Prior to the COVID-19 pandemic, the workforce was already facing disruptive changes. The fourth industrial revolution and technology in the workplace, specifically artificial intelligence (AI), robotics, and big data, were already drastically reshaping the profile of a highly skilled worker in the 21st century. Now, the combination of challenges caused COVID-19 and these new workplace technologies are responsible for displacing entire occupations, shifting worker skills and tasks, and creating new sets of skills and tasks (World Economic Forum, 2018b). To ensure full employment of the workforce by 2030, major and possibly historic workforce transitions to new jobs, skills, and occupations will need to occur (McKinsey Global Institute, 2017). Middle skill jobs are jobs that typically require more than a high school diploma but less than a four-year degree. These jobs represent a significantly large sector of the American workforce and have been particularly vulnerable to workplace transitions (Autor, 2015; National Science Board, 2019). In an environment of workforce disruption caused by COVID-19, technology, external market forces, and globalization, middle skills workers need innovative avenues to support adaptation and development of skills for career resilience and sustainability.

Analyzing news media can provide important insight into public understanding, perspectives, and support of current events and issues (Hodgetts & Chamberlain, 2014). In fact, serious analysis of American life and culture must include media (Altheide & Schneider, 2013). Immediate access to media means that evaluation of media is useful for phenomenon and emerging situations for which there is little published empirical research. Further, news media is important in helping to set a common agenda for collective action and response (Feezell, 2017). In the field of human resource development, news media analysis is a method that has not been often utilized. However, both workers and employers are exposed to news media regularly and the daily news they receive can shape their perceptions and actions in the workforce. Analysis of the public information in news reports and corporate filings can provide insight into challenges and potential focus areas for learning solutions for the middle skills workforce.
While there has been much forecasting on the future transformations of labor markets, few practical approaches exist to identify reskilling and job transition opportunities, especially for middle skill workers (World Economic Forum, 2018a). This current study helps to address the gaps in literature related to general understanding of middle skill workforce learning needs while specifically examining the short- and long-term impacts of COVID-19 on middle skill education and learning and development. This article presents a thematic content analysis of media published in the United States during the first six months of the COVID-19 outbreak. The purpose of this study is to examine how the middle skill workforce has been affected by COVID-19 and specifically examine learning solutions and recommendations designed to support improved work outcomes and career sustainability of this workforce sector. This analysis of news media integrates media articles from newspapers, industry trade press, news transcripts, general news articles from newswires, company filings, stock reports, executive materials, industry analyst reports, and congressional publications from January 1, 2020 through June 25, 2020. This study will present an overview of emerging public trends in middle skill education and learning and development, suggest directions for future research, and provide implications for practice.

**Middle Skills**

The middle skills sector represents well paying, high demand jobs and with 17.7 million workers is a significantly large sector of the American workforce which is projected to grow to 18.5 million by 2029 (Bureau of Labor Statistics, 2020; Christo-Baker et al., 2017; National Science Board, 2019). Analysis of Bureau of Labor Statistics data of occupations requiring an associate degree, a postsecondary non-degree award, or some college (97 total) revealed that in 2019 the average annual salary was nearly $53,000 with a high of $122,000 (Bureau of Labor Statistics, 2020). This analysis also revealed stronger than average job openings with an annual average of 17,700 occupational openings projected between 2019 and 2029 and a high of 209,200 openings (Bureau of Labor Statistics, 2020). Yet, given this strong workforce demand, a skills gap exists where there is a lack of skilled workers who are qualified for available jobs. In fact, 69% of employers state that their inability to attract and retain middle skills talent limits their firm’s competitiveness and ability to grow (Harvard Business School, 2016). Employers also report that human resource issues related to recruitment, training, and retention of this vital workforce are predicted to create a shortage of nearly 3.4 million skilled technical workers over the next few years (National Science Board, 2019). In today’s dynamic workplace, employers are combating a skills gap which makes it difficult to recruit and retain a high technology, highly qualified, middle skill workforce.

Preparation for middle skill jobs is broad and may include certificates, (academic and/or industry recognized), associate degrees, and in some cases four-year baccalaureate degrees (Land, 2012). Many institutions of higher education and industry partners are working together to make credentials stackable to provide multiple employable exit points. However, the impact of automation and technology in the workplace is beginning to change the educational requirements that students need to meet to ensure that they are learning relevant and career sustainable skills (Burning Glass Technologies, 2019). The recent COVID-19 pandemic has made this need to focus on relevant skills even more pressing for middle skill workers.

While the effect of advanced technologies in the workplace is being felt across all industry sectors and jobs, middle skill and technological education growth in employment and wages are particularly vulnerable to and have declined as a result of the advances of workplace technology and automation (Autor, 2015). Additionally, there is little empirical research and few practical guidelines that focus on the importance of developing the skills needed for jobs of the future to support career sustainability, especially in the middle skill sector (McKinsey Global Institute, 2017). Developing a deeper understanding of the role that middle skill education can play provides foundational knowledge essential to supporting the nation’s technical infrastructure and capacity for innovation (Frase et al., 2016).

**Changing Workforce and Career Trends**

While the marketplace itself is changing based on megatrends such as globalization, robotics, AI, analytics, and many other factors, the characteristics of the individual worker are also changing. Workforce demographic trends include a large shift to a more diverse, multinational, and aging workforce (Toossi, 2016). Another major trend impacting the workforce is the emergence of “gig” or contract workers. This gig economy trend is creating seismic shifts in the workplace where the majority of new jobs created over the past 10 years were short-term, contract work (Mayln-Smith et al., 2017). These trends contribute to a growing barrier for workers
without updated, relevant skills wishing to enter and remain in the world of work. These trends, already in place prior to the COVID-19 outbreak mean that work is being redesigned to accommodate new work trends and new worker values (flexibility, job enrichment, career development) and workers must be adaptable to these changes in order to sustain their careers. The COVID-19 outbreak now adds an additional layer of needed understanding of career sustaining skills to this already complex and evolving workplace dynamic.

These factors are impacting careers which are lasting longer and on average spanning over 60 years (Deloitte, 2017). Success in future work environments will be dependent upon the workforce’s ability to acquire new sets of skills and competencies (Mayln-Smith et al., 2017). Thus, preparing the current and future workforce with a broad spectrum of in-demand knowledge, skills, abilities, and other characteristics will provide greater flexibility, adaptability, and agility within work. Investing in learning and development solutions can equip workers to better handle new skill requirements brought on by COVID-19 and prepare them with the 21st century skills needed to fill current and future middle skill jobs (National Institute for Certification in Engineering Technologies, n.d.).

**Emerging Learning Needs**

The importance of learning for the workforce is emphasized by data that suggests that every three years workers will have to relearn 35% of their jobs and every five years a worker’s skill set will be half as valuable as it was previously (McGowan & Andrews, 2015; World Economic Forum, 2017). In fact, learning has been identified as the leading human capital trend most urgent to organizations (Deloitte, 2019). Eighty-six percent of chief executive officers (CEOs) rank learning and changing the way people learn as most important; yet, only 46% feel prepared to address that challenge (Deloitte, 2019). In growing middle skill industries such as manufacturing, construction, and healthcare; training for current needs is inadequate with much uncertainty about future needs (Christo-Baker et al., 2017). To be effective learning must address both current and future needs. Further, new needs spurred by the COVID-19 pandemic have demanded a clearer understanding of the role that learning plays in a high-quality workforce. The learning evolution is a major workforce trend necessitating the need for developing updated and agile curricula for technological and higher education, addressing the availability of retraining opportunities for the workforce, and enabling a mindset of lifelong learning for all (Mayln-Smith et al., 2017; World Economic Forum, 2018). A study of emerging and relevant media reports, company filings, and other reputable media sources provides an overview of public understanding of both current and future learning and development needs related to the changes prompted by the COVID-19 pandemic.

**Sustainable Careers**

The concept of sustainable careers is emerging in career and human resource development literature (Lawrence et al., 2017). The idea that individuals need to develop career competencies to support sustainability and resilience in careers has been recently spurred by current trends, external factors, changing workplace demographics, and contextual factors (technology, globalization, and the economy; Greenhuas & Kossek, 2014; McDonald & Hite, 2018; Mirsha & McDonald, 2017). Sustainable careers are “the variety of paid and unpaid work experiences that provide continual growth and renewal and that intersect multiple life contexts resulting in meaning and well-being for individuals over time” (McDonald & Hite, 2018, p. 350).

The key characteristics of sustainable careers include:

a) longevity in the face of technological and economic conditions to sustain longer careers,

b) resilience to disruptions and challenges with the agility to adapt,

c) interdependency and recognition of the global and external factors impacting careers, and

d) social justice emphasizing access to and preparation for decent work for all and more inclusive organizational cultures (McDonald & Hite, 2018).

As the marketplace is shifting, identifying the skills and competencies needed by middle skill workers is critical to supporting their long-term career sustainability. The emergence of COVID-19 related changes has impacted many areas of predicted skills and must also be evaluated as part of preparing a highly qualified workforce with sustainable careers and skills for jobs of the future.
Methods

The central aim of this media review is to identify middle skill workforce trends in learning and development related to the COVID-19 pandemic. The review is descriptive and follows an integrative synthesis approach which aims to summarize content from multiple news media sources while minimizing interpretation by the reviewer (Harden & Thomas, 2010). This analysis of news media is framed by two general questions:

What is the public perception of middle skill workers and how have they been impacted by the COVID-19 outbreak?

In light of COVID-19 related workforce disruptions, what stories emerge from published media to suggest needs and directions for future learning solutions targeted at improving middle skill individual and organizational outcomes?

Lexis Uni (formerly LexisNexis), one of the most comprehensive news database sources (Altheide & Schneider, 2013), was used to identify 485 media articles published from January 1, 2020 through June 25, 2020 reporting the impact of COVID-19 on middle skill workers. Five primary sets of key words describing the middle skill workforce were individually searched in the advanced Lexis Uni search including: “COVID” +“middle skill” (seven articles), “COVID” +“blue collar” (247 articles), “COVID” +“skilled worker” (four articles), “COVID” + “skilled workforce” (205 articles), “COVID” + “technical workforce” (22 articles), and “COVID” + “skilled worker” (zero articles). The word “technician” was also initially used however, the articles that were returned in that search were out of the context of this paper and focused primarily on medical laboratory technicians. Also, the search initially included a search of each identified key word with the word “Corona” instead of “COVID” but that search also returned articles unrelated to COVID-19. Additional filters in the news search included articles in English and location by publication in the United States. The units of analysis included news media integrating media articles from newspapers, industry trade press, news transcripts, general news articles from newswires, company filings, stock reports, executive materials, industry analyst reports, and congressional publications. Other less reputable and less sourced publication types such as web links, blogs, web-based publications, and newsletters were excluded. After review of all 485 articles, 177 articles were included in this study.

The media articles were analyzed in MaxQDA12 using thematic content analysis. Content analysis is the prominent method for studying news representations (Hodgetts, & Chamberlain, 2014). Content analysis was conducted using an adaptation of Hodgetts and Chamberlain’s media content analysis process: (a) identify the topic and scope of data required; (b) identify key themes, coding, selecting, and checking for discrepancies; (c) grid, visualize, and break down data to explore emerging patterns; (d) order themes, link, and construct a new analytic story; and (e) develop an overall interpretation and writing (2014). It is important to note that in this analysis, items b and c were reversed from Hodgetts and Chamberlain’s original process. The reason for this reversal is that in the original process gridding appears to be manually done however, to utilize the full data visualization capabilities of MaxQDA visual tools; code matrix and code relation browsers were used to identify connections in the data that would be difficult to identify manually. Otherwise, the other steps in the Hodgetts and Chamberlain (2014) process were followed.

Results

The findings from this study explore the strategic importance of the middle skills workforce, challenges and changes for middle skill workers and organizations as a result of the COVID-19 pandemic, and middle skill learning opportunities. Table 1 provides an overview of major themes, subthemes, frequency of themes appearing in media, and types and number of articles per theme.

**Strategic Importance of the Middle Skills Workforce**

Throughout analysis of the articles, the most frequently coded items (78 total codes in 68 articles) were those related to the strategic importance of the middle skills workforce and the need to recruit and retain this important workforce. The industries reported in the articles of this analysis include: healthcare (also biotechnology and medical devices), skilled trades, design, supply chain (logistics and transportation), information and data storage, food production, advanced textiles and materials, construction trades, welding consumables, food and agriculture, defense, aerospace, shipbuilding, advanced manufacturing, and apparel.
Although unemployment has soared during the COVID-19 pandemic, the skills gap is continuing to grow. The skills gap and lack of a skilled workforce is a problem of great concern because it impedes growth for individuals, organizations, and the market as a whole. Lack of a skilled workforce was specifically mentioned in 29 articles coded 31 times as a major challenge that organizations expect to face in 2020 and beyond. This issue also impacts regional growth and community economic development. Federal and state spending has been allocated to support regional workforce development programs providing training to enhance regionally demanded skills and address the talent gap. These workforce development programs are vital to bolstering regional economies as state Representative Matt Hall of Michigan stated, “The single-largest barrier to economic growth that job providers … have communicated to me is the lack of a skilled workforce” (States News Service, 2020a).

Innovations and partnerships such as Next Chapter and Generation T are also poised to support job matching and recruitment to combat the skills gap. Next Chapter company CEO said, “employers are grappling with the seemingly endemic skills gaps in healthcare, supply chain, and skilled trade fields” thus a new platform was launched to help displaced workers identify new roles with employers and sectors that are hiring (Guild Education, 2020). Instead of focusing on reemployment of existing workers, other solutions such as Generation T are focusing on recruiting new generations into the middle skill workforce. In response to the fact that one third of the skilled technical workforce will retire by 2028 and only four percent of high school seniors are considering a career in skilled trades, PeopleReady, an industrial staffing agency, is supporting the Generation T movement to reignite interest in skilled trades and reduce the future skills gap (NewsBites, 2020c). Each of these recruitment tools is targeted to prepare and recruit more qualified workers into the middle skill workforce.

Across 18 different company filings and related company filing transcripts, many CEOs and business leaders acknowledged their skilled workforce as a strategic advantage. Emphasizing the importance of this workforce three elected leaders, a union president, a CEO, and the Mississippi Speaker of the House all refer to this workforce as the “backbone” of their company and the United States economy (DSV Panalpina A/S, 2020; NewsBites, 2020b, States News Service, 2020d). As organizations are scrambling to implement a variety of measures to balance the financial impact during the crisis, most express primary concern for taking care of their most critical resource, their people. Asking workers to give up net pay, furloughs, adjusting work sched-
ules, mandatory use of vacation time, reducing number of hours, temporary layoffs, reduced use of subcontractors, restructuring, and reducing executive compensation have all been identified as strategies for rightsizing the cost base while retaining technical talent. Unfortunately, other companies have been forced to scale down the size of their workforce through more permanent layoffs. However, throughout all articles only four companies were specifically identified as utilizing layoff strategies, while 24 other documents more generally mentioned layoffs impacting middle skill workers. Regardless of the strategy selected, the importance of retaining the skilled technical workforce was a strong emphasis. A highly skilled, highly qualified middle skill workforce was identified as critical not only to managing the current crisis but also a vital part of long-term success, growth, and competitiveness.

The pervasiveness of global impact on corporations and the workforce was heavily evident with 114 of the total articles referencing a global presence or global impact. Additionally, six articles identified an urgent need to shore up the middle skill workforce supporting national security in the armed forces, aerospace, supply chain, defense industry manufacturing, and telecommunications. In speaking to the training need to prepare workers in national security roles, John Mengucci CACI's President and Chief Executive Officer said, "CACI's tailored language and cultural training programs provide vital tools and expertise to national security professionals carrying out this mission" (NewsBites, 2020a).

To further address the needs of both the workforce and middle skill families, at least 40 U.S. Senators and eight U.S. Representatives are quoted as either authoring or calling for support of COVID-19 legislation or funding packages. Legislation includes the Families First Coronavirus Response Act, Relaunching America’s Workforce Act, the CARES (Coronavirus Aid, Relief, and Economic Security) Act, and increasing funding to the already established Workforce Innovation and Opportunity Act and Carl D. Perkins Career and Technical Education Act. Other federally funded relief has been in the form of the U.S. Department of Agriculture’s National Institute of Food and Agriculture Grant Scholarships, dislocated worker grants providing temporary employment and training programs through state and local workforce programs, defense industry workforce protection funds, and layoff aversion funds. Elected officials “have taken a tremendous step toward ensuring a rapid and robust economic recovery for the nation by making a significant investment in our nation’s greatest asset - our skilled workforce," said John Beauregard, President and CEO of the Eastern Connecticut Workforce Investment Board (Courtney, 2020).

As shown throughout this section, the strategic importance of the middle skill workforce and addressing the skills gap of this workforce represented the majority of the articles published about middle skills workers during this time period. Thus, this was the largest and most prevalent theme throughout analysis of the media articles. The wide variety of the types of articles addressing this topic and the pervasiveness of this theme across many different levels being emphasized from an individual worker perspective, to an organizational perspective, to a community and regional perspective, and even a national perspective verifies this as major public issue around which collective action and response is beginning to emerge.

**Challenges and Changes**

An understanding of the challenges facing the middle skill workforce provides insight into ways to shape learning and development programs that respond to employer, marketplace, and workforce needs. The challenges faced by this workforce most often identified by the articles in this study include general challenges, safety challenges, and challenges addressing inequality.

**General Challenges.** Article analysis revealed that many middle skill workers are facing COVID-19 challenges similar to all working Americans such as adapting to working from home, becoming more efficient in the use of teleworking technologies, and balancing childcare in the absence of schools and daycare availability. However, this seems to be where the similarities end. Additional, middle skill challenges identified in these media articles included adaptation to new business models, dealing with automation, and redefining employers and work structures.

New business models have begun to emerge as a result of COVID-19 changes. Some are temporary changes requiring adapting to new job responsibilities and roles as workers’ jobs and manufacturing output have been repurposed to make personal protective equipment (PPE), soap, hand sanitizer, diagnostic testing, and ventilators. Companies such as GE, Medtronic, Novacyt, Ford, and General Motors are reporting new manufacturing agreements. To enable these vastly different product lines to be manufactured all companies listed here, across
a variety of newswires and company filings, have discussed the importance of a highly skilled, flexible workforce with strong manufacturing capabilities.

More permanent changes to business models in industries that employ middle skill workers are dealing with integration of automation. The importance of automation as a corporate strategy is written about in more than 10% of all articles (20) with the most automation discussion appearing in company filings reviewing end of term earnings and outlining future strategies. Mark Muro, a senior fellow at The Brookings Institution believes automation will accelerate as a result of COVID-19 stating,

It is likely that the current trend of automation and machine learning replacing human workers will accelerate as a result of this crisis, because the sudden reopening of businesses will require many companies to find employees very quickly despite their declined revenues … this environment might encourage many companies to turn to cheaper, more efficient robotic workers that will replace blue-collar jobs, becoming another barrier to social mobility and education among lower-income students while potentially increasing jobs for those in the tech industry. (Cho, 2020, p. 2)

Twenty-one articles also mentioned new and broader ways of defining employers as the COVID-19 related downturn has accelerated growth of nonstandard and more precarious types of employment. Part-time workers, gig workers, and workers with multiple employers bring new employment needs, expectations, and skill needs to the workplace. This trend is also leading to new portable benefit systems that move with workers. After conducting a survey on the impact of COVID-19 on gig workers, Yong Kim CEO and Co-founder of Wonolo an online staffing platform stated, "Gig workers have already played an essential role in preventing an even greater economic collapse during the COVID-19 pandemic and will play a critical role in driving America's recovery" (Wonolo, 2020).

**Safety Challenges.** COVID-19 safety related concerns drastically disrupted the American workforce. Some in the middle skill workforce are working from home but nearly 10% of all articles in this study (17) discuss the increased safety risk that the majority of middle skill workers who are essential workers who are required to physically go into the workplace. While, going to work provided continued income for workers, there were many concerns expressed in 11 articles made up of company filings and congressional publications by The Manufacturers’ Association, U.S. Senators and Representatives, and corporate CEOs for personal and family health and safety of workers who must enter the workplace. COVID-19 has promoted discussion of employer accountability and new standards for workplace health and safety, particularly for workers who are required to work in face-to-face, group settings.

Companies reported various strategies to prioritize the health of their workforce and increase workplace safety. To protect the workers, many companies instituted heightened public health protocols which included physical distancing, use of face masks and PPE, increased hand washing and distribution of hand sanitizer, daily wellness checks, and for larger companies extended benefits and sick time off. Organizations have also reported the use of safety strategies such as generally reducing the number of workers on-site and implementing temporary alternate work schedules to reduce and better control the number of people on-site at the same time. Despite these measures the physical work requirements of the middle skill workforce has resulted in disproportionate COVID-19 infection rates among this workforce.

**Inequality Challenges reported.** The COVID-19 outbreak has also served to highlight systemic inequalities and structural flaws which produce and perpetuate racial and economic inequalities. Nineteen media articles comprised of newswires, newspapers (mostly university newspapers), and news transcripts from national broadcasts by CNN, Fox News, and National Public Radio reported the various types of inequalities surfacing and intensified by COVID-19. AdWeek’s first-ever Diversity and Inclusion Summit of senior executives, news broadcasts, and congressional reports identified and discussed issues of inequality heightened by COVID-19. A common theme reported throughout these articles identified an increase in cases of COVID-19 among low and middle skill workers and members of the Black, Latinx, and LGBTQ communities. The reason for the increase in cases among these populations was attributed to being more likely to work in jobs requiring face-to-face contact, having more preexisting health conditions, and having less access to healthcare (Lemon et al., 2020; States News Service, 2020b; Zakaria, 2020; Zanger, 2020).

Another population that was highlighted throughout media coverage as being adversely impacted by the COVID-19 outbreak was women. Women, who are more likely to be single parents than men, also experi-
enced additional challenges in managing childcare while schools and daycares were closed (McKinsey & Company, 2020). This lack of access to childcare combined with the requirement of many middle skill workers to go into work physically is contributing to increased gender gaps in employment and wages. This creates constraints for women forcing them to choose between work and taking care of their children (Kurtzleben et al., 2020). Prior to COVID-19, the female labor participation rate had grown to record highs, but this new crisis threatens to undermine these gains and further aggravate the challenges faced by working women (McKinsey & Company, 2020).

COVID-19 was reported to have more deeply affected low and middle skill Black, Latinx, LGBTQ, and female populations. The pandemic is also predicted to have longer lasting effects on these disadvantaged populations. While many middle skill workers were able to continue working, many more were unable to maintain a steady income due to layoffs (temporary and permanent), furloughs, and reduced work hours which further expands the economic divide between class and race (Acosta et al., 2020; Zanger, 2020). In fact, it was reported that there is a greater risk that some types of low and middle skill jobs may not return with the eventual recovery (Stiglitz et al., 2020). There is however hope that as COVID-19 has exacerbated challenges related to inequality that it will also prompt new ways, institutions, and measures to stop the trend toward greater inequality (Stiglitz et al., 2020).

Middle Skill Learning Opportunities

Fifty articles specifically identified importance and strategic value of quality learning initiatives. Initiatives included traditional higher education degrees and certificates, company sponsored learning and development initiatives, and flexible learning innovations focused on reskilling the workforce. The focus on reskilling is important because it helps workers to be more prepared and knowledgeable about their current job, better prepared for future jobs and transitions to new careers, and supports workers as they pursue reemployment opportunities as the economy rebounds from COVID-19. Learning opportunities are providing ways for middle skill workers to move into higher paying and more resilient jobs. Frank Britt, CEO of Penn Foster, stated that the focus should be on “rewiring the labor market in a way that enables workers to move from lower wage jobs into middle skill careers that will be higher paying, and far more resilient” (Penn Foster, 2020). Dara Warn, Chief Customer Officer at Penn Foster further stated that providing upskilling opportunities to help Americans get back to work will “lay the foundation to rebuild the economy in the year to come” (Penn Foster, 2020).

Skills for the Future. A recent survey from the nonprofit Strada Education revealed that “57% of Americans in the workforce are worried they will lose their jobs and 33% believe that if they lose their jobs, they will need additional education and new skills to find a comparable one” (Guild Education, 2020). CEO of Kaplan Higher Education, Gregory Marino emphasized the need for workers to learn marketable skills that will not only make them competitive in the new economy but will also support the growth and competitiveness of the organizations in which they work (Guild Education, 2020). As COVID-19 has spurred debates about essential versus non-essential workers, Rahm Emanuel former Mayor of Chicago stated, “We don’t have a person to waste in America in the 21st century. Everybody is essential. And our goal is to invest in your essentialness to the future” (Zakaria, 2020). Identifying the skills and fields in which to invest educational and learning and development capital provide important insight into making the middle skill workforce more marketable and competitive.

Nine articles (five newswires and four congressional publications) cited importance and growing emphasis on digital skills and people who can adapt quickly and learn to use new tools and technologies. Other skills specifically identified were ability to innovate and problem solve, technical leadership, logistics expertise, advanced materials discovery, product development, mechanical system manufacturing, big data analytics, use of automation, and machine learning. Multiple in-demand fields identified included: artificial intelligence, machine learning, digital marketing, product management, data analysis, cloud computing, autonomous vehicles/systems, and programming. Overall, 21 articles discussed the shift in skills and in-demand fields needed to adequately prepare the middle skill workforce for skills and jobs of the future.

Online Delivery. As a result of COVID-19, 11 articles identified that middle skill workers’ need access to training opportunities that are accessible remotely, affordable, and focus on the skills that they will need to be successful in the current, volatile labor market. However, moving learning and training opportunities into online formats has enhanced the fear of broadening the digital divide. One article described the digital divide as effecting regions where workers and students in lower income and rural areas, which are also among the
most minoritized communities, may lack access to broadband and necessary equipment (Targeted News Service, 2020). Measures such as the establishment of the Technical College System of Georgia Emergency Response Fund allocates funding for essential computers and equipment for students in need (States News Service, 2020c).

Online or digital training is providing an option for new low-cost and more broadly accessible training programs to provide skills required in new jobs. In 2019 the global online education market grew with the largest growth attributed to organizations such as Coursera Inc., edX Inc., Instructure, Inc., iTutorGroup, iversity, LinkedIn Corporation, McGraw-Hill, Pearson, Udacity, Inc. and many others (Absolute Market Insights, 2020; Udacity, 2020). Growth is predicted to continue through 2020, especially now that many individuals and organizations are seeking quality online learning and training options (Absolute Market Insights, 2020).

Opportunities for Workers. Across the subtheme opportunities for workers and leaders there were 38 total articles. Topics such as safety training, certification, diversity and inclusion (D&I), and personal development were identified as individual level learning opportunities. The most common topic was safety training (NewsBites, 2020d). Several companies have reported new safety training programs, delivered on a regular basis, that blend classroom and hands-on training. The safety topics include proper use of PPE, work zone safety, dealing with the strain and stress caused by COVID-19, chemical handling requirements, and more. Twenty-one articles specifically mentioning companies such as GE, Medtronic, Novacyt, Ford, and General Motors discussed retraining the workforce to prepare them for new projects ranging from new company initiatives to training to prepare the workforce to produce a new type of end product such as PPE or ventilators.

Short-term certifications were identified in six articles as a tool for increasing employability through engaging in new learning opportunities. Most of these articles highlighted the importance of developing certificates and programs with working adults in mind. While certifications typically increase employability, one limitation of certifications that was highlighted was the restrictive nature of occupational licensing laws which act as barriers to movement across state lines for skilled workers (Singer, 2020). There were many examples of newly launched certificates shared. Facebook has partnered with Pathstream to provide certificates in digital marketing, sales, and skilled trade programs (Guild Education, 2020). Udacity announced its new Nanodegree® programs for in-demand fields including artificial intelligence, machine learning, digital marketing, product management, data analysis, cloud computing, autonomous vehicles, and programming (Udacity, 2020). SkillsUSA also introduced a new credentialing process to assess how ready potential employees are for a given job (SkillsUSA, 2020).

Other examples of learning opportunities launched during the COVID-19 pandemic have included D&I and personal development emphases. A new company, D&I Consultancy, launched a new online program called The Diversity Movement. The Diversity Movement is designed to be implemented at the organization level through multiple interventions delivered via online courses (O’Hara, 2020). In the area of personal development, a need was identified to increase knowledge of personal financial management to support more stability of low and middle skill workers during non- or low-paying time periods. Personal financial management training is designed to help to increase the long-term financial stability of workers and to reduce the financial pattern of living paycheck to paycheck (Udacity, 2020). Finally, some organizations are using this time of reduced production to accelerate efforts to reskill their workforce by providing new training opportunities for their workers. Unisys Corp. has identified new technology and future market opportunities in the field to shape their training and strengthen their workforce (Unisys Corp., 2020).

Opportunities for Leaders. Analysis of public media published during the COVID-19 pandemic also revealed information about the learning needs and opportunities of leaders and supervisors who manage the middle skills workforce. Of the 38 articles which outline opportunities for workers and leaders, 11 articles discuss the importance of leaders and managers focusing on retention of the skilled technical workforce before and after the pandemic. Hiring and maintaining a skilled workforce, retention initiatives for the less resilient blue-collar employment sector, and maintaining specialized employee skillsets were all identified as strategically important to the outcome of the organization (ATS Automation Tooling Systems Inc., 2020; ThinkWhy, 2020). Training in retention of this workforce is a learning opportunity for leaders which directly links to the primary theme of these research findings of the strategic importance of the middle skill workforce.

Articles also identified the need for leaders and managers to have knowledge and expertise on how to balance financial impact during the COVID-19 crisis. This knowledge and expertise included managing changes to the
workforce size, scheduling, compensation, accelerating payments to vulnerable suppliers, and establishing and implementing business continuity plans (AAR Corp., 2020; Briefing.com, 2020). The need for managers to be well versed in the worker rights and human resource benefits of this vulnerable population was also identified. Understanding the nuances of human resources benefits will enable managers to better address issues of sick leave for the estimated 34 million American employees with no access to sick leave who need to stay home when sick or take care of others who are sick (Harlow et al., 2020). Solutions to this issue have included expanding worker benefits during the COVID-19 crisis to include emergency time off and flex time benefits for gig workers, calls for policy makers to subsidize COBRA benefits to ensure continued health coverage for laid off Americans, and portable benefits systems (International Union of Painters and Allied Trades, 2020; Stiglitz et al., 2020).

Other predictions of new challenges for organizations in 2020 include lack of a skilled workforce, data complexities, more stringent regulations, and dealing with supply chain disruptions (Quantzig, 2020). Specifically, four articles discussed the importance of use and analysis of big data to support decision making. Ability to adapt and manage the supply chain to be shorter and more flexible has also been viewed as a critical element for business success during the unexpected COVID-19 related disruptions (Alphabet Inc., 2020). Leaders who are skilled and knowledgeable in these areas will be able to focus on bringing production back online and maintaining a skilled technical workforce as the COVID-19 social distancing ends.

Higher Education. Sixteen articles discussed strategies implemented by institutions of higher education during the COVID-19 pandemic. Many higher education institutions identified the importance of flexibility in being able to pivot from traditional delivery to online delivery. A trend that surfaces throughout 14 of the higher education articles is the increased need to be innovative in the face of educational disruptions caused by COVID-19. Innovations such as new types of degree and certificate programs and new forms of delivery and instructional practices were discussed. An example of a new form of innovation delivery is the development of the P-TECH or Pathways to Technology program. This program is an early career six-year high school that has partnered with over 600 employees and enables students to earn an associate degree in technology while earning a high school diploma (International Business Machines Corp., 2020). Finally, reducing administrative barriers to support student learning was identified as important. To reduce the administrative barriers, the Office of Postsecondary Education at Florida Department of Education introduced a new rule to amend the definition of clock hour to provide flexibility for distance learning (Carr, 2020). This new definition emphasizes the importance of demonstrating learning rather than counting seat time hours.

Increased access to higher education and training opportunities were identified as critical to helping workers to better adapt to trends such as the rise in automation which is predicted displace many middle skill workers. Dr. Heidi M. Anderson, President of University of Maryland Eastern Shore states that grants providing educational funds for students enrolled in programs are “critical to the economic fabric of [the region], the State, and the nation” (Courtney, 2020). CEO of Pathstream, Facebook’s course partner, recounted that of the 7.2 million jobs lost during the Great Recession, 99% of the jobs of recovery went to college degree holders and suggests that this pandemic will result in a similar outcome with a growing emphasis on the importance of digital skills (Guild Education, 2020). Access to new educational and learning and development funding sources helps to ensure that the middle skills workforce will be well positioned to obtain sustainable career opportunities.

Providing additional funding to increase accessibility to higher education through either scholarships or free tuition to public institutions was identified in eight articles as a strategy that will help middle skill workers to reskill, upskill, and prepare for new marketplace realities. Middle skill scholarship programs include SkillsUSA’s support of the rapid transition to online learning through providing free access for up to 40,000 students to the SkillsUSA Career Essentials suite (SkillsUSA, 2020). Also, the #KeepCraftAlive scholarships were established for deserving students to continue their education (SkillsUSA, 2020). In a related funding opportunity, Udacity’s Pledge to America’s Workers job training grant will provide 100,000 technical training scholarships by 2025 (Udacity, 2020). In addition to supporting training scholarships, Udacity is also calling on corporations who are faced with downsizing to include retraining as part of severance planning (Udacity, 2020).

Alternative Learning Opportunities. Alternatives to course-based learning and development approaches, aimed at upskilling, reskilling, and preparing the workforce were highlighted. These approaches have been implemented as pipeline and workforce development solutions for the pre-workforce, new to the workforce solutions, mid-career solutions, and post-workforce solutions. Five articles discuss the importance of pre-
workforce solutions including enhancing recruiting efforts and developing training programs that partner with various schools to create a pipeline for technicians (AAR Corp., 2020; Reed, 2020; Van Hollen, 2020). The shipbuilding industry has developed several talent development labs for high school students to provide more hands-on experience and knowledge of needed skills (NewsBites, 2020b). Also, TrueBlue and Generation T have joined to launch PeopleReady an initiative designed to address workforce myths and reignite interest in blue collar careers (NewsBites, 2020c).

Two articles specifically discuss early and mid-career solutions in the form of apprenticeships (International Business Machines Corp., 2020; Shields, 2020). In one example, the energy sector is using formal apprenticeship programs to train new skilled workers. Mid-career apprenticeships, called 21st century apprenticeships, have also been introduced as workers are looking to switch careers (International Business Machines Corp., 2020). Returnships, a concept put into place mostly for women who have left the workforce to serve in caregiving roles, are providing avenues for workers to return to the workforce (International Business Machines Corp., 2020). Finally, post-career workforce solutions discussed were aimed at supporting workers who have been displaced. Next Chapter is providing coaching opportunities for displaced workers to help them identify reskilling opportunities in growing industries such as technology, healthcare, and the skilled trades (Guild Education, 2020). Each of these alternative learning opportunities are aimed to provide greater career sustainability to workers through increased skills and knowledge from the field.

**Discussion**

The COVID-19 pandemic has emphasized the importance of creating more resilient systems that are less vulnerable to disruption. Most news articles analyzed in this study generally agree that agility and adaptation are key to this resilience. This is consistent with prior research that links crisis management with leadership competencies that require organizational agility to support business recovery and promote organizational resilience (Wooten & James, 2008). Various learning solutions have been specifically identified as key to the success of managing COVID-19 related disruptions in the middle skill workforce. The combination of these findings support prior middle skill research and can suggest learning solutions for the middle skill workforce that support short-term recovery from COVID-19 challenges, support companies in global competition and long-term growth, and establish sustainable careers and a more resilient workforce (National Science Board, 2019; World Economic Forum, 2018a).

Establishing sustainable careers and a more resilient workforce can be done through high-quality, data driven educational solutions (McDonald & Hite, 2018). Given that the middle skill workforce is technically skilled in specific areas of domain expertise, effective learning and development for this workforce has specific needs. Learning solutions look different and are delivered differently for middle skill workers. As new COVID-19 challenges, increasing automation, and new technologies emerge education is a primary factor mediating the relationship between new technology and employment (Burning Glass Technologies, 2019; Garcia-Murillo et al., 2018). It is also important to recognize that learning solutions come in many forms other than traditional degrees, certificates, and/or industry sponsored learning and development. While in many cases, training for current and future needs is lacking, COVID-19 related challenges have prompted many innovative and out-of-the-box solutions (Christo-Baker et al., 2017). The innovative learning solutions shared in this media analysis are aimed at supporting recruitment, retention, and education of the middle skill workforce. Human resource development practitioners may draw from and build on these solutions to continue to strengthen the middle skill workforce. The findings highlight the importance middle skill career sustainability as an emerging theme in human resource development research and practice (Lawrence et al., 2017).

Finally, training programs need to focus on long-term impacts such as tackling the structural flaws that produce racial and gender inequalities. Given that this workforce is already more vulnerable in the workplace, focus on and incorporation of a social justice perspectives is of even greater importance (Autor, 2015). Social justice efforts should reflect the current context of work while recognizing social and economic conditions (McDonald & Hite, 2018). D&I initiatives while they are growing in importance in the workplace, must go beyond hiring and recruiting (Combs et al., 2019). Learning and development must focus more on D&I as well as addressing workplace inequities. The inequality of the workforce was a strong theme throughout the media articles indicating a need to develop more effective measures to stop the trend toward greater inequality.
Limitations

The findings and conclusions of this study are limited by several factors. First, at the writing of this article COVID-19 had impacted the American workforce for approximately six months. This short window of time provides little to no empirical research upon which to build discussion and implications. Second, while analysis of media articles and public corporate filings provides important insight into public awareness of the issues, it does not provide as in-depth nor reliable analysis as other research methods. Finally, the generated themes require careful interpretation in light of the emerging nature of the subject matter under investigation.

Future Research

The importance of training middle skill managers and supervisors in key areas is critical to the short-term recovery from COVID-19 related challenges. Leaders and managers have direct impact on the overall work environment and have been found to significantly influence employee turnover (Malek et al., 2018). The crucially important middle skill workforce must be retained (National Science Board, 2019). A variety of new management and cost balancing strategies, discussed in this study, have been introduced throughout the marketplace. Future research is needed to determine the success and efficacy of these actions. Additionally, ability to adapt to new business models and rapidly adjust the supply chain in a way that responds to global and external factors is also key to not only organizational success but also in the ability to support and retain the middle skill workers’ careers (Greenhaus & Kossek, 2014). The need for businesses to respond to changes in globalization have been previously recognized as vital for success but as COVID-19 has created a new worldwide pandemic, more research needs to be done to determine how interconnected and vulnerable countries and industries may be.

Additionally, this media analysis reveals that a variety of organizations ranging from non-profit workforce development agencies to industry to higher education have adapted content and delivery of learning solutions as a result of COVID-19. As these solutions continue to be implemented across a variety of organizational and educational environments, more research should be conducted to determine the educational efficacy of these adaptations. Beyond educational efficacy, more research needs to be done on ways to increase access and equity of learning opportunities to the middle skill workforce to support individual career advancement and regional workforce development.

Implications for Human Resource Development

Implications for this research may generally be characterized in areas of education, organization, community, and the workforce. Where few practical guidelines exist, these findings help provide more research-based strategies to develop in-demand skills and career sustainability for middle skill workers (McKinsey Global Institute, 2017). Educationally, this work provides rich information for both K-12 and postsecondary educational institutions and curricula focused on preparing and reskilling middle skill workers. This research will highlight the need for and facilitate much needed communication of the importance of the middle skill workforce in K-12 educational systems where lack of awareness exists (National Academy of Engineering, 2016). Initiatives such as Generation T represent an opportunity to bolster the middle skill pipeline by introducing students to technical skilled career pathways. Also, the adaptation of learning opportunities to more distributed, online formats will make new learning opportunities available in high school settings. This makes career enhancing learning opportunities more accessible for high school students regardless of the resources of their local school, district, or availability of teachers qualified to teach the technical skills and competencies required by regional employers.

Exploration of new learning and career opportunities also provides opportunities for linking higher education, specifically two-year colleges and industry. First, given the strong emphasis on the importance of globalization and the global impact of workers and companies on the marketplace; colleges and industry may work together to ensure that learning programs (courses, certificates, and/or degrees) include both marketable global competencies and forward looking skills for jobs of the future (Mayln-Smith et al., 2017). Two-year colleges are already particularly adept at communicating with and working closely to meet local employers’ needs (Yarnall et al., 2016). However, establishing a system and routine to collaboratively evaluate curriculum and learning outcomes will improve curricular alignment of dynamically evolving demanded skills and competencies demanded by regional employers to reduce the skills gap for graduates. More directly engaging two-year colleges and industry creates more opportunities for increased diversity and more meaningful partnerships with two-
year colleges who enroll nearly 45% of the undergraduate population and are among the most diverse student bodies in higher education (The College Board, 2012). Partnering to provide new pathways and learning resources to support the middle skill learning evolution supports major workforce trends, opens new avenues for developing more agile curricula, and reinforces the importance of lifelong learning (World Economic Forum, 2018).

Within the organization, these new findings may provide guidance to organizations with the potential to impact employee satisfaction, employee engagement, and retention. Advocating for sustainable career practices in organizations and in communities provides an opportunity to link social and ethical components of career sustainability with a social justice perspective by identifying inequalities in workplaces and careers and reinforcing the need for more inclusive societal and organizational cultures with decent work for all (Mirsha & McDonald, 2017). Additionally, acceleration of technology, workplace automation, and globalization are often cited as central causes for inequities in the workplace (Keeley, 2015). Increasing income polarization is of grave concern because it can cause decreases in economic growth, limit learning opportunities, accelerate declines in social mobility, and generally threaten political stability. Countries such as the U.S. and other advanced economies are at greatest risk for increased income polarization and new research in the area of career sustainability can challenge and transform current educational and workforce training models and approaches to skill-building (McKinsey Global Institute, 2017).

Impacts of this research on the workforce may also be significant. The technical or middle skill workforce with less than a bachelor’s degree comprises nearly half of all jobs and have higher proportions of workers who are both native born and more diverse (National Science Board, 2015). Equally important, these technical jobs represent high paying and stable jobs. However, automation has eliminated many low and middle skill and the new jobs will require more education and career skills than ever before (Gordon, 2015). Middle skill worker education plays a foundational role in building skills for the future, sustaining the strategic importance of the middle skill sector, and developing a deeper understanding of the role that middle skill workers play in supporting national infrastructure and innovation (Frase et al., 2016). This research provides insight into reskilling and retraining the existing workforce providing “essential levers to fuel future economic growth, enhance social resilience in the face of technological change, and pave the way for future-ready education systems for the next generation of workers” (World Economic Forum, 2018b, p. 1).

Conclusion

Fully developing the human capital of the skilled technical workforce is critical to long-term success of organizations (Deloitte, 2019). The COVID-19 pandemic has created new challenges for both middle skill workers and employers. Findings from public news sources suggest tangible education and learning and development opportunities that can position companies and middle skill workers with skills for the jobs of the future. These learning opportunities can support a short-term bounce back from a COVID-19 caused economic downturn, support companies in global competition and future growth, and establish more sustainable careers for workers. This pandemic has caused us all to look at ways to create more resilient systems that are less vulnerable to disruptions and capable of creating more a resilient workforce.

A news article from Foreign Policy Magazine put it best, “This much is certain: The pandemic will lead to permanent shifts in political and economic power in ways that will become apparent only later” (Stiglitz et al., 2020). The human resource development community, through implementation of data driven learning solutions, can help organizations and middle skill workers to reach positive and sustainable outcomes.

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