Building Resiliency and Creating Innovation in the Digital Age Through Leadership and Human-Connection

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A soft skills gap is evident in all business sectors. The future of competition and innovation in America is dependent upon a strong workforce rooted in science, technology, engineering, and mathematics (STEM) to facilitate and connect technology with humanity. The study conducted 27 interviews with STEM employers in the top-growing healthcare industry to identify emerging skills and strategies needed for innovative growth in the future of the healthcare industry. Hearing their voices through semi-constructive interviews, all participants (100%) indicated the demand would only increase for future STEM college graduates. Most respondents (93%) identified leadership starting with self-leadership and the ability to connect with others (89%) on top of their emerging soft skills. They indicated that the key to innovation in the digital age resides in our competencies to unite humanity and technology to facilitate decision-making and effectively deliver results.

Keywords: leadership, healthcare, STEM, soft skills, humanity, digital age

INTRODUCTION

STEM Healthcare in the Digital Age

The future of competition and innovation in digitalized America is dependent upon a strong workforce rooted in science, technology, engineering, and mathematics (STEM). Over the past century and a half, the strength of STEM industries within the United States helped construct a robust national drive for innovation and technological/scientific advancements, stimulating global economic growth and competitiveness (National Academies of Sciences, Engineering, and Medicine, 2016). STEM occupations are diverse and vast. They include biological, agricultural, and environmental life scientists, computer and mathematics scientists, physical and social scientists, engineers, science and technology managers, and technicians (National Science Foundation, 2018). Data from the Pew Research Center on employment trends from 1990 to 2016 reveals that 52% of STEM workers were employed in healthcare and that STEM employment gains significantly outpaced that of overall employment (79% vs. 34%) (Funk & Parker, 2018).

While STEM disciplines have played a significant role in the nation's trajectory toward innovation and economic growth (White & Shakibnia, 2019), industry and employment experts have expressed concern that our country may not have an adequate supply of skilled technical workers to maintain its global competitiveness (Olson & Riordan, 2012). It is projected that during this decade, the United States will

need an additional one million college graduates with STEM education to meet employment needs in healthcare and other fields (Cimatti, 2016; White & Shakibnia, 2019).

Technological advancements in digital automation, robotics, and big data are transforming STEM healthcare (Autor & Salomons, 2018; Fujii & Managi, 2018; Manyika et al., 2017). As time continues, this advancement will only become further cemented with the development of innovations like Robotic Process Automation, which enables medical and surgical artificial intelligence, robot nurses, and the light/sensor technologies of autonomous vehicles (Hamstra, 2018; MIT Technology Review Insights, 2019; Smithsonian Science Education Center, 2018).

Soft Skills Gap in STEM Healthcare Workforce

As businesses struggle to fill critical and skilled roles in STEM occupations, the workforce throughout the United States is facing a skills gap crisis, with implications for economic competitiveness (Garvin, 2013; Weiss, 2019; White & Shakibnia, 2019). There is a national misalignment in the workforce regarding soft/transfer and hard/technical skills (Association of American Colleges and Universities, 2018; Francis & Auter, 2017; J. P. Morgan, 2019; Smith & Morris, 2017; White & Shakibnia, 2019). This misalignment is due to a widening imbalance of prioritizing technical skills over soft skills (Francis & Auter, 2017; Coy, 2019; Patacsil & Tablatin, 2017).

Soft skills referred to as transferable skills, are defined generally as "abilities like teamwork, collaboration, leadership, problem-solving, critical thinking, work ethic, persistence, emotional intelligence, organizational skills, creativity, interpersonal communication, and conflict resolution" (Karimi & Piña, 2021, p. 22). Soft Skills are essential to the success of entry-level and leadership healthcare roles (Abraham, et al., 2021; Ashbaugh 2003; Doley, et al., 2021; Karimi & Piña, 2021; Kroning, 2015; Saiyad, 2018). Other research finds a correlation between success and soft skill competencies in other STEM professions (e.g., Deming, 2017; Livia, et al.2017; McCraw, 2017; Patacsil, & Tablatin, 2017; Wilkie, 2019).

Table 1 below shows the results of an online 2020 Association of American Colleges and Universities survey of over 1,000 employers from diverse organizations in the private, public, government, and non-profit sectors. Results indicated employers do not believe most graduates possess the preparedness needed for workforce success – leading to a skills gap that is not being managed effectively (Association of American Colleges and Universities, 2021).

TABLE 1
RECENT COLLEGE GRADUATE PREPAREDNESS FOR WORKFORCE SUCCESS

Soft Skills-Based Learning Outcomes	Recent Graduate Preparedness (%)	Considered Highly Important (%)	Preparedness Skills Gap
Work effectively in teams	48	62	14
Critical Thinking Skills	39	60	21
Analyze and interpret data	33	76	-43
Apply Knowledge in real-world setting	35	76	-41
Demonstrate complex problem-solving	40	80	-49
Communicate Effectively through	38	77	-39
Integrate ideas across different settings	42	77	-35

Source: Association of American Colleges and Universities (2021), p. 16

Prioritization of Technical Skills Over Soft Skills

This misalignment has been attributed to a widening imbalance that prioritizes technical skills over soft skills (Francis & Auter, 2017; Coy, 2019; Patacsil & Tablatin, 2017). As a result, according to the U.S.

Chamber of Commerce Foundation (2018), somewhere along the path from education to employment, the system is not routinely equipping students with the soft skills they need to succeed. This imbalance is present despite the value that employers across all sectors place on soft skills (Association of American Colleges and Universities, 2021; Linkedin, 2019).

Meanwhile, Chief Academic Officers and other educational leaders argue that they are providing competent, skilled graduates for the job market (Bidwell, 2014). According to the National Academies of Sciences, Engineering, and Medicine (2016), 96 percent of today's educators believe they are providing students with a STEM education that delivers workforce-ready graduates to the job market. However, only 11 percent of U.S. employers agree with these assertions. Despite the value disparity that academia places on soft and technical skills, employers continue to rate soft skills as highly as technical skills (Linkedin, 2019). According to Weiss (2019), in many cases, soft skills are considered more important than technical expertise.
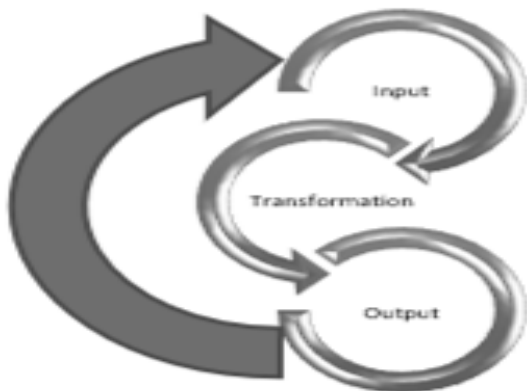
An example is Google's Project Oxygen, which tracked hiring and firing trend practices; the seven top characteristics of career success were soft skills, with technical STEM skills ranked last in terms of importance (Weiss, 2019). Clearly, with the increase in demand for STEM graduates with soft skills, it is noticeable that the U.S. industry cannot accomplish its goals without systemic reform (American Associations of Colleges and Universities, 2021; Francis & Auter, 2017; J. P. Morgan, 2019; Smith & Morris, 2017; White & Shakibnia, 2019; World Economic Forum, 2018).

Organizational Transformation

A possible explanation for the disconnect between higher education and employers is provided by Betts (1992) and Bastedo (2004). They suggest that needed improvements can be facilitated by adopting an open systems approach. Ludwig Von Bertalanffy, the founder of General Systems Theory, described an "open system" as an entity that receives input from and sends output to its environment. Open systems can evolve and self-regulate as they interact with and receive feedback from their environments. Systems can also be "closed" or isolated from their environments (Bertalanffy, 1968). Although initially devised to explain biological systems, open systems have been adapted to many arenas, including social sciences, business, and education (e.g., Banathy, 1992, 2000; Bastedo, 2004; Betts, 1992).

Open systems allow for cycles of input, transformation, and output that continuously flow within organizations. Through the feedback loop cycle, as depicted in Figure 1 below, organizational outputs connect with renewed organizational inputs, thus feeding organizational change. Through open systems, organizations can help improve the soft skills gap by knowing what is needed and what needs to be changed to transform the STEM healthcare industry.

FIGURE 1
TRANSFORMING FEEDBACK WITHIN ORGANIZATIONS

Purpose of the Study

This study focused upon the intersection of STEM and the healthcare industry. The goals of this study were to examine the current state of the soft skills gap; determine what is needed to sustain innovation within STEM healthcare by identifying key soft skills competencies of STEM undergraduates; provide guidance to business and academic leaders for creating an operational strategy between their entities to enhance innovation within the STEM healthcare industry. Technological advances such as artificial intelligence or robotics rapidly enter the STEM healthcare industry, and soft skills competencies or human intelligence are needed to complement technical skills. Both skills impact innovation, and a better understanding of this phenomenon is required to reduce the soft skills gap among STEM undergraduates.

Prior quantitative studies have addressed the STEM soft skills needs and gaps; however, few studies have qualitatively measured employers' perceptions through in-depth, face-to-face conversations focusing on innovation sustainability. To uncover the root of the soft skills gap as well as strategies to ameliorate it, this qualitative research sought to answer the following research questions:

R1: Does a soft skills gap exist among recent healthcare STEM graduates?

R2: Which soft skills will be most in demand for the future of healthcare?

R3: Are healthcare employers currently collaborating with academia?

R4: What can be done to reduce the soft skills gap within the current STEM climate?

METHOD

Participants

The participants were healthcare executives and managers throughout the state of Kentucky. Criterion sampling (Creswell & Poth, 2018) was utilized to limit participants to those who had recently hired or worked with STEM graduates. The final selection of 27 participants ranging from small businesses to Fortune 500 organizations. Four participants were CEOs, four were Vice Presidents, five were HR managers, six were directors, and eight were department managers. Four participants worked at smaller organizations, twelve at mid-sized organizations, and eleven at larger organizations. Twelve of the participants were women, and fifteen were men.

Data Collection

Data was collected using a semi-constructive interview. Semi-structured interviews provided participants ample opportunities to reflect on the interview questions and offer their insights. This qualitative research followed Walker's (2012) guidelines, which suggest using saturation to determine when there is adequate data (i.e., when subsequent interviews cease to add new data to a topic). The study used constant comparisons with previous data to confirm information and constructs found across or between data samples, steering the researcher towards the final phase of theoretical saturation. The strength of this method lies in the fact that accumulating data continues until the discovery of any new data confirms findings from previous data (Glaser, 1992).

Data Analysis

The data analysis involved open, axial, and selective coding procedures, as Strauss and Corbin (2015) recommended, which began soon after each interview's transcriptions were completed. Using this approach, the researcher sorted, coded, and analyzed the data as it was collected (Wilkin, 2010). Themes and patterns were uncovered during the data interpretation phase to make meaning of the raw data. In this phase, the participants' feedback was reduced and broken into themes, clusters, categories, and subcategories based on their characteristics, properties, and dimensions (Strauss & Corbin, 2015).

RESULTS

The purpose of this qualitative study was to hear the voices of 27 STEM managers and executives to better understand the causal conditions that are leading to the growing soft skills gap amongst recent undergraduate STEM students entering the healthcare workforce. The study aimed to identify key soft skills that will be needed from these graduates for the future of the healthcare workforce and to provide guidance on how healthcare managers may be able to address the soft skills gap. Results of the interviews and coding yielded four primary themes that address the four research questions of this study:

1. The soft skills gap exists among recent STEM undergraduate students.
2. Key soft skills will be in demand for the future of healthcare.
3. Employers and academic institutions are not systematically collaborating.
4. Collaborative partnerships aimed at reducing the soft skills gap heavily depend on leadership.

Theme 1: Soft Skills Gap Amid Recent Undergraduate STEM New Hires

The first research question asked whether a soft skills gap exists among recent healthcare STEM graduates. When employers were asked if they had ever experienced a soft skills deficiency amongst their new STEM undergraduate hires, 100 percent of the 27 interviewed employers said yes. These responses align with prior research which claims the misalignment of interests at the intersection of the workforce and higher education is generating a national soft skills gap. The most reported soft skills that are lacking amongst recent entry- The first research question asked whether a soft skills gap exists among recent healthcare STEM graduates. When employers were asked if they had ever experienced a soft skills deficiency amongst their new STEM undergraduate hires, 100 percent of the 27 interviewed employers said yes. These responses align with prior research, which claims the misalignment of interests at the intersection of the workforce and higher education is generating a national soft skills gap. The most reported soft skills that are lacking amongst recent entry-level STEM hire in the healthcare industry are the following:

- Forming a 'human connection' with patients or colleagues
- Critical thinking
- Creativity
- Receiving/giving constructive feedback
- Professionalism
- Communication
- Collaboration

Lastly, employers stressed the importance of specific soft skills that they claim students should master before or upon graduation to attain a job. Examples of soft skills that employers mentioned are:

- Email communication
- Clear, confident, professional communication in interviews or career fairs
- Phone communication
- Active listening
- Reliability
- Timeliness in responding to emails or voicemails
- Assertiveness, confidence, and ability to accept feedback

Theme 2: Key Soft Skills Will Be In-Demand for the Future of Healthcare

The second research question addressed the future of soft skills. The second theme identified significant soft skills that will be in demand as the future unravels. This relates to research done by the World Economic Forum (2018), which stresses that sophisticated new technologies will eventually become capable of overtaking highly technical and repetitive tasks, therefore cultivating a workforce that will require lesser technical skills development. In effect, this means technology will likely force society to value STEM professionals who master soft skills since these individuals will be able to guide the development and application of data using a human-centered approach. For instance, according to Barr (2019), emerging technologies, such as easier-to-use artificial intelligence (AI) and virtual reality (VR), will offer incredible

opportunities to provide better healthcare to billions of people and help our healthcare systems cope with ever-increasing demands.

The 5G network technology will enable healthcare organizations to transmit larger digital files so STEM professionals can review and advise patient care more efficiently. AI and Internet of Things (IoT) technologies will enhance STEM professionals' abilities to deliver treatments through AR, VR, and mixed reality for remote and reliable patient care (Barr, 2019; Laplante et al., 2018).

Employers indicated that if they must select between two candidates--one possessing strong technical skills and another with comparatively stronger soft than technical skills--they will wholeheartedly choose the candidate with the superior soft skills. Their justification was that they could teach candidates the technical knowledge they need, but it is not as easy to teach them soft skills. While soft skills can be learned regardless of one's educational background, employers indicate that they require repetition and practice that contribute to a comparatively longer learning curve.

The increasing demand for soft skills renders it essential to understand which soft skills will be most necessary in the healthcare industry. To uncover this need, the interviewed STEM employers were asked to express their views on the soft skills that they think future STEM undergraduates will need to enter the healthcare industry by 2025. Results are displayed in Table 2 below.

TABLE 2
SOFT SKILLS EMPLOYERS IDENTIFIED AS NECESSARY IN 2025 (N=27)

Key Soft Skills	Considered Essential by Healthcare Employers
Leadership	93
Human Connection	89
Communication	81
Creativity	70
Collaboration	70
Critical Thinking	63
Empathy	56
Problem Solving	44
Emotional Intelligence	37

Theme 3: Employers and Academic Institutions Are Not Systematically Collaborating

The third research question aimed to understand how employers are working with academia to foster soft skills development. The two avenues of specific interest were a collaboration between academia and industry and the extent to which partnerships were effective. As a result of this inquiry, a third theme emerged: systematic, collaborative synergies do not exist in the relationships between most employers and local educational leaders. Employers claim that the connection between the two entities is so detached that it is blocking employers' opinions from the design and development of STEM undergraduate curricula. This lack of dialogue and engagement was evident amongst most employers. As a result, 78 percent of employers who participated in this study do not partner with local academia to enhance STEM students' soft skills competencies, while only 22 percent do. A key method of improving this cross-pollination is through the industry advisory boards of universities. According to the interview data, 81 percent of employers do not sit on any such advisory boards, meaning their expertise is not being shared in the academic arena. Furthermore, employers identified the following conditions as major influencers of soft skills competencies:
- Collaboration on curriculum with relevancy based on industry trends
- Creating a culture of accountability for all key stakeholders: business, academia, and students
- Integration of real-world projects in core classes to master both soft and hard skills
- Offering post-graduation soft skills training to alumni

Theme 4: Lack of Internal Leadership Support to Reduce the Soft Skills Gap

The fourth theme that emerged from these results is the lack of organizational support from leadership to initiate collaboration with academic leaders to address the soft skills gap. Given reasons for this phenomenon include the absence of an established relationship with local academic leaders, insufficient staffing to make these commitments, and lack of familiarity in initiating such a collaborative process. Meanwhile, those employers who did have the necessary leadership support to establish collaborative relationships with academia successfully identified a shared-value vision strategy to achieve mutual goals and objectives.

Open Systems and Collaboration

The findings of this study indicate that an open system does not exist between healthcare organizations and local academic institutions. Therefore, this lack of collaboration stunts the community's ability to address the soft skills gap at its core. In an open system, organizations actively engage in relationships that allow them to exchange information, and this lack of open systems impedes soft skills development in undergraduate STEM students. Healthcare employers' views in this study indicate that an open systems approach--including both collaborative engagement and accountability--are needed by healthcare organizations and educational institutions to address the soft skills gap. They viewed this as a local phenomenon that needs to be addressed by the local key stakeholders.

DISCUSSION

Healthcare organizations and academic institutions share common interests regarding STEM undergraduates. Healthcare managers wish to hire competent and qualified workers with the technical and soft skills to move their organizations forward. Academic leaders desire to graduate students who are career ready. Healthcare managers who worked in an environment where their organizations and local higher education institutions had adopted an open systems approach engaged in collaborative business-education relationships and experienced much higher satisfaction with the quality of new STEM employees from these schools.

Establish Leadership Commitment to Initiate Engagement From Local Perspective

The healthcare industry has a growing need for employees who possess both technical and soft skills. Research indicates a disconnect between academe and employers about the soft skills competencies of STEM undergraduates working in the healthcare industry. Therefore, healthcare managers have a vested interest in pursuing strategies to reduce the soft skills gap of future employees. Employers experienced greater success with the recently hired STEM undergraduate if their organizations had strong internal leadership support to initiate the engagement with the local academic leaders. Leadership is "the set of activities required to articulate an organization's vision and ensure that all its stakeholders will support the vision" (Stid & Brandach, 2009, p. 36).

Similarly, Northouse's (2007) definition of leadership "is a process whereby an individual influences a group of individuals to achieve a common goal" (p. 3). Healthcare employers in this study expressed the need to establish leadership support with the goal of collaborating with internal and external stakeholders. This relationship building, starting from the top of the hierarchy, is essential for initiating any external engagement program.

Healthcare managers who have sufficient authority should visit the college and university campuses that provide their greatest pools of potential employees and engage in meetings with academic leaders to discuss the importance of soft skills and ways in which they may partner and collaborate to produce career-ready graduates. For those not having this authority, the soft skills competencies of incoming employees should be a regular topic of meetings with organizational leaders, who should be encouraged and reminded that it is in the organization's best interests to pursue partnerships with higher education institutions.

Serve on Advisory Boards

Advisory boards can provide guidance to academic programs informed by the field, allowing them to align their educational programs to employer and practitioner expectations (Dominguez et al., 2013; Hardcastle, 2021). Healthcare managers and leaders who served on advisory boards of the academic programs that prepare their future employees expressed satisfaction with their ability to collaborate and influence the training of soft skills and other topics. Some also engaged in other collaborative efforts, such as evaluating student portfolios and judging student capstone projects. Again, these employers view the value of soft skills competencies among STEM undergraduates and treat the gap phenomenon locally for the betterment of their communities. They take ownership of this and act upon it by engaging with the academia. They indicated that this task brings academia and business to collaborate by being present at the table and allowing their voices to be heard and exchanged.

Provide Internships, Co-Ops and Externships

Healthcare participants in this study identified multiple benefits in collaborating with academia to establish, promote and maintain internships, co-ops and externships. For healthcare organizations, these programs can provide a "feeder" stream of talented student workers and a viable pool of potential long-term employees. The students benefit from on-the-job experience, the enhancement of resumes, and the possibility of future employment with the organization. Finally, educational institutions can benefit by enhancing the curriculum from experiential learning and by identifying whether the curriculum endows students with the soft skills (and technical skills) to be effective on the job.

Collaborate on Curriculum

In situations where both healthcare organizations and educational institutions operate as open systems, some have found abundant opportunities to collaborate on improving the training of future healthcare STEM workers. According to the healthcare management leaders interviewed for this study, the most effective situations occurred when soft skills education was integrated into technical STEM courses—rather than relegated to a single soft-skills-based course. The goal should be to promote the interconnectedness of technical and soft skills and the essential nature of each, beginning with the first year of undergraduate education and continuing until graduation. Establishing leadership commitment, serving on advisory boards, and providing internships and other experiential opportunities, can lead to true curricular partnerships between employers and the institutions that train their employees.

According to Heckman (2019), the encouraging element of soft skills development is that soft skills can be mastered by all students regardless of their technical disciplines or personal attributes. However, this is only possible when educators invest in a sustainable, systematic approach to teaching specifically catered toward soft skills education. There is a return on investment concerning soft skills training and proficiency (Deming, 2017; Heckman, 2019). Given these research outcomes, we may find that targeting soft skills competencies might be beneficial for individuals and organizations to survive and thrive within the globally competitive 21st Century STEM workforce.

Provide Post-Graduation Soft Skills Training

The fact that 100 percent of employers interviewed in this study have witnessed the soft skills gap indicates that this problem is ubiquitous. Because the healthcare managers reported that soft skills are valuable for their organizations, they provided several strategies for addressing this industry-wide deficiency. Some employers are taking this educational burden upon themselves and are offering soft skills training workshops to their new hires. This need could present a business opportunity for academic leaders to develop soft skills training service that aims to help organizations build their internal skills.

CONCLUSION

Findings from this study suggest that healthcare managers operating within an open systems environment, with a high level of engagement and collaboration with academic institutions, experience a

steady pipeline of competent and talented STEM college graduates. These employers advise other organizations who also seek to accomplish these outcomes to become better informed about what is happening in their communities. To do so, employers should establish a network of academic leaders in their region and industry. Most importantly, employers and educators should pursue working strategies that accommodate open dialogues rooted in strategies for improving local education. The soft skills gap is evident among STEM undergraduates and is not improving. This phenomenon needs to be managed locally through a systematic collaboration based on a shared-value vision with goals and objectives. Accountability will be required for all key stakeholders to achieve goals and objectives. This cooperation can help educators understand the elements of their programs that are working and those which need more attention. Furthering this understanding via open dialogue can also create a space for employers to share their opinions on the skill sets and qualifications that they expect from job applicants to fulfill the market demand. Once both entities can align the supply and demand of skilled students, the extent of the soft skills gap will ultimately diminish.

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