Integrating Technology into Intergenerational Learning

Bucharest, Romania Project Site

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Integrating Technology into Intergenerational Learning

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ABSTRACT

To combat early school dropout rates in Romania, the Fundația Regală Margareta a României (FRMR) created its Generations' Centres program, which connects children to retired mentors in after-school programs. The centers are designed for underprivileged students to receive tutoring, mentorship, and companionship from retired volunteers. The FRMR aims to enhance these centers by integrating technology into their daily programs. Our team was asked to redesign a center in a way that incorporates technology into the existing program. Our project works to design a fun, safe, and technology based intergenerational learning center which will improve student engagement and involvement of retirees in their community.

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EXECUTIVE SUMMARY

In an effort to combat high early school dropout rates in Romania, the Fundația Regală Margareta a României (FRMR) created its Generations' Centres program, which pairs children to retired volunteers in after-school programs. The centers are designed so that underprivileged students receive tutoring, mentorship, and companionship from retired volunteers. According to the FRMR website, the centers act as a tool to keep children from underprivileged backgrounds involved in productive activities within a safe and supportive environment (n.d.). At the moment, Generations' Centres provide academic tutoring and various extracurricular activities. While these functions meet the goals of the centers and the basic needs of the children, their execution could be improved to enable a more exciting and collaborative learning experience. The FRMR seeks to integrate technology in order to aid the students in their academic pursuits. To assist them, our project designed a fun, safe, and technology based intergenerational learning center. This new design aims to help underprivileged children by giving them the resources needed to keep up with their classmates, while also giving the volunteers the opportunity to connect with their community.

The growth of technology has revolutionized many aspects of learning within educational institutions. The ability to instantly gather, assess, and distribute information opens pathways for different lesson plans and can contribute to a more experimental learning approach. Different types of technology can be utilized in many different ways. Items such as computers and tablets give students access to instant information as well as software that can enhance the educational experience. Other resources, such as projectors and smart boards, give instructors greater control in the dissemination of information (Muhanna & Nejem, 2013). They also provide significant advancements in the classroom, such as facilitating collaborative work, which allows students to learn from each other as well as their instructors.

Unfortunately, the benefits of using technology in classrooms only reach those who remain in school. According to Eurostat data, in the year 2018, Romania had the fifth highest early school dropout rate in Europe at 16.4% (2019). The FRMR attributes these dropouts primarily to poverty, which is extremely prevalent in Romania nowadays. According to UNICEF, half of the child population in Romania is currently at risk for childhood poverty and a quarter of the child population already experiences it (n.d.). As of 2017, 23.5% of the Romanian population lives below their national poverty line, with 5.7% living under the international poverty line, one of the highest percentages in Europe (The World Bank Group, 2019). Poverty has a large impact on a child's education; income is "one of the most significant predictors...of their educational success" (Garcia, 2017, p. 1). Children affected by poverty often end up falling behind, despite starting at the same place academically (Porter, 2015). The FRMR hopes to encourage more students to

stay in school by providing engaging learning experiences and increasing students' chances for academic achievement.

Another goal of the FRMR's Generations' Centres is to provide the elderly population with an opportunity to become involved in their communities. As people age, they are faced with new sets of challenges to overcome. In addition to having complex housing and medical needs, older retirees also face many emotional hardships. It has been widely acknowledged that not meeting the emotional needs of the elderly has a large negative impact on their physical health (Malcolm, 2019). Oftentimes, unfulfilled emotional needs and social isolation affect health-related behaviors that ultimately play a large role in the overall well-being of the person. 514 elderly Romanian people were surveyed in a study done in 2015 by the FRMR. They were asked questions about their lives and their mental well-being, such as how bothered they are by things such as loneliness, having no one to talk to, or feeling as though others are avoiding them. 60% of respondents reported feeling some level of loneliness (Milos, Pasparuga, & Gogita, 2015). Intergenerational learning programs bring together children and retired individuals to boost a sense of community and the transfer of knowledge.

A major aspect of our project is to implement technology to improve the intercommunication and engagement between students and volunteers. But without proper training, this could be detrimental to the social balance of the center. Research shows that older adults may find it more difficult to navigate the implementation of new technology. This can be due to negative perceptions in learning how to use it, poor health, or the view that technology is useless (Wang, 2018). The fact that many older adults haven't used newer technology before can also impact how quickly new skills can be learned. This specifically affects Romanians because, in general, Romania has one of the smallest rates of internet usage throughout the European Union (Cimpoieru, 2011). In a recent study, it was found that only 13% of the elderly population in Romania use the internet at least once a week (Cimpoieru, 2011). This lack of usage of the internet may cause a disparity in the ability for all Romanian age brackets to be able to use technology properly. Based on this, it is essential to also provide resources in how to best operate and utilize new technology.

Our team had three main goals for the redesign of the center: to improve student engagement and academic performance; to attract additional sponsors and volunteers; and to aid retired volunteers in reconnecting to their community in a way that is replicable in other centers. To reach these goals, we collected data by talking to FRMR staff and creating surveys to better understand the challenges that students and volunteers face. The data we collected provided ample information to refine our broad ideas about what elements of technology would create the greatest positive effect in improving intergenerational interactions and student engagement with respect to cost. We found specific products that correlated to the ideas we had

and organized them into a sample budget and a comprehensive design. After finalizing the comprehensive design of product and software recommendations, we produced an online volunteer handbook for those suggestions to ensure the continuity of quality instruction, as well as facilitate the transfer of knowledge among centers. Finally, we created promotional videos as recruitment tools for the center, targeting new volunteers and sponsors. The videos showcase the impact the products could have on the center to inspire potential sponsors and volunteers to join the community. All our final deliverables can be found on the project and volunteer websites. Links to these websites[1,2] can be found in Appendix J.

The deliverables we gave to our collaborators for this project will assist them in building a great foundation upon which the FRMR can improve their center. We also left advice and considerations for the continued success of this project, and anticipate that future IQP teams will be able to further aid the FRMR with its goal of integrating technology into its intergenerational learning centers. Specifically, a post-implementation survey would provide future teams with a baseline of how successful our project work was and how they could work with the FRMR to improve. We also hope future teams will use our promotional videos as a tool to send to potential sponsors and as a way of recruiting new volunteers. This project is truly at the intersection of science, technology, and society, and with continued research into how technology can best be implemented, the FRMR's centers will benefit for years to come.

[1]Project Website: https://learningcenteriqp.wixsite.com/projectsite
[2]Volunteer Resources Website: https://learningcenteriqp.wixsite.com/projectsite/website

1 INTRODUCTION

Education is an extremely important global issue. Education can set individuals up with skills needed for joining the workforce and can also be a predictor of long term success in life. Recent data suggests that students who do not complete secondary school are more likely to experience poverty, unemployment, and social isolation (Petersen, 2018). Around the world, young people drop out of secondary school and are not employed. In the European Union (EU) as a whole, these people make up 10% of the population. In Romania, this percentage increases to 16.4%. Romania experiences the fifth highest early school dropout rate, meaning its educational system and supplementary programs are in need of change. According to the Fundația Regală Margareta a României (FRMR), these dropouts are due to the rampant poverty that affects half of the child population. More information about the FRMR goals can be found in Appendix A.

In a movement to combat this problem, the FRMR created its Generations' Centres which use intergenerational learning to connect children and retired individuals, encouraging community mentorship and innovative learning experiences. According to the FRMR, these centers combat the two largest social problems that Romania faces today: early school dropout and accelerated demographic aging. The volunteers working at the centers provide both the retirees and children participants with role models, intergenerational collaboration, community building, and academic guidance. As of 2017, there were 589 children enrolled in 15 Generations' Centres across Romania and 63% of these students improved their academic performance (FRMR, n.d.).

Similar endeavors can be found in the United States to increase academic success through after-school programs and intergenerational learning. The Boys & Girls Club of America and Big Brothers Big Sisters are after-school programs that are great references for improvement, as they were created to combat child poverty, lower early dropout rates, and combine adult mentoring with academic tutoring. In addition, the Providence Health and Services of Washington State is known for its Intergenerational Learning Center that has an innovative problem solving curriculum, allowing the children to have independence with the guidance of elderly mentors. This center is very similar to Romania's Generations' Centers, however this center is located on a retirement home's campus and the students come to visit. This way the center is able to provide additional resources to care for the mental and physical needs of the elderly. The drawbacks of this center are its high operational cost, the fact that people pay to participate, and its emphasis on the elderly, none of which are present in the Romanian centers.

Our project aimed to design a fun, safe, and technologically based intergenerational learning center.

Our specific goals and reference questions are detailed in Appendix B. The new design targets underprivileged children in order to help them keep up with their classmates both academically and socially. To support this, we looked into the supplies and technologies that will be most effective in creating the design for the space. We then advanced our understanding of the problem by evaluating the needs of our stakeholders, the FRMR staff, the volunteers, and the participating children, to gain a clearer picture of the needs of the children and volunteers. This information was used to create a design plan for the center. Promotional videos showing the positive impact of technology in the Generations' Centre were created based upon our findings. These videos will be distributed to the stakeholders as well as potential sponsors and volunteers. Finally, we compiled additional information into a volunteer resource website in order to aid in the training of the retirees. The website can be accessed by all the centers, providing the same resources to each volunteer.

Overall, we want our final deliverables to assist the FRMR in facilitating mutually beneficial collaboration among generations. Through the implementation of technology and multimedia resources for new software and hardware, we aim to help generate a more exciting environment to foster intergenerational learning. The promotional videos we created will assist the center in sharing an image of this exciting new atmosphere with future sponsors and volunteers. With the resources we provide, the FRMR can update and improve the specific center we are collaborating with as well as their other centers throughout Romania.

2 BACKGROUND

In order to contextualize the challenges we expected to face throughout our project, we researched topics relating to the obstacles faced by the FRMR. We first sought to better understand the struggles faced by younger generations relating to their education, as well as the struggles older generations face in their day-to-day lives. We looked into these problems on a global scale and then narrowed our research to see how they affected Romania specifically. To see how these challenges are being tackled around the world, we then researched existing educational programs and different ways technology is currently being implemented into classrooms to create more engaging environments.

2.1 Causes and Impacts of Early School Dropout

Poverty has a large impact on a child's education; low income is "one of the most significant predictors...of their educational success" (Garcia, 2017, p. 1). Children affected by poverty often end up falling behind students who are not affected by poverty, despite starting at the same place academically (Porter, 2015). Low-income families may struggle to purchase quality school supplies that can help advance learning. On top of these setbacks, economic factors can challenge their ability to attend higher-level programs, like private schools that can offer a better quality education. Even "looked-after children and care leavers," also known as those in the foster care system, "have lower educational achievements than their peers" (Brown, 2019, p. 220).

Education is a necessity in modern life. Nowadays, most jobs that will bring in a decent salary require at least a high school diploma. However, according to a study done by the Digest of Education Statistics, 18 out of 100 US high school students did not graduate on time, if at all, in 2016 (Cass, 2018). Recent data suggests that students who don't complete secondary school are likely to experience social exclusion, unemployment, and poverty, because not being enrolled in secondary education "leads to marginalization and inactivity" (Petersen & Andersen, 2018, p. 43). In the EU as a whole, 10% of the young adult population are considered "early leavers" - people between 18-24 years of age who are not currently in formal education and left school before completing their secondary education (Figure 1)[3]. In the southeastern regions of the EU, 15% of the young adult population is not employed or enrolled in any kind of education, which puts them at risk of social exclusion and poverty (Eurostat, 2019). Overall, having at least a baseline of secondary education can lead to a better quality of life, and the current school dropout rates around the world are

[3]The 'X' marks on the graph indicate each country's 2019 goal for their percentage of early leavers.

leading to a large number of people being put at a disadvantage.

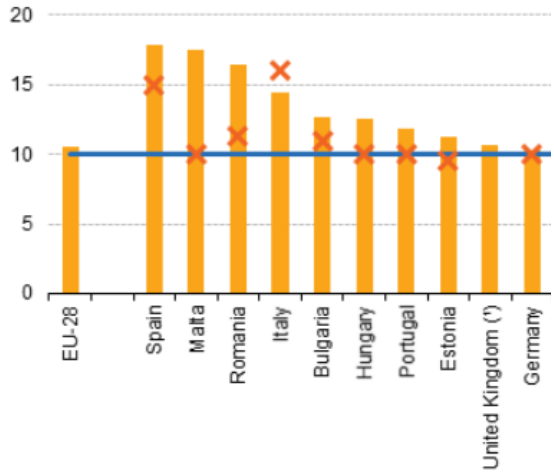

Figure 1: Proportion of Early Leavers from Education and Training (Eurostat, 2019)

2.2 The Romanian Education System

According to Eurostat data, in the year 2018, Romania had the fifth highest early school dropout rate in Europe at 16.4% (2019). The FRMR attributes these dropouts primarily to poverty. Poverty is extremely prevalent in Romania nowadays. According to UNICEF, half of the child population in Romania is currently at risk for childhood poverty and a quarter of the child population already experiences it (n.d.). As of 2017, 24.4% of the Romanian population lives below the national poverty line, with 5.7% living under the international poverty line, one of the highest percentages in Europe (The World Bank Group, 2019). Specifically, minority groups in Romania, such as Roma, are at a higher risk of falling below these poverty lines (Table 1). The poverty rates of the Roma population, as shown in Table 1, could possibly be attributed to the discrimination they face and the attitude the more traditional Roma population holds about education. Issues pertaining to these factors may be present in the Generations' Centre we are working with, due to the population the students in the center are being drawn from.

Ethnicity	**Rate of Severe Poverty**	**Poverty Rate**
Romanian	9.3%	24.4%
Hungarian	6.4%	19.9%
Roma	52.2%	75.1%

Table 1: Poverty Rates Among Communities in Romania

The Special Fund for Children program, created by the FRMR, works to prevent early school

dropout in two ways: by providing individual scholarships to children and young people in need, and by awarding grants for after-school programs in rural areas and small towns. According to a 2019 report by the European Commission, "The shortage of staff with proper qualifications in rural areas...remains a challenge" (p. 4). Furthermore, it states that one guidance counselor can be expected to work with as many as 2000 children (2019). The FRMR hopes to offset these discrepancies with programs targeted at students facing such challenges. Both poverty and a lack of funding for schools contribute to today's dropout rates. However, these concerns are merely symptoms of a systemic problem based on the turbulent history of Romania and the impact both communism and, later on, early-stage democracy had on the development of the education system.

Starting in the 1950s, Romania's version of communism diverged from its original model implemented by the Soviet Union. The Soviet Union and other communist states fell into a reformist movement after Khrushchev's fall from power in 1964; however, as Soviet troops left Romania, the country adamantly opposed the reformist movement (King, 2007). The effects of this loosening of Soviet hegemony were particularly felt in the education system, as the Romanian Communist Party (RCP) began passing legislation focused on supporting schools for their own goals. The Education Law of 1955 contributed to the addition of more secondary and postsecondary schools, even opening some dedicated to practical learning, in a strategy similar to vocational education (Connor, 2003). Another act, the Law and Reform of 1968, strictly defined a mandatory minimum of ten years of schooling, and established clear distinctions between middle school and high school grade levels. It also included updates to school curriculum and based the necessary qualifications for entry into higher level education institutions on student performance rather than family connections (Connor, 2003). However, the regime was more focused on pushing students through schools so they could enter a manual labor workforce; the reforms failed to aid schools in their own right. Finally, in 1978, the communist regime founded four national, governmental groups[4] in an attempt to further integrate engineering and technology into Romania's education system, with the sole purpose of promoting what was seen as "useful" fields of study (Connor, 2003, p. 26). Consequently, important subjects such as the arts, humanities, and natural sciences became less popular.

The communist regime implemented many so-called "reforms," hoping to educate a generation of youth that could fill the growing demands of forced industrialization. However, many of these changes lacked public support, as they increasingly brought schools under the control of the government and universities lost much of their autonomy. Many regulations were ultimately overturned with the fall of the communist party in 1989 (Siani-Davies, 1996). The following periods of reforms had some positive impacts on the Romanian

[4]The four national groups were the Congress on Education and Instruction, the Supreme Council for Education and Instruction, the Academy of Social and Political Sciences, and the National Council for Science and Technology.

education system, and created a solid foundation from which the system could continue to grow. According to Georgeta Connor in her master's thesis at the University of Georgia, Romania's education system underwent four major stages of change after 1990 and the fall of the RCP: "De-Structuring, Stabilization, Restructuring, and Comprehensive Educational Reform" (2003, p. 34). The first stage eliminated much of the communist influences on education; for example, the country shifted from providing the maximum number of students with low-level education to ensuring that the students who were enrolled in school received quality education. The stabilization period from 1991-1992 was characterized by the Constitution of Romania, which supported private and religious schools, granted the right to education for national minorities, and solidified secondary and higher education, among other reforms. In 1995, Romania began to restructure its education system, namely by creating a state-mandated curriculum. During this time, the education system was also greatly impacted by foreign policy, as Romania joined the Council of Europe and accepted foreign aid from the World Bank and the European Union's Poland and Hungary: Assistance for Restructuring their Economies (PHARE) program. Throughout the period of comprehensive educational reform, strides were taken to better imitate the education systems of other nations in the European Union. These periods and reforms had major positive impacts on the Romanian education system, and created a solid foundation from which the system could continue to grow.

The country has been in a continuous state of reform since joining the European Union in 2007, or even since declaring itself a social democratic nation in 1989. Despite all of the continuing reforms to education, the economy, and politics enacted while establishing itself as a social, democratic nation, Romania is still working through many pitfalls, including large-scale poverty, discrimination, and a disparity in consistent education between the urban and rural regions of the country (Roma Education Fund, 2007). Poverty, while improving, is still fairly high, especially in rural areas. While efforts have been made to decrease discrimination per EU regulations, Romanian society still struggles with the systemic residue from years previous, especially toward the Roma community (The World Bank Group, 2019) (Roma Education Fund, 2007). Unfortunately, there is also still a disparity between the standard of living in urban areas and rural areas. Those who are Roma or live in rural areas have significantly higher drop-out rates than Romanian students or those who live in cities. Overall, we can see that the current socio-economic state of Romania greatly influences the education of Romania's children.

2.3 Global Aging Population Concerns

According to the "World Population Ageing" report from the United Nations in 2019, there are 703 million people in the world over the age of 65. This makes up 9% of the total population on earth, compared

to the 6% of the world population who was over the age of 65 in 1990. The United Nations also predicts that these numbers will rise to 1.5 billion people and 16% of the population. This increase in population will put greater financial pressure on support systems for the elderly (United Nations, 2019).

As people age, they are faced with new sets of challenges to overcome. In addition to having complex housing and medical needs, older retirees also face emotional hardships. It has been widely acknowledged that not meeting the emotional needs of the elderly has a large negative impact on their physical health (Malcolm, 2019). Oftentimes, unfulfilled emotional needs and social isolation affect health-related behaviors that ultimately play a large role in the overall well-being of the person.

Retirees struggling with the death of a spouse, divorce, "empty nest syndrome," or financial issues can lead to habits of social isolation and avoidance. To help manage these habits, people often come out of retirement and rejoin the workforce, volunteer, or continue their education. The U.S. Council on Aging connects the elderly to services and resources to help with this. One such service is a class to help mature workers transition back to the workforce (Anderson, 2010). The course describes the phenomenon of technophobia, the disapproval and avoidance of new emerging technology, and gives a guide on understanding the importance and use of e-mail and Microsoft programs.

2.4 Aging Population in Romania

The issues faced by the aging population worldwide can also be found on a local level. 514 elderly Romanian people were surveyed in a study done in 2015 by the FRMR. They were asked questions about their lives and their mental well-being, such as how bothered they are by things such as loneliness, having no one to talk to, or feeling as though others are avoiding them. 60% of respondents reported feeling some level of loneliness (Milos, Pasparuga, & Gogita, 2015). Figure 2 below breaks down the percentages of these 514 Romanians who were bothered by these thoughts or feelings.

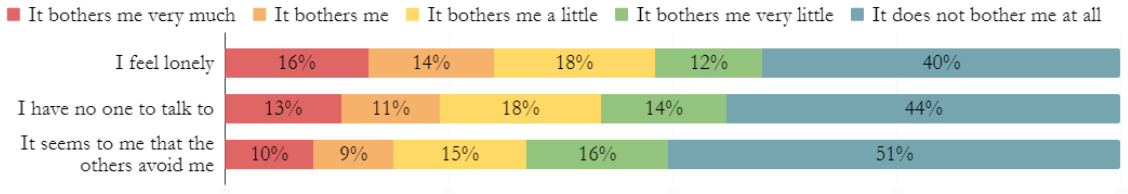

Figure 2: Rates of Loneliness Among Elderly (Milos, Pasparuga, & Gogita, 2015)

In addition to these findings, Eurostat has done in-depth research on the way the elderly are living today through data collection targeting information about their social and economic behaviors. Overall,

17.4% of Romania's population is considered "elderly," which is defined to range between the ages of 65-74 years old (Eurostat, 2017). Through this article, we were able to find that 35.6% of the elderly population lives alone and that only 15% of the elderly population are economically active (Eurostat, 2017). Larger proportions of the population retiring and becoming economically inactive can put the country at a greater risk of falling into a recession (Melenciuc, 2019).

It was also found that only 13% of the elderly population in Romania use the internet at least once a week and, with the rapid expansion of technology, this is a severely low number. In comparison to the rest of the European Union, Romania has one of the smallest rates of internet usage (Cimpoieru, 2011). In general, this lack of usage of the internet may cause a disparity in the ability for all Romanian age brackets to be able to use technology properly. Older Romanian adults may find it even more difficult to navigate the implementation of new technology due to negative perceptions in learning how to use it, poor health, and the view that technology is useless (Wang, 2018). However, it is becoming more and more imperative that older generations have the ability to use technology as it is integrated into everyone's day-to-day lives, including systems as imperative as home security and prescribed drug distribution (Heaggans, 2012). With all of the limitations and the stigma older adults have toward technology, it can be difficult to both effectively teach them about and ensure that they can easily use said technology. Studies that have looked into teaching and implementing technology for older adults suggest multiple different guidelines for doing so, including short, goal-oriented steps of instruction, using easily legible fonts and sizes, and allowing sufficient time for both steps and repetitive practice (Heaggans, 2012). Overall, the use of certain technologies can assist older adults with the problems they are facing and, given the proper education, adults can use the technology to its fullest potential.

2.5 Existing Education Programs

Intergenerational learning programs bring together children and retired individuals to boost a sense of community and the transfer of knowledge. The article "Intergenerational Learning and Care Centers, A Report from Generations United to The Commission on Affordable Housing and Health Facility Needs for Seniors in the 21st Century" extensively describes the housing and health needs of the elderly as well as the emotional needs that should be considered when planning an intergenerational community center. The importance of understanding the federal, state, and local regulations involving both children and the elderly is also stressed, as often they can be contradictory and can result in liability issues. Overall, connecting the founding principles of an intergenerational program to real, feasible action is crucial for any center involving children and the elderly. A summary of ideas we pulled from the following programs are organized

in Appendix C.

The Providence Health and Services of Washington is known for its award-winning Intergenerational Learning Center (ILC). The center is home to the retired residents and acts as a campus for the children to visit for daycare services. The opportunities available to both the children and retirees involved are clearly detailed. According to the ILC, the children learn about the normal aging process and have the opportunity to both give and receive love and attention. Children often report feeling as though they become part of a new, extended family. The retirees benefit from the physical and mental activity of working with children each day, having the opportunity to act as role models, and transferring knowledge to future generations.

Other ongoing U.S. programs also provide exemplary services to underprivileged students. The Boys & Girls Club of America is dedicated to building successful futures for disadvantaged children, often at risk of drug use and gang activity. Over the years, the Boys & Girls Club has shifted its focus to integrating technology into its community programs. The article "Beyond Safe Havens: A Synthesis of 20 Years of Research on the Boys & Girls Club" looks at 20 evaluations from the past 20 years to give a larger scale view of the program's effect on troubled youths (Arbreton, Sheldon, & Herrera, 2005). The report shows participation in the club increases academic achievement, homework completion, and the ability to participate in academic discussions. Students were also able to learn how to set clear goals that set them up for long term success and to enjoy the safe space and opportunities to utilize technology. The long term and widespread success of this club makes it an ideal model for any program for disadvantaged children.

The Big Brothers Big Sisters' program has been operating for nearly 100 years as an after-school program that connects disadvantaged children from 6-18 years of age to an adult, well-educated mentor. The article "BIG Ideas on School-Based Mentoring: Evaluation of the Big Brothers Big Sisters - Greater Twin Cities School-Based Mentoring Program" evaluates both qualitative and quantitative data to measure the success rate of meaningful connections between adult "Big Brothers and Sisters" and their "Little," their mentee. High numbers of mentors were satisfied with the program's application, interview and match processes, and training. It was noted that additional continued support for the mentors is needed to aid in relationship building. The article suggests bi-monthly check-ins from a problem-solving coach to ensure mentors receive the support they require. The length of success and suggestions for major improvements also makes this a model program.

2.6 Technology in Education

The growth of computer technology has revolutionized many aspects of society, including educational institutions. The ability to instantly gather, assess, and distribute information opens pathways for different lesson plans and can contribute to a more experimental learning approach. According to a study by Amy Baylor and Donn Ritchie (2002), "the computer facilitates the student's internal cognitive processes by serving as an extension to their intellectual capacity" (Impact on HOTS section, para. 1). This allows students more time to think critically about problems. As such, the European Union created an action plan in 2018 to add better technology in classrooms. Not only did they plan on implementing technology, but they also focused on incorporating it into the every-day life of students with initiatives such as a "public awareness campaign on online safety, media literacy and cyber hygiene" (sec. 2). One study conducted in Switzerland examined the effectiveness of tablet use while teaching basic mathematical concepts to kindergarteners. The study concluded that "students that were taught with educational intervention based on [the Kindergarten Tablet Division Model] had a significant improvement on their mathematical achievement of division in comparison to those taught using the traditional teaching method according to the kindergarten curriculum," (Zaranis & Alexandraki, 2019, p. 291). This shows that technology can have a positive effect on early learning.

Different types of technology can be utilized in many different ways. Ideally, a teacher would be able to choose which devices best apply to a course, and then incorporate them into classroom activities. Items such as computers and tablets give students access to instant information as well as software that can enhance the educational experience. In the past decade, Google has greatly expanded and improved upon its available applications. Google Docs, Slides, and Sheets can be accessed for free and provide many of the same functions as Microsoft Office programs (Koranteng, Wiafe, & Keuada, 2018). Other online resources, such as KAHOOT! and Quizlet, can enhance language learning and vocabulary (Jones, 2019). Khan Academy, an online tutoring service, is another resource students can access free of charge (Thompson, 2011). Other resources, such as projectors and smart boards, give instructors greater control in the dissemination of information and provide significant advancements in the classroom (Muhanna & Nejem, 2013). There are also different educational tools that can be applied in different areas of teaching, including E-books, which provide supplemental, interactive reading activities and the ability to have the book read to the student through online recordings (Office of Educational Technology, 2017). Students can also be given the opportunity to take virtual tours of different museums and zoos, which offers another interactive, exciting opportunity for the students to learn (Office of Educational Technology, 2017).

A more modern approach to technology used in community-based learning, especially in regards to STEM, are makerspaces. This buzzword has been heard quite frequently in recent years and describes any communal space that includes tools and supplies for people to pursue projects that interest them. Areas like these allow people to explore new activities such as woodworking, painting, 3D printing, and more. These spaces can greatly aid any member of a community, so they are being implemented more and more in schools. Free access to these STEM resources leads to open-ended learning and gives kids a safe place to learn and explore without fear of failing or being compared to a peer. It is common to find children taking apart donated electronics, learning to use simple computer aided design programs, using a 3D printer to bring a new idea to life, or developing engineering problem solving skills at makerspaces in local U.S. libraries. The model of a makerspace is simple and fluid, allowing it to be implemented in any size space with any budget. Kindergarten classrooms often use simple shelves filled with markers, Legos, and construction paper to encourage creativity. Figure 3 shows an example of a simple, inexpensive space for kids. Although it is a simple set up, the directions can lead to complicated projects to foster imaginative builds and art pieces.

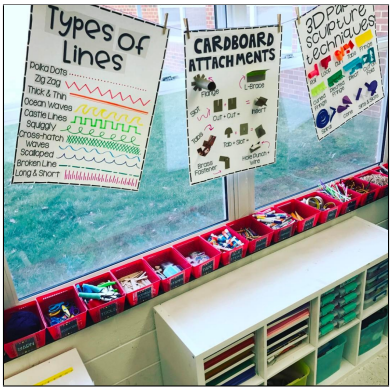

Figure 3: Example of a Simple Makerspace for Children

The article "Makerspace or Waste of Space: Charting a Course for Successful Academic Library Makerspace" explores how best to utilize a space, find funding, and implement the right technology to aid the users at a university level (Benjes-Small, Bellamy, Resor-Whicker, & Vassady, 2017). In that article, a survey of 25 makerspace founders in the U.S. showed that 22 of them repurposed an existing classroom, and 18 turned the whole room into a dedicated space. The majority of the spaces received funding from both the university it was located in and grants. A breakdown of the technologies implemented can be seen in Table 2. This shows potential technologies to utilize and illustrates that, while not all spaces are the same, all can be successful. In fact, 21 of the 25 respondents indicated that they considered their center a success (Benjes-Small, Bellamy, Resor-Whicker, & Vassady, 2017).

However, the simple availability of technology in the classroom can have little effect on learning;

Technology	Number of Makerspaces	Technology	Number of Makerspaces
3D Printing	22	Computer Workstations	19
Photo Editing	14	Scanners	14
Video Recording/ Editing	9	Audio Recording/ Editing	9
Creating Websites	8	Animation	6
Creating Apps	4	Other	17

Table 2: The Break-Down of Makerspace Technologies out of 25 Respondents

"the critical element is how technology is incorporated into instruction" (Baylor & Ritchie, 2002, Technology integration section, para. 1). The instructor's expertise and understanding of a specific device remains an issue in the utilization of technology. One study found "students believed that faculty should be fully trained in how to use the technology. . . .'the professors not knowing how to use the technology or not using it in a meaningful way, doesn't leave a good impression for students'" (Granito & Santana, 2016, p. 4). Furthermore, technology is rarely distributed equally to every classroom. This creates problems for professors that frequently change classrooms and cannot rely on the availability of technology when creating lesson plans (Granito & Santana, 2016). A goal of this project will be to incorporate technology into the given learning space in such a way that the students can claim the maximum benefits from its availability.

2.7 Conclusion

The ongoing educational struggles in Romania, including high early dropout rates, are a growing concern for the FRMR. Through our research of this global problem, we have gained a better understanding of what resources and programs have been effective in the past and around the world. We have also seen how the emotional needs of both the students and the aging volunteer population are critical to establishing how, where, and why technology can be implemented to meet the needs and wants of each group. Overall, we realize that an effective after school program can limit the risk of young students dropping out at an early age and that the addition of technology within this program can increase engagement and access to resources.

Our project encompasses a lot of different moving parts that we need to address, making contextualizing the problem a major portion of our methodology. We will conduct online student and volunteer surveys to tie in details of the major problem to the specific needs of the project center. This information will be analyzed and used in written reports for our stakeholders. It will also contribute to videos highlighting our goals, which are redesigning the center, gaining sponsors and volunteers, and creating a volunteer handbook.

3 METHODOLOGY

The Fundația Regală Margareta a României (FRMR) aims to enhance the centers by integrating technology into their daily programs. Most importantly, the FRMR affirms that technology will aid the students in their academic pursuits. Furthermore, incorporating technology into the centers will also appeal to many prospective sponsors, who are looking for technologically advanced programs to support and are essential for the continued success of the Generations' Centres. We had three main goals for the redesign of the center: to improve student performance, to attract additional sponsors, and to be replicable in other centers. The data we collected in the student and volunteer surveys provided ample information to confirm our broad ideas about what elements of technology would carry the greatest effect with respect to cost in this context. These broad ideas were then narrowed down to specific products and organized into a sample budget; an online volunteer handbook was created to ensure the continuity of quality instruction, as well as facilitate the transfer of knowledge among centers; and promotional videos, targeting new volunteers and sponsors, showcase the impact these products can have on the center.

3.1 Contextualization of the Problem

In order to achieve any of the goals set out for this project, we began by contextualizing the problem. While our background research provided insight on the causes of educational problems and issues faced by elderly volunteers, it would be impossible to truly help without first understanding how our specific stakeholders are impacted. We started by organizing our ideas and formulating a plan from the project definition, so our team could create a goal statement, a list of general project objectives to achieve that goal, and questions for each objective to guide our research. We put all of this information into a table which can be viewed in Appendix B. To begin working toward our goals as a team, we looked at which of the questions from the table could be answered through background research and which could not. We then met remotely with FRMR staff, which provided us with answers to questions that we were unable to obtain from background research.

The surveys (Appendices D and E) list the questions that the stakeholders were asked, including questions to gauge how familiar the students and volunteers are with technology, and what they believe can be improved within the center. Using the data collected from these surveys, we could fine-tune our deliverables to meet their expressed wants and needs.

3.2 Evaluating Needs of Stakeholders

One of the main goals of the Generations' Centres is to provide before- and after-school support for the enrolled children while their parents or guardians are not available. This is particularly necessary as a majority of the children that participate in the program live in economically disadvantaged households, and can greatly benefit from the resources the FRMR provides. According to the FRMR website, the centers act as a tool to keep these children involved in productive activities within a safe and supportive environment (n.d.). At the moment, Generations' Centres provide academic tutoring and various extracurricular activities. While these functions meet the goals of the center and the basic needs of the children, their execution could be improved so as to increase the children's engagement and improve the volunteers' ability to use technology effectively.

Through our discussions with our collaborators, we found that the centers fail to excite the children's interest and they lack the enthusiasm that the FRMR tries to inspire. In order to fully understand this, we used anonymous feedback collected from student and volunteer surveys to analyze the state of the center. The questions asked the respondents to choose their main academic and extracurricular interests as well as how many of these interests the Generations' Centre meets. We also asked the volunteers to define the overall goal of the program and to describe why they decided to join the program. From these answers, we compiled numerical data describing how the center is succeeding and in what areas the center needs the most development.

Our last mode of collecting data to evaluate our stakeholders' needs involved holding discussions with the staff at the FRMR, specifically our collaborators. We did this by holding weekly meetings with our collaborators over Zoom to update them on what we had been working on. From there, they were able to give us feedback and supply us with other resources we needed while working on this project.

3.3 Center Design and Modular Budget

Similar programs, such as the Boys & Girls Club, incorporate many ideas that could be utilized in the FRMR Generations' Centre (Appendix C). These programs have high success rates, and the students involved are typically excited and deeply involved in the activities presented. Using these programs as models could greatly benefit the Generations' Centres, as the main goal is to increase engagement and involvement from both the students and the volunteers. The research conducted surrounding these centers contributed to the brainstorming and selection of a variety of resources that could improve the center.

In order to increase student engagement in center activities, we aimed to provide them with materials for multimedia learning as well as tools for collaboration with their peers and mentors. As our collaborators in Romania would have difficulty purchasing products advertised to U.S. educators, we wanted to provide examples of possible items as well as highlight their main features so that similar, local items could be purchased. We also wanted to present them to the center with a rough outline of their importance and necessity. Because price did not always correlate to the potential impact of an item, we needed a system that not only fairly ranked purchases but that also gave the center the ability to decide which products would be the most useful to them. Using Google Sheets, we created a weighted matrix table (Appendix K) from which we formulated a budget and list of product recommendations.

Following the completion of this project, the FRMR will be able to begin directly implementing the changes we suggest. While our collaborators have the final say on product purchases, there are certain things we hope they will keep in mind. First, technology is changing at a rate faster than ever before, and many things that are initially being implemented may become obsolete in only a couple of years. Due to this fact, the centers have to be adaptable to the rapid innovations we see in technology today. This means that the foundation will need to stay up to date on the advancement of the technology we propose and stay alert to research done in technology in education. Another aspect to keep in mind is that the center's study room has to be modular. The space itself is constantly changing depending on the activity, so the changes implemented have to be mobile and easily stored depending on the current activity in the center. While the technology we suggest follows these guidelines, ideally other products found by the FRMR should also. By keeping these aspects in mind, the Generations' Centre will last and be able to engage the minds of students and volunteers for years to come.

3.4 Online Stakeholder Resources

Due to the technological aspect of our design, one additional deliverable for our project is a "technology training course," or a resource reference guide, for the volunteers. Without proper training, the retirees may not be able to effectively use the technology we implemented into the design. Providing a stockpile of resources such as training videos and instructions allows the volunteers to easily access information, aiding in an efficient transition to working in the redesigned center. To meet the needs of the volunteers, we used a program called Wix to develop a website where these training manuals and other resources could be made easily accessible to the volunteers. Our team decided to use Wix to build our volunteer resources website because it is a collaborative program which is designed for people with no prior experience in building websites. Wix allows users to create high quality websites with relative ease, and offers the ability to collaborate

with both peers and teammates, as well as professionals who can be hired to assist users.

There are many different ways to convey the necessary information to the volunteers. Our team decided to base our manual on E-books, because of the many attractive features that are elaborated on in our background. These provide in-depth and comprehensive information regarding technology. For more time-sensitive subjects and to aid in efficiency, critical information is also presented in short YouTube videos and step-by-step instructions. This way, different types of learners within the retired population will have access to all of the resources they could need to effectively run the Generations' Centre.

3.5 Promotional Videos

The Generations' Centre is currently looking for sponsors in order to implement the suggested technology in this report. Our team decided to create promotional videos to help raise awareness about the center and program. While a traditional report document could convey the same information, WPI's Global Media Lab training session in Transmedia Storytelling demonstrates that visual content can elicit a greater emotional response from viewers than a textual report, leading to an increased potential for support.

Two types of sponsors are specifically targeted: financial and in-kind sponsors. Financial sponsors can either request specific projects to fund directly, or donate in support of the general well-being of the center. Monetary donations will allow the FRMR to purchase the improvements suggested in this report as needed. In-kind sponsors can also help the center by donating items the children and volunteers can use: computers, computer software, school supplies, or any product that could enhance the educational and extracurricular potential of the center. With the support of sponsors, the Generations' Centres can build a program that extends far beyond its current offerings.

Volunteers are also necessary for the continued success of the program. While the center currently has enough volunteers to manage the students present, a promotional video would help in the recruitment process and update the current process for gaining volunteers. This was brought to our attention by the collaborators, who informed us that most of the volunteers learn about this opportunity through word of mouth. Promoting the center with a video would help reach a wider array of people through different outlets. The video could be posted on the center's website, as well as social media sites such as Facebook. Gaining increased community interest in volunteering would help not only the center we are currently working with, but also other centers around Romania. Our hope for this deliverable is that the FRMR will be able to use these videos to effectively attract potential sponsors and new volunteers to the program.

4 RESULTS

As stated in our methodology, we planned for and created three different types of final deliverables: the design of the center with a modular budget, an online training handbook to accompany the technological implementations, and promotional videos targeted at different stakeholders. Due to the cancellation of our travel to Romania because of the COVID-19 pandemic, our original plans for our deliverables needed to be altered to fit a fully-remote project. Nevertheless, the deliverables we produced and outlined below can greatly help the center, and form a platform from which future WPI teams and FRMR staff can build upon while in Romania.

4.1 Center Design and Modular Budget

To help our collaborators at the FRMR implement our design for the center, we created an itemized list of potential technological hardware and software. This list contains classroom supplies such as whiteboard paint, dry-erase markers, and new tables and chairs. We also organized these products into a modular budget, estimating how much the improvements would cost. Then, we created a 3D walk-through of the center to show a potential layout and visual presentation of the redesigned center. This project focused on helping the collaborators prioritize resources rather than generating one physical design for the center. This way, the center can choose which pieces of technology to implement at a given time. In the future, the FRMR will also be able to use the list to implement pedagogical technology in various other centers.

Our original draft of the list served as a starting point from which we were able to refine our ideas using the data from the surveys shown in Appendices D and E. We then created the graphs shown below to even further guide modifications to the first draft of our list of technologies. To ensure that the students' love for music and arts was taken into account, we incorporated Wacom tablets and projectors into our final design recommendations (Figure 4). Wacom tablets are computer attachments that allow users to create digital drawings more efficiently, and projectors allow students to participate in musical games like karaoke.

With our technology list finalized, we then did further research into each item to pinpoint the exact features that would benefit the center. We included these along with item descriptions in our list. Besides generating a catalogue of potential products, we also needed to determine which of those products the center should prioritize for the best impact on the center. To objectively rate each product, we created a weighted matrix table (Appendix K). The table scores each product on categories ranked from most impactful to

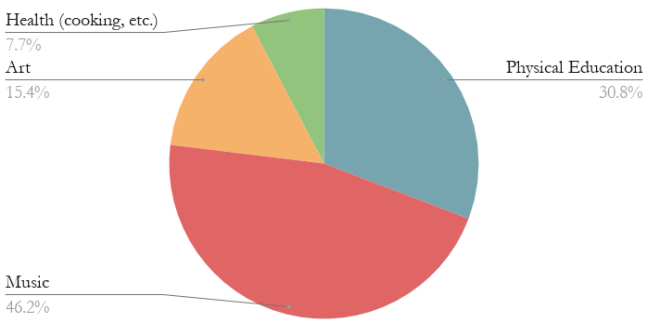

Figure 4: The Break-Down of Extra-Curricular Activity Preferences from 9 Respondents

least impactful in the following order: Interaction, or educational features; Collaboration; Engagement, or student's anticipated enjoyment using the product; and Total Price. Each product was given a score of 1 (bad) through 5 (excellent) for each category. For a product, its score in a category is multiplied by the rank of the category; then, its total score for each category is added together for a resulting product score.

A projector screen, with a score of 41, was ranked as the most important. This was one point higher than the projector itself, as the screen is a cheaper item. Ideally, both the screen and the projector would be purchased at the same time. Tablets also received a high score of 40 due to their high scores in Collaboration, Interaction, and Engagement. Tablet cases and a laptop cart received the lowest scores of 13 and 12, respectively. As these are items geared toward center safety, they had the lowest scores in terms of Collaboration and Interaction.

From the resulting prioritized list, we grouped items into a tiered ranking system. The tiered ranking system, consisting of three levels of varying importance, gave the center the freedom to choose which items they would like to implement from a group of items yielding similar impacts. The highest tier, named "Priority: 1," includes tablets, tables and chairs, and a projector and screen. The second tier, "Priority: 2," includes laptops, whiteboard paint, dry-erase markers, and cork boards. The lowest tier, or "Priority: 3," should contain the laptop cart and tablet cases according to the weighted matrix table. However, we decided to override this outcome, as the matrix did not take into account the safety factors of these items. Therefore, we moved the laptop cart and tablet cases into the second tier, and the 3D printer[5] and Wacom tablet into the third tier.

The technology we researched and added to our recommendations was then organized into a modular budget. This way, the FRMR can choose its next steps in developing its centers. Instead of providing a

[5]Upon the completion of this project, we were informed that the program already has a 3D printer. With this knowledge, we recommend purchasing additional 3D printers and expanding our volunteer resources website to include information and guides for these specific products.

Order of Importance	*Finalized List*	*Score*	*Priority Level*
1	Projector Screen	41	
2	Tablets	40	
3	Projector	40	**Priority 1**
4	Tables	38	
5	Chairs	38	
6	Laptops	35	
7	Whiteboard Paint	34	
8	Dry-Erase Markers	34	**Priority 2**
9	Picture Tables	31	
10	Cork Boards (4' x 3')	29	
11	Tablet Cases	13	
12	Laptop Cart	12	**Priority 3**
13	3D Printer	25	
14	Wacom Tablet	22	

Figure 5: The Finalized List of Recommendations Sorted by Priority

single design for a single center, having a modular budget will allow the FRMR to share the information with all of the existing Generations' Centres, and to decide how to further advance each center depending on its specific needs.

Modular Budget

Item	Number	Individual Price	Total Price	Priority	Total Price by Priority Section	
Tablets	10	$70	$700	1		
Projector	1	$290	$290	1		
Projector Screen	1	$65	$65	1		
Tables	6	$294	$1,766	1		
Chairs	30	$80	$2,396	1	Priority 1 Total:	$5,217
Laptops	5	$180	$900	2		
Laptop Cart	1	$590	$590	2		
Tablet Cases	10	$22	$220	2		
Picture Tables	3	$50	$150	2		
Cork Boards (4' x 3')	3	$24	$72	2		
Whiteboard Paint	1	$22	$22	2		
Dry-Erase Markers	1	$10	$10	2	Priority 2 Total:	$1,963
3D Printer	1	$900	$900	3		
Wacom Tablet	1	$80	$80	3	Priority 3 Total:	$980
					Overall Total:	$8,160

Priority Ranking	
1	High Importance; should be purchased immediately
2	Moderate Importance; should be purchased when feasible
3	Low Importance; purchase at discretion of center

Figure 6: The Modular Budget

Due to the complications with COVID-19, it became even more essential to provide our collaborators with visuals of our proposed design as we were not able to physically be there to make changes and explain our ideas. Using reference information and images provided by our collaborators, a 3D model of the room was created with Google Sketchup. Google Sketchup is a free online tool as described in Appendix N. An overhead view of the model is in Figure 7. Additional information about the 3D Design can be found in Appendix J.

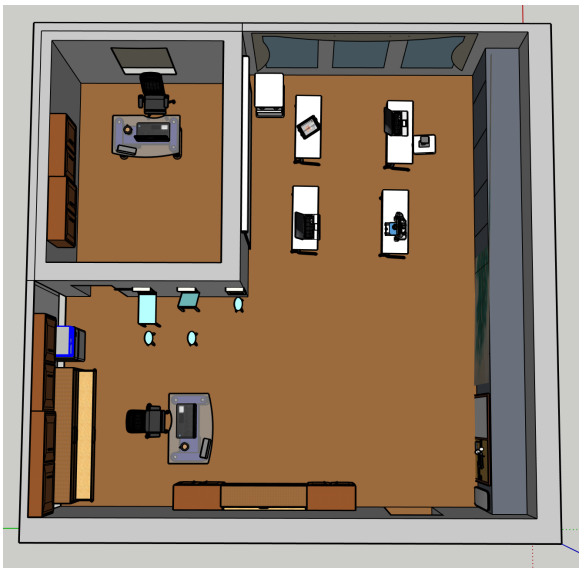

Figure 7: Overhead View of 3D Design Model

Using references helped make the model recognizable and ensure our sponsors could accurately visualize new technologies in the space. The list of technology recommendations was used as a guide to select one potential layout; our collaborators are encouraged to adjust this plan to best meet their needs. Some of the featured technologies in the 3D model include the projector and screen, whiteboard paint, and tables. A list of the technologies included in the 3D model are described in Appendix O. The recommendations were added to the model from the free Google Sketchup library of pre-modeled objects.

The projector and screen are ranked as Priority 1 items and therefore require a prominent location in the center where they can be easily accessible. With the help of references from the actual center, we determined that the wall shown in Figure 8 could be the area for the projector screen, as in Figure 9.

Figure 8: Image of a Generations' Centre's Main Wall, February 2020

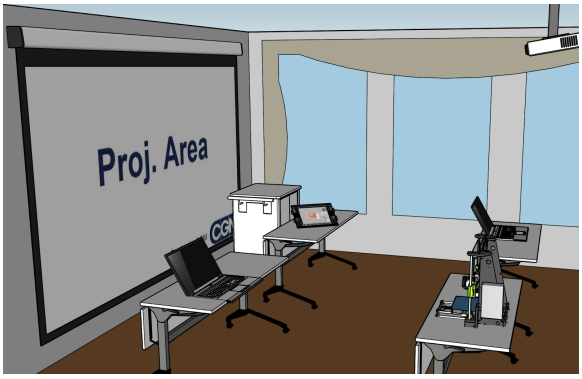

Figure 9: Potential Projector Area of 3D Design Model

Another major aspect of the 3D design has to do with the locker area of the center shown in Figure 10. Adding cork board and whiteboard paint to the fronts of the locker doors can transform them into engaging workspaces, while still being a functional storage space. An example of this space being used can be seen in Figure 11.

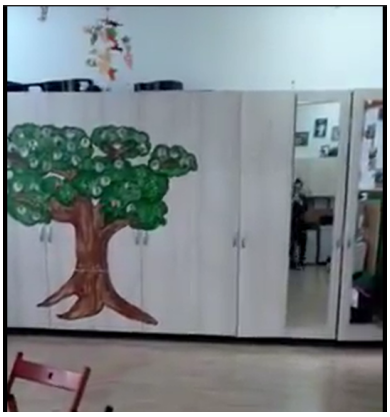

Figure 10: Image of a Generation's Centre's Locker Area, February 2020

Figure 11: Potential Locker Area Activity from 3D Design Mode

In the case that the collaborators need more tables, but don't have the floor space always available, the 3D model features folding picture frame tables, shown in Figure 12. Tables like this are usually built instead of purchased, so the modular budget reflects the cost of the materials needed to make them as opposed to purchasing the tables in a store. Building these tables can be a hands on, engaging activity for the students and volunteers. Instructions on how a folding picture frame table can be built can also be found in Appendix L.

Figure 12: Potential Folding Picture Frame Tables from 3D Design Model

With the Google Sketchup Walk Tool and a simple screen capture program we were able to create an in-person walkthrough experience. This walkthrough is later used in our promotional videos. It can be found on our project website, as well as in Appendix J. With this model, video walkthrough, and modular budget, our collaborators should be able to visualize the potential for the center and begin making changes.

4.2 Volunteer Resources

Our next goal was to create resources that will be useful for the volunteers, who will eventually have to learn how to use the technology we recommend. Thus, we started working on transcribing step-by-step guides on how to use specific software that was included in our final design. Along with these, we embedded links to different videos on YouTube that physically show these steps and more in-depth tutorials throughout the videos. By including both written steps and videos, we are hoping that this full, comprehensive guide will be enough to encompass everything they need to learn how to use these software efficiently. After completing all of the guides, we developed a website[6] to house this online, interactive handbook, as it allows the information to be easily adapted when different types of technology are introduced to the center. Additionally, to introduce a more social and interactive experience to the website, we also included a forum-like page where volunteers, upon making an account in the website, are able to post and share ideas and

[6]A copy of the website can be found at this address: https://learningcenteriqp.wixsite.com/projectsite/website

experiences. While the entirety of the website is accessible to the public, the ability to make posts on this portion of the website requires an account to be made and approved by our collaborators, to ensure that everyone using this feature is an active volunteer with the foundation.

One of our objectives while producing this deliverable was to make it easy for the FRMR staff to keep up-to-date, while also being easy for the volunteers to access and use. By using Wix, we could pass the ability to edit the website on to someone at the FRMR. Our materials are easy to maintain and update by the staff at the FRMR, and thus in the future can ensure that the volunteers are receiving relevant and valuable information.

In order to ensure that the volunteer resources website was easy to use for the elderly volunteers, we kept the design and layout fairly simple. The header for the website, which is visible from any page, contains simply the title of the website, "Centrele Comunitare Generaţii Portalul Voluntarilor," a button in the top right corner which allows you to either log in to your account or, if you have already logged in, takes you to your profile, and the navigational menu. The navigational menu has four tabs: "Pagina Principala," the homepage (Figure 13); "Pagina Comunitară," the community page; "Resurse," the resource page; and "Informaţii de Contact," which has the contact information for the center. The footer of the website, which is located at the bottom of every page, contains links to some of the FRMR's social media, including their Facebook and YouTube pages as well as their LinkedIn profile.

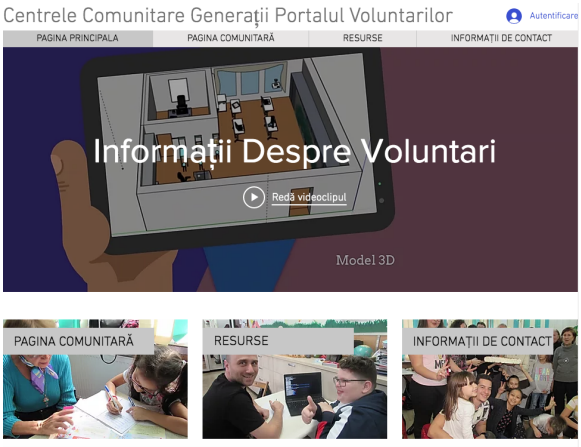

Figure 13: Volunteer Resources Website Homepage

On the homepage, or "Pagina Principala" in Romanian, there is a video player containing the Romanian version of the volunteer promotional video. While the primary users of this website will be the existing volunteers in the program, we decided to include this promotional video on the homepage in case any potential volunteers found the website while looking for information about the program. Below the

promotional video is a small photo gallery with three images, each of which are linked to separate pages of the website.

The next page of the website is the "Pagina Comunitară" page. This is the area of the website which contains the forum that the volunteers can use to make posts and share ideas with other volunteers. While this portion of the website can be viewed by anyone, only people with accounts that have been approved by the owner of the website can actually interact with the forum. Also accessible through the "Pagina Comunitară" page is the "Membri" page, which is where anyone with an account can view the profiles of other account holders. This page is only accessible to people with approved accounts, so that nobody who is not a volunteer or staff member of the Generations' Centres program can see the profiles.

After the "Pagina Comunitară" page is the "Resurse" page, pictured in Figure 14 below, which serves as the navigational page for all of the guides that were written for the volunteers. The original guides were written in English on Google Documents, and were sent to the collaborators with the rest of the deliverables. Using online translation programs, such as Google Translate, the guides were translated to Romanian and copied over to Wix. They were then reformatted to match the rest of the website.

Figure 14: Volunteer Resources Website Resource Page

The last page of the Generations' Centres' volunteer resources website is the "Informaţii de Contact" page. This portion of the website was left without custom formatting so that our collaborators at the FRMR can fill in the contact information with the correct information. The FRMR will be able to add information such as phone numbers, e-mail addresses, and social media pages so that anyone visiting the website will be able to contact the FRMR, whether it is a program volunteer or a member of the community seeking information on how to become involved.

Along with the website itself, our team created an additional Google Document titled "Guide to Wix," which contains information that will assist the FRMR with maintaining and updating the website in the future. This guide was not included on the website itself, as it was not intended to be a resource

for the Generations' Centres' volunteers but rather as a tool for the FRMR to continue using the "Centrele Comunitare Generații Portalul Voluntarilor" website.

4.3 Promotional Videos

As a result of collecting data through talking to our collaborators and our volunteer survey, we found that the most prominent source from which volunteers heard about the Generations' Centre was through spoken communication, either by volunteers currently working at the center, their friends, or even through the FRMR's phone service, Elderly Line. This tendency is shown in Figure 15 below. From this, we determined that the FRMR could gain more volunteers by utilizing different forms of communication to reach wider audiences. In order to reach these wider audiences, we created two promotional videos, one in English and one in Romanian, to specifically target new volunteers more effectively by illustrating their role in the center. We hope that the new videos will attract retirees to volunteer at the centers by incorporating visual and promotional content.

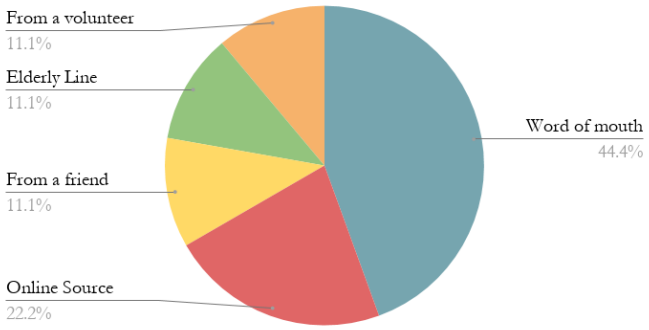

Figure 15: The Break-Down of How Volunteers Hear About the Center from 9 Respondents

We also created a sponsorship video, with English and Romanian translations, so that the FRMR could reach more sponsors through different media avenues. The sponsorship videos[7] can be submitted with funding grant applications as well as shown to prospective sponsors during pitch meetings. The videos show what the centers could become with the help of sponsor contributions in a creative way. While a paper report containing numbers and figures certainly outlines the program effectively, the visuals presented in the video will make the same data more memorable and eye-catching.

Unfortunately, due to the COVID-19 pandemic, we were unable to bring our original idea of using first hand accounts by conducting interviews with various students and volunteers from the center to fruition. Because of this limitation, we decided to use animation software instead, basing the concept drawings off

[7]The promotional videos can be viewed at https://learningcenteriqp.wixsite.com/projectsite/promotional-videos

photos taken at the center. A list of the software used to create the promotional videos can be found in Appendix N. We felt it was especially important to use free online tools so that future IQP teams and even our collaborators would be able to create similar videos. Adobe Illustrator was used to create the digital illustrations seen throughout the promotional videos. While this program is free to download for WPI students and faculty, outside collaborators will need to purchase it.

When creating the promotional videos, we felt that the best way to communicate the purpose was to start them with a description of the FRMR and its overall goals. It then goes on to introduce our team and why we are involved. We went on to show the technology changes we proposed and how they can transform the center into a better learning environment. To visually represent this, we created a 3D digital mock-up of the new designs for the Generations' Centre. The 3D walkthrough illustrates what it would be like to experience the space first hand, and it shows how someone would interact with some of the technology in our list of recommendations. The sponsorship video then describes how becoming a sponsor will aid the center in meeting their objective of implementing new technologies. Similarly, the volunteer video describes the role of the volunteers and what background experience is recommended. Given the limited access to stable WiFi in the homes of the Romanian volunteers and students, we were only able to conduct one formal interview with a volunteer to receive a first hand account of the effect the center has on those who participate in it (Appendix I). From this interview, we were able to construct what a typical day at a Generations' Centre would look like. Additional context, as well as feedback on our ideas, was provided to us through weekly meetings with said volunteer and the center psychologist. With this information, we were able to expand upon what volunteers would be experiencing if they were to join the FRMR community and what kind of impact sponsors could have. Both videos end with a Thank You slide and link to one of the FRMR's web pages. The sponsorship video links to the FRMR's donation page and the volunteer video links to their information and sign-up page.

5 CONCLUSION

Overall, this project alone accomplishes the FRMR's goal of creating a technology-based intergenerational learning center that is both fun and interactive. We were able to create a functional design for the center with a list of recommendations formatted in a modular budget. We also created a website that houses important volunteer information and provides volunteers with the ability to communicate amongst themselves. Lastly, we created promotional videos to help the center reach more volunteers and sponsors to continue the growth of the center. While the scope of our project was simply within the realm of increasing engagement in the students at the one center in Bucharest we were working with, we created our deliverables with the hope that our suggestions are able to be modified for implementation at all of the existing Generations' Centres across Romania.

5.1 Future Recommendations

While this project was a strong first step toward reaching the FRMR's goal of integrating technology into their Generations' Centres program, there is still a lot that can be done to further this progress, both by the FRMR and by future WPI project teams. Unfortunately, given only 14 weeks to complete this project and with the limitations that were brought on by doing this IQP remotely, there are tasks that our group was unable to complete. One of these tasks was recording interviews with current students and volunteers about their experiences in the center to use as materials for gaining sponsors and additional volunteers. Being able to conduct these interviews would provide more context for the day-to-day work within the Generations' Centres. Examples of questions our team drafted can be viewed in Appendix H. A future WPI team could work with these students to create these materials to use alongside the ones we provided to help the FRMR apply for grants from possible sponsors, which was not within the scope of our project given our time frame.

Other elements the FRMR could implement in the future include implementing the design elements they chose based on our recommendations and circulating a post-implementation survey to gather data on the opinions the students and volunteers hold about the changes made. Overall, we suggest they evaluate 5 main sections: sustainability, efficiency, affordability, accessibility, and the children's engagement. An example of our surveys can be viewed in Appendices D and E as a guideline. The results from these surveys will allow our collaborators to evaluate how well we have met the goals we and the FRMR set. It will also provide them with valuable insight into what changes need to be made in the future to make it work most effectively.

We also recommend that the FRMR try to keep the technology as updated as possible. Technology advances at an almost exponential rate. It is important for the center to stay updated so students can stay engaged and connected to the information they need to succeed academically. Access to new technologies provides students with new skills that may be necessary in the future. With the current pace of innovation, we understand this may be difficult. The FRMR's collaborators should keep an eye out for new hardware and software that will benefit the growth of the students and volunteers. One way to enhance an understanding of how new technologies can be implemented into classrooms is by following online blogs by teachers who are actively seeking out new technologies; examples of educational technology blogs can be found in Appendix P. Another simple way is by having a physical space in the center where students and volunteers can leave recommendations for new items they would like to use.

In addition to this, our collaborators could also adapt the website we created for volunteers in many different ways. First, they can create a new section of the website to house an outline of the goals the FRMR has for these centers and what will be expected of the volunteers while working there. This can include rules for the volunteers to follow, a general schedule that the center follows, examples of past programming (or since it will be new, ideas for programming), and general emergency intervention information. They can also add a new location on the website, perhaps with the help of a future WPI team, where students can access a broad list of online websites that provide educational and creative experiences or even create an entirely new website for student resources. Many have direct academic objectives, such as the resource CoolMathGames. This website provides free games for all ages in the areas of strategy, numbers, and logic. Some games even specifically target classes such as pre-algebra and algebra. Other resources, such as Smithsonian Open Access, provide artistic and historical images and videos of museum exhibits that can be used without copyright concerns. For STEM inclined students, Bioexplora provides 360 degree online representations of biology specimens featured in museums. With these and other online resources, students can explore more of their interests through online interactive exhibits, broadening their educational experiences and exploring the world from the center itself.

Lastly, a direction that may be able to help with multiple different aspects of the center is by applying a junior mentor program with the students that eventually age out of the Generations' Centre. Once they reach secondary education, they can come back and assist in teaching volunteers more about the nuances of technology. In addition to being an added resource for learning new ways to use the technology we implement, these peer volunteers can act as role models for the younger students and gain important experience in teaching and working with their superiors toward a common goal. It can also help give students more one-on-one time with someone when doing homework or other activities.

5.2 Concluding Remarks

Overall, an IQP is designed to challenge students to work together with peers from different majors to address a problem at the intersection of science, technology, and society. Throughout the 14 weeks our team has been working on the project, we have tackled large scale problems in education and contextualized them to the specific needs of the center. Although we faced a major obstacle due to COVID-19 that made it impossible to travel to Romania, we were able to quickly adapt our project to create final deliverables that would satisfy our collaborators and aid the center for years to come.

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APPENDICES

Appendix A: The Fundaţia Regală Margareta a României

This table gives an in-depth description of the origins, mission, and programs run through the foundation our collaborators work for.

Origin	The Fundația Regală Margareta a României (FRMR) is a non-governmental organisation (NGO) established in Switzerland in 1990 by Princess Margarita of Romania and her father, King Mihai. The Romanian office of the FRMR was opened in 1991 as a branch of the Swiss office. It did not acquire independent legal personality until 1998. Currently, there are six branches of the FRMR, located in Switzerland, Romania , the United Kingdom, France, Belgium, and the United States.
Mission	In their 2006 annual report, the FRMR stated their mission to be "to act as a catalyst for the development of human potential, in the spirit of dignity, solidarity and the promotion of Romanian cultural talent and values" (Fundația Regală Margareta a României, 2006). They then went on to explain that their goal was to design sustainable projects which serve the community and contribute to the spiritual and social renewal of Romania. In particular, they pride themselves on 29 years of supporting children, young people and the elderly through sustainable intervention, based on sharing experiences and values between generations.
Programs	**Special Fund for Children:** The FRMR website describes the Special Fund for Children as "national programme for assistance and access to education dedicated to helping children who find themselves in situations of hardship" (Fundația Regală Margareta a României, n.d.). The program "promptly responds to the needs of families across the country, providing them with financial support to overcome a crisis context as a result of which children may drop out of school (Fundația Regală Margareta a României, n.d.).
	Elderly Line: In an effort to combat the epidemic of loneliness experienced by much of the elderly population in Romania, the FRMR established the Elderly Line. The Elderly Line is a free and confidential helpline accessible at national level, dedicated to the elderly. Trained operators are ready to offer information and guidance to callers, aiming to improve quality of life and social participation among the elderly.
	Generations' Centres: At the Generations' Centres, elderly volunteers work with underprivileged children to provide tutoring and social assistance. Through receiving educational and social support from the volunteers at the Generations' Centers, the underprivileged children are able to keep up with their peers and classmates in school and are less likely to drop out at an early age. And as the elderly volunteers work to provide this educational and social support, they are also able to reduce their sense of uselessness and regain a social role.

Appendix B: Project Goals and Objectives Table

This table goes into depth on the goal we set for this project given the original parameters, lists objectives for that goal, and lists research questions to help us achieve each objective.

Overall Project Goal:	**Overall Research Question:**
The goal of this project is to design a fun, safe, and tech-based center for underprivileged kids to keep up with their classmates while also providing retirees a way to interact with their community.	What supplies and technology will be most effective in creating a space that both caters to the children's needs academically and excites them, while also engaging the retirees and fulfilling their social needs?
Project Objectives:	**Subsidiary Research Questions:**
Identify the needs and wants of the children so that the Generations' Centre can properly address them	What are the emotional needs of the children? Do the current resources meet those needs?
	What kind of academic support do the children need? What resources are lacking in the current system?
	Outside of tutoring, what other resources can we provide?
Evaluate the current status of the Generations' Centres and find what can be improved	How do the children and their families feel about the centres? What do they like and what do they think is lacking?
	What do the retirees think of the centres? What do they like and what do they think is lacking?
	What do the teachers think of the centres in terms of class performance? What do they like and what do they think is lacking?
	What do the sponsors feel is going well or could use improvement? What do they like and what do they think is lacking?
Determine what resources we feel are necessary to the success of the program	What resources do the children want/need?
	Of the resources the children want/need, what can the retirees most effectively use?
	What do the sponsors require as a bare minimum?
	What resources do professionals/experts believe are necessary?
	What resources do other programs offer?
Determine what resources we have available to us and how to utilize them to create our design	What sort of resources do the sponsors have on hand?
	What businesses or organizations, if any, would be willing to work with us?
	What knowledge can the retirees bring to the program?
Identify ways that our designs can be implemented in the new Generations' Centres and how the existing Generations' Centres can apply our designs to improve as well	How have similar programs succeeded?
	How can we distribute working knowledge and ideas to the existing centers?
	How can we ensure the sustainability of the center?

Appendix C: Table of Possible Implementations from Other Programs

This table shows a comprehensive list of ideas we had based off of our research in other programs, either because the program worked well or because we see an area where we make improvement.

Pre-Existing Program	**Ideas**
Big Brothers, Big Sisters	Increasing the number of volunteers through better outreach techniques - having a higher ratio of volunteers to children can increase engagement and emotional connection in the children.
Providence Health	One-on-one tutoring, where volunteers go around to each student individually during homework time to ensure that they're doing their homework correctly.
	This program currently emphasizes the needs of the elderly. Perhaps we can do training with child development and education with the volunteers to ensure they have the best information on how to interact with the children to get the best results.
Boys and Girls Club	Implementing technology that all children have access to (i.e. laptops, tablets, etc.) can improve the children's ability to use technology and apply it to completing homework.
	Implementing educational programs on internet safety helped students become more aware of the problems they could run into while using technology.

Appendix D: Volunteer Survey

This shows a copy of all of the questions we asked the volunteers involved in the program to gain an understanding of their technical skills and opinions about the program as it is currently run. The informed consent agreement for this survey can be found in Appendix F.

For the following questions, please select the best response as it applies to you.

1. How did you hear about the Generations' Centres program?
   - ❏ Word of mouth
   - ❏ Social media
   - ❏ The FRMR website
   - ❏ Other online source
   - ❏ Other… (free response)

2. Why did you want to get involved in the Generations' Centres Program? (Select up to 3)
   - ❏ Something to do during the day
   - ❏ To get involved with the community
   - ❏ Enjoy tutoring and/or teaching
   - ❏ Like working with children
   - ❏ To have people to talk to on a regular basis
   - ❏ You know someone involved in the program and wanted to work with them
   - ❏ To share knowledge and experience with younger generations
   - ❏ Other… (free response)

3. How long have you been volunteering with the Generations' Centres program?
   - ❏ Less than three months
   - ❏ Three months to six months
   - ❏ Six months to a year
   - ❏ One year to two years
   - ❏ Over two years

4. How frequently do you use the following devices:

	Never	Once a Month	Once a Week	2-5 Times a Week	Daily
Computer or Laptop	☐	☐	☐	☐	☐
Tablet	☐	☐	☐	☐	☐
Phone with wifi connection	☐	☐	☐	☐	☐
T.V.	☐	☐	☐	☐	☐

5. How often do you feel prepared to help the students with the following subjects?

	Never	Sometimes	Often	Mostly	Always
Math	☐	☐	☐	☐	☐
Reading/Literature	☐	☐	☐	☐	☐
Computer Skills	☐	☐	☐	☐	☐
General Science	☐	☐	☐	☐	☐
History	☐	☐	☐	☐	☐

6. If you were given the opportunity to teach a weekly, one-hour class, what are some subjects/topics you would consider? (Select up to 3)
    - ❏ Computer programming (Python, C+, Java, etc.)
    - ❏ Physical Education (athletic activities)
    - ❏ Music
    - ❏ Art
    - ❏ Health (cooking & good habits)
    - ❏ Trade
    - ❏ Other… (free response)

7. What is your favorite thing about the Generations' Centre?
    - ❏ The students
    - ❏ The other volunteers
    - ❏ The involvement with the community
    - ❏ The opportunity to tutor/teach
    - ❏ Other… (free response)

8. Do you think the Generations' Centres program you participate in could be improved? If so, how? (Select up to 3)
    - ❏ The facilities
    - ❏ Communication with parents and teachers
    - ❏ Teaching resources
    - ❏ Extracurricular resources
    - ❏ The amount of volunteers and employees (not enough)
    - ❏ The amount of students (too many)
    - ❏ Communications with other centers
    - ❏ Student engagement and participation
    - ❏ Nothing, the program is great
    - ❏ Other… (free response)

Appendix E: Student Survey

This shows a copy of all of the questions we asked the students involved in the program to gain an understanding of their technical skills and opinions about the program as it is currently run. The informed consent agreement for this survey can be found in Appendix G.

For the following questions, please select the best response as it applies to you.

1. What is your current grade in school?

2. How frequently do you use the following devices at **home**?

	Never	Once a Month	Once a Week	2-5 Times a Week	Daily
Computer or Laptop	☐	☐	☐	☐	☐
Tablet	☐	☐	☐	☐	☐
Phone with wifi connection	☐	☐	☐	☐	☐
T.V.	☐	☐	☐	☐	☐

3. How frequently do you use the following devices at **school?**

	Never	Once a Month	Once a Week	2-5 Times a Week	Daily
Computer or Laptop	☐	☐	☐	☐	☐
Tablet	☐	☐	☐	☐	☐
Phone with wifi connection	☐	☐	☐	☐	☐
T.V.	☐	☐	☐	☐	☐

4. On average, how much homework do you complete at…

	None	Some	Half	Most	All
Home	☐	☐	☐	☐	☐
The Generation Centre	☐	☐	☐	☐	☐

5. What are your favorite subjects? (Select up to 2)
   - ❏ Math
   - ❏ Reading/Literature
   - ❏ Computer Skills
   - ❏ General Science
   - ❏ History
   - ❏ Other… (free response)

6. What are your favorite non-academic subjects? (Select up to 2)
   - ❏ Computer Programming (Python, C+, Java, etc.)
   - ❏ Physical Education (athletic activities)
   - ❏ Music
   - ❏ Art
   - ❏ Health (cooking & good habits)
   - ❏ Other… (free response)

7. What are your favorite things about the Generations' Centre? (Select up to 2)
    - ❏ The other students
    - ❏ The volunteers
    - ❏ The help with homework and classwork
    - ❏ The extracurricular activities
    - ❏ Counseling
    - ❏ Other… (free response)

8. Do you think the Generations' Centre program you participate in could be improved? If so, how? (Select up to 3)
    - ❏ The facilities
    - ❏ Tutoring resources
    - ❏ Extracurricular resources and activities
    - ❏ The amount of volunteers and employees
    - ❏ Day-to-day activities
    - ❏ Daily schedule/routine
    - ❏ Nothing, the program is great
    - ❏ Other… (free response)

Appendix F: Informed Consent for Volunteer Surveys

This shows our informed consent agreement for the adults to allow us to give them our surveys and use the data from them in our final report. This agreement was linked at the start of the Google Form used to conduct the survey.

Informed Consent Agreement for Participation in a Research Study

Investigators: Alexa Eves, Kate Hogan, Jimmy Mancuso, Scott Rementer, Tess Sandbrook

Contact Information: aseves@wpi.edu, cmhogan@wpi.edu, jcmancuso@wpi.edu, smrementer@wpi.edu, tasandbrook@wpi.edu

Title of Research Study: Romanian Learning Center

Sponsor: Fundația Regală Margareta a României

Introduction
You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study:
We are gauging student and retiree knowledge of technology, as well as preferences in programming, to develop a design to improve the Generations' Centre.

Procedures to be followed:
During the study, electronic surveys will be distributed to the participants through the Fundația Regală Margareta a României staff. The expected time spent on an individual survey is 15 minutes. The answers from the survey will be recorded anonymously and compiled by the researchers.

Risks to study participants:
There are no anticipated risks to you.

Benefits to research participants and others:
There are no anticipated direct benefits to you.

Record keeping and confidentiality:
The information obtained in this study will not be associated with any identifying information. All information will be stored in an Excel sheet on a personal, protected computer owned by one of the researchers, in such a way that any specific data cannot be linked to any one participant in this study. Only the researchers conducting the study, listed at the top of this form, will have access to the data. The data will be compiled into charts and graphs to be published in a report submitted to and published by Worcester Polytechnic Institute. Any specific data obtained from individual participants will be destroyed after the completion of the study.

Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or it's designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect

and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

Compensation or treatment in the event of injury:
This research does not involve more than minimal risk of injury or harm. No compensation or treatment is available in the event of injury or harm. Further information may be obtained by contacting the individuals listed at the top of this form. You do not give up any of your legal rights by signing this statement.

For more information about this research or about the rights of research participants, or in case of research-related injury, contact:

Professor Kent Rissmiller, WPI IRB Chair
Tel. 508-831-5019
Email: kjr@wpi.edu

Michael J Curley, University Compliance Officer
Tel. 508-831-6919
Email: mjcurley@wpi.edu

You may also contact the researchers involved in this study, whose names and contact information are listed at the top of this form.

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.

_____ Date: _____
Study Participant Signature

_____
Study Participant Name (Please print)

_____ Date: _____
Signature of Person who explained this study

Appendix G: Informed Consent for Student Surveys

This shows our informed consent agreement for the parents/guardians to allow us to give the students our surveys and use the data from them in our final report. This agreement was linked at the start of the Google Form used to conduct the survey.

Informed Consent Agreement for Participation in a Research Study

Investigators: Alexa Eves, Kate Hogan, Jimmy Mancuso, Scott Rementer, Tess Sandbrook

Contact Information: aseves@wpi.edu, cmhogan@wpi.edu, jcmancuso@wpi.edu, smrementer@wpi.edu, tasandbrook@wpi.edu

Title of Research Study: Romanian Learning Center

Sponsor: Fundația Regală Margareta a României

Introduction
You are being asked to provide consent for the children under your care to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that they may experience as a result of their participation. This form presents information about the study so that you may make a fully informed decision regarding their participation.

Purpose of the study:
We are gauging student and retiree knowledge of technology, as well as preferences in programming, to develop a design to improve the Generations' Centre you oversee.

Procedures to be followed:
During the study, electronic surveys will be distributed to the participants through the Fundația Regală Margareta a României staff and volunteers. The expected time spent on an individual survey is 15 minutes. The answers from the survey will be recorded anonymously and compiled by the researchers.

Risks to study participants:
There are no anticipated risks to you or the participants of the study.

Benefits to research participants and others:
There are no anticipated direct benefits to you or the participants of the study.

Record keeping and confidentiality:
The information obtained in this study will not be associated with any identifying information. All information will be stored in an Excel sheet on a personal, protected computer owned by one of the researchers, in such a way that any specific data cannot be linked to any one participant in this study. Only the researchers conducting the study, listed at the top of this form, will have access to the data. The data will be compiled into charts and graphs to be published in a report submitted to and published by Worcester Polytechnic Institute. Any specific data obtained from individual participants will be destroyed after the completion of the study.

Records of the children's participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or it's designee and, under certain circumstances, the Worcester Polytechnic Institutional Review Board (WPI IRB) will be able to

inspect and have access to confidential data that identify the children by name. Any publication or presentation of the data will not identify to the children.

Compensation or treatment in the event of injury:
This research does not involve more than minimal risk of injury or harm. No compensation or treatment is available in the event of injury or harm. Further information may be obtained by contacting the individuals listed at the top of this form. You do not give up any of your legal rights or those of the children by signing this statement.

For more information about this research or about the rights of research participants, or in case of research-related injury, contact:

Professor Kent Rissmiller, WPI IRB Chair
Tel. 508-831-5019
Email: kjr@wpi.edu

Michael J Curley, University Compliance Officer
Tel. 508-831-6919
Email: mjcurley@wpi.edu

You may also contact the researchers involved in this study, whose names and contact information are listed at the top of this form.

The children's participation in this research is voluntary. Your refusal to grant permission for their participation will not result in any penalty to you or them or any loss of benefits to which you or others may otherwise be entitled. You may decide to revoke your consent for their participation in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By signing below, you acknowledge that you have been informed about the study described above and consent to the participation of the children in your care in the Generations' Centre you oversee in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.

_____ Date: _____
Care-taker Signature

_____
Care-taker Name (Please print)

_____ Date: _____
Signature of Person who explained this study

Appendix H: Interview Questions

This shows a comprehensive list of questions we planned to ask the specified stakeholders to use in our promotional video. Notes from our interview with John C. Nydick can be found in Appendix I.

1. Sponsors
    (a) How did you become involved with the FRMR?
    (b) How did you become involved with the Generations' Centres program?
    (c) Why is this program necessary for the students and the community?
        i. How does it benefit those involved?
    (d) What future ideas would you like to implement in the center?
    (e) How would technology improve the program?
    (f) How would sponsor participation improve the program?
    (g) How would increased volunteer participation improve the program?
2. Students
    (a) Why do you like coming to the Generations' Centres program?
    (b) What's your favorite part of the program?
    (c) Do you think that the program has helped you academically?
3. Volunteers
    (a) Why did you choose to become involved in this center?
    (b) What is your favorite part of volunteering at the Generations' Centres?
    (c) What future ideas would you like to implement in the center?
4. Teachers
    (a) How integral is this program in the education of your students?
    (b) What kind of improvements have you seen in the students who participate in this program?
    (c) What are your general thoughts on the successes and benefits of the program?

Appendix I: Interview Notes

This shows the notes we took from our semi-structured interview with the main volunteer, John C. Nydick; we were in contact with him throughout the project. The questions were taken from our interview questions in Appendix H along with others we added in as the interview progressed. The notes are not direct quotes, but rather a general summary of the answers.

1. Why did you choose to become involved in this center?
    (a) Moved to Romania and was looking for something to get involved with, specifically something beneficial for the children in Romania
    (b) He was a substitute teacher for music in Philadelphia beforehand and enjoyed the idea of teaching
    (c) He started volunteering at a different program, at which he found out about the Generations' Centres through word-of-mouth and decided to join the FRMR community
2. What is your favorite part of volunteering at the Generations' Centres?
    (a) His favorite part is the interaction with the kids
3. Can you walk us through a typical day for you at the center?
    (a) Gets there around 1pm and waits for the kids, a couple of kids will go to interact with him throughout the day
    (b) Many students don't speak English, which is John's first language, so he sits down with them and talks about anything, as well as gives them English lessons
    (c) There's a rapport with the other volunteers and Mihaela - the center psychologist
4. What future ideas would you like to implement in the center?
    (a) He would like a bigger location
    (b) Tables and chairs need to be upgraded
    (c) Textbooks that use proper English instead of colloquial English
    (d) More availability of technology
5. Are there any ideas you think we should add to our current center design that are not currently on our list?
    (a) Does not think there's too much to add - the room is fairly small
6. Notes
    (a) Usually two waves of children (one in the morning, one in the afternoon) - younger in the morning, older in the afternoon?
    (b) Number of children varies - in the afternoon it's between 10-20 kids
    (c) There seems to be the right amount of volunteers usually
    (d) Most of the older volunteers are ex-teachers and if they were teaching a specific subject here, it's because they taught that subject when they were in the workforce
    (e) They don't really do the homework during their lessons, they just talk
    (f) If they wanted to be proactive, they could do a Facebook advertising campaign (or something similar) - TV/PSAs would be a secondary approach
    (g) Technology used as a tool to increase teaching ability
        i. Have more one-on-one ability (some in-person, some virtual)
        ii. Develop a whole program that would be a foundation to helping guide their learning

Appendix J: Break Down of Final Deliverables

The following is a list of everything contained in the folder of final deliverables sent to the collaborators.

1. Design
   (a) Weighted Matrix Table: A Google Sheet containing the ranking system used to determine our design and modular budget. More information can be found in Appendix K.
   (b) Design of Center: A Google Document containing descriptions, images, and links to all of the items our team recommends to the center. More information can be found in Appendix L.
   (c) Modular Budget: A Google Sheet containing a break down of costs of the items we recommend, sorted by priority. More information can be found in Appendix M.
   (d) 3D Design: A folder containing images and a virtual walkthrough of the 3D design of the center, which can also be viewed at https://learningcenteriqp.wixsite.com/projectsite/design-of-center.
2. Website Materials: All website materials were originally written in English and translated to Romanian when uploaded to the website.
   (a) Guide to KAHOOT!: A Google Document containing a comprehensive guide to the website KAHOOT!, containing images and videos with additional information.
   (b) Guide to Quizlet: A Google Document containing a comprehensive guide to the website Quizlet, containing images and videos with additional information.
   (c) Guide to Google Apps: A Google Document containing a comprehensive guide to the website Google Apps, containing images and videos with additional information.
   (d) Guide to Google Docs: A Google Document containing a comprehensive guide to the website Google Docs, containing images and videos with additional information.
   (e) Guide to Google Slides: A Google Document containing a comprehensive guide to the website Google Slides, containing images and videos with additional information.
   (f) Guide to Google Sheets: A Google Document containing a comprehensive guide to the website Google Sheets, containing images and videos with additional information.
3. Promotional Videos: Four promotional videos were submitted to the collaborators. These videos were also submitted to WPI along with this report. More information on the programs used to create these videos can be found in Appendices N and O.
4. Final Presentation
   (a) Final Presentation PowerPoint: The Google Slides presentation that was used during our final presentation containing information about our completed project.
   (b) Final Presentation Video: A recording of our final presentation given over Zoom on Monday April 27, 2020.
5. Additional Information
   (a) Guide to Wix: A Google Document containing a comprehensive guide to the website Wix, containing images and videos with additional information. The guide is for the FRMR staff so that they can properly access and edit the volunteer resources website in the future.
   (b) Guide to Google Forms: A Google Document containing a comprehensive guide to the website Google Forms, containing images and videos with additional information. The Google Document is in English, and was translated to Romanian when uploaded to the website.
   (c) Website Links:
      i. Project website: https://learningcenteriqp.wixsite.com/projectsite
      ii. Volunteer resources website: https://learningcenteriqp.wixsite.com/projectsite/website

Appendix K: Weighted Matrix Table

These are screenshots of the Weighted Matrix Table used to sort the modular budget and create the final design of the center.

	Categories								
Item	*Total Price (x1)*	**Score**	*Engagement (x2)*	**Score**	*Collaboration (x3)*	**Score**	*Interaction (x4)*	**Score**	*Total Score*
Tablets	2	**2**	5	**10**	4	**12**	4	**16**	40
Projector	4	**4**	2	**4**	4	**12**	5	**20**	40
Projector Screen	5	**5**	2	**4**	4	**12**	5	**20**	41
Tables	1	**1**	5	**10**	5	**15**	3	**12**	38
Chairs	1	**1**	5	**10**	5	**15**	3	**12**	38
Laptops	2	**2**	4	**8**	3	**9**	4	**16**	35
Laptop Cart	3	**3**	1	**2**	1	**3**	1	**4**	12
Tablet Cases	4	**4**	1	**2**	1	**3**	1	**4**	13
Cork Boards (4' x 3')	5	**5**	2	**4**	4	**12**	2	**8**	29
Whiteboard Paint	5	**5**	3	**6**	5	**15**	2	**8**	34
Dry-Erase Markers	5	**5**	3	**6**	5	**15**	2	**8**	34
3D Printer	2	**2**	3	**6**	3	**9**	2	**8**	25
Wacom Tablet	5	**5**	3	**6**	1	**3**	2	**8**	22
Picture Tables	5	**5**	4	**8**	2	**6**	3	**12**	31

Category Definitions:	
Interaction	Level of educational usefulness
Collaboration	Promotion of collaboration among students and between students and volunteers
Engagement	Anticipated level of student enjoyment
Total Price	The cost of the item

Order of Importance	*Finalized List*	*Score*	*Priority Level*
1	Projector Screen	41	
2	Tablets	40	
3	Projector	40	**Priority 1**
4	Tables	38	
5	Chairs	38	
6	Laptops	35	
7	Whiteboard Paint	34	
8	Dry-Erase Markers	34	**Priority 2**
9	Picture Tables	31	
10	Cork Boards (4' x 3')	29	
11	Tablet Cases	13	
12	Laptop Cart	12	**Priority 3**
13	3D Printer	25	
14	Wacom Tablet	22	

Appendix L: Design of Center

The following six pages contain screenshots of Google Document titled "Design of Center." This document contains descriptions, images, and links to all of the items our team recommends to the center.

Item Descriptions [Modular Budget]

Tablets

Priority: 1

Due to the price range and the versatility of tablets, they are the perfect candidate to be the foundation of the technological transition of the centers. They could be used to access online lessons and materials to be used for daily activities. The Hyundai tablet costs roughly $69.99, depending on the retailer. It is an Android tablet with 2GB of RAM, 16 GB of memory, and a front and rear-facing camera. It supports WiFi and bluetooth connections, with a headphone jack for audio and microphone capabilities. Some reviews report that pages on the internet can be a little slow to load; however, overall the tablet is a decent price for its capabilities.

Hyundai Tablet (Target)

Hyundai Tablet (Manufacturer)

Tables & Chairs

Priority: 1

During our interview with Lead Volunteer John Nydick, we determined that new tables and chairs would be needed for the center. The current tables and chairs are stackable to make the most use of the currently available space; however, newer designs can further maximize space and provide multi-functional capabilities.

The proposed table is $294.39 for one, is still foldable and has casters to increase mobility. The table has a whiteboard surface, so that students and volunteers can collaborate using an erasable medium while keeping their work at-hand. The table also comes with a wire management feature, which would work well with the other proposed electronic additions to the center. The suggested chair to accompany these tables is priced at $79.88 per chair, and also has wheels and can be stacked up to four chairs high. They come in a variety of colors, and are recommended for ages 10 and up.

Table

Chair

Item Descriptions [Modular Budget]

Tablets

Priority: 1

Due to the price range and the versatility of tablets, they are the perfect candidate to be the foundation of the technological transition of the centers. They could be used to access online lessons and materials to be used for daily activities. The Hyundai tablet costs roughly $69.99, depending on the retailer. It is an Android tablet with 2GB of RAM, 16 GB of memory, and a front and rear-facing camera. It supports WiFi and bluetooth connections, with a headphone jack for audio and microphone capabilities. Some reviews report that pages on the internet can be a little slow to load; however, overall the tablet is a decent price for its capabilities.

Hyundai Tablet (Target)

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Table

Chair

Laptop Cart

Priority: 2

A laptop cart allows for the charging, storage, and ensured security of laptops or tablets. The recommended cart holds up to 24 devices with height-adjustable shelves, a locking door, and wheel casters for easy mobility. There are 24 provided power outlets; these would be compatible with the chargers received with the above recommended tablets and laptops. However, a power converter will probably need to be purchased for the overall cart. The total cost is $589.88.

Laptop Cart

Tablet Cases

Priority: 2

We would recommend purchasing tablet cases to better protect the tablets that are purchased. Given that children will be using them, they will be more prone to being dropped or used roughly and implementing cases with the tablets will limit how quickly the tablets will break. To be compatible with the Hyundai tablets, we recommend purchasing cases that are "universal," or made to fit any 8" tablet. The first suggested option, the Vallkit Universal Case, is a sleek and minimally designed case. It will protect the tablets from light wear-and-tear, as well as short drops. It is $10.00 per case. The second option, the Cooper Trooper Rugged Case, offers more durability, and is made for heavy use from young children. It is made out of silicone and comes in a variety of fun colors, and costs $21.95 per case.

Valkit Case

Cooper Trooper Rugged Case

Cork Boards

Priority: 2

We would recommend purchasing cork boards to allow for easily changeable decoration and the ability to display students' work throughout the center. With the proper tools, such as staplers, thumbtacks, and craft supplies, you can create colorful, themed boards that can be educational, fun, and allow the students to have involvement in creating pieces to decorate it. A single cork board costs approximately $24 each. The cork board we recommend can be viewed in the photo. It is 3 feet by 4 feet (0.91 meters by 1.22 meters).

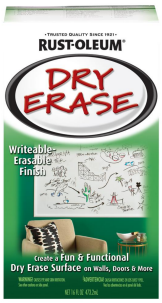
Cork Board

Whiteboard Paint & Dry-Erase Markers

Priority: 2

We would recommend purchasing whiteboard paint and dry-erase markers so that the students can have an added space to express themselves in the center. While the cork boards will allow this, it usually takes a longer time to design a whole cork board, meaning the themes couldn't necessarily change as quickly. With a space painted with whiteboard paint, students can have a space that they can use to add to the center that can be changed as frequently as they want with little to no hassle. Overall, the whiteboard paint costs $21.58 and a set of 8 multicolored markers will cost about $10.

Whiteboard Paint



Folding Picture Frame Tables

Priority: 2

Similar to the whiteboard tables we recommended, folding picture frame tables help maximize available space and provide multi-functional capabilities. Our team was able to find a high end model of this type of table for $185.63, available for purchase through Bellacor; however, our team believes that purchasing the materials and building the table is the best option. Not only would building the tables be the cheaper option, but it would be a fun, engaging activity for the students and volunteers. Instructions for building these types of tables can be found here, or by searching "Folding Picture Frame Table Instructions" on YouTube. We estimate that building the tables would cost approximately $50.00 per table.

Picture Table for Purchase

3D Printer

Priority: 3

Probably the most ambitious item on our list, a 3D printer could be a great tool to get students to get engaged in design and/or certain arts and crafts. The reason this has a low priority is due to initial investment costs. Not only do you have to buy the printer which is not entirely cheap, but you also have to train most if not all the volunteers to use it and maybe the students as well. The positive is that once initial investment is done, it's very inexpensive when it comes to upkeep and printing materials. Because of the vast range of printers on the market, we simply estimate the cost of one printer to be $900.

Wacom Tablet

Priority: 3

The survey responses indicate a number of students have an interest in art. Introducing drawing tablets, such as the Wacom tablet, could cater to their responses. The Wacom tablets are electronic drawing surfaces that use special pens to detect drawing movements and pressure intensity. They connect by bluetooth to a computer or other tablet that registers the information collected by the Wacom tablet and creates a picture according to what was drawn. A simple, basic Wacom tablet would currently cost $79.95.

Tablet

Software Descriptions

The technology listed above has great potential to positively impact the students, the volunteers, and their ability to collaborate and communicate in the center. However, the ability to effectively use this technology depends largely on finding the resources they give their users. The following list comprises software that can be used in conjunction with many of the suggestions made in order to fully realize the advantages of technology incorporated into classroom learning. Of course, there are many more online resources that would greatly benefit the students and the center. The ones below are simply examples of topics and ideas that can be further explored.

Translation:

Google Website Translator - this free translator powered by Google can translate websites from English into Romanian, allowing the following English sites to be used by anyone at the center.

Online Museum Exhibits:

Smithsonian - a database of exhibits showcased at the Smithsonian museum in the United States. The Smithsonian comprises 20 different museums, covering topics such as art, history, natural science, and space.

Grigore Antipa Collections

National Museum of Art Romania Collections

Productivity:

Google Suite - includes Google Docs, Slides, Sheets, and more. Students can use these to complete assignments and collaborate on documents.

Kahoot - an online, quiz-based game in which students answer questions on their devices (tablets, computers, or phones), and the student with the most correct and fastest answers wins.

Quizlet - a website that allows students to create and share flashcard sets for studying. Also provides resources for studying and creating practice quizzes.

Creativity:

SolidWorks academic license - a computer-aided design (CAD) software is necessary for use with the 3D printer. There are free, online softwares, but students can create a SolidWorks account and download one of the industry's leading software for free.

Drawing software:

Krita - a drawing program that is suitable for more advanced artists, but that can be used by almost all ages. It is open source and free; would work best on a tablet with a stylus or with a laptop in conjunction with a Wacom tablet.

Tux - a drawing program specifically designed for aspiring artists ages 3-12. It is also a free software, and would work best on a touch screen (tablet or Wacom tablet).

Appendix M: Modular Budget

This is a screenshot of the Google Sheet containing the Modular Budget that was sent to the collaborators as part of the final design.

Modular Budget						
Item	Number	Individual Price	Total Price	Priority	Total Price by Priority Section	
Tablets	10	$70	$700	1		
Projector	1	$290	$290	1		
Projector Screen	1	$65	$65	1		
Tables	6	$294	$1,766	1		
Chairs	30	$80	$2,396	1	Priority 1 Total:	$5,217
Laptops	5	$180	$900	2		
Laptop Cart	1	$590	$590	2		
Tablet Cases	10	$22	$220	2		
Picture Tables	3	$50	$150	2		
Cork Boards (4' x 3')	3	$24	$72	2		
Whiteboard Paint	1	$22	$22	2		
Dry-Erase Markers	1	$10	$10	2	Priority 2 Total:	$1,963
3D Printer	1	$900	$900	3		
Wacom Tablet	1	$80	$80	3	Priority 3 Total:	$980
					Overall Total:	$8,160
Priority Ranking						
1	High Importance; should be purchased immediately					
2	Moderate Importance; should be purchased when feasible					
3	Low Importance; purchase at discretion of center					

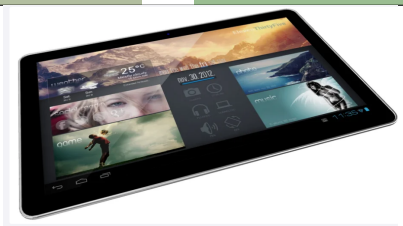
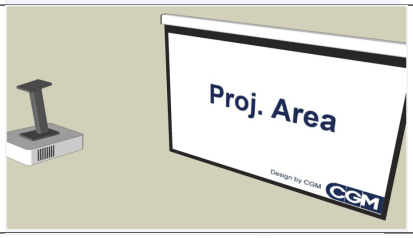
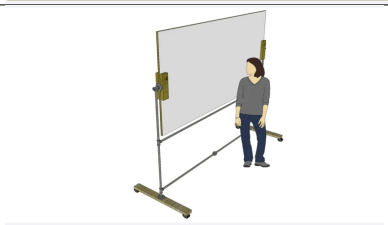
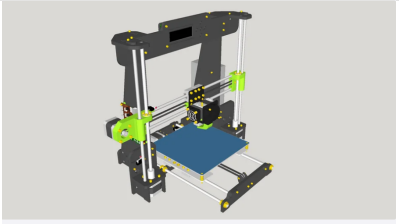
Appendix N: Video Software Overview

This lists the different software and websites that were used to create the videos and gives descriptions on how to use each one. We also included a document of example illustrations by James Mancuso from these software used in our final videos.

Software Used	Description
Powtoon www.powtoon.com	This is a free online program used to create animated videos and presentations. This software allows you to "drag and drop" information and images that you need. It also includes training documents and webinars so it's easy to learn and use.
Google SketchUp www.sketchup.com	This is a free online collaborative 3D modeling site that allows multiple people to create blueprints and gif files of 3D walkthroughs of a created space. You can even input real dimensions to have an accurate model and use Virtual Reality hardware to truly immerse yourself in the space you created.
Adobe Illustrator James Mancuso's Illustrations	This is a vector graphics software you can purchase and download onto your device to create icons, logos, and so much more. You can even create freehand drawings and illustrations

Appendix O: Images Used in 3D Model

All images used are from the free-use Google SketchUp Library.

Technology	File Image
Laptops	
Tablets	
Projector	
Whiteboard	
Wacom Tablets	
3D Printer	

Appendix P: Educational Technology Blogs

These are a few suggested blogs the collaborators and or volunteers can follow to help them stay up to date on the latest technologies and how they are being implemented in schools.

Software Used	Description
EdTech Roundup www.edtechroundup.org	This family run blog suggests new technologies, software, and games to help K-12 educators engage students.
Free Tech 4 Teachers www.freetech4teachers.com	This blog frequently posts links to free online activities ranging from simple online math games to virtual educational summer camps.