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Original Paper

Keeping High Schools Relevant in a Global, Innovative and Tech Ubiquitous Society

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Abstract

With the onset of COVID-19 and game-changes like ubiquitous technology, artificial intelligence and global economies, public high schools are challenged to provide a new level of education. In order for the United States and other countries to compete on a global scale, school leaders need to reevaluate and redesign educational programs to provide students the exposure and experience needed to become globally competent competitors. This collective case study examined the knowledge of educators ranging from school leaders to teachers in regards to the predicted global megatrends, the future 2030 workforce, game-changing technology and the impact at three public high schools. The study examined how the process of change was implemented, how each school addressed challenges and barriers, and to what degree each school was able to transition to an online environment during the unexpected 2020 COVID-19 shutdown.

The study design incorporated a mixed method case study approach. The information collected consisted of school leader and teacher interviews, as well as review of artifacts, documents and data. The researchers concluded that school transformation needs to start with an understanding of the future workforce and potential megatrends. Most importantly, schools must take action regardless of the challenges and barriers before them.

Keywords

high school, game-changers, megatrends, transformation, workforce ready

1. Introduction

As the United States further progresses into the 21st century and the economy continues to evolve on a global scale, societies are facing a new set of challenges and responsibilities in preparing students for the future. Public high schools are impacted by these unpredictable changes and are challenged to provide a new level of education. In order for the United States and other countries to compete on a global scale, school leaders need to reevaluate and redesign educational programs in order to provide students the exposure and experience needed to become globally competent competitors (KPMG International, 2014; National Intelligence Council, 2012).

As times change, new global factors come into play that impact the economical stage and, in turn, learning institutions. Over the last century, the movement of ideas, money, and needs within economies have morphed, creating a new level of competition in the workforce and the need to reevaluate the preparation of students (Ruby, 2014). In order to be marketable, young people entering the 2030 workforce will need a drastically different set of skills than they are taught today. Back in 2013, Oxford University conducted a study indicating that half of American jobs could be nonexistent and/or potentially replaced by artificial intelligence and machines by 2030. The United States and other global countries are finding themselves competing against these technology entities and are now placed in a position where they must create awareness, and prepare and plan accordingly (Frey & Osborne, 2013).

As Americans watched global and technological game-changers occur with COVID-19, the predictions of a looming pandemic and disruptors have become reality and will continue to manifest. In order to be prepared and adjust accordingly, these economical disruptions should ignite a sense of urgency in educational change leaders and school systems.

The United States public school system, and in fact educational systems across the globe, are facing high stakes and great pressure as current programs are becoming outdated and are failing to meet the skill demands predicted in the future economy (Flynn, 2017; MGI, 2017; OECD, 2018; Schwab, 2016). Technical and research-based reports provide evidence-based predictions on the future of economies and the reasons why redesigning work-based preparatory programs is vital. Looking at the workforce vacancies and at the skills and knowledge of average graduates of the American educational system, it is evident there is a misalignment; moreover, that the system is not providing adequate programs as recommended by Flynn (2017).

These reports also support Edward Gordon's argument in The Global Talent Crisis, Futurist (2009), that public school systems need a transformation in order to more effectively align with the new workforce demands and avoid becoming obsolete. Advocates for school change argue the need to provide guidance and a framework to our school systems. The same argument continues: "Schools need to systematically and programmatically change" (Rojewski & Hill, 2017, p. 5).

Unfortunately, American schools have had a reputation for priding themselves in being immune to the latest educational fads that too often prove to be counterproductive. At times, many are so resistant to new thinking that they ignore new, creative, and better ways to educate children, thus preventing schools

from becoming progressive and forward-thinking learning institutions. As a result, American schools become their own enemy (Bassett, 2002).

In order for the United States to compete on a global scale, school leaders must reevaluate, reimagine and redesign the entire system to provide students the exposure and experience needed to become globally competent and marketable.

1.1 Purpose of the Study

The purpose of the research was to learn more about schools who deem themselves as transformational and brand their schools as progressive, innovative and 21st Century learning and beyond environments. The focus was on determining how specific schools are able to design and develop innovative programs where students are exposed to and engaged in learning opportunities which prepare them for the 2030 workforce and the demands of the global society. The study also identified key steps that are necessary when implementing such programs and bringing awareness to the potential challenges that may arise.

In 2016, Klaus Schwab, Founder and Executive Chairman of The World Economic Forum, described the digital age as The Third Industrial Revolution, but he believed a new event was unfolding: The Fourth Industrial Revolution. According to Schwab (2016),

> We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of global polity, from the public and private sectors to academia and civil society. (p. 1)

Schwab believes internet access and technology advancements in areas such as 3D printing, artificial intelligence, and virtual reality have expanded the ability to drive new change, causing yet another economic and workforce disruption at an accelerated pace never seen before. These new technological advancements will create new demands and expectations of workforce skills, which makes it more challenging to prepare. This type of shift is not new. Historically, this similar impact is what drove the purpose of American schools during the First Industrial Revolution. The assembly line was the game-changer for the economy, as it increased a factory's ability to produce mass quantities of goods. This game-changer, in turn, impacted and required school systems to adjust and develop compliant type factory-skilled workers (Schwab, 2016).

With the new level of machines and technologies today and the research about the future economy that lies ahead, America once again needs to reevaluate and adjust how it educates and prepares youth. This knowledge needs to drive changes in the American school system. This research is also aligned with the work of Thomas Friedman. In his 2016 book, *Thank You For Being Late*, Friedman points out that we are living in an age of acceleration due to the demands of economic competition. He refers to the economy as "the market" and points out that current and future markets are constantly pushing for new ideas and solutions, known as game-changers, that are driving humans' need to work faster and more efficiently.

Friedman's game-changing examples include the birth of the microchip in 1971, Internet in 1980, and iPhone in 2007. These technologies clearly demonstrate how new and creative products can impact and shift the economic landscape. For example, the microchip enhanced technology systems to move faster in order to rapidly develop new and advanced products. After the development of the microchip, the technology industry began competing and racing to develop a faster and more efficient microchip. In 1980, the internet was born, changing the way humans interact, communicate and do business. Then in 2007, the world was introduced to the iPhone. During this time period, very few understood how a phone would impact every facet of people's professional and social lives. After its arrival, though, humans had a mini-computer in their hands and were able to accelerate how they communicated, accessed, and located information (Friedman, 2016). As a result, the 1980s game-changer of internet access accelerated to new and unpredictable heights and became the new commerce highway for communication and business, once again disrupting our economy.

From here a new communication format was born: The Internet Cloud. The Cloud was a new system that allowed communication to flow more rapidly and reduced the need to have information downloaded onto computer hard-drives, thumb-drives, or documents that needed to be shared and/or delivered through email. This brought new waves of disruption within the realm of communication and technology systems. The Cloud increased humans' ability to access, download, and exchange information from any location and any time of day at an accelerated rate never seen before. In turn, these new innovative ways to exchange and save information impacted the way products were designed and developed and the way business was conducted. This disruption required computer and software companies to adjust and develop new cloud-based programs in order to compete, and with it a new set of job skills hit the market. Soon after, a transformed race to develop internet businesses was born. New search engines, portal systems, social media, internet applications, and cloud-based companies such as Google, Facebook, Amazon, Pandora, iTunes, Netflix, Hulu, and Airbnb hit the market.

These accelerated game-changers then caused another wave of disruption in terms of businesses, employment and jobs skills, requiring schools to shift in how students are educated and prepared. This new era has been termed, The Fourth Industrial Revolution. The accelerated change driven by technology is an example of how rapidly the economy can change and how an unpredictable future workforce can be shaped. This pattern is what makes the future exciting and yet concerning at the same time. The acceleration trend has yet to slow down, causing challenges in predicting and determining future job markets. As a result, new job skills will require people to be adaptable and creative. Workers entering this new economy will need to be able to see and think of the unimaginable as well as work with others to problem-solve and generate new innovative ideas and solutions.

1.2 The Research

The research was driven by the hypothesis that schools can meet the demands of the 2030 work place if they:

- incorporate 21st century and future global workforce skills into learning

- (such as communication, critical thinking, problem-solving, collaboration, creativity and technology)
- integrate real-world work experiences into students' learning experiences,
- support students with college and career resources, and
- have systems in place to support students and teachers with the transition.

The researchers focused on collecting the following information from three high schools in the southern region of the United States who met their criteria for readying students for 2030 and beyond:

- knowledge of 2030 global megatrends and global competency skills that will be required
- curriculum and instruction utilized, and to what degree it aligned to the research, future economy expectations and integration of global competencies,
- leveraging technology for the 2030 workforce as well as artificial intelligence and virtual reality,
- lessons learned, including
  - how are they making the shift,
  - lessons to be drawn from study schools and replicable practices,
- perceived barriers that impact each organization's ability to further prepare students for 2030, and
- measurements used to determine effectiveness and success.

1.3 Limitations of the Study

The study was limited to three high schools in southern California, United States: (1) a Design-Thinking Charter High School, (2) International Baccalaureate (IB) High School and (3) an XQ high school (XQ organization provides schools with grant money to redesign and reimagine). Thus, the culture and demographics of the region were also limitations. In addition, other factors such as school closures due to COVID-19 in the spring and fall of 2020 limited the ability to conduct in-person site visits, classroom observations, and interviews.

2. Literature Review

The literature review begins with identifying global megatrends, game-changers, and disruptions that are impacting the economy and school systems today and those that are predicted to do so in the future. Next, it introduces the steps various government agencies have taken in attempts to address the American school system's shortcomings, as well as organizations that have been established to provide research, guidance, and networks to school systems seeking to transform. Afterwards, the literature review identifies four specific school organizations -International Baccalaureate (IB), Edleader21, XQ Schools, and Career Technical Education (CTE)- that have led concerted efforts to assist schools with reimagining, redesigning and integrating new school programs that better align with the future workforce skills and expectations. These organizations provide current research, literature, guidelines for system design,

networking support, established partnerships, and frameworks to develop proper innovative programs. For example, IB is an international school program that focuses on developing global citizenship. Edleader21 is an organization that carries a mission of helping schools develop programs to integrate global competency skills, also referred to as 21st century skills, into academic programs. XQ Schools focus on providing financial help to high schools, while Career Technical Education programs focus on developing students for the workforce through access to work-based experiences/training and course work. All four focus on emphasizing global competencies: critical thinking, communication, collaboration, creativity, and civics.

Finally, the literature review explores the similar qualities and programs these educational institutions claim to integrate that are centered around global competencies and learning environments heavily expressed and advocated in journals such as *Organization for Economic Co-operation and Development* (OECD), and *Future of Education and Skills 2030 Project*. As a result, a case study using three high schools located in Southern California who base their school programs around these philosophies and concepts was conducted. School A is a charter high school that focuses on the drawn ideas of XQ schools, particularly with design-thinking and personalized learning, and integrates CTE concepts. School B is a formal International Baccalaureate High School that prides itself on a foundation of developing globally-minded citizens. School C is a XQ Super High School that was awarded a grant for its transformational design in efforts to reimagine and become innovative. The focus of this school has changed over the last 4 years and today is focused on personalized learning.

2.1 Relevance and Tech Ubiquitous Society

The alignment and relationship between the future 2030 workforce and high school preparation programs is leading the American educational system to a new set of crossroads. New game-changers and disruptions have created the demand for new workforce skills, and high schools are feeling the pressure. Some high school leaders understand these game-changes and are taking action to transform and align, while others are not. Schools that claim to have transformed are labeled and honored as progressive and innovative, while others are described as traditional and outdated. While some claim that American public schools have the ability to transform, others argue they do not because of philosophical and/or systemic barriers.

Research and future predictions from notable organizations, such as McKenzie Global Institute, The Brookings Institution, Center for Strategic and International Studies, Organization for Economic Co-operation and Development, Klynveld Peat Marwick Goerdele (KPMG) International, and the National Intelligence Council, argue that new global trends and challenges will impact the future economies. Furthermore, they emphasize that school organizations must adjust accordingly in order to build human capital needed to sustain our economy.

The rapid advancement of science and technology has exacerbated the demand for newly acquired knowledge, skills, and attitudes. Future citizens who will be contributing members in this new global job

market will need to understand the high stakes that lie ahead in terms of the challenges and skills that will be required for employment.

2.2 Megatrends

The research indicates that new Complex Global Megatrends will impact and challenge current knowledge, skills, and the workforce beyond just one country. One set of information on these complex global megatrends is outlined in *The Global Trends 2030: Alternative Worlds Report*, provided by the National Intelligence Council in 2012. The purpose of the global report is to outline future needs and provide insight and guidance on the geopolitical changes affecting the global economy.

In the last several decades, economic trends and research have been produced indicating that the United States and other world countries will economically function differently by 2030. If not careful, the United States could potentially lose its power and influence within the economy. According to the *Global Trends 2030: Alternative Worlds Report* (National Intelligence Council, 2012), the United States will no longer be the powerhouse because of four global megatrends. In order to prepare and develop solutions to address the 2030 global challenges, all government world leaders and citizens, including the United States, will have to view themselves as game-changers within four global megatrends: (a) Individual Empowerment; (b) Diffusion of Power Among States; (c) Demographics Patterns; and (d) Demands for Food, Water, and Energy. They will have to work as a cohesive front instead of nationalists focused on their individual issues (KPMG International, 2014).

Individual empowerment. According to predictions, individual empowerment is considered the biggest and most influential megatrend, as it will directly impact the global economy, including areas such as political and military power. Individual empowerment refers to an individual government's ability to develop into a powerhouse and control its own destiny and influences regardless of its physical size. The widespread exploitation of new and fast levels of communications and high-speed manufacturing technologies has enhanced how countries around the world can now compete, attack, and protect themselves. Both big and small countries will have greater access to technologies that are capable of mass destruction. This will impact how governments will battle and protect themselves. As a result, there is a greater need to create and develop cyber and bioterror instruments and weapons (KPMG International, 2014).

Diffusion of power among states. Global power and economic competition is predicted to shift as Asia is said to become the leading powerhouse continent, surpassing the United States and European countries, both socially and economically. Larger countries will no longer be considered as strong, influential and powerful as before; on the other hand, smaller countries are becoming more powerful. One example is South Korea who in 2021 is considered a leader in innovation while the United States has dropped out of the top ten most innovative nations (Jamrisko, Lu, & Tanzi, 2021). Governments will be judged by how they manage population size, military spending, and technological investments, regardless of size. Technologies used for communication will channel through more sophisticated, multifaceted, and

advanced networks, impacting how state and global governments transmit information and make informed decisions (KPMG International, 2014).

Demographic patterns. A growing world population will impact how people at all levels live. According to the 2014 KPMG International Report, the global population is expected to exceed 8.3 billion people in 2030, compared to 7.1 billion in 2012. This growth is attributed to (a) humans living longer, which in turn will create larger societies, and (b) an increase in migration, which will impact urbanization. These two elements will place significant demographic and political demands on living standards, the economy/job market, and land resources in order to support human life (KPMG International, 2014).

Demands for food, water, and energy. The global population increase, expansion of the middle class, and global climate changes will create new demands for food, water, and energy resources requiring policymakers to develop new creative ideas and solutions. For example, how we access and purify existing water resources, as well as the focus on agricultural production, will become a necessity. As biofuels threaten certain countries' land and food resources, new solutions for energy will be required. In order to support human life, government leaders, the private sector, and the educational field will have to work together to rethink and design solutions to avoid the negative implications, such as starvation. As a result, these three entities need to start working together now to prepare students and provide them with opportunities to develop sustainable solutions (KPMG International, 2014).

2.3 Technology Impact

Historically, megatrends have always existed, but changes based on different influencing factors have varying impacts; this is why they are referred to as game-changers. One of the strongest and most influencing game-changers in particular is innovation driven by advancing technology. The technology trends predicted in the past have occurred and will continue to occur with the acceleration of digital advancements, such as artificial intelligence (Zovko, 2018). Because new technologies are able to process and produce products at a faster pace and in mass quantities, computerized machinery and robots will continue to advance, transforming workplaces, such as production and customer service. According to organizational theorists, computer scientists and economists are now carefully considering "what computers do—that is, the tasks they are best suited to accomplish and how these capabilities compliment or serve as a substitute for human skills in workplace settings" (Autor, Levy, & Mumane, 2003, p. 9). Because humans can be replaced and production can occur in mass quantities, these advancements have accelerated new sets of job demands and skills. For example, the impact of robotics and machinery has led to industries needing a new set of workers who have a background in technology, computer science, math, and coding skills.

This technology and machine game-changer, in conjunction with the other global megatrends, has placed a new sense of urgency on countries to develop solutions. This, in turn, has created a multi-faceted level of competition placing pressure on learning and preparational institutions to develop a new type of graduate who can design fresh, innovative systems and devices to solve these challenges. This level of

competition has developed a manifestation referred to as singularity (Zovko, 2018). The singularity phenomenon is not a new concept; it was originally linked to the computer scientist and science-fiction writer Vernor Vinge, who warned society that artificial intelligence would replace people by 2030. In order to support singularity and the potential impact, Zovko (2018) references Vinge's 1993 essay, "The Coming Technological Singularity," where he stated:

> Employees today are knowledge workers. Their source of motivation is not control or fear. They have a desire to be creative and challenged, have the feeling of accomplishment and self-fulfillment. Brain-based organizations need a new value system, aligned with passion, enthusiasm, appetite for life, engagement, commitment, great causes, and determination to make a difference. The students and workers of the present are not trained for shared adventures, bizarre failures, and appetite for change. (p. 420).

Zovko (2018) believed the rise of super intelligence is based on the need for humans to enhance intellectual abilities with intimate technological bonds. Furthermore, he stated:

> Radical transformations of the concept of learning will take place—knowledge and skills transfer will be instantaneously available to everyone, making the schools (as known today) obsolete and the concept of employment and work will be redefined—the general trend is moving toward shorter working hours, making more time available for leisure activities. (Zovko, 2018, p. 420)

After reviewing the economic and educational trends over the last 10 years, Vinge's (as cited in Zovko, 2018) 1993 predictions continue to be proven true in describing how technology and artificial intelligence would change, not only the landscape of the workforce, but also the platform of learning and educational organizations. Based on the OECD (2018) report, technology and digital trends continue to expand at rapid speeds, and schools must adjust. In order to compete with new technologies, such as the impact of new machinery and robots, school leaders must be aware of how these trends and new forms of technology will not only influence job skills, but students' interests and abilities to learn.

2.4 Education Organizations Leading Transformational Work

According to Yong Zhao's (2012) report, "Flunking Innovation and Creativity," American schools focus too much on high academic achievement and test scores, which stifles the ability to think creatively, and the development of ideas and entrepreneurial qualities in students (Zhao, 2012). Zhao's research compared the Programme for International Student Assessment (PISA) math scores to entrepreneurial abilities and determined that high PISA scores do not always correlate to the necessary skills demanded of workers and/or business savvy citizens. Thus, his report causes friction with the messages often articulated to American students and families by K-12 public and post-secondary schools. He argues this competition between student achievement and developing creative entrepreneurs is the rift. According to Zhao (2012), high performing countries, such as China and Singapore, have picked up on this and are looking for ways to reform their own educational systems in order to invest in their own social capital;

therefore, the United States should be concerned with this and follow a similar thought process. This emphasizes an even bigger need to reform American schools.

Although there are challenges in transforming schools, there are some organizations that support Zhao's (2012) philosophies and are taking action to realign curricular programs, instructional practices, and assessment of workforce future job skills and global competency needs as identified in *The Future of Education and Skills: Education 2030*, developed by the OECD (2018). Starting in 2001, educational guidance organizations such as Partnerships for 21 Century Learning (p. 21, 2007), Battelle For Kids (Battelle for Kids, 2018), and Edleader21 (Edleader21, 2010) were established to promote 21st century school reform. In 2019, these three organizations joined forces to develop one large network system. The synergetic efforts of these organizations is to create a stronger and larger national movement in developing innovative and progressive schools; moreover, to bring the knowledge and experiences of all three to provide school organizations with the most current research as well as a suitable and manageable framework to implement. Also, these efforts seek to assist with the development of a plan that will provide guidance in creating a 21st century vision that links academic content, standards, and instruction to global competencies. Initially, these were simply known as the 4Cs, namely communication, collaboration, critical thinking, and creativity. Soon after, others adopted a "fifth C", to include civic skills, understanding the importance of addressing the social and civic responsibilities needed among students and the world.

The development of this group collaborative is a testament to the use of the collective effort approach, emphasizing the need to involve stakeholders, such as local businesses, community members, and other education-focused organizations to support continuous transformation. The group provides assistance in developing and putting into action a roadmap and graduate profile aligned to its vision. It also provides further support through professional learning opportunities, connecting leaders to other school success stories and networking systems to support the work (Battelle for Kids, 2018).

In addition, there are selective programs that have been used in the redesign of schools based on current research and future job market predictions. One such program is The International Baccalaureate Programme (IB) producing globally-minded citizens. Career Technical Education (CTE) is another one focused on developing programs based on the current job market and demands. Then there's XQ, which awards funding to Super Schools with doable, sustainable and transformational plans. Along with the global competencies and future workforce skills that these networks and programs outline and emphasize, technology integration is an overarching theme threaded throughout all. The aforementioned competencies are aligned with skills needed to develop global-minded students who will in turn be more engaged and take ownership of their education (OECD, 2018).

Today, new global megatrends are the driving force behind changes in the economy and directly impact preparational programs such as schools. It is crucial that American public schools develop the systems, mindset, infrastructure, programs and information needed to prepare and develop students for this new and unprecedented workforce and economy. In order for schools to avoid becoming obsolete, it is

necessary that school leaders not only continuously understand the role of education, but the connection and responsibility between learning institutions and the job market.

As a result, a case study using three high schools located in Southern California who base their school programs around these philosophies and concepts was conducted. School A is a charter high school that focuses on the drawn ideas of XQ schools, particularly with design-thinking and personalized learning and integrates CTE concepts. School B is a formal International Baccalaureate High School that prides itself on a foundation of developing globally-minded citizens. School C is a XQ Super High School that was awarded a grant for its transformational design in efforts to reimagine and become innovative. The focus of this school has changed over the last 4 years and today is focused on personalized learning.

3. Methodology

This research was driven by three key factors: (a) how schools incorporate 21st century and future global workforce skills into learning (such as communication, collaboration, critical thinking, problem solving, and using creativity), (b) how real-world work experiences are integrated into students' learning experiences, and (c) how students are supported with college and career resources.

The purpose of this research was to examine school programs that brand and claim themselves as progressive, innovative, and 21st century learning-and-beyond environments. The focus was on how these specific schools are able to design and develop innovative programs where students are exposed to and engaged in learning opportunities which prepare them for the 2030 workforce and the demands of a global society. The research also unearthed key steps that are necessary when implementing such programs and brought awareness to the potential challenges that may arise.

A case study, mixed-methods approach, consisting of interviews and observations was conducted, as well as a review of school artifacts, documents and reports. The study was designed to answer the following research questions:

1) What do school leaders and stakeholders know about the 2030 global megatrends and global competency skills required?
2) What curriculum and instruction is used and how are the global competencies integrated?
3) How are schools leveraging technology for the 2030 workforce, as well as artificial intelligence and virtual reality?
4) What can we learn from schools who are preparing students for the 2030 workforce?
    a. How are they making the shift?
    b. What lessons can be drawn from these schools and what practices replicated?
    c. What do they use to measure and determine effectiveness and success?
5) What are the perceived barriers that impact districts' ability to prepare students?

A convenience sampling technique was used to identify three schools that met the inclusion criteria listed below. Once the three schools were identified, a mixed-methods case study investigation was conducted. This approach was an appropriate choice to better understand how these schools are able to influence

others and execute changes. By using this methodology, the researchers were able to better understand the steps the study schools have taken and how they have overcome barriers that many other schools are experiencing and have not been able to overcome.

3.1 Inclusion Criteria

The following criteria was used to identify the participants:

- school claims to follow a set of established, recognized and reputable 21st century school globally-minded elements, such as those used by IB, XQ, CTE or other 21st century branding;
- vision, mission, and school plan provides evidence that demonstrates knowledge in developing students' skills that address global megatrends and the 2030 workforce needs;
- school will be able to produce a 21st century transformation framework focus that is used to drive school-making decisions and programs;
- programs integrate the 21st century and future workforce skills;
- technology is integrated into the school programs;
- school has been labeled as a 21st century innovative school; and
- school used the guidelines and framework of a reputable research-based organization to design its program.

Following identification, the three schools selected participated in a full scale and in-depth investigation, which included leadership interviews and teacher focus group interviews, as well as a review of school artifacts, documents and reports. Classroom observations were originally planned, but school closures due to the COVID-19 pandemic prevented this from occurring.

4. Findings

The case study was conducted using three high schools in California, USA during the summer and fall of 2020. All three schools met the research criteria based on self-reporting. During this time, schools were impacted by the COVID-19 school closures. As a result, Zoom meetings were used to conduct interviews and to collect data. The researchers collected quantitative and comparison data. Specifically, school leadership and staff members were interviewed and school artifacts and assessment data were analyzed. The findings reported include triangulated school comparison on the following:

- school staff knowledge of global megatrends,
- school staff knowledge of predicted future workforce,
- process for transformation,
- curriculum, instructional practices and technology integration,
- success and outcome barriers, and
- current challenges and recommendations for schools embarking on the transformation journey.

4.1 Three-Way School Comparison

The qualitative data-leadership and staff interviews-were used to determine how the three schools compared to one another and to identify significant themes among each unique type of program in terms of having knowledge and understanding of the global megatrends, future job markets and predicted economies. Data was collected to determine what type of processes each school used to lead, brand, and guide the transformation as well as to determine to what extent each school is successfully working and producing results. An analysis of the data organized by the researched groups and questions is below. For each question, themes are reported with evidence from the principal interviews, focus interviews and review of the artifacts.

Knowledge global megatrends and predicted future workforce and process for transformation. Significant themes were noted with the school leadership participants and focus group interview responses. Similarities among School A, School B and School C included that intent for school transformation was based on a strong passion and desired purpose to improve school programs to better prepare students for the future workforce; strategic intent on how to bring all stakeholders (students, parents and staff) along including conversations around current research, and providing professional development and workshops that supported for shifting philosophies, pedagogy and instructional practice. All three schools' artifacts used to communicate and brand the school were aligned and supported the overall goal and intent of the school vision and transformational shifts expected on site and in the classrooms.

What varied in the responses were the individual driving forces, philosophies, justification and the level of knowledge between leadership and staff members regarding the future job markets, global megatrends, and the processes used to lead school transformation. School A's and School B's leadership and staff members had the most knowledge and had systems in place for keeping all stakeholders informed, updated and educated on the latest research related to global and future job market trends. Both schools also directly tied this information to their school vision, expectations, culture, communication, and classroom practices. School C struggled in this category at the leadership level. The principal's answers were limited in scope in terms of understanding the future job market, global megatrends and did not use this information to drive transformation. Instead, School C's school leader focused more on building culture by making personal connections and building relationships among teachers, parents, community members and students rather than educating and bringing these stakeholders up-to-par with the latest educational needs and transformational research. Overall, all three schools had limited knowledge of the megatrends.

Curriculum, instructional practices and technology integration. Each of the three schools were unique in terms of curriculum. School A utilizes an online core curriculum suited to meet the design and intent of personalized learning, but also integrates design thinking activities developed by teachers to supplement each course. School B utilizes core curriculum required by the International Baccalaureate program. School C utilizes district-adopted core curriculum, but in a less traditional manner.

In terms of instructional practices, all three schools were similar in pointing out that they focus on integrating 21st Century instructional practices and the Four Cs (communication, collaboration, critical thinking and creativity) with teaching content standards. School A's and School B's interview answers were much stronger in emphasizing and giving examples of current 21st century practices, developing global citizens, and how they align to the future workforce skills needed. Each school was unique in emphasizing specific strategies related to the branding of their schools. School A focused on design and deeper learning concepts and on providing a personalized learning experience that matches student's individual academic and social/emotional needs. School B is based on a global instructional continuum designed to increase the rigor each year. Its instruction also includes students' development physically, emotionally and ethically in addition to intellectual and academic growth. Additionally, instructional practices are centered around having students apply knowledge and make connections regarding curriculum, instruction and the real world. Due to the pandemic, School C's teachers did not participate in the focus group interviews; therefore, understanding their instructional philosophies and practices were the most limited. Although the principal acknowledged the Four C's, his emphasis was more about personalizing the learning experience in order to better connect and engage students.

In terms of technology, all three schools varied. School A was by far the furthest along and with the strongest technology implementation. From the inception of the school, students were provided with 1:1 devices, internet service and access to online curriculum. As a result, this school was able to shift to an online learning environment immediately without any disruption or loss of instructional days due to the COVID-19 pandemic. School A closed with brick-and-mortar instruction on Friday, March 13, 2020 and opened on Monday, March 16, 2020 with full day synchronous online instruction. The other two schools were not 1:1 schools and did not provide students with access to the internet nor access to online curriculum. As a result, these two schools scrambled and functioned in a panic-reactive mode when the school closures hit. It was a learning curve for many. The majority of teachers struggled with how to use the basic substitutional functions of technology to communicate and provide quality instruction in an online environment. Unlike the other two schools in the study, School A students did not miss a day of instruction as teachers were already providing a blended learning environment to students and were able to easily move communication and delivery of instruction to online platforms full time. In terms of the degree to which technology is used to enhance learning and provide a more engaging and personalized experience. School A was far beyond School B's and C's skill sets. School A had already provided students with an online curriculum. In addition, School A clearly understood the need to go beyond the substitution level of integrating technology to enhance learning. The school leader and teachers stated they were working together to determine how to further use digital platforms and tools to go beyond the substitution level in efforts to further engage students and provide a more effective personalized learning experience for all. Furthermore, School A's staff recognized and understood the need to continue working together to rethink curriculum and instruction and redesign new lessons to provide students a more

effective and engaging blended learning experience. The 2020 school closure validated their transformational technology work and personalized learning efforts over the last several years.

Because School B and C were in response mode, it was evident they struggled to see beyond the substitution level of technology integration. Their mindset and focus again was learning how to utilize and understand basic functions of technology to communicate and provide students access to teachers and core instruction. Both noted that the shift was very challenging due to teachers' lack of 21st century knowledge, technology skills and inability to integrate digital platforms, curriculum and tools prior to the pandemic shutdown. With this said, the COVID-19 pandemic's disruption did provide these schools, and so many others, the realization that the shift to a blended learning environment needed to happen as well as the importance of being able to adapt at a moment's notice; hence schools can no longer rely on in-person instruction as the only mode of learning. Although School B and C's technology skills have improved, they continue to struggle with accepting this new mode of online instructional delivery. This impediment of learning to let go of traditional instructional delivery seems to be preventing them from moving forward and proactively working together to design new blended learning online activities and instruction.

Success and outcome measurements. In terms of identifying and measuring success, there were some similarities and differences among the three schools. Although all three school leaders believed change was necessary and reported that their driving force was in effort to prepare students for the future global economy, each one had an individual and distinct focus. School A was focused on design-thinking, and on deeper and personalized learning. The goal of this school is to provide students with learning experiences that connect to the future job market skills, which is to think, apply, and problem-solve and design solutions related to local and global issues. School B was focused on personalizing and connecting the learning experiences to the real world by shifting the teaching staff to embrace and include more student and community input, voice and choice in efforts to change what and how they teach. School B's philosophies were based on designing learning experiences that would develop a globally-minded and empathic student based on International Baccalaureate theories and guidelines. School C was focused on having students take ownership of learning and being involved in school improvement efforts. Nevertheless, for the most part, all three utilized California's *college and career indicator* data (California Department of Education, 2018) California state assessment data and college assessment data such as the PSAT/SAT to measure academic growth. What varied was the type of local and perceptual data used. School A had evidence of using parent, student and staff input to evaluate strengths and needs of the school's services and programs. School B and C claimed to collect and use perceptual data but no evidence was provided.

Past barriers, current challenges and recommendations for schools embarking on the transformation journey. In terms of past barriers, current challenges and recommendations related to the transformational process, all three schools' participants responded similarly. All three school leaders pointed out that the beginning of the process, that is, changing mindsets and having ample time to

implement changes, were key pieces and the most challenging barriers to navigate around. Each one expressed that although the process is worth the effort, it brings in a great deal of frustration as it takes time, energy and relentless focus to keep the school moving forward as situations happen that can potentially derail the work. Examples of the situations given were related to archaic and outdated school systems, structures and instructional practices; need for full support from all stakeholders; political and labor group hesitations, new and/or competing initiatives, and people's lack of knowledge or unwillingness to learn and work collectively.

When looking at current challenges that continue to impede the work, the same examples were given. One additional challenge mentioned was associated with COVID-19 school closures. The unforeseen disruption temporarily required schools to shift from an in-person to online model. As a result, leading, working with and supporting staff in delivering blended learning in an online environment became the number one focus and challenge. The human connection—time and the inability to meet in person and collaborate—was impacted. The emphasis shifted to learning how to work together within an online platform to determine needs and how best to support students and deliver this new mode of instruction. As mentioned in the technology section, this was an easier transition for School A as they had already implemented technology by providing students with laptops, internet access and online curriculum. Regardless though, all three schools' staff had to work and collaborate in a new environment.

Overall, the study concluded that school transformation begins with school leaders who are visionary, knowledgeable, and purposeful. Transformational leaders understand the role of education and have a sense of urgency to create school programs that prepare students with the skills for future global economy. Data collected from the three schools studied confirms the need to clearly understand the purpose of learning institutions in relation to preparing students for the future workforce. Schools must have a strategic implementation plan that is based on research and a guiding framework. In addition, all stakeholders must be brought on board, educated on the intent and have an opportunity to provide input on the decision-making process. The study also concluded that staff member philosophies, school programs and instructional practices must be aligned and support the overall arching goals, vision and strategic plan of the school.

5. Conclusion

The digital and computer age has placed pressure on what students are learning and how they are learning it (Friedman, 2016). The impact is two-fold: (a) American school systems today are not producing enough skilled labor to fill these new job demands caused by these game-changers, and (b) schools are struggling to engage this current new generation of students. This gap and student disconnect will continue to widen if American public schools do not find ways to adjust and provide more meaningful and relevant learning experiences linked to preparing students for the future labor workforce. The current school-to-work misalignment and educational program mismatches are glaring. As a result, the current

labor market outcomes are being impacted and new jobs are going unfilled (Bol, Ciocca Eller, Van de Werfhost, & DiPrete, 2019).

In this study, school leaders and staff overall had limited knowledge of the future global megatrends and the potential impact this has on societies, the economy and workforce. This is concerning because, if the intent of education is to develop students for future job markets, it is important that school leaders have a clear understanding of these global megatrends, as it has a direct correlation to the future global economy. If not, American schools will be unprepared for disruptive situations such as the 2020 coronavirus pandemic.

The COVID-19 pandemic provides a living example of disruptions foretold and of megatrends working in unison to impact the world as described in *The Global Trends 2030: Alternative Worlds Report* (National Intelligence Council, 2012) and *Future State 2030: The Global Megatrends Shaping Governments* (KPMG International, 2014). Both reports emphasize that global megatrends will impact the global economy, businesses, and relationships. Reflecting on these predictions and not planning accordingly, the United States may sabotage their long-term standing of being the powerhouse country. In order to be prepared and develop solutions to address the 2030 global challenges, all government's world leaders and citizens, including the United States, will have to view themselves as game-changers within these predicted global megatrends and work as a cohesive front instead of nationalists focused on their individual issues (KPMG International, 2014).

Although the literature and research clearly stated and provided strong arguments and evidence that public schools need to learn and understand the predicted future economy, revisit their purpose, and redesign schools, the struggle continues for many, whether it is due to the lack of knowledge, willingness to take action, and/or failure to recognize past challenges and barriers plaguing current school systems. Moreover, at the time of this research, an unforeseen and impactful infectious disease, COVID-19, which originated in Wuhan, China, plagued the world and created a global pandemic which should have been used as a wake-up call. The COVID-19 crippling event led to school closures around the world. It supported the notion that societies and public school systems were not prepared for such an event nor had integrated the level of technology needed to shift and support a new online learning environment at a moment's notice. As uncomfortable and frustrating as it was for many, the 2020 experience was an example of living in a tech ubiquitous society, one in which we have to rely heavily on technology to communicate, conduct business, and provide educational opportunities. The event brought an increased sense of awareness and urgency as to the importance of ensuring societies take action to redesign high schools to survive and thrive in an unpredicted tech ubiquitous global society.

This is a pivotal time no one ever expected to experience. The COVID-19 pandemic is an example of how society and school systems can be disrupted without warning as was outlined in the megatrends and the implications of not integrating technology platforms and tools as a response to the Fourth Industrial Revolution noted in the literature review. As a result, the educational outcomes, learning losses, and disparities of an already existing inequitable public school system is now being exacerbated by this 2020

disruption (Dorn, Hancock, Sarakatsannis, & Viruleg, 2020). The findings from this research are clear indications that the current educational public school system was not designed to adjust and shift gears when daunted by an unprecedented life altering event. This pandemic has left school districts floundering, unprepared, exposed for lack of 21st century readiness and off guard. As a result, sadly no one anticipated that schools could pivet and provide a full-time online learning environment overnight (Dorn et al., 2020).

The pandemic highlighted the negative impacts of not paying attention to and/or heeding the research and predictions of the future, and, most importantly, not planning or embedding technology adequately, timely, effectively, or in a responsive way. This pandemic event is a wake-up call to take action. The state and federal governmental levels need to provide guidance, leadership and funding to support the critical systemic changes needed to overhaul current school programs and address these deficiencies. The research has advanced, and the recommendations are aligned to the future 2030 workforce needs, but the educational systems in many places continue to function archaically and are stubbornly resistant to change. In addition, states have accountability systems that do no support nor align with the changes that schools are tasked to make. Work needs to continue around aligning learning expectations, standards, curriculum, instructional practices, and integrating technology in order to prepare students to adequately handle present and future challenges and be prepared for the future job market.

6. Implications and Recommendations

To reiterate, this 2020 mega-global event should be viewed as a wake-up call and validate the need to continue analyzing and understanding future predictions. Additionally, it should be viewed as an immediate and necessary call to action to learn how to (a) transform school systems, and (b) to adapt to changes, especially in the area of technology integration. More should be done to educate school leaders and teachers about the megatrends, game-changers and the work necessary to link current education to the 2030 workforce. This should be the basis of school reform and should validate and further drive the sense of urgency to creatively redesign schools. The focus of learning must shift to educating students on how to solve complex problems, to critically analyze information, communicate and collaborate globally, and understand how to apply knowledge and skills to design solutions for local and global issues.

With this said, all three case study schools provided evidence of taking action to redesign; but, only the public charter school was able to make the shift almost seamlessly, as measured by the level of integrated technology prior to COVID-19. This experience is an indication and evidence that technology integration is non-negotiable. The Internet is the new global communication highway that will only continue to expand and grow. Although the pandemic forced schools to provide students with the basics—a device and internet access—school systems must do more to expand the integration of technology beyond the substitution level. The next step is to utilize technology to enhance learning and serve as a base for creativity and curiosity, to develop deeper and higher level technical and digital workforce skills in order

for students to be well-equipped and prepared. Countries must also commit to providing every student with free high-speed internet access both at school and at home.

Based upon the study findings, literature review, the consideration of the challenges and adjustments the world is experiencing due to the 2020 COVID-19 pandemic and the reliability of technology, the need to redesign and transform schools is more evident than ever. Expectations, initiatives, practices and policies that should have been in place prior to COVID-19 are now critical if public schools are expected to survive this disruption and develop skilled students for the future workforce. If school systems react appropriately and accordingly, they will thrive and contribute to the development of human capital and a sustainable workforce. If they ignore this wake-up call, learning institutions could place themselves at risk and become the demise of the workforce; furthermore, the future economy and the position of the United States as a powerhouse on a global scale will be at stake.

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