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A. Quality of the Project Design

Introduction: Role Models play a significant role in inspiring, motivating and changing students' attitudes about pursuing STEM careers. A vast body of research finds that role models significantly change girls' interest and attitudes about STEM and especially in computer science careers (Franklin, 2019; Choney, 2018; Shin, Levy & London, 2016; Hong & Lin-Siegler, 2012). Below is the definition of a STEM professional role model and the profound impact they can have on girls.

Who Is a Role Model? A role model is someone whose own passion and enthusiasm help motivate others and inspire them to see possibilities for their own future. As a role model, you have the opportunity to increase interest and participation in STEM careers, especially for girls and underrepresented groups, through the simple act of sharing your own stories and experiences. It is also a chance to dispel negative stereotypes and myths around women working in STEM fields that often hold girls back from exploring their interest in science (Techbridge, 2013).

This seems like a simple thing to do – connect students to STEM Role Models. However, in small rural communities and for underrepresented populations, this is a tremendous challenge resulting in not many students pursuing or exposed to STEM/ Computer Science Careers. There are limited diverse role models in these rural communities which creates a persistent educational challenge.

This project proposes to build upon research demonstrating the significant impact STEM Role Models have on girls in large urban communities (Microsoft, 2019; Berwick, 2019; Sammet & Kekelis, 2016; Steele, 2006). We propose to study the effects of using diverse STEM/CS role models virtually for another high-need and underrepresented population in rural communities. The project will leverage the use of virtual technology to bring diverse Role Models into these rural communities.

The target population is too often "**left out**" or "**forgotten**" and their potential is underestimated. These children come from families with parents having one of the lowest educational attainment levels in the US (**35%** have less than a **9th** grade education). Forty percent (**40%**) do not speak English, they work in the harshest conditions with low wages (**33%** make less than **$35,000** per year) and endure many hours of hard labor (OSPI 2020). These families reside in small rural communities, many living in the shadows in deteriorating labor camps or dilapidated housing projects.

These families are on the front lines serving as essential **agricultural workers** throughout this country. There are more than three million farmworker families in this country (NCFH, 2020). These students of farmworker families are the highest need, underrepresented in STEM, lack local diverse STEM Role Models and have a strong work ethic and great potential given an opportunity.

How are Farmworker Students Different? For many, their primary language is Spanish (ELL). The majority are Hispanic, 1st generation, perform the lowest on academic achievement, some move several times a year in search of agriculture work. Their parents have the lowest educational attainment levels and lowest wages of any population. Some are immigrants/ DREAMERS and live with the uncertainty of deportation, intimidation and the anxiety of often moving between schools. Society views them as necessary agricultural workers with low career expectations (NCFH, 2020)

Opportune Timing for the Changing World: The **Coronavirus** exposed how this vulnerable population of color and front-line farmworkers are being disproportionately impacted educationally, economically, and socially by the lack of access to healthcare by this pandemic. The coronavirus has forced students and workers to use virtual meeting platforms or similar technology in new ways to learn, work, access health care (telemedicine), shop and communicate. Consequently, everyone is now more comfortable using this technology. Furthermore, the **Black Lives Matters** protests across the county have increased awareness about the need to hire a more diverse workforce with organizations and business rapidly creating "Diversity Officers" or "Departments" to hire a more diverse workforce. The convergence of these two factors will have a transformative impact on our new normal after the pandemic and will profoundly change the way we live in the future. This project recognizes this changing world and will study the emerging and increasing use of technologies to virtually connect diverse STEM Role Models to geographically isolated rural farmworker students. Virtual connections open the world to many potential diverse role models that look and speak like farmworker students. The more students see and interact with STEM professionals that look like themselves, the more they are influenced in pursuing those careers (Microsoft, 2019). We will leverage existing technology to digitally make these live connections.

The Problem to Study

The proposed **Educational Innovation** is to **Research** the impact of the increasing use of new virtual technologies to connect diverse STEM/CS Role Models with farmworker students in isolated small rural communities to examine changes in attitudes about pursing STEM/CS fields. Students in rural communities lack STEM Role Models that look like them and understand their educational challenges. Virtual technology is becoming more universally common and is an emerging and promising innovation that make these new connections possible. Our vision is to inspire more farmworker students to become computer scientists and STEM professionals.

Another Opportunity is our Location - Washington State is home to some of the largest engineering, computer science, technology, biomedical and mathematician employers in the world. Within a two-hour drive from the agricultural fields of the Yakima Valley are the Seattle-based employers – Microsoft, Boeing Aerospace, Amazon, Expedia, Paccar and similar tech businesses. Washington ranks **#1** in STEM Jobs and is ranked the #1 tech hub in the United States, beating out Silicon Valley and San Francisco (Levy, 2018). Furthermore, the University of Washington (UW) is a national leader in educating students for STEM fields (U.S. News, 2018). Computer Science is the fastest growing and most popular major at UW and expanding by constructing a second building. Much of this work was started and is supported by Bill Gates and the late Paul Allen. There are many in-state high-paying STEM jobs for our farmworkers students if they pursue a STEM career. There are also many potential diverse Role Models in these large tech companies we can access virtually.

1.Goals, Objectives and Outcomes: The **ESD 105 Consortia** has developed the following specific project objectives and measurable outcomes that address the purpose of the EIR Early-Phase, addresses the high needs of students and meets Absolute Priorities 1 & 2 (Field-Initiated Innovations - STEM) and Competitive Preference Priority (Computer Science) in rural designated communities. These outcomes are also aligned with the 6 EIR Annual Performance Measures. Baseline data was collected from the needs assessment to establish realistic and achievable outcome targets.

Goal 1: Study the effects of using a Role Model (RM) system with farmworker students to examine their impact on pursuing computer science careers.	Measuring Instruments
Objectives & Outcomes	
1.1 By March 2021, Start WWC recommended Randomized Control Trial (RCT) research design by randomly identifying and assigning students in intervention and comparison groups in all the schools under WWC protocol.	Study design computer program for random assignment
1.2 Ongoing in years 1-3, Examine the degree of which key components of the RM system are implemented as intended.	Mixed methods implementation study that includes observations, fidelity monitoring checklist/ monitoring logs, role model & student feedback surveys and rating forms.
1.3 Ongoing in years 1-3, Examine the extent of the fidelity of RM implementation and what key components influence students the least & most.	
1.4 At the end of year 3, Based on examinations, make adjustment to the RM system to be the most effective in changing attitudes about computer science careers.	Student and role model interviews and survey feedback results.
1.5 At the end of year 3, Finalize the components of the RM system in preparation for full implementation in other schools in Washington State with significant farmworker students.	Completion of all the training materials, toolkit, portal, and study results.
1.6 At the end of year 5, Publish and disseminate findings throughout the educational community in Washington state and the US.	Publications included in educational journals and posted on WWC.

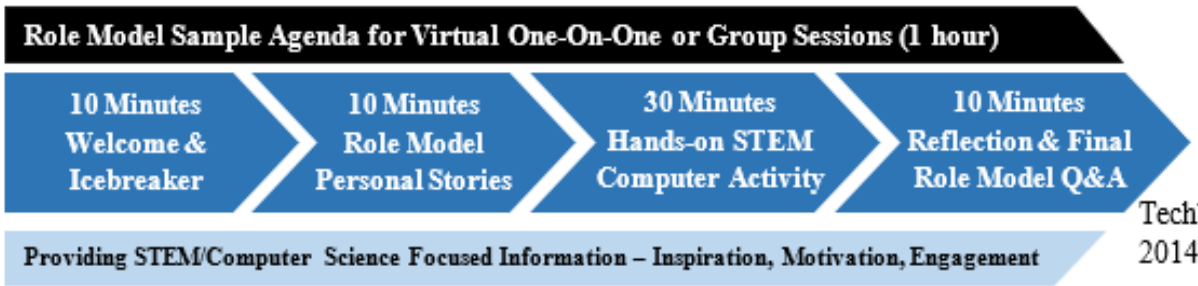
Goal 2: Implement a proven Role Model (RM) system to increase farmworker (FW) students' interest in computer science careers and increase academic achievement in math and science.	Measuring Instruments
Objectives & Outcomes	
2.1 At the end of each school year, students in the intervention group will demonstrate an increased interest of **7** points higher in computer science careers than the comparison group.	Pre and Post Surveys *(Walston, Redford & Bhatt, NCEE, 2017)*
2.2 By the end of 8th grade, the percentage of MS students in the intervention group meeting the standard on the state administered proficiency exam in **Science** will increase from a baseline of **27.0%** to **35%. Secondary Outcome:** intervention group will meet proficiency standard at least 10 points higher than the comparison group.	State Science Smarter Balanced Assessment test scores
2.3 By the end of 8th grade, the percentage of MS students in the intervention group meeting the standard on the state administered proficiency exam in **Math** will increase from a baseline of **33.6%** to **42%. Secondary Outcome:** intervention group will meet proficiency standard at least **12** points higher than the comparison group.	State Math Smarter Balanced Assessment test scores
2.4 By 12th grade, the percentage of HS students in treatment group enrolling and completing a computer science course from a baseline TBD. **Secondary Outcome**: Treatment group will complete at least **30** points higher than control group.	Computerized school transcripts
2.5 By the end of the 12th grade, the percentage of HS students in the intervention group meeting the standard on the state administered proficiency exam in **Science** will increase from a baseline of **22.5%** to **39%**. **Secondary Outcome:** intervention group will meet proficiency standard at least 10 points higher than the comparison group.	State Science Smarter Balanced Assessment test scores
2.6 By the end of 12th grade, the percentage of HS students meeting the standard on the state administered proficiency exam in **Math** will increase from a baseline of **18.1%** to **30%. Secondary Outcome:** intervention group will meet proficiency standard at least **15** points higher than the comparison group.	State Math Smarter Balanced Assessment test scores
2.7 By the end of 12th grade, the percentage of HS students in the intervention group who completed advanced placement **Math or Science** courses will increase from a	Computerized school

baseline of **11.5%** to **25%**. **Secondary Outcome:** intervention group will increase by at least **12** points higher than the comparison group.	transcripts
2.8 By the end of year 3 upon HS graduation, the percentage of students in the intervention group will pursue a computer science career at a higher rate of **12** points than the comparison group.	Pre and Post Surveys *(Walston, Redford & Bhatt, NCEE, 2017)*

Plan for Addressing Absolute Priorities & Competitive Preference Priority			
Priorities Addressed	**Plan of Activities for Meeting Priorities**	**Reference Page #**	**Addresses Outcomes**
Absolute Priority 1 Demonstrates a Rationale.	Addresses this priority by selecting a key component "Role Model" supported by research using a strong theory framework and by developing a Logic Model (rationale) demonstrating key relationships essential to achieving intended project outcomes.	9-12	1.2, 1.3, 1.4, 1.5, 1.6, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7
Absolute Priority 2 Field-Initiated Innovations – Promoting Science, Technology, Engineering, or Math (STEM) Edu.	Addresses this priority by further developing "Role Model" system promoting STEM for high-need farmworker students leading to increased student academic achievement in math and science in middle and high schools.	3-5, 9	1.2, 1.3, 1.4, 1.5, 2.2, 2.3, 2.4, 2.5, 2.6
Competitive Preference Priority 1 Computer Science	Addresses this priority by selecting diverse Role Models in computer science fields to increase interest in Computer Science careers for farmworker students and enrolling in HS & AP computer science courses.	5, 8, 9, 12	1.2, 1.4, 1.5, 2.1, 2.4, 2.8

2. Project Design & Addressing the Needs: Conceptual Framework – the Virtual STEM Role Model Connection (RM) is grounded in sound design and strong theory. We know from empirical evidence that students are influenced by role models that look like them (Dorie, et al. 2014; Sjaastad, 2010). We will study the impact that diverse STEM Role Models (RM) have in *influencing farmworker students' attitudes* toward pursuing STEM and Computer Science careers and the RM's *impact on Middle and High School academic achievement in math and science*.

Through our research, we identified the following evidence supported and promising Role Model design having the highest impact (Techbridge, 2014). We propose to use and study this model with farmworker students. This model has 4 basic components as illustrated below.



Techbridge, 2014, p.8

For the study, each intervention student will engage in two Role Model sessions each quarter per school year. Two cohorts will be identified as the intervention/ treatment group and each will be followed for 3 years. The first group will be Middle School students starting the study in 6th grade. The second intervention group will be in High School starting in 9th grade until graduation. Each cohort will include **462** students - **231** intervention and **231** comparison group. The project staff will develop training materials and train the students and role models to ensure fidelity among all sessions. The number of sessions may vary overtime based on ongoing study results to assess the appropriate dosage for maximum impact. Students not having laptops will be assigned one.

Needs -Target School Districts & Farmworker Students: The Yakima Valley is within this ESD105 service area and includes communities highly dependent on an agricultural workforce. This valley is located in the eastern part of Washington state. Schools in these communities serve the largest percent of students of color, have the highest poverty rates, highest percentage of English Language Learners and the highest numbers of farmworker students in the state. This is truly a high-need population. The following are the schools for the study including their students' characteristics.

Target Schools' Student Demographics							
School District	**Enrollment 6-12 grades**	**Farmworker Students**	**Hispanic/ Latino(a)**	**English Language Learners**	**F/R Lunch**	**Meets Rural Definition with Code**	**Small & Rural Schools**
Wahluke	**1,328**	**48.6% /645**	**96.9%**	**51.7%**	**100.0%**	**Yes**	**Yes**
Sunnyside	**3,809**	**16.0% /609**	**92.3%**	**29.1%**	**78.9%**	**Yes**	**Yes**
Grandview	**1,958**	**10.4% /204**	**92.7%**	**32.2%**	**72.0%**	**Yes**	**Yes**
Granger	**801**	**16.4% /131**	**92.8%**	**39.0%**	**87.5%**	**Yes**	**Yes**
Mabton	**441**	**29.9% /132**	**97.2%**	**46.5%**	**93.7%**	**Yes**	**Yes**
Yakima	**8,642**	**9.0% /778**	**79.5%**	**30.0%**	**80.6%**	**No**	**No**
Total/Average	**16,979**	**21.7%/2,499**	**91.9%**	**38.1%**	**85.5%**	**5 of 6**	**5 of 6**
WA State	**N/A**	1.9%	24.0%	11.7%	45.3%	**N/A**	**N/A**

(Source: OSPI State Report Card, 2019-20)

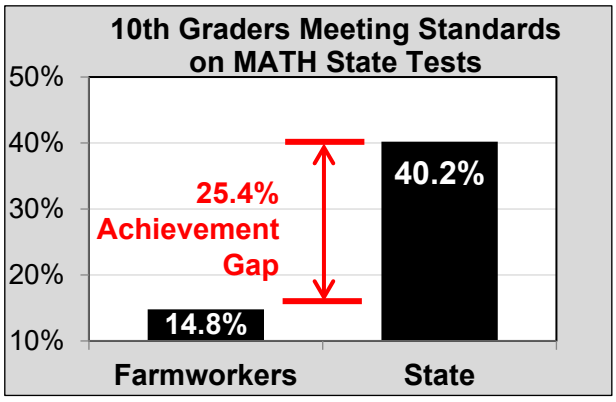
Lack of Role Models in STEM & Computer Science - Through a comprehensive literature review and local knowledge of role model program strategies, interventions, and gaps, we identified the

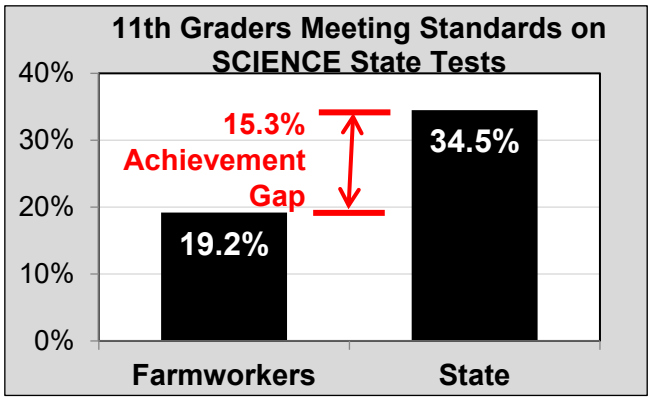
following five areas of need to be addressed for farmworker students preventing them from successfully participating and becoming motivated into STEM and computer science careers.

1. **Lack of Research on the Impact of STEM/CS Role Models -** A study in the UK by Microsoft (2018) of **11,500 girls** and women across **12 countries** discovered that girls were much more likely to consider a career in STEM if they had a visible role model. As mentioned earlier, after a comprehensive literature review, there were limited studies on the impact diverse role models have on male underrepresented minority students and no studies specific to farmworker students.
2. **Lack of STEM/CS Role Models in Local Rural Schools -** Data shows that, among STEM-interested students, **17 percent** of students in rural high schools meet the ACT STEM Benchmark, versus **33 percent** of students in suburban high schools and **27 percent** of students in urban high schools (ACT, 2017, p.20). Rural students face numerous obstacles to entering the STEM fields including low educational aspirations, **lack of STEM role models**, lack of access to STEM outreach, and lack of access to advanced math and science curricula. These factors can both limit the entry of rural students into STEM fields and hinder their progress toward degree completion (Versypt, J. & Versypt A., 2013). In a large-scale study comparing aspirations of rural and non-rural youth, Haller & Virkler (1993) found that rural students aspired less frequently to professional jobs that are relatively uncommon in rural areas. Haller & Virkler also concluded that within the rural geographic and cultural context, a **lack of contact** with professionals in the STEM fields prevented student awareness of STEM career opportunities, leading to their lack of interest in pursuing degrees in fields that they have little or no exposure to.
3. **Farmworker Students Lack Awareness about and/or Interest in STEM/CS –** The University of Washington (UW) recently conducted a study of target middle school students to assess their college interests, career goals, future plans after high school, interest in STEM fields. UW found that **38.4%** of students are interested in pursuing a math career and **46.9%** are interested in a science career. However, the majority have **no plans to attend college**, a necessity for pursuing STEM and

other careers. The UW Study found that **31.9%** have no plans to go to college, **30.1%** plan to work, and **27.8%** plan to help their parents. This is low compared to national data where **92%** of 8th graders surveyed plan to enter college as reported by the College Board. These results were attributed to the fact that **55.4%** of their parents did not attend college, and **21.9%** of students do not have someone to talk to about going to college (UW Student Study, 2018).

4. Low Academic Achievement –The state administers the Smarter Balanced Assessment (SBA) to measure a student's ability to meet state academic standards in **mathematics, science** and **English** in various grades. Many students in the target schools are not passing the **math** or **science** tests. There is a severe achievement gap when target farmworker students are compared to state averages in passing state test rates as shown below.





(Source: OSPI Report Card Assessment Data, 2018-19)

These achievement gaps are similar in the middle school for farmworker students with achievement gaps in science at **23.8%** and math at **17.1%** when comparing farmworker students to the state.

Addressing the Identified Needs		
Identified Needs	**Addressing the Needs by Conducting These Solutions**	**Addresses Outcomes**
1.Lack of research on the impact of STEM/ Computer Science **Role Models** on farmworker students (girls & boys) in rural communities.	Conduct study that examines the impact on farmworker students (girls & boys) in rural communities.	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8
2.Lack of STEM/Computer Science **Role Models** in local rural schools.	Implement a Role Model system in rural schools using Zoom or other technology to connect with RMs.	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 2.4, 2.5, 2.6, 2.7, 2.8

3.Farmworker students lack awareness about or interested in STEM/computer Science careers.	Role Models inform & inspire students about the various STEM/CS Careers possibilities.	1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.8
4.Farmworkers experiencing large academic achievement gaps in science and math compared to non-farmworkers based on state testing.	Role Models teach students about the importance of taking math and science courses to pursue STEM/CS Careers.	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8
5.Farmworkers not taking Advanced Placement courses in math and science which would place them on a pathway to a STEM/CS Career.	Role Models teach students about the importance of taking AP math and science courses to pursue STEM/CS Careers.	1.1, 1.2, 1.3, 1.4, 2.4, 2.5, 2.6, 2.7, 2.8

5. Advanced Placement Math & Science Courses - According to the recent school assessment, students are not taking sufficient rigorous courses in core subjects. On average, only **14.1%** of students completed advanced math courses, **11.5%** completed advanced science (UW Study, 2019).

The Solution

We believe this proposed innovative approach is an entrepreneurial solution because virtual technologies, a consequence of COVID-19, is becoming universally used in schools, homes and work. Virtual technologies are inexpensive (free on many devices), easy to use, takes advantage of existing computers, infrastructures and are readily available on numerous devices. The new generation (students) is easily adopting these new technologies in record numbers. Furthermore, this approach is easily scalable to other schools in the US with a minimal investment and training. The project will develop a toolkit, portal, policies, implementation training videos, demonstrations and research evidence supporting its effectiveness. The USDE's Return-on-Invest in this solution is amplified because it can be used for all populations in STEM fields in the US.

Who We Are: We are a Yakima Consortia of six majority small rural school districts, the University of Washington – GEAR UP, Washington State STEM, RGI Research Corporation and the Educational Service District 105 (ESD 105) as the grantee. The ESD 105 service area includes 25 school districts in South Central Washington State. ESD 105 provides a range of educational services to its districts including curriculum selection, training, technical assistance in a range of subjects such as Math, Reading, Science, Technology, School Climate, Safety, and others. MOUs and letters from all these partners demonstrating their commitment and support are in Appendix C.

3. Up-to-date Knowledge & Effective Practice:

Rationale & Logic Model – Our **rationale** for selecting the intervention for target students is based on U.S. Department of Education's 34 CFR 17.1(c) definition. This definition requires that key

components of selected interventions are informed by research or evaluation findings likely to improve selected outcomes. Accordingly, we have selected an evidence-based intervention meeting these conditions. The key intervention we selected to implement is using **"Role Models"** as an effective intervention supported by research. Many of the proposed effects are for students to achieve academically, take more rigorous courses leading to advanced placement courses in math and science, enrolling in High School Computer Science courses and pursuing STEM/ Computer Science careers. The research findings for Role Models includes the following two studies.

Encouraging Girls in Math and Science Study

The USDE What Works Clearinghouse (WWC) identified only one study about Role Models that meets WWC group design evidence standards. This study cites evidence from four random-assignment experiments indicating that exposing women to female role models who are high-achieving or who are perceived as math experts can mitigate the effects of stereotype threat on math test performance. These studies show that even brief exposure to women who are perceived to be experts in math can improve female students' performance on math tests (Marx and Roman 2002).

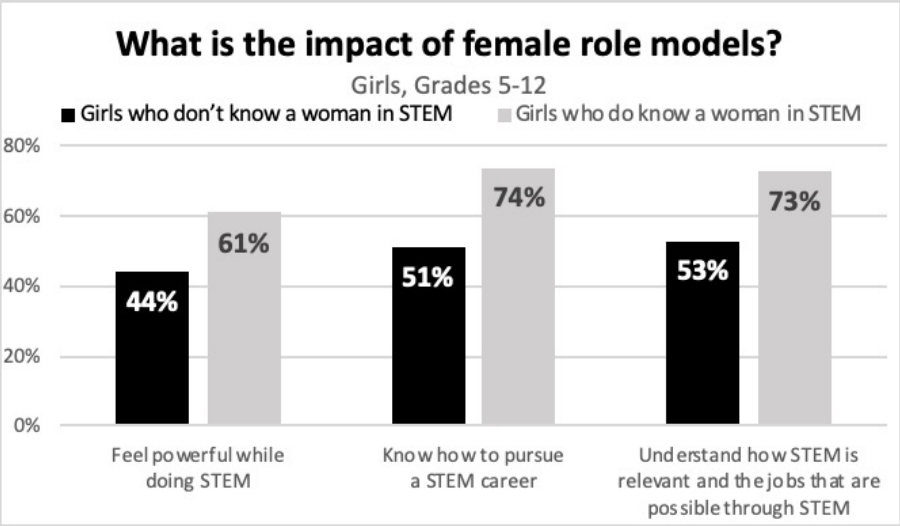
Marx, D.M., and Roman, J.S. (2002). Female role models: Protecting women's math performance. Personality and Social Psychology Bulletin, 28(9), 1183–1193.

Microsoft Study

After the UK study, Microsoft commissioned a research study in the U.S. to better understand what causes girls and women to lose interest in STEM subjects and careers, as well as what strategies and interventions have the greatest potential to reverse this trend. This study included a quantitative analysis of 6,009 girls and young women and examined the attitudes toward STEM, school, and the workforce throughout the pipeline. One of main findings is: "*Girls and young women have a hard time picturing themselves in STEM roles. They need more exposure to STEM jobs, female role models, and career awareness and planning".* Below is a chart of their findings about the impact of female role models on young girls

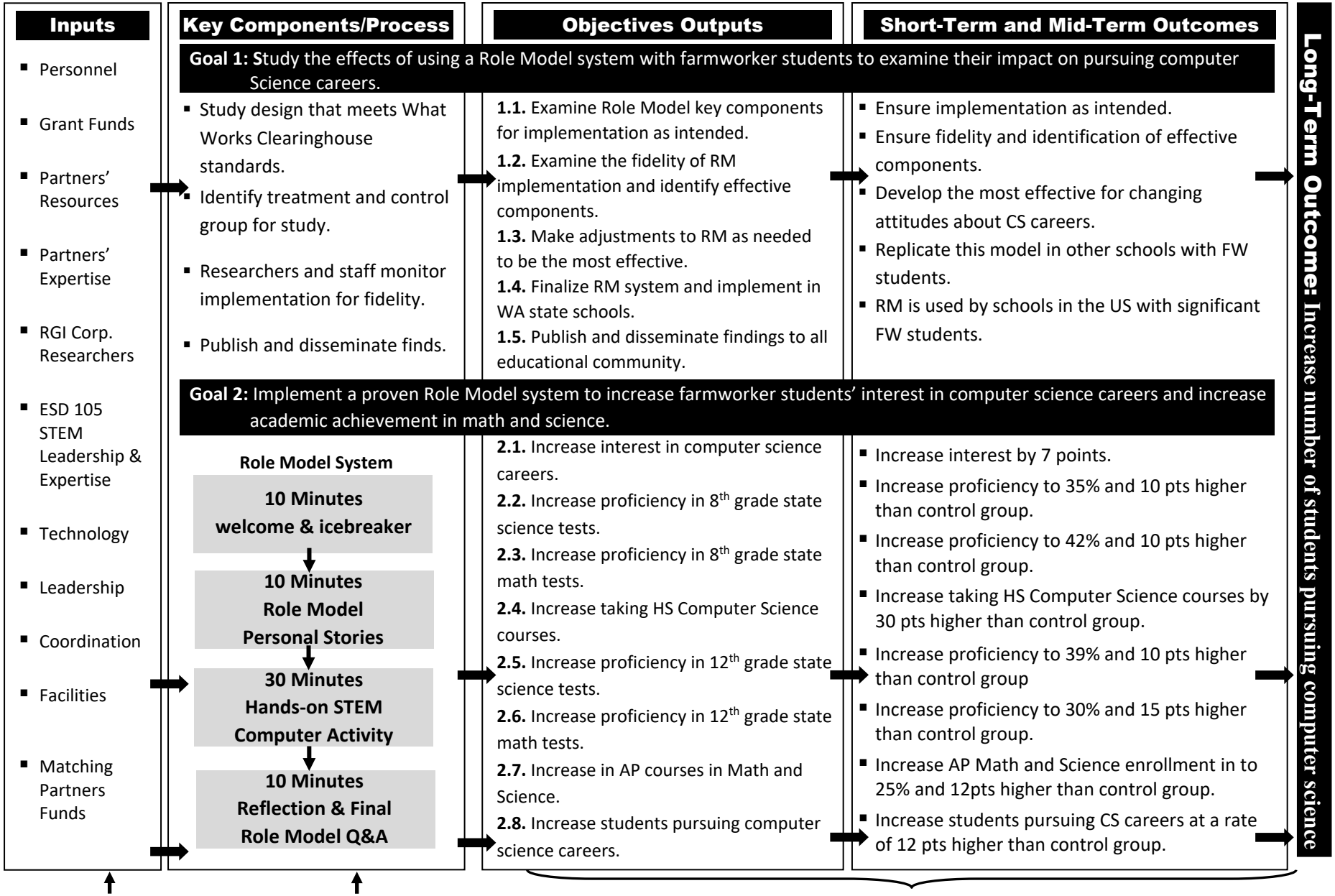
Closing the STEM gap (Microsoft, 2019). The study is included in other attachments Appendix J.

Both studies demonstrate various degrees of evidence that women Role Models influence girls pursuing STEM fields. However, no strong evidence is available about using diverse Role Models with farmworker students in rural communities. Our proposed study will determine if diverse Role Models for farmworker populations, using virtual technology, are effective in influencing them to pursue STEM and Computer Science careers.



Logic Model - Our selection or rationale of this field-initiated intervention was further informed by our needs assessment, academic research and local educators knowledge about role models improving students' academic achievement. The selection of the intervention rationale included all stakeholders engaged in a program development and design process using a proven strong theory for the proposed process, product, strategy and services that is typically illustrated in a Logic Model linking the relationships between key program interventions, indicators and outcomes - theoretically and operationally. Our logic model is a graphic representation of our conceptual framework connecting the proposed rationale or theory of the intervention to the intended short, mid and long-term outcomes (Lawton, Cicchinelli & Kekahio, 2014). According to "Theory-based Evaluation" Harvard researcher Carol Weiss, a rationale or strong theory is often referred to as a Pathway of Change, Logic Model or Theory of Action. Consortia partners, with the assistance of our evaluator, selected to use a Theory of Action Logic Model (on next page) to demonstrate our actions/ interventions (inputs & outputs) and our proposed results (outcomes).

Yakima Consortia Partnership – Rationale Represented by Theory of Action Logic Model



Ongoing Feedback – Program Adjustments ← **Evaluation – Continuous Improvement – Study Findings**

4. Contribution to Increased Knowledge or Understanding.

Lack of Specific Research on Farmworker Students - Women who work in STEM fields along with other business leaders, have begun a movement to engage girls and young women in STEM as **role models** (Microsoft's DigiGirlz, 2020; PBS SciGirl, 2019; Techbridge, 2019; Girls, Inc. 2017; Ulaby, 2013; Goldie Blox Company, 2017; Boolean Girl, 2014; Girls Who Code, 2020). There is also a substantial amount of research on the benefits that STEM female role models have on young women (Drury & Cheryan, 2011; Weber 2011; Hermann & Bodford, 2016; Garcia-Holgado, Diaz, & Garcia-Penalvo, 2019; Hughes, Nzekwe & Molyneaux , 2013) In fact, **93%** of girls in the Techbridge Program say that role models made them more interested in working in STEM (Kekelis & Joyce, 2014). However, a startling gap in research found **no studies** on the effects STEM role models have specific to farmworker students. Students from farm working families, many of which are Hispanic, English language learners (ELLs), low-income and first-generation have the highest high school drop-out rate in the country (US Farmworker Fact Sheet, 2015). These students have additional challenges as stated in the needs section beyond those of girls in pursing STEM/ Computer Science careers. Furthermore, there is no research on the impact of using the new virtual technology to connect role models to students in rural areas.

Limited Role Model Research - There is only **limited evidence** from research meeting WWC evaluation standards about diverse role model programs across the U.S. There is only one study meeting the WWC standard and it is about girls and STEM careers (Halpren, et. al. 2007; WWC _ Encouraging Girls in Math and Science). We also found a lack of consistent types of Role Models Programs and how they were being implemented without fidelity.

Our own literature review revealed a most recent 2019 report commissioned by Microsoft titled "Closing the STEM Gap" that helped better understand what causes girls and women to lose interest in STEM subjects and careers, as well as what strategies and interventions have the greatest potential to reverse this trend. While promising, this study provided possible

interventions, beliefs and insights from girls towards STEM but lacked applicability of an actual role model program.

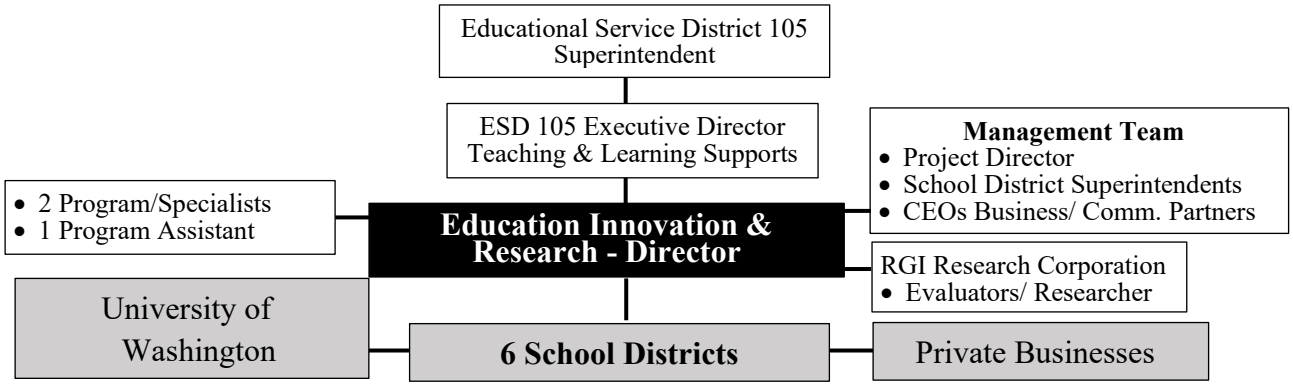
Proposed Study: Our proposed study will utilize a mixed method approach that includes a WWC randomized control trial (RCT) that meets WWC Design Standards without reservations. RCT's are the most stringent methods of determining whether a cause-effect relation exists between intervention and the outcome (Kendall, 2003). The lack of studies underscores the need for additional WWC eligible research to contribute to the knowledge base of how a role model program or a role model roadmap can be effective and can help solve persistent problems for another high-need student population. In addition, both existing studies were conducted in an urban setting only for girls and women. We intend to take our study a step-further by using an RCT and assessing the cause-effect relationship of a Virtual Role Model program for middle and high school farmworker youth across 6 rural and agriculturally diverse low-income school districts in Washington State. The results of our proposed program will be shared with similar groups and in addition, will evaluate the efficacy of a highly replicable role model program that serves high-need student populations.

The study's results will contribute to the lack of knowledge and provide a better understanding for practitioners and policymakers of the challenges farmworker students encounter in pursuing STEM/ Computer Science careers. Furthermore, it will provide a refined, complete and tested virtual Role Model program that can be replicated in any school in the US with farmworker students or other populations. The intervention will be easily scalable to other schools in the US with a minimal investment and training. The project will develop a toolkit, portal, policies, implementation training videos, demonstrations and research evidence supporting its effectiveness.

B. Adequacy of Resources and Quality of the Management Plan

1. Management Plan – ESD 105 will use its grants management experience, leadership and knowledge in the management of this EIR Program. The **Management Plan** incorporates all the essential control functions and elements to ensure an efficient and effective program. These include the traditional management functions of planning, reporting, management of information, human resources, evaluation and continuous improvement mechanisms for the delivery of accessible, quality and culturally relevant services for target students and schools.

The **ESD 105** will include a Management Team composed of representatives from all the partner schools with authority to make decisions on behalf of the consortia. This includes the Project Director, School Superintendents, Executive Directors from partner organizations and the Evaluation Team. The Management Team will meet monthly in the first year and quarterly in subsequent years. They will provide advice and input for the EIR Program regarding budgets, program continuous improvement, review of evaluation results, program changes and other program policy matters. The EIR Project Director will host and facilitate the Management Team meetings. The project' management and operational organizational structure will be:



Management Methodology - The Consortia will use a proven management methodology that includes tools such as a tasks management software, timelines, specific personnel assignments, responsibilities and milestones to ensure objectives and outcome measures are achieved on time and within budget. Successful and efficient project implementation and management in multiple

school partnership grants requires a clearly defined Management and Work Plan agreed upon by all the partners. Accordingly, the partners have adopted this Management Plan. The program will use a Project Task Management Software (PTMS) to further identify, assign and manage relational tasks, activities and due dates. This PTMS is web-based and will be used by the project and evaluators to manage and complete all assigned tasks. Each year in July, the Management Team will develop, review and update milestones for the next year based on the project's progress, the study's results and achievement of performance measures. The Work Plan includes a **Timeline** with tasks assigned to each associated personnel responsible and includes timelines/ milestones and related performance measures. A specific developed Work Plan with timelines will facilitate the implementation, monitoring, evaluation and achieving of performance measures by project personnel. These tasks will also be used to assess progress towards achieving milestones, objectives and annual performance measures. The specific Work Plan is as follows.

Work Plan: Tasks, Milestones and Timeline – 5 Years			
Legend for Personnel: PD – Project Director, PS – Program Specialist, PA – Program Assistant, R – Researcher, E – Evaluation, SD – School Districts, P – Partners, RM – Role Models			
Stage One: (Jan 2021 – Aug 2021) – 1st Six Months			
Project Tasks & Milestones	**Personnel Responsible**	**Performance Measures**	**Due Date**
Recruit & hire Project Director	ESD 105	All	Jan 2021
Recruit & hire Project Personnel	PD, ESD 105	All	Feb 2021
Management Team meets	All	All	Mar-Aug 2021
Attend National Directors' meeting	PD, R, E	All	TBD
Finalize evaluation design	PD, R, E	All	Mar 2021
Finalize management plan	PD, PS	All	Mar 2021
Meet with Partner schools to provide grant orientation	PD, R, E, SD	All	Mar 2021
Establish all baselines for measures	R, E	All	Apr 2021
Customize database for data collection	PD, E	All	Jan-Apr 2021
Develop evaluation instruments	R, E, PD	All	Jan-Apr 2021
Develop the Role Model training manuals and resources	PD, PS	All	Mar-May 2021
Develop outcome questionnaire, fidelity monitoring checklist, and continuous improvement tools	R, E, PD	All	Feb-Apr 2021
Pilot key components of the intervention	PD, R, PS	All	Apr-Jun 2021
Pilot outcome questionnaire	R, E	All	Apr 2021
Finalize outcome questionnaire	R, E	All	May-Jun 2021
Finalize continuous improvement tools	R, E	All	May-Jul 2021
Finalize the Virtual Role Model Connection Program	PD, PS, E	All	Jun-Jul 2021
Train all staff on use of database	PD, E, PS, PA	All	Apr-Jul 2021
Stage Two: Milestones and Timeline (Sept 2021 – Aug 2022) – 1st Full School Year			
Select Role Model and contact each partner school	PD, PS, SD	1.1	Sept-Oct 2021
Obtain parental consent for study participation	PS	1.1	Sept-Oct 2021
Conduct at least 2 annual on-site planning meetings with schools	PD, PS, R, E	1.2, 1.3	Sept & Jan 2022
Provide training to Role Models to ensure fidelity	PD, PS	1.2, 1.3	Oct-Dec 2021

Randomly assign study participants to participate in treatment or participate in control group	R, PD	1.1	Sept 2021
Assign Laptops to students without computers at home	PS, SD	1.1	Sept 2021
Match Role Models – Students	PS, SD, RM	1.1, 1.2, 1.3	Oct-Nov 2021
Ensure students are scheduled for Role Model sessions according to the outcome of random assignment	PS, RM	1.1, 1.2, 1.3	Oct-May 2022
Administer baseline surveys to study participants	R, SD,PS	1.1, 1.2	Sept 2021
Management Team meets	All	All	Ongoing
Database operational for collection	E, PS	All	Sept 2021
Launch Role Model with at least 120 6th and 120 9th graders at target schools	PD, PS, RM	All	Oct 2021
Evaluation activities occur	E, PS	All	Ongoing
Ongoing monthly RM sessions with students	RM, PS	All	Monthly
Review programs for fidelity	R, E, PS	All	Ongoing
Review milestones, task, timeline	All	All	Sept & Jan 2022
Data collection ongoing & analysis for reporting	R, E, SD, PS	All	July 2022
Administer End-of- School Year Student surveys	PS, R, E	All	May 2022
Annual Evaluation Reports completed & Continuous improvement feedback	PD, PS, R, E	All	Aug 2022
Lessons learned, documented, and incorporated into Role Model program	PD,PS, E	All	Aug 2022
Stage Three: Milestones and Timeline (Sept 2022 – Aug 2023) – 2nd Full School Year			
Finalize and disseminate initial feedback reports	PD, E	1.2, 1.3, 1.4	Sept 2022
Management Team meets	All	All	Ongoing
Grant training to all staff start of year	PS, PD, SD	All	Sept 2022
Conduct at annual on-site planning meetings with schools	PS, PD, SD	1.1, 1.2, 1.3	Oct 2022
Conduct orientation session at each partner school to prepare them to implement Role Model program	PS, PD, SD	All	Sept 2022
Attend National Directors' meeting	PD, R, E	All	TBD
Provide training to Role Models to ensure fidelity	PD, PS, RM	All	Oct-Dec 2022
Evaluation activities occur	R, E	All	Ongoing
Implement Role Model program in schools	PS, PD	All	Sep-Oct 2022
Ensure students are scheduled into the program according to the outcome of random assignment	PS, PD	1.1, 1.2	Sep-Oct 2022
Administer End-of- School Year Student surveys	R, E	All	May 2023
Review program for fidelity	PS, R, E	All	Ongoing
Review milestones, task, timeline	PD, E, PS	All	Jan & Jul 2023
Data collection ongoing & analysis for reporting	R, E	All	Aug 2023
Annual Evaluation Reports completed & Continuous improvement feedback	R, E, PD	All	Jun-Jul 2023
Stage Four: Milestones and Timeline (Sept 2023 – Aug 2024) – 3rd Full School Year			
Finalize and disseminate initial feedback reports	PD, E	1.2, 1.2, 1.3	Sept 2023
Management Team meets	All	All	Ongoing
Select Role Models for the new school year	PS, PD, SD	1.1	Oct 2023
Conduct at annual on-site planning meetings with schools	PS, PD, SD	1.1, 1.2	Oct 2023
Conduct orientation session at each partner school to prepare them to implement Role Model program	PS, PD, SD	All	Sep 2023
Attend National Directors' meeting	PD, R, E	All	TBD
Provide training to Role Models to ensure fidelity	PD, PS	All	Oct-Dec 2023
Evaluation activities occur	R, E	All	Ongoing
Implement Role Model program in schools	PS, PD	All	Sept-Oct 2023
Ensure students are scheduled into the program according to the outcome of random assignment	PS, PD	1.1, 1.2	Sept-Oct 2023
Review program for fidelity	PS, R, E	All	Ongoing
Administer End-of- School Year Student surveys	PS, R, E	All	May 2024
Review milestones, task, timeline	PD, PS, E	All	Jan-Jul 2024
Data collection ongoing & analysis for reporting	R, E	All	Aug 2024
Annual Evaluation Reports completed & Continuous improvement feedback	R, E, PD	All	Sept-Oct 2024
Stage Five: Milestones and Timeline (Sept 2024 – Aug 2025) – 4th Yr. Scale Up to all ESD 105 Service Area			
Finalize all RM training materials for implementation	PD, PS, E	1.6	Sept-Oct 2024
Implement RM in all ESD105 service area school districts with significant farmworker students	PD, PS, E	1.5, 1.6	Sept-Dec 2024
Management Team meets	All	All	Ongoing
Grant training to all new school personnel on RM	PD, PS, E	All	Oct-Dec 2024
Select Role Models for the new school year	PD, PS, SD	1.1	Sept-Oct 2024

Conduct at annual on-site planning meetings with schools	PD, PS, E	1.1, 1.2, 1.3, 1.4	Oct 2024
Conduct orientation session at each partner school to prepare them to implement Role Model program	PD, PS, E	1.1	Sep-Oct 2024
Attend National Directors' meeting	PD, R, E	All	TBD
Evaluation activities occur	R, E	All	Ongoing
Ensure students are scheduled into the program according to the outcome of random assignment	PD, PS	1.1	Sep-Oct 2024
Administer end-of-school year surveys to study participants	PS, E	All	May 2025
Review milestones, task, timeline	PD, PS, E	All	Jan & Jul 2025
Data collection ongoing & analysis for reporting	R, E	All	Aug 2025
Annual Evaluation Reports completed & Continuous improvement feedback	R, E, PD	All	Sept-Oct 2025
Stage Six: Milestones and Timeline (Sept 2025 – Dec 2025) – 5th & last 6 months of Grant			
Finalize and disseminate all research study results	PD, R, E	1.5, 1.6	Sept-Nov 2025
Submit results to What Works Clearinghouse for review	PD, R	1.5, 1.6	Nov-Dec 2025
Submit journal articles to various educational publications	PD, R	1.6	Nov-Dec 2025
Attend National Directors' meeting	PD, R, E	All	TBD
Evaluation activities occur	R, E	All	Ongoing
Implement Role Model program in all schools	R, PS	All	Sept-Oct 2025
Review milestones, task, timeline	PD, PS, E	All	Oct 2025
Data collection ongoing & analysis for reporting	R, E	All	Ongoing
Evaluation reports completed & Continuous improvement feedback	PD, R, E	All	Dec 2025
Complete full 5 year project evaluation report with lesson learned	PD, R, E	1.6	Dec 2025
Submit at least two manuscripts on project results to a peer-reviewed journal	R	1.6	Dec 2025
Refine plan to sustain program beyond EIR grant and expand to additional schools	PD, PS	1.5, 1.6	Oct-Dec 2025

2. Reasonable Cost – In order to establish a reasonable and cost-effective program, the Consortia took the following steps in its budget develop process. This resulted in a program design that provides the most efficient allocation of resources to achieve the intended project outcomes.

- **ESD 105 Budget development experience:** ESD 105, established in 1969, has an extensive history of operating and budgeting USDE/ State grants and meeting outcomes within allocated budgets. ESD105 manages an annual budget of [redacted] which includes federal and state grants. ESD105 used this budgeting experience and its Finance Office to develop this budget.
- **Zero-Based Budgeting:** As a new project, we developed the budget based on actual costs for each allocated resource needed for staffing, travel, materials, evaluation, publishing and replicating the program. The budget reflects actual costs and is adequate to support all operational costs based on our demonstrated experience of similar research projects.
- ESD105 researched and analyzed previously awarded and posted EIR 2019, 2018 grants, posted i3 grants and other similar research grants to establish a reasonable cost for the project. Based on this analysis, we found our costs are comparable to the grants reviewed based on the allocation

of their resources and costs. The annual cost per student after scale-up is [redacted] / 2,645 students) This cost-to-benefit ratio is similar to rural, previously funded national projects we identified through our research.

Another factor we considered was the limited resources of these small rural school districts. Through our planning and budgeting process, we arrived at an annual budget of [redacted] which includes a 10% matching contribution. The Consortia believes all these financial resources are necessary to achieve all the intended project outcomes on time and within budget. (Matching funds-Appendix G)

3. Qualifications of Key Personnel - The Consortia has selected **Mark Cheney, MA** as Project Director. Mr. Cheney has a Master of Arts in Educational Technology and a B.A. in Education with 25 years of experience as a Math/ Science Teacher, STEM Grants Manager and Administrator. He has been at ESD 105 for 12 years and has extensive expertise managing and implementing STEM and Computer Science grants. Mr. Cheney is the current Director of the South-Central WA STEM Network and current Co-Director of the South-Central Career Connect Project. Mr. Cheney has a successful track record serving as PI and managing and directing large-scale state and federal grants. All other project staff will be hired. All Job Descriptions are in included in Appendix B.

RGI Research Corporation (RGI) will serve as the independent evaluators.

Ricardo Valdez, Ed.D., Senior Evaluator at RGI, will serve as **Lead Researcher** for this proposed EIR grant. Dr. Valdez has over 15 years of experience as a researcher and evaluator on state and federal USDE grant programs. Dr. Valdez has broad knowledge of scientifically based experimental designs, formative and summative evaluation methodologies, evaluation design and implementation, and reporting requirements for federally funded programs. He is supported by a group of research specialists each holding master's degrees or higher. Dr. Valdez was also a professor/ administrator at a nationally recognized university. He is the current evaluator for a 2019 USDE School Climate Transformation Grant administered by ESD 105. Dr. Valdez has an extensive

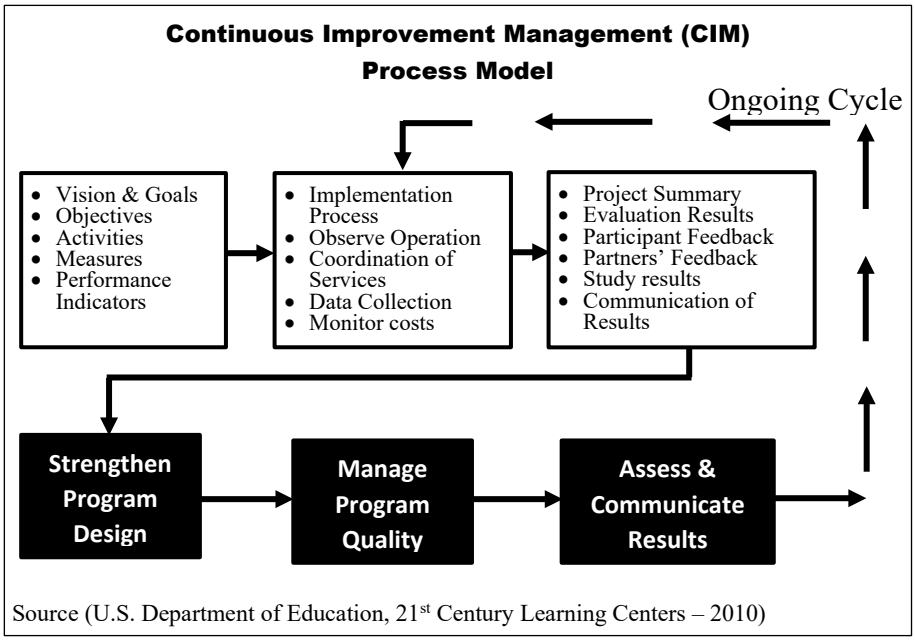
history working in rural schools and low-income communities. Dr. Valdez also holds a *What Works Clearinghouse (WWC) Certification* for Group Design IES standards training.

Ryan Landvoy, Ph.D., will serve as **Lead Program Evaluator**. Dr. Ryan Landvoy has over 20 years of experience in secondary and post-secondary education as an administrator and educator in both public and private sectors. He has served as a University Professor, Department Chairman, and Researcher in the fields of Education, Mathematics and Computer Science. Dr. Landvoy has broad experience in management, instructional technology, curriculum design and development, technology-based assessment, statistical analysis, and evaluation design. His expertise and interests include program evaluation, web development and Internet-based learning. He directs research projects relating to the evaluation and study of regional, state and federal social, education and economic social programs. Included as Appendix B are summary resumes for all these **Key Personnel** and below are their roles and responsibilities in the project.

Name & Position	Description of Roles - Key & Project Personnel
Mark Cheney, Project Director (1.0 FTE) (Job Description - Appendix B	Oversee all aspects of the EIR Role Model project; facilitate school meetings; Management Team Meetings, liaison with USDE EIR, superintendents and community partners; works with treatment group of students, role models and ensures partner schools uphold commitments; addresses implementation obstacles; hire/ train/supervise project staff; develops and coordinates external communications; and prepares required project reports.
(2)Project Specialists (2.0 FTE) (Job Descriptions -Appendix B	Responsible for the recruitment, training, coordination, and development of STEM Role Models; connects Role Models with treatment group. Conducts stakeholder development, technical assistance, on-site fidelity monitoring; assist schools with recruitment of farmworker students according to outcome of randomization, assist schools with matching role models and students; assist schools with the collection of academic, attendance and performance measures data.
Program Assistant (1 FTE)	Provide programmatic support, assist with data entry, and managing and accessing school and EIR project student databases.
Dr. Ricardo Valdez, **Lead Researcher** RGI Research Corporation	Oversee development, implementation, randomization, reliability, and validity of the proposed RCT design, including instrumentation (questionnaire content), baseline measures, measurement analysis, analysis of confounding factors, research questions, WWC standards and analytic methods. Prepare initial drafts of the impact and implementation evaluation/analysis plan and aggregate findings, including main and supplemental findings.
Dr. Ryan Landvoy,	Day-to-day management of the program evaluation plan; monitors and assesses the achievement of project objectives and outcome measures; working with sites to operationalize how the study will work at their school,

Program Evaluator RGI Research Corporation	working with sites to complete a study agreement, training staff, setting up datasets for data collection, working with sites to support study consent. Track continuous improvement and implementation data, monitor/manage implementation data databases, summarize implementation data, and provide feedback to project teams.

4. Continuous Improvement (CI) & Feedback Strategy – The program has adopted the Continuous Improvement Management (CIM) Process Model developed by the U.S. Department of Education for the 21st Century Community Learning Centers Program. This model will be used by the Management Team, project staff and Evaluators to ensure feedback and continuous improvement in the operation of the project. This CIM Process Model includes all the steps and specific functions necessary to achieve a continuous improvement process throughout the grant period. The CI major functions have been included in the Work Plan to ensure they are implemented as intended. ESD105 has used this CI model with other USDE grants with much success. This model will be implemented by reviewing milestones and project performance, administering role models and student surveys, personal interviews, focus groups, and data collection/ monitoring. This information will be compiled, analyzed by the Evaluators, and used by the Management Team and Evaluators to review results and make improvements to the effectiveness of the program. The project will use the CIM Process Model to ensure that feedback mechanisms are implemented into a systematic process which results in a continuous improvement to strengthen the program design. The ongoing implementation of this CIM self-evaluation process by the Project Director and Evaluators will ensure the most



Source (U.S. Department of Education, 21st Century Learning Centers – 2010)

effective and efficient program is operated. These activities are also imbedded in the logic model.

5. Dissemination of Results - ESD 105 has an established infrastructure for delivering training, curricula, materials, technical assistance and direct services in all school districts in ESD 105's service area. Findings will be disseminated at all the ESD 105 service area and presented at national research-, practice-, and policy-focused conferences. Some of these include the American Educational Research Association (AERA), National Rural Education Association (NREA), National Council for Community and Education Partnerships (NCCEP) GEAR UP, National Association of State Directors of Migrant Education (NASDME), and the Association of Educational Service Agencies (AESA).

An online portal dedicated to the project and its results will provide open source materials to interested practitioners, policymakers, and researchers. The project will develop a toolkit, portal, policies, implementation training videos, demonstrations and research evidence supporting its effectiveness to assisting disseminating the program. Key findings and strategies for implementation and replication will also be disseminated at the local and state level such as the Association of Educational Service Districts (AESD), a consortium of all nine educational service districts in the State of Washington and Washington STEM Network, an independent nonprofit comprised of connected and well-respected business and public STEM experts that identify and foster innovative STEM programs and partnerships. Additionally, these evaluation findings will be shared with other selected grantees to replicate effective programs appropriate for their unique populations. Our research findings will also be published in several scholarly journals including the American Journal of Education, Youth and Society and the Journal of Mentoring and Tutoring.

Our dissemination goal is to reach the largest amount of schools and service providers that serve farmworker students in the US.

All references found in Appendix K.

C. Quality of the Project Evaluation

The Virtual STEM Role Model Connection (RM) evaluation is guided by a set of overarching research questions to understand whether the STEM/CS Role Models are influencing attitudes about pursuing a career in STEM/CS fields for farmworker students. Furthermore, the evaluation is based on stated objectives and outcomes of the Virtual STEM Role Model to study the effects of using a Role Model system to examine their impact on pursuing computer science or STEM careers and whether FW students increase their academic achievement in math and science.

1. Meeting WWC Standards & 2. Mediators, Outcomes and Measurable Thresholds - In addition to exploring student outcomes as stated in the Program Design section, this evaluation will conduct a mixed method evaluation approach to holistically understand the broader impact. It's been well documented that student performance and access to curricular experiences are linked to student achievement, engagement, and science outcomes. Developing occupational aspirations in STECM/CS by 8th grade is crucial, as students begin to identify a college degree as a requirement to meet their future career plans (Cabrera & La Nasa, 2000). Previous research highlights the importance of students' early aspirations, college-going identity, knowledge, and academic planning and preparation (Huerta et al, 2018; Welton & Martinez, 2014). Identifying possible careers early on allows students to begin to plan and prepare to earn the necessary college credentials in order to pursue that career (Akos et al, 2007; Trusty & Nyles, 2004).

Given the above, the following evaluation questions will guide this study:

1. Do farmworker students participating in 6-8 grades Virtual STEM Role Model Connection lead to increased performance in math & science compared to their non-participant comparison peers?
2. Do farmworker students participating in 9-11 grades Virtual STEM Role Model Connection lead to greater improved scores on statewide test assessments in math and science compared to their non-participant comparison peers?
3. For participating school districts, are there student differences between schools?
4. Do farmworker students have increased non-cognitive growth (e.g., science identity, social emotional) and behaviors compared to their non-participants comparison peers?
5. What impact do role models have on developing and maintaining aspirations for STEM/CS careers?

Under the mixed-method evaluation approach, the dominant design is a randomized control trial for two cohorts of 6th and 9th grade students and is based upon three distinct quantitative data including: district student-level longitudinal data, 2) surveys among student participants, and 3) surveys from role models. The qualitative component of this mixed methods evaluation will capture the student experience using virtual focus groups and interviews.

Randomized control trials - To answer research questions one, two, and three. A total of 231 farm worker students out of 2,499 will be eligible to receive the intervention from 6 school districts. We intend to use equal numbers of students in the intervention and comparison conditions. That is, only 231 students will be randomly selected to the intervention based on a set of criteria (e.g., a student is identified as a farmworker and must be enrolled as a 6th or 9th grade student at participating schools) and 231 students will be randomly assigned to the comparison group. The 462 students selected for the study will have the power to detect a large effect (0.50) with the probability level to accept an effect as being statistically significant is a standard alpha-level of 0.05 using a two-tailed test. The power level of 0.95 was set, thus providing a 95 percent probability of detecting an effect. In accordance with What Works Clearinghouse Design, all intervention and comparison students will be identified before the intervention begins and will be measured according to the student outcomes and possible mediators. The overall and differential attrition for the groups is set to be at optimistic and with cautious assumptions due to 10% student withdrawal rate by grade, resulting in 210 students in each group. This study will use complete case analysis when possible, but will consider imputation data techniques such as regression imputation or maximum likelihood approaches when there is missing outcome data that needs to be addressed.

To control for mediating factors and be able to isolate the intervention impact, Hierarchical Linear Modeling (HLM) procedures will be conducted to assess the relationship between Virtual

STEM Role Model Connection on various student outcomes. HLM is an appropriate procedure because it accounts for the nested nature of district data (e.g., students will attend different classrooms, schools, and districts) and allows the study to explicitly examine the effects of on student outcomes. With this technique, regression covariate and statistical adjustments will be considered for each outcome.

Students will be tracked longitudinally for the life of the grant. RGI has data sharing agreements with participating school districts to have access to all intervention and comparison student information, including student demographics (e.g., Race, gender, Free-reduced lunch, attendance, state administered standardized exams, and advanced courses taking, GPAs, etc.)

To answer research question four and five. Annual pre-post surveys will be administered to all eligible students and participating role models to understand gain scores. In the student survey, the goal is to understand student perceptions, non-cognitive skills and behaviors. Sample survey items will include science identity development as measured by recognition (e.g., others see them as a computer science person, I see myself as a computer science person) and competence (e.g., students are confident they can do an excellent job in science tests and assignments), and if students are pursuing computer science careers. The role model survey seeks to understand the frequency and quality of their interactions with participating students. This will include role model beliefs about their own capacity and effectiveness to be a role model. Furthermore, role models will be asked if they noticed science aspirations changes from student participants. All data will be linked to the student to understand possible mediators and complement the qualitative case study design component.

Qualitative Case Study Design - The qualitative component of this project will consist of a comparative case study design that will assess the impact of the intervention at each of the participating districts (Merriam, 2009; Yin, 2014). Qualitative data that will be collected will include focus groups and individual interviews with program participants. Focus groups allow

researchers to develop a shared understanding of the experiences of a particular group of people or students (Merriam & Tisdell, 2016). Individual interviews allow for the researcher to gain in-depth knowledge about individuals and their perceptions about pursuing a career in a STEM/CS field.

From the total sample of participants, purposeful sampling will be used to identify students for the qualitative component. Using survey data and other student information, 12-15 participants will be selected from each school site to participate in focus groups and individual interviews. Using state assessment scores in math and science, participants will be divided into three ability groups: above proficiency, proficient and below proficiency. Identifying participants in this manner will ensure that the entire eligible farmworker population will be represented in the sample to maximize the effectiveness of the intervention. At each school, 4-5 participants will be identified from each ability groups, that is, 4-5 students above proficiency, 4-5 students at proficiency, and 4-5 students below state proficiency levels for math and science.

Once students have been identified, participants will be invited to take part of a pre-intervention focus group in order to understand student experience and their views about pursuing a career in STEM/CS. Each site will conduct two to three focus groups to ensure that all participants have an opportunity to share their opinion. These initial focus groups will allow the researchers to identify potential challenges that participants may encounter, future career interests and post-secondary aspirations. For the 9th grade cohort, participants will also discuss course enrollments during 9th grade and any previous experiences in math and science courses.

Once the intervention begins, the selected students will be interviewed individually at the end of each semester for a total of 36-45 interviews per grade level per semester. With longitudinal interviews, two things are significant, ensuring that the time between interviews allows for enough change to occur and frequent enough to prevent attrition as longer time periods may increase the probability of losing participants (Hermanowicz, 2013; McCoy, 2017). The purpose of the interviews will be to follow up with students on the impact that their role model is having and

explore any changes in attitude around careers in STEM/CS. These interviews will also allow the researchers to understand challenges that may exist with the math and science curriculum.

Focus groups will be conducted at the beginning of each academic year and will help assess the experience and satisfaction of students in the Virtual STEM Role Model Connection and identify ways to improve the program. In addition to participant interviews, Role Models will also be interviewed on an annual basis. Role Model interviews will allow the research team to triangulate data with student interviews and identify any challenges that may emerge within the program. These interviews can also help the research team identity additional changes that can be beneficial to participating students.

3. Providing Valid & Reliable Data -Together, the randomized control trials, annual student surveys, role model surveys, and student interviews will provide robust sources of information to answer the five research questions. The approach described above provides a high-quality statistical approach using randomized control trial procedures and HLM techniques to understand intervention impact. Additional survey and qualitative data will be collected to provide a formative and summative holistic picture of the intervention to track short, medium, and long-term impacts within the 5 years of the program. RGI plans to utilize the findings to identify the successful approaches that may be disseminated in academic journals, research reports, and sharing back to the participating districts to inform effective practices and approaches for raising STEM outcomes for their farmworker students.

In addition to the study, the project will simultaneously conduct the program evaluation to measure progress and achievement of project specific outcomes and GPRA measures for completing the USDE EIR Annual Performance Report. The complete table indicating all the types of data to be collected, how often, instruments used and how data will be analyzed for the project is included as the Program Evaluation Plan in Appendix I. All references found in Appendix K.