations, such as Deloitte with the Manufacturing Institute and ManpowerGroup, have published reports on the skills gap. These reports assert that employers are having difficulty finding qualified people to hire for open jobs and that the future is bleak if we do not solve this problem (Giffi et al., 2015; ManpowerGroup, 2015; Morrison et al., 2011). Many of these, if not all, rely almost entirely on surveys of business leaders. The reports have been picked up by journalists, politicians, and other business executives as sources used to either discuss the issue or, as in the case of politicians and business executives, to argue for reforms in education. The recent concerns about a STEM skills gap have their roots in the report *Rising Above the Gathering Storm* published by the National Academies in 2005. However, concerns with STEM education go even further back to the post World War II report *Science, the Endless Frontier* by Vannevar Bush (1945) and the Soviet Union's launching of Sputnik (Teitelbaum, 2014). In fact, Teitelbaum (2014) suggests similar concerns have been raised at least five times since the 1940s.

However, some economists, such as Peter Cappelli and Paul Krugman, refuted these claims on the basis of economics and on the methodology of the surveys (Krugman, 2014; Nicklaus, 2014). Krugman (2014) stated that the ManpowerGroup survey used loaded questions and, he further argues that the skills gap is a “zombie

idea" (Krugman, 2014, para.10). For example, one of the questions is, "How much difficulty are you having filling jobs due to lack of available talent?" (ManpowerGroup, 2015, p. 3). Krugman (2014) cites another question "Which of the following do you feel best describes the 'gap' in the U.S. workforce skills gap?" and finds it "amazing that 8[%] of the respondents were willing to declare that there was no gap" (para. 10). According to Nicklaus (2014), "[i]f there is a skills gap in the data, Cappelli says, it's the opposite of the one the employers talk about. The average worker actually has more education than his or her job requires" (para. 13). Cappelli describes the survey questions as vague and argues that the reports should be disregarded and that the skills gap is essentially a myth.

Cappelli (2015) introduces the term *skill problems* to refer collectively to the different complaints about the supply of skills: *skills gap*, *skills shortage*, and *skills mismatch*. He explains that the skills gap idea is the broadest complaint "that some systematic shortfall exists in skills, broadly defined, across entire age cohorts of the population" (Cappelli, 2015, p. 254). Usually, this is an argument that the educational system (including K-12) has failed to provide students with basic skills. For Cappelli (2015), the term *skills shortage* refers more specifically on job-related skills, usually in the case of specific Science, Technology, Engineering, and Math (STEM) related occupations. The term *skills mismatch* is different from skills gap and skills shortage, in that it could mean either oversupply or undersupply of certain skills (Cappelli, 2015).

However, this paper will be more focused on higher education related complaints.

Whether or not there is actually a nationwide work force issue is beyond the purview of this study; however, the mass media's portrayal of this evidence is of utmost concern to communication scholars. This topic is important for two primary reasons: First, and topic of this study, there are many competing claims of what the problem actually is, or if there really is a skills gap at all, along with various solutions. Secondly, many of the solutions call for restructuring higher education, which could have profound unintended consequences. Therefore, understanding what and who is driving this policy discussion as it unfolds is absolutely necessary. On a deeper level, it requires us as a society to ask ourselves what interest(s) our educational system is meant to serve. Given the importance of this topic, the way it is framed in the media may significantly influence how the public and decision makers understand the issue and what actions are taken (Scheufele & Tewksbury, 2007).

Literature Review

Framing Theory

Erving Goffman (1974/1986) defines a frame as a "schemata of interpretation" that people use to interpret new events and information (p. 21). Frames help us categorize in order to relate new events and information to what we already know. Goffman (1974/1986) makes the distinction between natural frames, which are deterministic, and social frames that involve (usually) human agency. In addition to

these, there are also primary frameworks that determine our initial reaction as to what we think about an event. The frameworks used by members of a social group are integral to that group's culture.

Entman (1993) identifies framing as a scattered conceptualization. Essentially, the concept is used for research in many disciplines, but there is not a unified understanding. He describes the functions of framing and where framing is present in the communication process. According to Entman (1993), “[t]o frame is to *select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation* for the item described” (Entman, 1993, p. 52). In terms of operationalizing framing theory specifically in the realm of media effects, Scheufele (1999) develops a typology in order to create a system with which to compare the fragmented approaches. This typology is based upon two dimensions, if the research examined either media or audience frames and if the frame was treated as an independent or dependent variable. With political communication as the focus, Scheufele (1999) argues that framing is best understood in the context of social constructivism as this is (or was) the current paradigm of understanding media effects.

Frameworks are what we use to interpret new information and events based upon previous knowledge and ideas. Social events can be understood with both natural and social frameworks (Goffman, 1974/1986). However, we not only use frames to

understand things, but they are also used to present information. Entman (1993) describes the action of framing in a clear way that can help to identify frames in texts.

He presents four possible functions performed by frames, frames can:

1. *Define problems*—determine what a causal agent is doing with what costs and benefits, usually measured in terms of common cultural values;
2. *Diagnose causes*—identify the forces creating the problem;
3. *Make moral judgments*—evaluate causal agents and their effects;
4. *Suggest remedies*—offer and justify treatments for the problems and predict their likely effects.

[numbering added for clarity] (Entman, 1993, p. 52)

For Entman (1993) frames are used by communicators to generate the message in ways that reinforce certain facts or judgments. However, the receiver may not use the intended frame to understand the messages and thus come to different conclusions.

Frames are a powerful force in society, especially when it comes to politics and the news. Entman (1993) explains that frames within the news are an “imprint of power” because frames present reality in a way that could influence the reaction of the audience (p. 55). This is not to say that framing does not allow for audience autonomy; on the other hand, framing research aims to describe the “dominant meaning” that “consists of the problem, causal, evaluative, and treatment interpretations with the highest probability of being noticed, processed, and accepted by the most people”

(Entman, 1993, p. 56). Entman (1993) argues that since the general public is usually not well-informed about politically important issues, the dominant frame has a strong influence on its reaction.

Framing is also important to journalistic objectivity and content analysis. Without an understanding of framing, objective reporting may not have the desired effect because simply presenting facts from opposing sides of an issue, does not necessarily amount to challenging a dominant frame (Entman, 1993). An unchallenged dominant frame prevents the news from making other interpretations equally salient. In fact there have been calls to train journalists in framing theory in order to avoid these issues (Davis & Kent, 2013; Entman, 1993). In a similar way, content analysis can misrepresent the effect of media messages by only using raw counts of negative or positive terms. In order to determine the dominant meaning audience members receive from media messages, content analysis should take into account the “salience of elements in the text, and ... the relationships of the most salient clusters of messages—the frames—to the audience’s schemata” (Entman, 1993, p. 57).

Scheufele (1999) classifies the four typical operationalizations of framing theory in order to develop a typology of framing research. The typology is based upon whether framing is operationalized to examine media or individual frames and if the frames are treated as independent or dependent variables. The appropriate research questions to compare research within and between each operationalization are shown

in Table 1. Furthermore, Scheufele (1999) identifies four processes¹ that link the operationalizations into a cycle of influences. The first of these is *frame building*, which is the processes through which media content gets framed and what factors influence the final media frame. It is this first process that this study will examine to determine the most salient frames and what/who are the sources of those frames.

Scheufele (1999) explains that framing, as it pertains to political communication, falls within the social constructivism research paradigm of communication. In this, news media provide versions of reality, including interpretations, to the public. The journalists' framing of a news story could be influenced by at least five factors: "social norms and values, organizational pressures and constraints, pressures of interest groups, journalistic routines, and ideological or political orientations of journalists" (Scheufele, 1999, p.109).

Based upon previous research, the influence of these factors leads to the process of frame building happening in at least three different ways. In order to interpret new information, journalists often use their own ideological or political orientations and to some extent, social norms and values. Frames can also be selected due to the organizational pressures and constraints, as well as their journalistic routines

¹ *Frame setting* is the process of audience frames being influenced by media frames. Scheufele (1999) notes that a direct link between media frames and people's behaviors has not been found. Instead, he argues that their individual frames impact these behaviors in the process of *individual-level effects of framing*. The final process is *journalists as audiences* where the individual attitudes and behaviors impact the organizational pressures, ideologies, and elites that influence *frame building*.

(Scheufele, 1999). A third way that frames are selected is by the influence of political actors, interest groups, and elites. The frames suggested by such groups "are adopted by journalists and incorporated in their coverage of an issue or event," although Scheufele (1999) notes that this is likely to have stronger influence when there is a new issue, as opposed to when an issue has received attention (p. 116).

Skills Gap Reports

Based upon preliminary searches, three popular concerns are raised within the skills gap discourse: (a) a general lack of qualified people for businesses to hire (ManpowerGroup, 2015), (b) an insufficient amount of STEM graduates to meet future needs (Committee on Prospering in the Global Economy of the 21st Century (U.S.) & Committee on Science, Engineering, and Public Policy (U.S.), 2007), and (c) a lack of people trained for "middle-skills" jobs such as manufacturing (Giffi et al., 2015). It is important to note, that many middle-skills jobs (i.e., those that require less than a four year degree but more than a high school diploma) are related to STEM in that they require skills/knowledge from STEM fields (Oleson, Hora, & Benbow, 2014). However, these are interrelated ideas and typically amount to concerns over workforce preparation by higher education. The following three relatively popular reports get cited when making these claims.

In 2015, ManpowerGroup completed their *10th Annual Talent Shortage Survey*. According to its website, "employers have consistently reported difficulty hiring right-

skilled talent, and this trend shows no sign of abating” (“Talent shortage survey,” 2015). They conducted a global survey of hiring managers about talent shortages that they experienced. Globally, 54% of employers responded that this issue was impacting their business in a negative manner and “38% of employers are having difficulty filling jobs” (ManpowerGroup, 2015, p. 4). The hardest jobs to fill include mostly middle-skills jobs such as skilled trade workers, technicians, production/machine operations, as well as STEM occupations such as engineers and IT staff. Specifically, in the United States, the survey found that 32% of employers had difficulty filling jobs. According to the report, the top five reasons for this difficulty (at least globally) are: (1) lack of available applications/no applications, (2) lack of technical competencies (hard skills), (3) lack of experience, (4) lack of workplace competencies (soft skills), and (5) looking for more pay than is offered (ManpowerGroup, 2015, p. 5). According to Cappelli (2015), this series of reports is “[p]erhaps the most influential and widely quoted of the consultant reports” (p. 260).

The “Skills Gap Report” series is typically cited in media reports on the troubles of manufacturers finding qualified people to hire. These reports are published by the Manufacturing Institute and Deloitte, with reports in 2001, 2005, 2011, and 2015 (“Skills gap in manufacturing,” 2015). The most recent of these reports is based on the 2014 Manufacturing Skills Gap survey of over 450 manufacturing executives (Giffi et al., 2015). The report highlights that the manufacturing industry is an important economic

driver and it is expected by the International Monetary Fund (IMF) to grow; however, the industry has experienced a talent gap for years now.

It is projected that, unless solutions are put into place to solve the problem, this gap will widen as a result of more job openings due to retiring baby boomers and economic expansion and the lack of new workers entering the industry. According to the report “[o]ver the next decade nearly 3 ½ million manufacturing jobs likely need to be filled. The skills gap is expected to result in 2 million of those jobs going unfilled” (Giffi et al., 2015, p. 2). The reasons that enough new workers will not be able to take those jobs is a combination of younger generations’ negative perception of the industry, lack of STEM skills, as well as the decline of technical education in public schools (Giffi et al., 2015).

It is interesting to note that the “Methodology” section only contains two pie charts about the industry classification and annual revenue of the participations. At the very least, they fail to report their sampling procedure which is crucial to understanding how valid the results are and how representative the sample is of all U.S. manufacturers. In addition, they use annual revenue as a measure of “company size.” While this may be appropriate in certain cases, it would seem that when the focus is on workforce skills, the company size should be based upon number of employees they have. Certainly it could be the case that a company with a certain level of annual revenue may produce relatively few, high priced items and employ a handful of people,

or employ hundreds of people and produce many more, lower priced items. The top four skills that the manufacturing executives reported as most deficient were: (1) technology/computer skills (70%), (2) problem solving skills (69%), (3) basic technical training (67%), and (4) math skills (60%). Apparently, this is measured as “the percentage of executives who did not opt for ‘Extremely sufficient’ or ‘Sufficient’” (Giffi et al., 2015, p. 6). It is unclear as to what the executives did select, another figure reveals the answers to a shortage question as the “‘Severe shortage’ and ‘High shortage’ response” being summed together, aside from this, there is no other indication (Giffi et al., 2015, p. 8).

Most of the recent concerns about a STEM skills gap have been stimulated by *Rising Above the Gathering Storm* a report published by the National Academies in 2005. In fact, the America COMPETES Act of 2007 is based off of the report’s prescriptions. The concerns laid out in *Rising Above the Gathering Storm* stem from other countries (mostly China) catching up to the United States in economic competitiveness. The report asserts that research and technological progress lead to economic progress. Therefore, increasing STEM education, to build the STEM workforce, and increasing incentives for innovation, namely enhancing the Patent System and tax credits for research and development (R&D), are called for to create and fill jobs in science and technology and ensure that the United States remains in the lead of innovation (Committee on Prospering in the Global Economy of the 21st Century (U.S.) & Committee on Science,

Engineering, and Public Policy (U.S.), 2007). The connection between STEM R&D and the economy can be traced back to Vennevar Bush's, then Director of the Office of Scientific Research and Development, 1945 report *Science, the Endless Frontier* (Bush, 1945).

Indeed, the two reports share a motivation for improving the public welfare including health, security, and the economy. They also share recommendations to the extent that increasing training in STEM fields and incentives for research to be conducted by universities and private corporations. However, there are some major differences. One being that *Rising Above the Gathering Storm* frames many of these suggestions as ways to attract Multinational Corporations (MNCs) to create jobs in the United States and seems to view educational institutions as primarily supplying the training. The other major difference is that Bush (1945) maintains the importance of other areas of academic inquiry and writes, "It would be folly to set up a program under which research in the natural sciences and medicine was expanded at the cost of the social sciences, humanities, and other studies so essential to national well-being" (A Note of Warning section, para. 1). While *Rising Above the Gathering Storm* pays some homage to the social sciences, it no doubt is focused on attracting the "best and brightest" to science and engineering (p. 9); whereas, Bush (1945) is cautious about drawing too much of the nation's talent into the sciences. One could argue that *Rising Above the Gathering Storm* views STEM as somewhat of a messiah for the economy.

Academic Research on Skill Problems

Teitelbaum (2014) identifies at least five previous instances of a concern about a lack of scientists and engineers, or a STEM skills gap that have followed a similar pattern of “*alarm, boom, and bust*” (p. 2). The *alarm* stage consists of concerns that the United States is falling behind; this is reflected in *Rising Above the Gathering Storm*. The *alarm* is typically echoed by interest groups, economic elites, and political elites. The *boom* stage occurs when there is a political response that rapidly increases the number of scientists and engineers. Teitelbaum (2014) admits that the *bust* stage did not always occur, but generally the large number of newly minted scientists and engineers find a tough labor market at the end of a long road of education which tends to decrease the attractiveness of these careers for future young people. As for the current cycle, Teitelbaum (2014) concludes that the recent alarms are not supported by the available evidence. Furthermore, the solutions executed tend to damage the STEM enterprise and that the current malaise of the STEM workforce cannot be solved by an influx of funding.

Most of the policy discussion on this subject has been driven by reports from major consulting agencies, industry and trade groups, and claims by economic elites (Cappelli, 2015; Hira, 2010; Hira, Stephan, Salzman, Teitelbaum, & Matloff, 2014; Lowell & Salzman, 2007; Salzman, Kuehn, & Lowell, 2013). Many of the employer-based studies have issues with validity due to design and sampling issues and a lack of

transparency about the methods. Cappelli (2015) asserts that in the cases when there is really a problem, it is likely not with people fresh out of school since they make up a small proportion of the workforce. Additionally, many of the discussions ignore the interest of employees and students. This is evident in that while industry and university leaders claim that there is a lack of supply of STEM workers, STEM workers believe that there is a lack of demand (Hira, 2010). In fact, Cappelli (2015) states that,

[i]t is difficult to think of another labor market issue for which academic research or even research using standard academic techniques has played such a small role, where parties with a material interest in the outcomes have so dominated the discussion, where the quality of evidence and discussion has been so poor, and where the stakes are potentially so large. (p. 283)

Given that education outcomes have improved over the last 30 years and, when surveyed, only two out of the top 15 work skills employers find missing are academic skills such as oral communication and reading skills, the education system can hardly be at fault for all of this (Cappelli, 2012). In fact, many of the top work skills on the list would fall under Life and Career Skills in the Partnership for 21st Century Learning's (2015) 21st Century Skills framework. The real problem is likely an issue with the employers themselves. Lack of experience is a major part of the claims employers make because companies would like workers to start contributing immediately, however, a lack of experience or knowledge, is not a lack of skills. Additionally, the extensive

automation in human resource departments leads to many applications being thrown out if the person does not meet all requirements or use the right words (Cappelli, 2012).

Cappelli (2012) argues that employers are framing the large number of jobs going unfilled with high unemployment as a problem with workers, when in fact, the cause is the employers' expectations and flaws in the hiring process. Although, others such as Hira, Stephan, Salzman, Teitelbaum, and Matloff (2014), explain the reasoning behind these claims as more sinister, at least when it comes to STEM, in that these are self-interested claims in order to have guest worker programs expanded and thus, cheapen the price of labor.

Krugman (2014) asserts that if there were really a skills gap, companies would offer higher wages and workers with the skills in short supply would be doing better comparatively. However, this is not the case. He also suggests that this may be a way to distract from rising profits while wages are stagnate. Indeed, the claims made by the Manufacturing Institute reports have been challenged by Osterman and Weaver (2014) where they find that the claims are "overblown." They find that those having difficulties hiring are in the minority. While not entirely dismissive of a future issue, research conducted by The Boston Consulting Group states that any current issue is local and not national and will not hamper a resurgence in manufacturing (Sirkin, Zinser, & Rose, 2013). However, the report calls for investment by both the public and private sectors in workforce development.

Although, academic research has found evidence of some sort of skills problem. It seems the middle-skills problem has been studied less than issues in higher education STEM education as there is no aggregate estimate (the Deloitte and Manufacturing Institute report figures were for manufacturing alone). Although, contrary to explaining this as an issue with young people or an educational system failure, some suggest broader economic shifts and to some extent, what young people are told, as the culprit (Kochan, Finegold, & Osterman, 2012). There are two traditional routes to obtaining skills, on-the-job training and higher education.

The first was largely driven by company loyalty to employees by promoting from within, and employers and unions working together to offer apprenticeships; however, as the proportion of unionized workers has diminished (to 7% in the private sector and 12% overall) such apprenticeships, that are mostly at unionized workplaces, and promotions from within have also declined (Kochan et al., 2012). Additionally, the skills in demand have shifted towards those that require advanced training, either technical or behavioral, and away from those that can easily be built through on-the-job training. Kochan et al. (2012) also point out that human resources budgets are the first to be cut partially due to a fear that they will invest in training someone that ends up taking a position at another company once trained. These factors have also contributed to the 36% decline in apprenticeships.

As for trends in higher education, according to Kochan et al. (2012), while

demand for STEM skills has increased, the proportion of college graduates in STEM fields (15%) has remained the same over the past two decades. However, it is not clear if they are talking about STEM degrees broadly or just about middle skills STEM jobs.

Kochan et al. (2012) seemingly argue that young people being told “that the key to the American dream [is] to play by the rules and major in a field that [suits] your interests and talents” has caused students to study liberal arts, despite a significant drop in the demand for those with liberal arts degrees; although they fail to produce data on these claims (p. 85). Presumably, they are implying that there might otherwise not be a STEM skills gap if they were to pursue STEM instead of liberal arts.

Part of the concern here is that even those with STEM degrees might have insufficient skills (Evans, Leinhardt, Karabinos, & Yaron, 2006; Fair, Kleist, & Stoy, 2014). Although, these findings are usually from within specific disciplines, for example, chemistry. Earlier research, prior to the Great Recession, highlighted that chemistry education, starting in high school, does not display the exciting aspects of chemistry in the real world, and therefore, does not entice students to pursue the field (Evans et al., 2006). Although, in more recent research, some claim that what is taught to those with bachelor’s degrees in chemistry is not what employers need, in essence a disconnect between what is taught in the classroom and what skills are needed by industry (Fair et al., 2014).

It seems that whether or not there are skill problems, the policy prescriptions

focus on one variable to “fix” the problem(s). In the case of STEM, the vast complexity of the system makes it impossible to both diagnose issues and predict the ramifications of changing a single variable without accounting for the key elements shown in Table 2, all of which need to be taken into account when giving policy prescriptions (Hira, 2010). The first two, rewards and risk and uncertainty, encompass the variables that have an impact on a person's decision to enter a certain occupation. The elements of employment trends and forecasts and talent pool deal mostly with the macroeconomic complexity of the STEM workforce system. What this amounts to is the problem is not being studied in the right way, which typically leads to poor decisions (Hira, 2010). Additionally, there is a false assumption typically made that the STEM labor market is homogeneous. Hira (2010) explains that the STEM labor market “is better characterized as ... multiple labor markets, demarcated by occupation, level of degree, geographic location, industry-specific knowledge, and years of experience” (p. 951).

Research Questions and Hypotheses

This study will seek to uncover the nuances of how frames are used in the popular press when discussing the claims about inadequacies of the workforce. As previously mentioned, various solutions are proposed to treat the skill problems. Using Entman's (1993) functions of frames as a guide, the articles can be analyzed for how the issues are framed by those cited and/or the author. The general research question is guided by Scheufele's (1999) suggested research questions when treating media frames

as dependent variables: What factors, such as interest groups, ideologies, attitudes, and/or elites, influence how the popular press frames skill problems as they relate to higher education? More specifically, to understand what frames are actually used, the news articles will be analyzed for how they perform Entman's (1993) four actions. Thus:

RQ1: What skill problems do news articles in major U.S. newspapers discuss?

RQ2: How do news articles evaluate the causal agents of the skill problems and their effects?

RQ3: What remedies do news articles suggest for the skill problems?

The answers to RQ's 1-3 will yield the frame element variables present in the articles.

This will allow for the identification of the most salient frames. Thus:

RQ4: What are the salient frames found in the major U.S. newspaper articles?

Knowing the sources of information for the news articles is important in understanding what potential influence there is over the journalistic frame. It stands to reason that the way a source frames the information could, and likely does, impact the way a journalist frames the information and/or issue when reported on. Therefore:

RQ5: What are the affiliations of the authors and the media outlets of the articles?

Method

Identification of Sources of Data

The popular press articles analyzed were collected from the LexisNexis®

Academic database. Ten search terms were used to collect possibly related articles: (a) “skills gap,” (b) “skills-gap,” (c) “skills shortage,” (d) “skills mismatch,” (e) “shortage of skilled workers,” (f) “shortage of qualified individuals,” (g) “STEM workforce,” (h) skills AND workforce, (i) “labor supply,” and (j) “skill sets.” These search terms were arrived at during the first few weeks of exploratory searches. The keywords that emerged from articles found with “skills gap” and subsequent search terms were tested for the number of results they returned. If there were only a few results they were not used. These searches were conducted during the week of August 17, 2015 through the “All News Search” with advanced options selected as follows (see Figure 1):

- Date: From 01/01/2000 to 08/17/2015
- Source Type: U.S. Newspapers

After the advanced options were applied, the search terms were used individually in the search box. The results were further refined through options available on the results page: “Duplicate Options” was set to “On – High similarity” and “United States” was selected under the “Geography” groups. The first 100 articles were collected to be analyzed. This yielded 802 total articles (some had fewer than 100 results).

The first 100 articles for each search term were selected for a few reasons. First, when sorted by relevance, the articles found on the first four pages of results should be mostly relevant to the topic, and if any of the results are relevant they should appear on the first page. Secondly, these results would likely have the most visibility for people

using the database around the time of the search.

Procedures for Collecting Data

Matthes and Kohring (2008) provide an overview of the typical approaches to framing that tend to have issues with validity and reliability. Approaches that code whole frames at once, such as the hermeneutic, manual holistic, and deductive approaches, either require pre-established frames or they use frames developed in a nontransparent way. These approaches leave open the possibility of missing an emerging frame either because of the lack of flexibility or the development of a coder schemata that dictates how the researcher perceives the issue. The linguistic approach also codes whole frames at once but focuses on specific words as the building blocks, however this is highly complex and is difficult to do with large samples (Matthes & Kohring, 2008). One way to deal with the complexity could be the computer-assisted approach, or frame mapping, but this requires an assumption that words and phrases have a singular meaning no matter the context. Matthes and Kohring (2008) propose conceptualizing frames as clusters of frame elements and coding the individual frame elements to improve reliability and validity. This method has three advantages for this study. First, given the relative lack of frame analysis surrounding the issue of skill problems, using a deductive approach with established frames would likely be unreliable and overly complicated. In addition, such a method would be problematic for this study as it is designed to uncover the issue-specific frames rather than generic

frames (Matthes, 2009). Second, it provides for higher reliability when compared to using abstract, holistic frames (Matthes & Kohring, 2008). Finally, it allows emerging frames to be easily identified.

The frame elements coded were those identified by Entman (1993) and the specific variables for each frame element can be seen in Table 3. The frame element variables were developed out of a qualitative examination of the first 25 articles of each search term. In total, 204 (161 unique related) articles were read in full and information regarding the sources cited, the problems discussed (in relation to skills issues), and the proposed solutions were recorded. The *problem definition* consisted of both the main topic and type of problem that is discussed. The topics consisted of what types of skills or jobs the article discussed; while the problem types consisted of the article discussing an inadequate quality of skills of those in a certain field and/or an inadequate quantity of people trained in a field. The *causal attribution* element differed from Matthes and Kohring (2008) in that typically actors are seen as having a specific reason why they are the cause such as the educational system not providing adequate training, businesses having high expectations while offering low pay, or job seekers having out-of-date skills. For the *moral evaluation*, the article presented the issue as a threat to economic growth or competitiveness, a threat to business or industry growth, linked the issue to unemployment, and/or presented the issue as fake. The solutions proposed or discussed served as the *treatment* frame element.

During the initial analysis to develop the coding scheme it was found that 17 of the first 25 articles found under “labor supply” were either unrelated or difficult to discern how they may relate to the topic. Given this, the remaining 75 articles collected under this search term were not used in this study. The headlines and first two paragraphs of each of the remaining 523 articles were coded for the frame elements discussed above. Tankard (2001) has noted that it is appropriate for frame research to use headlines and leads. Since part of this study is to understand what perspectives are represented in popular press articles on skill problems, the following non-frame elements were coded as well:

- The author of the article, along with his/her affiliation and what segment of society he/she represents (academics/education, business/industry, politicians/bureaucrats, labor organization/worker, or other).
- The publication venue and the type of news it is focused on (general/popular, business, political, or education).

A fellow graduate student served as a second coder of 55 (11%) articles that were used for the inter-rater reliability. Five of the articles were found to not be related by both coders, and were excluded from the calculations as to not inflate the statistic (although they could be seen as observations with zeros for all variables). Given that most variables were coded as not present most of the time, this introduced kappa’s paradox where there is high percent agreement but traditional inter-rater reliability

statistics, such as Cohen's κ and Scott's π , yield very low or negative values (Gwet, 2008). Given this, Gwet's (2008) agreement coefficient (AC_1) was selected due to its ability to handle this situation. Wongpakaran, Wongpakaran, Wedding, and Gwet (2013) suggest that benchmark scales developed for kappa can be used for the AC_1 statistic. Eleven out of the twenty-nine variables fell within the "Good" benchmark and the rest were in the "Very Good" benchmark on Altman's scale (as cited in Wongpakaran et al., 2013). The General Workforce and Skilled Trades codes had the lowest AC_1 values, 0.63 and 0.64 respectively. Additionally, the variables indicating the problem type (inadequate skills and inadequate number) had AC_1 values of 0.66 and 0.65.

Treatment of Data for Purposes of Analysis

The data gathered from the articles was used to identify the frames existing in the popular press articles and those that are dominant within the sample. Each frame element variable was computed as binary variables. Variables with frequencies less than 5% were excluded from the cluster analysis. The number of frames was determined through the elbow criterion on a plot of the within group sum of squares. The most salient frames were determined through a hierarchical cluster analysis using the Ward method, which produces accurate clusters (Breckenridge, 2000, p. 281). Additionally, chi-square tests were used to determine any significant difference in the publication types and author affiliations that fall under each cluster, or frame. The

specific frames emerged directly from the articles in linking the skill problems discussed and the solutions provided.

Results

After removing unrelated articles and articles that gave no clear indication of being related in the sections that were coded (thus providing no codes), 396 articles remained and were used for the cluster analysis. The variables for problem type (inadequate quality of skills or an inadequate quantity of people trained) seemed to be difficult to reliably distinguish between the two. While this may be an important distinction for determining an appropriate solution as one can imagine these could have different causes and different solutions, the two issues seem to intersect if the problem is defined as “a lack of adequately trained people” for a given job/industry. Perhaps the nebulous nature of what type of problem exists is an artifact of the skills gap reports describing both problems (and their combination); therefore, they were excluded from the analysis. The problem topic of general workforce was used as a default code when no specific group of skills, industry, or occupation was discussed. Table 4 indicates the percentage of articles in the entire data set coded as containing each particular variable. Variables present in less than 5% of articles were not included in the cluster analysis.

For the articles coded according to the coding scheme, the sum of squares were as follows: 912.12 (one cluster), 795.15 (two clusters), 754.69 (three clusters), 640.45 (four clusters), 607.13 (five clusters), 602.54 (six clusters), 590.18 (seven clusters), 544.97 (eight

clusters), and 534.50 (nine clusters). One can see in Figure 2 that there is a leveling between five and seven clusters; however, the slope increases slightly afterwards. Given that one would have to go to eight clusters to get a further drop, five clusters was determined to be an appropriate amount. Table 5 depicts the mean values of all the variables that were present in the articles coded. For the interpretations of these frames, the highest means within a cluster indicate what the most important variables are (for that cluster). Additionally, Table 5 indicates both the most prominent variable in each frame element for each cluster as well as in which cluster each variable had the most presence.

Identified Frames

The largest cluster, or frame, which consisted of 27% ($n = 107$) of the articles deals with the shortage of people trained in the skilled trades or middle skills jobs ($M = 0.99$, $SD = 0.10$). However, about one quarter of the articles also dealt with STEM skills ($M = 0.26$, $SD = 0.44$). This frame tends to say the educational system ($M = 0.17$, $SD = 0.38$) and millennials ($M = 0.13$, $SD = 0.34$) are responsible for the skills gap (i.e., the difficulty employers are having in filling middle-skills jobs) by not providing enough well trained people, and by either not being interested in the skilled trades or lacking the skills, respectively. While the blame seems to be spread around, this issue is seen as both a threat to economic growth and business or industry growth ($M = 0.27$, $SD = 0.45$). It seems the solutions proposed in this frame are scattered but

somewhat focus on revising the curricula at the technical school/community college level ($M = 0.10$, $SD = 0.31$). This frame is termed Middle Skills. It should be noted that this was not a very cohesive frame, except for the identification of skilled trades and/or middle skills being an issue, in that the most salient causal attribution and treatment codes do not have a much greater presence than the other codes for those frame elements.

The second largest frame (24%, $n = 97$) is concerned with a STEM skills gap ($M = 0.96$, $SD = 0.20$). This is framed as a threat to economic growth ($M = 0.23$, $SD = 0.42$) and seen as being caused by the educational system ($M = 0.18$, $SD = 0.38$). The solutions proposed to solve the STEM gap are funding education, such as scholarships or funding colleges and universities, and programs to stimulate interest in STEM fields and careers ($M = 0.21$, $SD = 0.41$). Additionally, most of the occurrences of the H-1B visas and immigration being a solution were in the STEM frame ($M = 0.14$, $SD = 0.35$).

The Economic Impact frame (18%, $n = 72$) is entirely concerned with the general workforce lacking in skills being, at least partially, caused by an inadequate educational system ($M = 0.22$, $SD = 0.42$). Although, the pending retirement of the baby boomers is playing a role too ($M = 0.14$, $SD = 0.35$). This frame derives its name from the prevalence of seeing the issue as a threat to economic growth or competitiveness ($M = 0.53$, $SD = 0.50$). This frame proposes the solution of revising curricula ($M = 0.19$, $SD = 0.40$), typically, with the involvement of large employers or the largest

industries in the region.

The Personal Responsibility frame (16%, $n = 64$), like the Middle Skills frame, identifies the lack of those trained for Middle Skills jobs as the dominant issue ($M = 0.66$, $SD = 0.48$). However, it also contains concerns with 21st Century skills ($M = 0.25$, $SD = 0.44$). This frame largely claims that job seekers have outdated or inadequate skills for the jobs that are open ($M = 0.44$, $SD = 0.50$) as well as current employees lacking certain skills ($M = 0.23$, $SD = 0.43$). Naturally, this is linked to unemployment ($M = 0.36$, $SD = 0.48$). This frame is named Personal Responsibility because the main solution proposed is using training and/or certificate programs ($M = 0.52$, $SD = 0.50$). This includes older workers going back to school to either upgrade their skills or to train for a new career.

The Unemployment frame (14%, $n = 56$) seems to contain the largest occurrences of uncommon variables. This frame is dominated by concerns about the general workforce ($M = 0.95$, $SD = 0.23$). The frame attributes this to the inadequacies of job seekers ($M = 0.45$, $SD = 0.50$) but also has the highest occurrence of attributing the issue to politicians or government ($M = 0.11$, $SD = 0.31$) as well as business and industry practices ($M = 0.07$, $SD = 0.26$). This frame, more than any other, links the issue with unemployment ($M = 0.79$, $SD = 0.41$), thus it is termed the Unemployment frame. Additionally, this frame has the highest occurrence of articles that challenge the dominant frames or label the skills gap as a myth ($M = 0.16$, $SD = 0.37$). The most

common solution proposed by this frame is further education ($M = 0.23$, $SD = 0.43$) along with workforce training grants ($M = 0.16$, $SD = 0.37$).

Authorship and Publication Venue

Based on the results of chi-square tests there was no significant difference in author affiliation between the five frames with all affiliations taken into account $\chi^2(12, N = 396) = 13.94$, $p > .05$, $\beta = 0.32$. Table 6 shows the counts of journalist affiliation for each frame as well as the chi-square statistics for each affiliation versus the total of the other affiliations. It should be noted that due to the low occurrence of government and labor affiliated authors, these were combined with the other category. For the education and "other" affiliations, as well as the full table, some of the expected cell counts were below five, possibly resulting in misleading results. However, only the frequency of articles written by journalists test found a significant difference $\chi^2(4, N = 396) = 11.04$, $p < .05$. As shown in Table 6, the number of articles written by journalists in the Middle Skills frame is higher than expected and the number in the Economic Impact frame is lower. Aside from these differences, it seems that the frames identified are generally common across the author affiliations.

As with the author affiliations, the publication type, determined by the type of news focused on by the publication venue, yielded very little difference between the frames. The results of the chi-square tests, conducted the same way as the author affiliation tests, for this variable are shown in Table 7. Both the political and education

publication types had expected cell counts less than five. Overall, there was a significant difference found for publication type $\chi^2(12, N = 396) = 22.44, p < .05, \beta = 0.09$. The only significant difference was found with the education focused news falling mostly into the STEM frame $\chi^2(4, N = 396) = 12.08, p < .05$. While, having expected cell counts that fall below five can be problematic as it breaks the assumptions of the test, it seems to make sense that education focused news would fall under STEM given that the frame calls for funding of education and it is particularly concerned with four year degrees.

Discussion

The first three research questions can be answered by both the overall presence of each variable and the dominant variables in the frames identified. The problems discussed in the news articles seem to be spread fairly evenly across concerns about STEM (32%), skilled trades/middle skills (40%), and the general workforce (34%). This is reflected in the fact that each dominate the problem definition of the three largest frames.

The most common causal agents identified in the articles are the educational system (16%) for being inadequate and job seekers (15%) for having inadequate skills. Each of the five identified frames' causal attribution is dominated by one of these two causal agents. Although, there seems to be fairly low percentages of all the causal agent variables. The most prevalent moral evaluations are that these skill problems are threats

to economic growth and competitiveness (25%) and causing higher unemployment (24%). As with the causal agents, these two moral evaluations dominate the five frames. As far as these two frame elements are concerned, there are two major branches (such that if there were only two frames identified, these would have likely been the dividing line); the largest branch (Middle Skills, STEM, and Economic Impact frames) is dominated by seeing the education system as the causal agent of the skill problems and that it is threatening the health of the economy. The second branch (Personal Responsibility and Unemployment frames) identifies the causal agents as the job seekers themselves and in a way, keeping themselves unemployed.

As with causal agents, there seems to be relatively small percentages for every treatment variable. However, the most common solutions are further education and/or training programs for new careers or upgrading of skills (16%) and revising curricula (11%). The former being primarily clustered in the Personal Responsibility and Unemployment frames and the latter in the Middle Skills and Economic Impact frames. The only frame to not focus on these solutions is the STEM frame, which instead focuses on funding education (such as scholarships or grants to schools for facilities) and programs to stimulate interest.

Workforce Report Influences on Salient Frames

The frames identified in this study resemble those found in the workforce reports mentioned earlier. Some concepts are generally present such as attributing the causes to

the educational system as well as implicit, if not explicit, calls for changing the curriculum. ManpowerGroup's (2015) *10th Annual Talent Shortage Survey* seems to play a large role in all five identified frames, which confirms Cappelli's (2015) assertion that they are likely the most widely cited. This is partially because it mentions all three of the primary problem definitions as well as a lack of workplace competencies (or soft skills), which are included in the 21st Century skills (Partnership for 21st Century Learning, 2015). Additionally, attributing the cause of this to the job seekers' inadequacies and a general lack of applicants is present in the Personal Responsibility and Unemployment frames. Had there been a solid way to distinguish between inadequate skills and an inadequate number of people, this may have added some more description to this link (although both seem to be present in ManpowerGroup's (2015) results). This influence might be rivaled by that of the Manufacturing Institute's "Skills Gap Report" series.

The frame containing the most articles, Middle Skills, seems almost directly sourced from the "Skills Gap Report" series. Clearly the series, at least in the most recent iteration, attributes a shortage of people trained for the skilled trades/middle skills jobs (which includes manufacturing) to the educational system and to the younger generations' lack of interest or negative perceptions of the industry that is mirrored by the Middle Skills frame (Giffi et al., 2015). Additionally, the lack of STEM skills identified in the report as causing an issue for manufacturing seems to be reflected in

the frame as well. This frame, much like the report, views this situation as a threat to both the industry and due to its asserted importance, the overall economy as well. The threat to business growth concept is also presented in the *10th Annual Talent Shortage Survey*.

The Personal Responsibility frame seems to draw from the “Skills Gap Report” series as well; not only in the sense that it is concerned with middle skills but, also that problem solving skills are the second most deficient skills according to manufacturing executives. Problem solving is listed as one of the 21st Century skills, hence this frame’s inclusion of the corresponding problem definition variable (Partnership for 21st Century Learning, 2015). While the Economic Impact frame does not contain concerns about middle skills, it would seem it shares the idea that the impending retirement of baby boomers will present a great obstacle for employers as Giffi et al. (2015) claim, as well as the concerns about economic competitiveness.

A STEM skills gap, sometimes tied to concerns about middle skills occupations, seems to be a widespread concern as it is discussed by both ManpowerGroup (2015) and Giffi et al. (2015). However, the STEM frame largely seems to draw from *Rising Above the Gathering Storm*. The relationship between STEM and economic competitiveness is clearly outlined as a major reason to take an interest in STEM. In order to increase STEM education, *Rising Above the Gathering Storm* proposes funding research and degree programs as well as scholarships and other incentives to stimulate

interest.

Academic Critics

Some of the frame elements of the salient frames may not come directly from the workforce reports discussed above; however, they largely have been identified by academic critics as originating from elites. Peter Cappelli (2012), perhaps the most outspoken critic of what he considers to be alarmist, skills gap claims, explained that employers used workers as a scapegoat for the contradictorily high unemployment when there were large number of open jobs. Essentially claiming that job seekers' deficiencies were leading to their unemployment as the Personal Responsibility and Unemployment frames would have us believe. Critics calling attention to this may in fact be a reason why the unemployment frame had the highest proportion of articles attributing the problem to businesses and industry due to their high expectations and identifying the skills gap as a myth. The STEM frame had a few articles identifying the skills gap as a myth or challenging its validity as well. This may be due to criticism of the proposed solution of increasing H-1B visas and immigration. As mentioned earlier, Hira et al. (2014) explain this idea as a self-serving attempt by tech industry leaders to exert downward pressure on industry wages. In general, the STEM frame seems to be in line with Teitelbaum's (2014) "alarm/boom/bust" cycle in raising the alarm about a STEM gap and offering solutions that amount to the *boom* stage. Additionally, to some extent, it seems to offer a response to the *bust* stage in suggesting programs that

stimulate interest in STEM.

Sources of Frames

The authorship and publication venue results showed very little difference between the frames. However, here the nonsignificant results seem to fall in line with the predictions of both framing theory and skills gap skeptics. The fact that few academics are entering the conversation in popular media, and the lack of coverage in education news outlets, is likely due to either a lack of academic research conducted on the subject as identified by Cappelli (2015), or the reliance on scholarly papers rather than press releases, which Benderly (2012) points out, are used by proponents of the skills gap narrative.

To a large extent, all five of the salient frames identified in this study mirror the frames suggested by the workforce reports and by extension, economic and political elites. These results tend to confirm Cappelli's (2015) assertion that the discussion is largely being driven by the workforce reports. What is somewhat surprising is the relative lack of authors affiliated with a business or industry. While there was a decent proportion of articles from outlets that focus on business and industry news, the presumption was that the author was a journalist (or affiliated with the publication). Given that the majority of articles were written by journalists, the findings confirm the theorized influence of political actors, interest groups, and elites over the frames selected by journalists (Scheufele, 1999). In light of this, the lack of economic elites

directly weighing in on the public discussion may not be overly surprising if the journalists are already using their frames, it would be a redundant effort to directly make their frames salient.

Limitations

There are however, some limitations to this study. One being that the whole frame in an article may take more than the title and first two paragraphs to develop. This may have led to missing some combination of the variables that would make more pronounced frames. At the outset, the intention was to distinguish between claims of inadequate skills and an inadequate number of people trained in a field as they are two distinct ideas. Contributing to the difficulty is that they co-occur frequently. Coding the entire article may have resolved some of the ambiguity as to which they were talking about. Additionally, most of the newspapers were not those with national circulation, which may mean that these are less influential in the discussion.

Conclusion

The salient frames found in the newspaper articles, identified through cluster analysis, align closely to those frames suggested by the workforce reports and both political and economic elites. This study does not purport to be evidence whether or not the claims about the existence of a STEM or middle skills gap are valid or if they are myth as claimed by experts such as Peter Cappelli and Paul Krugman. That being said, everyone, especially those directly involved in education such as academics and

students, should be concerned that the public discussion seems extremely one sided.

Additionally, policy makers should be concerned with stumbling forward into the same cycle identified by Teitelbaum (2014).

It would seem that the dearth of academic research has allowed the discussion to be driven by, what is at best, methodologically flawed research and, at its worst, intentionally deceptive, self-interested claims. This will tend toward policy prescriptions that are either ineffectual or destructive. Therefore, I believe these results indicate it is necessary to echo Cappelli's (2015), and to some extent, Hira's (2010), call for more careful research on the skills gap to be conducted by academics. As far as journalism is concerned, it would seem that few articles challenge the dominant frames and, at least in the beginning of the articles, do not even cover the challengers of the skills gap alarmists. Therefore, as far as communication scholars are concerned, we should be training journalists in framing theory as suggested by Entman (1993) and Davis and Kent (2013). Furthermore, since journalism is heralded as a watchdog of the government, perhaps, at times, communication scholars need to act as a check on journalism. No doubt, this does occur and should be continued and increased. Finally, if there is indeed a widespread skills gap, solutions that threaten to turn higher education into mere workforce development, with no other societal purpose to be served, should be met with the utmost scrutiny, if not resistance.

In order to gain a greater perspective, this study could be extended to explore the

framing of the skills gap in nationally circulated papers of record, as these are likely to be more influential than local papers. Another way to extend this work might be to look at the framing of the issue in academic research that uses the skills gap as a motivation for the research as a way to reveal to what extent academics are also influenced by the dominant frames of elites. This study shows that the hierarchical cluster analysis approach, as suggested by Matthes and Kohring (2008), yields coherent frames even when not coding the entire article (although it may have benefited from doing so). Given this, it seems that future framing research would benefit from using this approach.

References

- Benderly, B. L. (2012). What Scientist Shortage? *Columbia Journalism Review*, 50(5), 19–20.
- Breckenridge, J. N. (2000). Validating cluster analysis: Consistent replication and symmetry. *Multivariate Behavioral Research*, 35(2), 261–285.
https://doi.org/10.1207/S15327906MBR3502_5
- Bush, V. (1945). *Science, the endless frontier: A report to the President*. Washington, D.C.: Govt. Print. Off. Retrieved from <http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm>
- Cappelli, P. (2012). *Why good people can't get jobs: The Skills Gap and what companies can do about it*. Philadelphia, PA: Wharton Digital Press.
- Cappelli, P. (2015). Skill gaps, skill shortages, and skill mismatches: Evidence and arguments for the United States. *ILR Review*, 68(2), 251–290.
<https://doi.org/10.1177/0019793914564961>
- Committee on Prospering in the Global Economy of the 21st Century (U.S.), & Committee on Science, Engineering, and Public Policy (U.S.). (2007). *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. Washington, D.C.: National Academies Press. <https://doi.org/10.17226/11463>
- Davis, D. K., & Kent, K. (2013). Journalism ethics in a global communication era: The framing journalism perspective. *China Media Research*, 9(2), 71–82.
- Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, 43(4), 51–58.

- Evans, K. L., Leinhardt, G., Karabinos, M., & Yaron, D. (2006). Chemistry in the Field and Chemistry in the Classroom: A Cognitive Disconnect? *Journal of Chemical Education*, 83(4), 655–655. <https://doi.org/10.1021/ed083p655>
- Fair, J. D., Kleist, E. M., & Stoy, D. M. (2014). A Survey of Industrial Organic Chemists: Understanding the Chemical Industry's Needs of Current Bachelor-Level Graduates. *Journal of Chemical Education*, 91, 2084–2092. <https://doi.org/10.1021/ed400570f>
- Giffi, C., Dollar, B., Drew, M., McNelly, J., Carrick, G., & Gangula, B. (2015). *The skills gap in U.S. manufacturing: 2015 and beyond*. Deloitte & Manufacturing Institute.
- Goffman, E. (1986). *Frame analysis: An essay on the organization of experience*. Boston, MA: Northeastern University Press. (Original work published 1974)
- Gwet, K. L. (2008). Computing inter-rater reliability and its variance in the presence of high agreement. *British Journal of Mathematical and Statistical Psychology*, 61, 29–48.
- Hira, R. (2010). U.S. policy and the STEM workforce system. *American Behavioral Scientist*, 53(7), 949–961.
- Hira, R., Stephan, P., Salzman, H., Teitelbaum, M., & Matloff, N. (2014, July). Bill Gates' tech worker fantasy: Column. *USA Today*. Retrieved from <http://www.usatoday.com/story/opinion/2014/07/27/bill-gates-tech-worker-wages-reforms-employment-column/13243305/>

Kochan, T., Finegold, D., & Osterman, P. (2012). Who Can Fix the “Middle-Skills” Gap?

Harvard Business Review, 90(10), 83–90.

Krugman, P. (2014, March 31). Jobs and skills and zombies. *The New York Times*, p. 21.

New York, NY.

Lowell, B. L., & Salzman, H. (2007). *Into the eye of the storm: Assessing the evidence on*

science and engineering education, quality, and workforce demand. Washington, D.C.:

Urban Institute. Retrieved from

<http://www.urban.org/sites/default/files/alfresco/publication-pdfs/411562-Into-the-Eye-of-the-Storm.PDF>

ManpowerGroup. (2015). *2015 talent shortage survey* (Talent Shortage Survey).

ManpowerGroup.

Matthes, J. (2009). What’s in a frame? A content analysis of media framing studies in the

world’s leading communication journals, 1990-2005. *Journalism & Mass*

Communication Quarterly, 86(2), 349–367.

Matthes, J., & Kohring, M. (2008). The content analysis of media frames: Toward

improving reliability and validity. *Journal of Communication*, 58, 258–279.

<https://doi.org/10.1111/j.1460-2466.2008.00384.x>

Morrison, T., Maciejewski, B., Giffi, C., DeRocco, E. S., McNelly, J., & Carrick, G. (2011).

Boiling point? The skills gap in U.S. manufacturing. Deloitte & Manufacturing

Institute.

- Nicklaus, D. (2014, August 24). Skills gap is a myth, labor expert says. *St. Louis Post-Dispatch*, p. E1. St. Louis, MO.
- Oleson, A., Hora, M., & Benbow, R. J. (2014). *What is a STEM job? How different interpretations of the acronym result in a disparate labor market projections*. Madison, WI: Center on Education and Work, University of Wisconsin-Madison. Retrieved from <http://alignmentstudy.wceruw.org/publications.html>
- Osterman, P., & Weaver, A. (2014). *Why claims of skills shortages in manufacturing are overblown* (Issue Brief No. 376). Washington, D.C.: Economic Policy Institute. Retrieved from <http://www.epi.org/publication/claims-skills-shortages-manufacturing-overblown/>
- Partnership for 21st Century Learning. (2015). P21 framework definitions. Retrieved from <http://www.p21.org/about-us/p21-framework>
- Salzman, H., Kuehn, D., & Lowell, B. L. (2013). *Guestworkers in the high-skill U.S. labor market: An analysis of supply, employment, and wage trends* (Briefing Paper No. 359). Washington, DC: Economic Policy Institute. Retrieved from <http://www.epi.org/publication/bp359-guestworkers-high-skill-labor-market-analysis/>
- Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication*, 49(1), 103–122.

Scheufele, D. A., & Tewksbury, D. (2007). Framing, agenda setting, and priming: The evolution of three media effects models. *Journal of Communication*, 57, 9–20.

<https://doi.org/10.1111/j.1460-2466.2006.00326.x>

Sirkin, H. L., Zinser, M., & Rose, J. (2013). *The U.S. skills gap: Could it threaten a manufacturing renaissance*. Boston, MA: The Boston Consulting Group. Retrieved

from

https://www.bcgperspectives.com/content/articles/lean_manufacturing_us_skills_gap_could_threaten_manufacturing_renaissance/

Skills gap in manufacturing. (2015). Retrieved December 1, 2015, from

<http://www.themanufacturinginstitute.org/Research/Skills-Gap-in-Manufacturing/Skills-Gap-in-Manufacturing.aspx>

Talent shortage survey. (2015). Retrieved December 1, 2015, from

manpowergroup.com/talentshortage

Tankard, J. W. (2001). An empirical approach to the study of media framing. In S. D.

Reese, O. H. Gandy, & A. E. Grant (Eds.), *Framing public life : Perspectives on media and our understanding of the social world* (pp. 95–106). Mahwah, NJ: Lawrence Erlbaum Associates.

Teitelbaum, M. (2014). *Falling behind? Boom, bust, and the global race for scientific talent*.

Princeton, NJ: Princeton University Press.

Wongpakaran, N., Wongpakaran, T., Wedding, D., & Gwet, K. L. (2013). A comparison of Cohen's Kappa and Gwet's AC1 when calculating inter-rater reliability coefficients: A study conducted with personality disorder samples. *BMC Medical Research Methodology*, 13(61), 1–7. <https://doi.org/10.1186/1471-2288-13-61>

Tables

Table 1

Typology of Framing Research

Studies Examining Frames as ...		
	Dependent Variables	Independent Variables
Studies Examining Frames as ...	RQ1: What factors influence the way journalists or other societal groups frame certain issues?	RQ3: What kinds of media frames influence the audience's perception of certain issues, and how does this process work?
Media Frames	RQ2: How do these processes work and, as a result, what are the frames that journalists use?	
Individual Frames	RQ4: Which factors influence the establishment of individual frames of reference, or are individual frames simply replications of media frames?	RQ6: How do individual frames influence individual perception of issues?
	RQ5: How can the audience member play an active role in constructing meaning or resisting media frames?	

Note. Adapted from Scheufele's (1999) research questions on p. 108 and table on p.

109.

Table 2

Elements of the STEM Workforce System

Element	Metrics
Rewards	Wages, benefits, wage changes, wages relative to peer occupations, social meaning, work–life balance
Risk and uncertainty	Probability of job loss, technological obsolescence, job tenure, unemployment rates, career tenure, job insecurity
Employment trends and forecasts	Employment levels, employment changes, employment volatility, stay rates
Talent pool	Incumbent STEM workers, gender representation, minority representation, recent immigrants, foreign students, foreign guest workers, former STEM workers, K-12 students capable of entering a STEM profession

Note. Reprinted from “U.S. policy and the STEM Workforce System,” by R. Hira, 2010, *American Behavioral Scientist*, 53(7), p. 953. Copyright 2010 by SAGE Publications.

Table 3

Variables and Codes for Cluster Analysis

Frame Element	Variables	Description
Problem definition	Topic: STEM	STEM skills or industries
	Topic: Skilled trades (middle-skills)	Do not require 4 year degree
	Topic: 21st Century skills	Includes problem solving skills as well as life and career skills ^a
	Topic: Soft skills	Teamwork and communication skills ^b
	Topic: Liberal Arts	Non-STEM 4 year degrees
	Topic: General workforce	General concerns about the workforce; used as a default
	Type: Inadequate skills Type: Inadequate number	The skills people have are lacking Not enough people trained in the field
Causal attribution	Educational system	Not providing adequate training
	Business/Industry	High expectations; low pay; self-serving; too few jobs
	Millennials	Problems with them; lack of interest in industry
	Baby boomers	Retiring baby boomers
	Politicians/Government	Not providing enough support
	Employees	Current employees do not have the right skills
Moral evaluation	Threat to economic growth/competitiveness	The situation is a threat to economic growth or competitiveness
	Threat to business/industry growth	Prevents businesses or industry from growing
	Unemployment	Linking the situation to unemployment
	Myth	The skills gap is a myth or manufactured

(continued)

Table 3 (continued)

Frame Element	Variables	Description
Treatment	Revise curricula	Involve local/major employers in designing curriculum
	H-1B visas/immigration	Increase skilled immigration to fill demand
	Restructure human resources practices	Lower expectations/offer higher pay
	Workforce training grants	Government provides funds to train employees
	Funding education	Government needs to fund education more
	Employer sponsored training	Apprenticeships/on-the-job training
	Public-private partnerships (Internships)	Training for students at local employers
	Programs to stimulate interest	Usually at younger ages, industry teaches about field
	Further education/new career	People need to go back to school to train for new career or update their skills

Note.

^aFor more information refer to the cited Partnership for 21st Century Learning (2015) document. ^bAlso part of the 21st Century skills

Table 4

Percent of Articles Containing Each Variable

Variable	%	Variable	%
STEM	32	Threat to economic growth/competitiveness	25
Skilled trades (middle-skills)	40	Threat to business/industry growth	12
21st Century skills	5	Unemployment	24
Liberal Arts	3	Myth	7
General workforce	34	Revise curricula	11
Educational system	16	H-1B visas/immigration	5
Business/industry	4	Restructure human resources practices	3
Millennials	7	Workforce training grants	9
Baby boomers	7	Funding education	8
Politicians/government	5	Employer sponsored training	3
Employees	6	Public-private partnerships	5
Job seekers	15	Programs to stimulate interest	7
		Further education/new career	16

Table 5

Mean Values and Standard Deviations for Five Identified Frames

Variables	Unem- ployment (<i>n</i> = 56) <i>M</i> (<i>SD</i>)	Personal Respon- sibility (<i>n</i> = 64) <i>M</i> (<i>SD</i>)	Economic Impact (<i>n</i> = 72) <i>M</i> (<i>SD</i>)	Middle Skills (<i>n</i> = 107) <i>M</i> (<i>SD</i>)	STEM (<i>n</i> = 97) <i>M</i> (<i>SD</i>)
STEM	.04 (.19)	.08 (.27)		.26 (.44)	.96 (.20)^a
Skilled trades (middle- skills)	.07 (.26)	.66 (.48)		.99 (.10)^a	.07 (.26)
21st Century skills ^c		.25 (.44) ^a		.02 (.14)	.03 (.17)
Liberal Arts ^b	.02 (.13)	.05 (.21)		.01 (.10)	.06 (.24) ^a
General workforce	.95 (.23)	.08 (.27)	1.00 (0)^a	.02 (.14)	.01 (.10)
Educational system	.09 (.29)	.11 (.31)	.22 (.42)^a	.17 (.38)	.18 (.38)
Business/Industry ^b	.07 (.26) ^a	.03 (.18)	.06 (.23)	.04 (.19)	.01 (.10)
Millennials	.04 (.19)	.06 (.24)	.04 (.20)	.13 (.34) ^a	.05 (.22)
Baby boomers		.02 (.13)	.14 (.35) ^a	.08 (.28)	.06 (.24)
Politicians/Government	.11 (.31) ^a	.06 (.24)	.01 (.12)	.02 (.14)	.05 (.22)
Employees	.02 (.13)	.23 (.43) ^a		.01 (.10)	.05 (.22)
Job seekers	.45 (.50)^a	.44 (.50)	.03 (.17)	.04 (.19)	.02 (.14)
Threat to economic growth/competitiveness	.09 (.29)	.09 (.29)	.53 (.50)^a	.27 (.45)	.23 (.42)
Threat to business/industry growth	.14 (.35)	.06 (.24)	.03 (.17)	.27 (.45)^a	.06 (.24)
Unemployment	.79 (.41)^a	.36 (.48)	.14 (.35)	.08 (.28)	.09 (.29)
Myth	.16 (.37) ^a	.05 (.21)	.00 (.00)	.06 (.23)	.08 (.28)

(continued)

Table 5 (continued)

Variables	Unem- ployment (<i>n</i> = 56) <i>M</i> (<i>SD</i>)	Personal	Economic	Middle	STEM
		Respon- sibility (<i>n</i> = 64) <i>M</i> (<i>SD</i>)	Impact (<i>n</i> = 72) <i>M</i> (<i>SD</i>)	Skills (<i>n</i> = 107) <i>M</i> (<i>SD</i>)	(<i>n</i> = 97) <i>M</i> (<i>SD</i>)
Revise curricula		0.14 (.35)	.19 (.40)^a	.10 (.31)	.11 (.32)
H-1B visas/Immigration			.04 (.20)	.01 (.10)	.14 (.35) ^a
Restructure human resources practices ^b	.02 (.13)		.06 (.23) ^a	.04 (.19)	.02 (.14)
Workforce training grants	.16 (.37) ^a	.13 (.33)	.10 (.30)	.08 (.28)	.03 (.17)
Funding education	.04 (.19)	.06 (.24)	.06 (.23)	.01 (.10)	.21 (.41)^a
Employer sponsored training ^b	.02 (.13)	.05 (.21) ^a	.03 (.17)	.04 (.19)	.01 (.10)
Public-private partnerships	.04 (.19)	.02 (.13)	.10 (.30) ^a	.07 (.26)	.01 (.10)
Programs to stimulate interest				.06 (.23)	.21 (.41)^a
Further education/New career	.23 (.43)	.52 (.50)^a	.08 (.28)	.07 (.25)	.06 (.24)

Note. Problem type was not used in the clustering analysis. Most prevalent variable for each frame element in each identified frame are in boldface.

^aThis variable occurred the most in this frame. ^bVariable was not included in cluster analysis since it occurred in less than 5% of articles. ^cSoft skills variable was recoded as 21st century skills since it does include the equivalent of the soft skills.

Table 6

Cross-Tabulation of Author Affiliation and Cluster/Frame

Cluster/Frame	Author Affiliation				Marginal Row Frequencies
	Journalist	Education	Business/ Industry	Other	
Unemployment	49 (43.84)	1 (3.82)	4 (5.52)	2 (2.83)	56
Personal responsibility	48 (50.10)	6 (4.36)	7 (6.30)	3 (3.23)	64
Economic Impact	49 (56.36)	6 (4.91)	10 (7.09)	7 (3.64)	72
Middle skills	91 (83.76)	6 (7.30)	8 (10.54)	2 (5.40)	107
STEM	73 (75.93)	8 (6.61)	10 (9.55)	6 (4.90)	97
Marginal column frequencies	310	27	39	20	396
Individual Publication Type vs. Others	11.04*	3.71 ^a	2.57	6.07 ^a	13.94^{ab}

Note. χ^2 test expected cell counts in parentheses.

* $p < .05$

^aSome expected cell counts less than 5. ^b $df = 12$

Table 7

Cross-Tabulation of Publication Type and Cluster/Frame

Cluster/Frame	Publication Type				Marginal Row Frequencies
	Popular	Business/ Industry	Political	Education	
Unemployment	38 (42.99)	13 (9.19)	5 (2.69)	0 (1.13)	56
Personal responsibility	52 (49.13)	7 (10.51)	4 (3.07)	1 (1.29)	64
Economic Impact	53 (55.27)	13 (11.82)	5 (3.45)	1 (1.45)	72
Middle skills	85 (82.14)	20 (17.56)	2 (5.13)	0 (2.16)	107
STEM	76 (74.46)	12 (15.92)	3 (4.65)	6 (1.96)	97
Marginal column frequencies	304	65	19	8	396
Individual Publication Type vs. Others	4.18	4.99	5.74 ^a	12.08 ^{*a}	22.44^{*ab}

Note. χ^2 test expected cell counts in parentheses.

* $p < .05$

^aSome expected cell counts less than 5. ^b $df = 12$

Figures

Advanced Options ▶

Date

From

to

Or
Select ▼

Build Your Own Segment Search

Select a Segment ▼

Useful when you need to narrow your search to something specific, like a legal citation, an author's name, or a word in the headline. For example: HEADLINE(Congress w/5 budget)

Source

Select Source by Type (below) or Enter Source Name Here

Index Terms
[Look up Index Terms](#)

Source Type

- Newspapers
- Major World Publications
- Magazines
- Wire Services
- Blogs
- Business and Industry News
- University Newspapers
- U.S. Newspapers
- Webnews

Article Type

- Book Reviews
- Movie Reviews
- Music Reviews
- Restaurant Reviews
- Theatre Reviews
- Deaths & Obituaries
- Editorials & Opinions

- Interviews
- Letters & Comments
- Profiles & Biographies

Geographic Location

By Region

US State ▼

By Location

Choose a State ▲

Alabama

Alaska

Arizona ▼

Figure 1. LexisNexis® Advanced Options

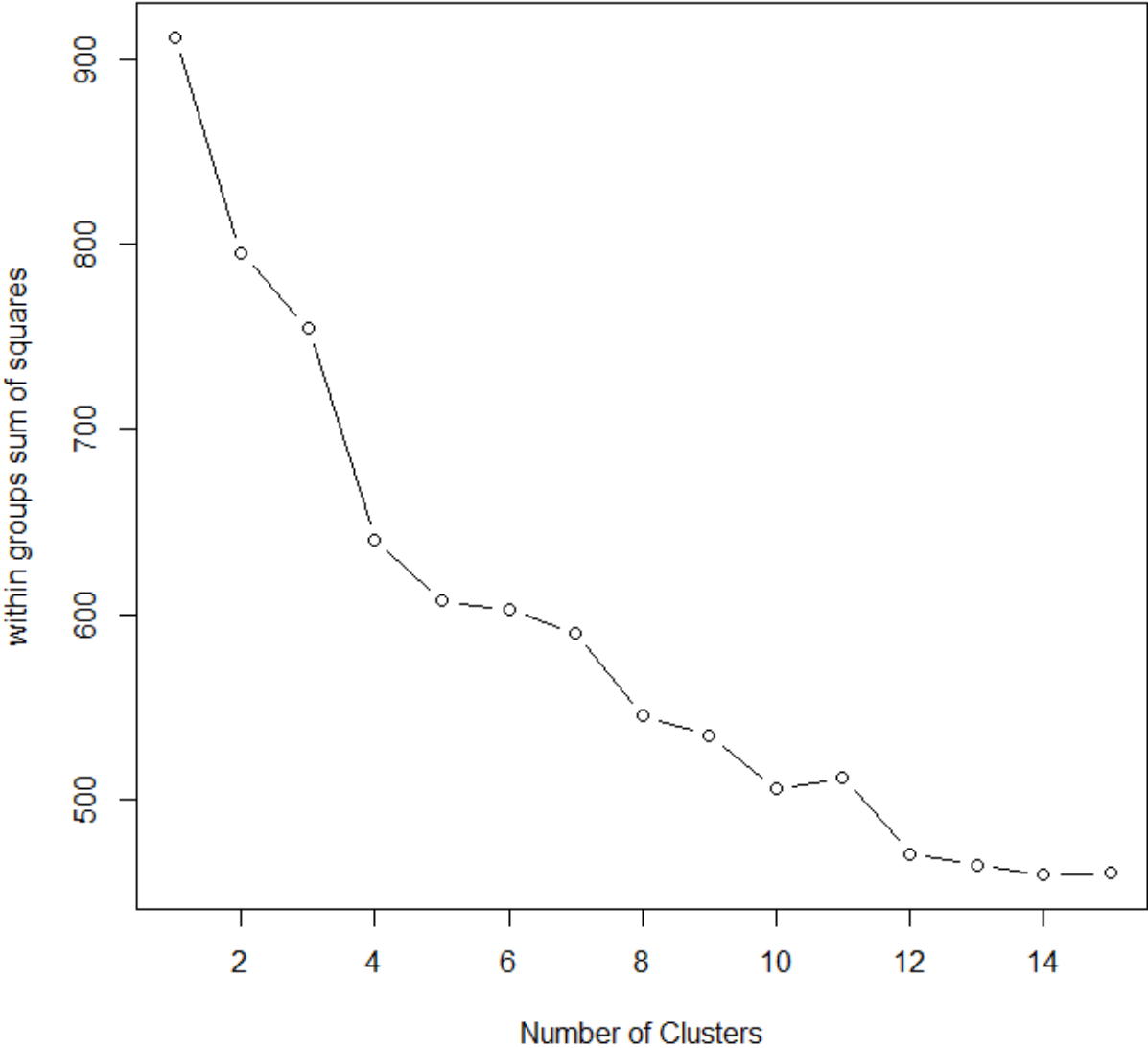


Figure 2. Within groups sum of squares by the number of clusters.