Future Vision of Education Case Study: Norton School

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Introduction

The purpose of this case study is to provide the educational context of an organization, analyze multiple technological, public policy, economic, and demographic trends currently shaping education, and through the use of the scanning futuring technique, develop a vision for the future of that organization. The organization in focus is Norton School, an elementary public school, which is one of 7 public schools located in Cheshire, Connecticut. According to data retrieved from the National Center of Educational Statistics, of the 4 elementary schools located in Cheshire, Norton School has the smallest population, serving 425 students from kindergarten to 6th grade. The student population's racial demographic is 76% White, 12% Asian, 6% Hispanic/ Latinx, 4% mixed race, and 2% African American (National Center for Educational Statistics, 2019). The median yearly household income for Cheshire residents is $112,945, while the median yearly household income for parents of students served in the public school district is $151,667 (NCES, 2019). Norton School's future vision will be discussed at the conclusion of this case study, and a plan for change will be proposed as well.

History: Past and Present

Norton School was founded in 1955, the 5th school founded in the Cheshire public school district and the 2nd school that was intended for students from kindergarten to 6th grade. Over the years, many changes have been made to Norton School in an effort to benefit both teachers and students. Some of the most significant, albeit fairly recent changes made include the adoption of Responsive Classroom teaching practices, the addition of a Reading and Math Specialist faculty position, and the purchase of Chromebooks for students for classroom use. According to recent annual reports from the town of Cheshire, there is evidence to support the

positive benefits of Responsive Classroom practices. In the Town of Cheshire 2012-2013 annual report, due to the hiring of a consultant from Responsive Classroom and additional teacher training sessions for Responsive Classroom, there are fewer referrals to the office for student misbehavior and many fewer referrals for repeat offenders (Milone, 2014). According to reports when Responsive Classroom was first introduced, a Safe School Climate Survey issued by the Safe School Climate Committee indicated that 82% of students in grade 1-3 and 84% of students in grades 4-6 felt like their teachers cared about them (Milone, 2015). Teacher feedback indicated that the work with a Responsive Classroom consultant on effective strategies and the professional development sessions led to an improved impact of their teaching on the students in their classroom (Milone, 2015). The Reading and Math (RAM) Specialist position was a successful addition to the staff at Norton School, and the specialist and classroom teachers worked successfully through the analysis of student data to provide interventions for students. The effectiveness of this collaboration is indicated in improved student achievement and a reduction in required intervention support following the addition of the RAM position (Milone, 2015). This has led to numerous benefits for students, and now students in grades k-6 have access to devices, with students from grades 3-6 having 1 to 1 access. Chromebooks were handed out during the 2020 pandemic, allowing each family to have access to a school issued chromebook. According to NCES data from 2019, Norton School ranked better than 97.5% of schools nationwide in 2019 in regards to standardized test scores (NCES, 2019). On Norton School's website, their mission statement is stated as follows: "The Norton School Community is committed to providing a caring and safe learning environment where all students can strive to reach their fullest potential, academically and as community contributors." (Cheshire Public

Schools, 2019) The goal of Norton School is to create an environment that not only supports complex thought, but social-emotional learning. In subsequent sections of this case study, current technological, public policy, economic, and demographic trends will be analyzed

Technological Trends

Most educational scholars agree that education needs reform desperately. When discussions about education reform are brought up, two common themes seem to persist: Focusing on how students learn as individuals is paramount, and technology has the potential to create more effective, efficient, and sustainable models of education (Leer & Ivanov, 2013). As educational scholars and proponents of educational reform continually stress the importance of teaching to multiple intelligences, it seems the standardization of the system and the idea that every student learns the same thing at the same time is working against them, as teaching to multiple intelligences is very difficult in this standardized system. Many of the current standards in education cater to the needs of students in the 19th and 20th century (Prensky, 2013), but as machines are able to do more, it raises the question: should we continue to teach things the way we always have? Technology can make it much easier for teachers to cater to multiple intelligences in a diverse student body, and allow students to get in touch with their curiosities and make them drivers in their own learning. A significant educational technology trend shaping the future of education is an increased emphasis in learning outside the classroom. Learning outside the classroom environment has been a trend that has been on the rise due to the increased proliferation of mobile devices (Dani, 2019). The use of adaptive learning technologies allow students to learn at their own pace and time, and the idea that learning can happen anytime, anywhere, as opposed to only within the walls of a brick and mortar school building has become

an attractive premise for educators, parents, and students alike. Additionally, eBooks on mobile devices have been used more frequently, and those eBooks often are embedded with many features that can not only enhance the learning experience, but give access to literature and content that would otherwise be inaccessible to certain audiences, such as culturally and linguistically diverse students (Dani, 2019). The flipped classroom model is also becoming increasingly popular in higher education. The flipped model involves students learning content and prerequisite knowledge at home, so they have more time to do practical work and skill application in the classroom. Another budding technological trend in education is the increased emphasis on protecting student data and cybersecurity measures. A new cybersecurity incident strikes a school district approximately every three days, and those incidents often result in the theft of millions of taxpayer dollars, stolen identities, tax fraud and altered school records (SecurityMagazine.com, 2020). As a result of these breaches, schools are trying to find ways to avoid these breaches, but are finding it increasingly difficult to do with the mass influx of new technology. The number of U.S. K-12 students with access to the broadband they need for 'digital learning' in schools and classrooms grew from 4 million in 2013 to 44.7 million in 2018, and millions of devices for student and teacher use are purchased every year (SecurityMagazine.com, 2020). It is also apparent that more things in schools are becoming computer automated, and information in schools are shared much quicker and more freely than before: School telephone systems are migrating to VoIP services, point-of-sale systems are deployed in school cafeterias, HVAC and lighting controls are managed remotely through IP networks, student information systems offer real-time insights to administrators, teachers and parents, and Internet-connected surveillance cameras are being deployed in the name of school

safety just to name a few (SecurityMagazine.com, 2020). It is clear that a security breach in any capacity can spell disaster for a school system. One such school district is doing it's part to enhance security measures is the Val Verde Unified School District in California. Val Verde is using the Logicalis Veeam® Availability Suite in order to prevent security breaches or recover data quickly if lost. These enhanced security measures may see increased use in the future as cybersecurity and protecting student data becomes a bigger priority with the increased proliferation of technology. A third technological trend that is emerging is the increased use of VR in learning settings. Multiple studies have looked at the effectiveness of VR in military training and higher education, but few have looked at its use in primary education. In 2010, a study was conducted in Taiwan that explored how teaching with a virtually augmented Sun and Moon System affected 128 Taiwanese fourth grade students' science achievement. Four classes were randomly divided into comparison and treatment groups. The results show that: (a) students in the treatment group achieved significantly better grades than those in the comparison group under traditional class instruction and the questionnaire results revealed that more than two thirds of the treatment group liked to use the 3-D VR model and would like to introduce it to their classmates (Sun, Lin, & Wang, 2010). Additionally, many teachers who participated in the study stated that the model was easy to install and integrate into their everyday instruction (Sun, Lin, & Wang, 2010). New technologies such as VR can connect students with experts in certain fields around the world, and simulations can allow for easy to access experiments that can be repeated in a fraction of the time that a traditional science experiment would take. The potential impact of these technological trends cannot be understated if applied correctly and thoughtfully.

Public Policy and Economic Trends

One must analyze the current public policies and economic trends that will significantly affect education in the foreseeable future in order to develop a future vision of an educational institution. One of the trends currently affecting the economy and public policy is an increasing average age of the population. A trend that coincides with this is increased life expectancy and fluctuations in birth rates. By the year 2050, it is projected that the population will exceed 9 billion, and the number of people over the age of 65 will exceed the number of people under the age of 15 (Glenn, 2014). This is particularly significant because during the next several decades, senior citizens will represent an increased percentage of the U.S. population, and given the generally higher voter participation rates among the elderly, especially in local elections, seniors will represent a sizable contingent of voters in many local elections (Duncombe, Robbins & Stonecash, 2003). This gives them an increasing influence on local tax and service packages which makes senior voter participation a concern for public education. Anecdotal evidence of communities with a higher median age removing themselves from school districts in Florida have been used to claim a pending problem facing local school districts. Although little empirical evidence can back this claim, it is to be noted that generally voters are less likely to vote for costly policies that favor school districts when the service does not directly serve them (Duncombe, Robbins & Stonecash, 2003). Another economic trend currently shaping education is school funding reformation. Over the years, the funding model for education has evolved from being funded by local communities through many methods such as student fees, community contributions, and various forms of local taxation, to being funded mostly through property tax (Education Commission, 2013). This model has been subject to scrutiny over the years because property owners who live in property poor communities often face higher tax rates than property

wealthy communities in order to raise the same amount of funding (Education Commission, 2013). 8 states- Connecticut, Maryland, Massachusetts, New Jersey, New York, Tennessee, Rhode Island, and Virginia- have adopted methods to better measure a district's ability to pay for school by supplementing property values with income along with property tax (Education Commission, 2013). If this trend continues, then we may see lower income districts with higher property wealth gain more access to educational funding, which may lead to better educational outcomes for poorer districts as a result of more reliable and higher quality educational resources.

Demographic Trends

Changing demographics and recent trends that are affecting the student body educational institutions serve include a larger population of culturally and linguistically diverse students, a growing population, and an increased number of students who are being homeschooled. In recent years, the US population has grown significantly because of immigration, and the highest number of legal immigrants in the United States are coming from Mexico, China, the Philippines, India, the Dominican Republic, Cuba, and Vietnam (Shrestha & Heisler, 2011). The percentage of Hispanics in the US is trending upwards, and it is predicted that the population will be more evenly dispersed as far as race representation goes (Shrestha & Heisler, 2011). There are a number of challenges that this trend presents. One of those challenges include language barriers that continue to exist, and income disparities making homeownership more costly for poor families (Educational Commission, 2013). This changing student population also makes educational reform an imperative so education can meet the needs of all culturally and linguistically diverse students. Educational outcome data supports the idea that students with

nondominant socio cultural and linguistic backgrounds are not successfully served in the public school system (Yates, 2008). This failure is highlighted by a disproportionate amount of non-English speaking, especially Hispanic, students receiving special education services, being held back in grade levels, or dropping out of school entirely (Yates, 2008). As the current ethnic majority becomes the minority of the population, and the percentage of African American, Hispanic and culturally/ linguistically diverse students becomes the majority, the possible number of underserved and undereducated students becomes a frightening prospect. To combat this, it is important for schools to divert extra funding towards programs that will help these students achieve better educational outcomes. As Norton School's student body begins to evolve and the percentage of ELL students and CLD students increases, it is in the best interest to find a way to use technology and train current personnel to adequately serve this population in order to serve all of their students the way they intend to based on their mission statement. Another significant trend that points to possible changes in education includes an increase in the number of homeschooled children. From 1999 to 2016, the number of homeschooled children increased from 850,000 students, to 1,690,000 students, which now encompasses about 3% of the United States student body (NCES, 2019). Educational outcomes for homeschooled children have also been strong over the years (Mackey, Mackey, & Reese, 2011). Homeschooled children have outscored their public/ private school counterparts on standardized tests across the board (Mackey, Mackey, & Reese, 2011). Ethnicity, religion, family structure, and parent education level form a core set of demographics that are commonly represented in homeschooled children; that is, these students tend to have 2 parents, who tend to be white and Christian (Mackey, Mackey, & Reese, 2011).

Methodology and Futuring Techniques: Scanning

Scanning is a futuring technique that involves the systematic survey of information sources focusing on trends and then establishing the potential implications and importance of those trends on the organization over time, and can be beneficial for educators when done correctly and thoroughly (Encyclopedia.com, 2020). Scanning involves the use of both observational and research-based data and should include data from many sources from county, state, national, and international databases (Sobrero, 2004). The purpose of using this data is to use the intellectual capacity of social, economic, technology, political, and environmental experts to provide reliable trend analysis in issue areas. Scanning also involves using data from the actual population the organization serves and stakeholders as well. For example, Sombrero (2004) states that for educators, learner satisfaction data can be used to analyze the rate of practice change reported by learners, and it can be a source for identifying emerging issues as well as the perceived value of programs from the eyes of the stakeholders and learners in the organization. Administrators play a key role in scanning as well, as they informally and sometimes formally observe a variety of settings to gain valuable information on the important issues in their organizations that must be addressed (Sobrero, 2004). Scanning encourages continuous improvement and allows educators to develop the mindset that they must change as the educational landscape does. In this case study, multiple trends were analyzed in regards to technology, public policy, economics, and demographics. Then, the supposed impact and importance of those trends is analyzed, as well as the time-table as to when possible changes may start to take place.

Vision for the Future

The scenario technique of futuring posits that there are many possible outcomes in the future. This technique is seen as beneficial because the scenarios take into account the uncertainty of a situation and the myriad of outcomes rather than settling on one most probable outcome in the future. Futurists must consider all possible scenarios during the process of futuring, those of which have been categorized as such: continuation scenarios, optimistic scenarios, pessimistic scenarios, disaster scenarios, and miracle scenarios. (Encyclopedia.com, 2020). Mietzner & Reger (2005) reference multiple advantages of using scenarios in futuring for educators. First, scenarios can open the mind up to new possibilities, rather than perpetuate assumptions about what is seen as the "official" or unavoidable future (Mietzner & Reger, 2005). They also allow educators and administrators to use data to recognize weaknesses in their own educational organization and give them the power to adapt. In this section, a possible future scenario of Norton School will be described in terms of what it may look like 5 years from now if it makes changes related to the trends discussed in earlier sections. Clear rationale as to why the organization should adopt these changes will also be included, as well as possible challenges and opportunities that these changes may bring about. Finally, a scenario as to what may happen if these changes are not made will be proposed.

Use of Virtual Reality in Classrooms

The research behind the use of VR is extensive, and results of these studies point to the fact that student achievement and engagement can be improved through the use of Virtual Reality in classrooms (Sun, Lin, & Wong, 2010). One of the drivers of the adoption of VR in classrooms is undoubtedly the New Generation Science Standards that have recently been

adopted by the district. The NGSS Framework includes a comprehensive list of Science and Engineering Practices which involve developing models, conducting multiple trials, analyzing data and understanding patterns to name just a few (NGSS, 2011). The sheer volume of materials required for conducting many of these experiments, paired with the lack of time given during the school day that is dedicated to science instruction, creates a unique problem for teachers who are seeking to include these science and engineering practices in their instruction. This is where VR has possible benefits. VR allows for nearly instant replication of scientific experiments with minimal materials, and while VR technology is costly, in the long run, it will be more cost effective than providing teachers with new sets of materials every few years. Including VR in the social studies curriculum also provides opportunities for virtual field trips which again can enhance the learning experience without needing the extensive planning and spending required for field trips. Immersive 3D models will be used to help visual learners and will add a new element of engagement to the classroom. It is predicted that VR will start to see use in classrooms within the next five years, but become more widespread in years following that. Virtual Reality headsets and 3D virtual models will be examples of that technology that will see widespread use.

Table 1: Advantages and Disadvantages of VR technologies at Norton School

Possible Challenges	Possible Opportunities
- High price point - Not entirely applicable in all grade levels - Possible damage to software is likely - Adoption of VR technology must be carefully thought out, and sometimes technology is included simply for "technologies sake" without a careful analysis of how it is used and integrated - Makes some brick and mortar school supplies obsolete	- Virtual Field trips are a possibility - Decreased amount of materials needed for experiments or demonstrations - One time cost is high, but over time, may begin to pay for itself - New levels of student engagement - Possible uses for ELL students - Helps visual learners in a new and exciting way

Hiring of an ESL Teacher

It is clear that the academic achievement of culturally and linguistically diverse students are a big concern in education, and it is also clear that the number of students that fall under that category is increasing rapidly (Yates, 2008). It is predicted that in order to serve this population of students effectively, an ESL teacher will be hired at Norton School to support them in their acquisition of the English language. The ESL teacher's job will be to instruct at-risk ESL students in English, or provide them with techniques and technology that will enable them to have access to curriculum taught in the regular education setting. The ESL teacher should also work in conjunction and collaborate with the classroom teacher to provide relevant instruction in the ELLs native language. Spanish speaking students are on the rise, so within the next few years, Norton's demographics will change from 76% white to 70% white. As a result of the increased CLD student population, Norton will be faced with a decision of hiring an ESL teacher to support these students with particular needs that cannot be met by their classroom teacher.

Table 2: Advantages and Disadvantages of Hiring an ESL teacher

Possible Challenges	Possible Opportunities
- New teacher salary may provide some challenges for the school - Difficult to find ESL teachers well versed in multiple languages - Classroom teachers who collaborate with special ed, RAM specialists, and Learning Support Teachers may find another case manager to work with a challenging proposition - Idea that "the old way has always worked" may impede progress towards adopting this new position - Hiring one ESL teacher may result in a heavy caseload for that one teacher	- PD can be offered to select teachers with ELL students by ESL teacher - Allows for parent teacher conferences to be held with CLD parents - Improves lines of communication with parents of CLD students - Better educational outcomes for ESL students - Decreased special education enrollment for ESL students

Use of Adaptive Learning Technologies in All Grades and Subject Areas

It has been proven that the use of Adaptive Learning Technologies (ALT) can lead to positive educational outcomes, especially for struggling students (Moltudal,Høydal, & Krumsvik, 2020). With Norton's emphasis on the importance of personalized learning, it seems that the continued inclusion of ALT, especially with students in need of intervention, is in their best interest. ALT adapts to individual student achievement, and is mastery based. That is, students who have not mastered a concept have opportunities to revisit concepts easily until mastery is achieved. Norton's mission to promote complex thought and social-emotional learning can only be achieved through the continued use of these technologies. Parents in Cheshire were a previous deterrent when an ALT platform called *Summit* was introduced in 2017 (Nazerian, 2018). Some concerns from parents included worries about student data usage and limited data about the effectiveness of the platform. However, due to the recent coronavirus

pandemic and growing familiarity with ALT platforms such as Zearn and Khan Academy, the initial fears about ALT platforms may be disappearing from the minds of parents in the Cheshire school district. It is predicted that within the next few years, ALT platforms like Summit or even a revisit of the Summit platform itself will occur, and see use as instructional tools or for homework and possibly even assist in the adoption of a flipped classroom model at Norton school.

Table 3: Advantages and Disadvantages of ALT use at Norton school

Possible Challenges	Possible Opportunities
- May increase teacher reliance on technology - Parent concerns about student data privacy remain a possible challenge - Teachers may become overloaded with the sheer vastness of technological resources used at one time - Experienced teachers may be hesitant to use new technologies - Excessive student screen time is a concern	- Mastery Based - Allows for personalization of learning - Opportunities for learning to happen outside the classroom may allow for more project based learning and application activities to take place in the classroom - Keeps track of student data - Allows teachers to act fast and provide help to struggling students when at risk students are identified

Implementation of Enhanced Cybersecurity Measures

If Adaptive Learning Technologies are implemented in the coming years, then parent concerns must be addressed, and as stated previously, cybersecurity was a huge concern from parents (Nazerian, 2018). Concerns about what kinds of student data would be collected by and shared with Summit Learning were at the top of a long list of complaints from parents. In order to make ALT's and more widespread use of technology something that parents and staff are comfortable with, it is in Norton's best interest to adopt advanced cybersecurity software that can

protect Norton school from security breaches and preserve student data, and communicate the specifics of that new technology with parents and staff. The possible challenges and opportunities of these changes have been condensed in the table below from The Disadvantages and Advantages of Cyber Security (Xinyi Cybersecurity, n.d.)

Table 4: Advantages and Disadvantages of enhanced cybersecurity measures at Norton School

Possible Challenges	**Possible Opportunities**
- May be costly - Difficult to configure correctly - Constant updates needed - May block teachers from certain actions on the internet until firewalls are removed - May make system slower than before	- Protects the system against viruses, worms, spyware and other unwanted programs. - Protection against data from theft. - Protects the computer from being hacked. - Minimizes computer freezing and crashes. - Gives privacy to users

Alternative Scenarios

If these changes do not take place at Norton School, some things may happen in the future that may be considered undesirable. For starters, rigidity in regards to the technology Norton uses and lack of consideration in regards to the benefits of VR may make Norton victim to an essentialist mindset; rather than change, Norton will continue to do things the way it has always done. This may lead to teacher burnout and wasted funding due to the increased spending on educational materials that may be curbed with the adoption of some VR technology. If Norton fails to hire an ESL teacher, then those same students who have traditionally been underserved in the United States will continue to see, on average, poor educational outcomes. The level of

expertise that can be provided by an ESL teacher could be invaluable, but without that, teachers may continue to be unequipped to handle the needs of CLD students in their classroom. Failure to use ALT in classrooms and at home may prove to be a mistake since a lot of teacher time is devoted to teaching some things that ALT has the ability to do. There is still a need for the traditional style of teaching, but the role of the teacher needs to change a bit if Norton wants to align itself with its mission statement of providing personalized learning to all of it's students. Finally, failure to adopt enhanced cybersecurity measures may put Norton school at risk of avoidable data breaches.

Plan for Change

Norton school should take steps to prepare for these changes. In order to set itself up for success with the use of Virtual Reality in the classroom, Norton school technology committee members and district administrators should collaborate on research to find effective virtual reality uses in the classroom and think about ways to start using these in the curriculum. One of the technology committee's jobs should be to analyze emerging educational technology trends and bring new ideas to whole staff faculty meetings monthly. Norton should propose the new ESL position and start allocating funds to provide for the salary of an ESL teacher. Norton has some Learning Support Teachers, but should also look for Learning Support Teachers that are bilingual and trained in ESL instruction. Norton school is not unlike other schools, which face a problem when considering what new technologies to spend money on (Education Commission, 2012). State leaders must encourage the thoughtful adoption of new technology, and Norton school should collaborate across many sectors, including other schools in the district, early

educational programs, libraries, museums, and afterschool programs(Education Commission, 2012) to find what adaptive learning technologies could prove to be the most useful and beneficial for each subject area. Norton also needs to include parents more when it comes to introducing new technologies into the fold, and encouraging their use and practice at home to build familiarity. Finally, the school technology committee should work with district educational technology administrators to determine what cybersecurity measures need to be taken to decide on the thoughtful adoption of new security interfaces.

Call to Action

All of these proposals beg the question: Where do educators start when it comes to adopting these new changes. To start, building administrators must start prioritizing professional development that deals with two things: implementation of new technology, and EL student achievement. Administrators must conduct research and share results of the research in regards to new technologies that can be implemented in the classroom. Administrators must give teachers leeway to use and document results from the implementation of new technology to see how it affects all students, be it special ed students, students that are receiving scientific research based interventions, EL students, or students who receive no specialized instruction. RAM specialists and administrators should also survey teachers to see what their needs are when instructing culturally and linguistically diverse students so appropriate measures can be taken to assist these teachers, which will eventually lead to more support in the form of an ESL teacher. These are the first steps on the road towards aligning Norton School with this Future Vision.

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Appendix

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