Open Educational Resources Project Grant

2019-2020 Final Report

GRANT AWARDS

Conceptual Physics Course Development	Oak Harbor Public Schools
Dual Language Immersion Social Studies OER Project	Seattle Public Schools
Elementary Science Units	Sumner-Bonney Lake School District
Regional STEM Instructional Materials Collaborative	Educational Service District 112
Abstract of grant efforts	

DIRECTLY IMPACTED STUDENTS AND TEACHERS

	Teachers Impacted	Students Impacted
Conceptual Physics Course Development	6	150
Dual Language Immersion Social Studies OER Project	14	250
Elementary Science Units	8	225
Regional STEM Instructional Materials Collaborative	407	20522
TOTALS	**435**	**21147**

POPULATIONS IMPACTED

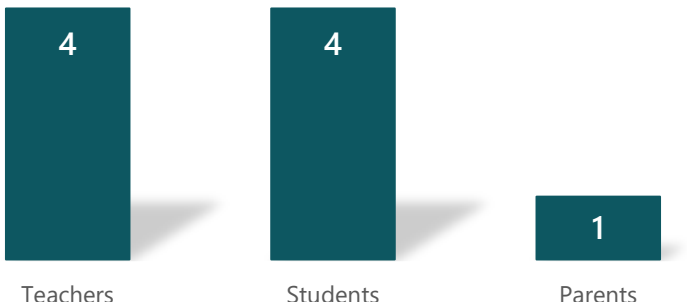

Figure 1: Number of grant projects serving each population of stakeholders.

SYSTEMS TO MAKE SURE LEARNING STANDARDS WERE MET

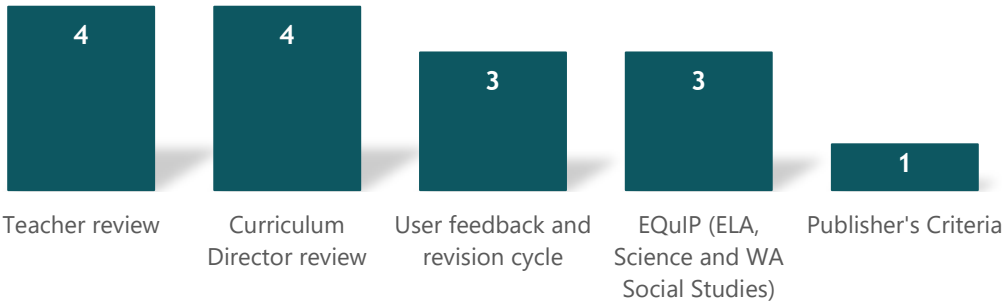

Figure 2: Number of grant projects using each system of review.

STUDENT OUTCOMES: How was efficacy measured?

Conceptual Physics Course Development

The resources comprised a two-trimester Conceptual Physics course that had not previously existed at the school. Efficacy was measured in three ways:

- the number of students who elected to enroll in the course
- student engagement levels with the curriculum
- student performance for each of the two trimesters.

Informally, efficacy was also monitored in terms of students' attitudes and feelings about individual lessons and the course overall. In its first year, more than 150 students chose to enroll in the course. This number was higher than expected, given that the course is an elective and the topic of physics carries some stigma for many students and parents. Engagement levels were very high in the first year, with less than 5% of assignments not completed. The percent of each assignment completed was also higher than anticipated, as was students' willingness to go back and complete missing assignments.

Student performance was also far above average for an elective science course at the school. Approximately 95% of students received passing grades for both semesters, in contrast with a usual range of 65%-80% for all other elective science classes. While no formal survey has yet been conducted to measure student attitudes about the class, teachers regularly observed student behavior and conversations that indicated excitement, enthusiasm, confidence and pride in work. Students frequently commented on how much they enjoyed the activities and projects.

Dual Language Immersion Social Studies OER Project

There were no specific student outcome measurements tied to these resources other than use, implementation and formative assessments that teachers created. The focus this year was on completing the translation and adaption work of OER Social Studies resources into partner languages for our DLI programs (in Mandarin and Spanish). So, the learning outcomes for the program using these resources were both the Social Studies standards and practices for 7th and 8th grade and language outcomes for students at the Intermediate Level of language proficiency in Mandarin or Spanish.

A plan for future work would be to develop aligned projects and common assessments that could be used across these courses and the dual language program to demonstrate student outcomes tied to grade level standards and efficacy of translated materials.

The teachers measured formatively whether the resources helped the students achieve the Social Studies learning targets. For language, we used the STAMP (Standards-based Measurement of Proficiency) to see if students were reaching our language proficiency targets for end of 8th grade (Intermediate Low - Intermediate Mid). Overall, students did meet those language targets.

Elementary Science Units

During the 2019 - 2020 school year approximately 225 students were used to access the efficacy of lessons and the if the outcomes desired. Next year, after the feedback and revision cycles all 4th grade teachers will be teaching the revised unit impacting approximately 980 students.

Student outcomes using this Open Resource were measured using the NGSS and integration of ELA CCSS. The NGSS being measured are outlined in the unit overview and in each lesson's learning purpose and learning targets. Opportunities for student efficacy is present throughout the unit due to the variety of activities, utilization of student talk moves, scaffolded models with student lead/designed checklist, sentence starters and continual student feedback. In the unit you will see several student examples. Such as; students' models, graphic organizers, and written summaries. (COVID 19 caused the schools to close before the unit was complete in most classes) Included in the unit to measure student outcomes include hands-on student investigations, simulations, grade level text with graphic organizers including Avid strategies, and videos.

Regional STEM Instructional Materials Collaborative

This year, due to COVID-19 closures, our regular method for measuring student outcomes has been disrupted. School closures have caused an interruption in STEM education due to an emphasis on basic education and a focus on ELA and Math instruction. Therefore, this year, we are measuring student outcomes by looking at the number of students who had access to meaningful STEM experiences during COVID-19 school closures in addition to the number of students who were able to experience instruction based on our STEM storylines prior to school closures.

Efficacy is being measured by looking at the number of students being given access to the STEM materials we have produced through

1) number teachers implementing STEM mini-projects due to professional development and access to STEM mini-projects and adapted versions of STEM Storylines,
2) number of students who were directly sent a STEM@Home mini-kit along with an activity guide, and
3) number of students who received instruction based on STEM Storylines prior to school closures.

We are in the process of collecting qualitative data regarding the student/family response of our instructional materials and hope to have some of this data by Summer which will allow us to make changes for any development in the fall.

TEACHER OUTCOMES: How was efficacy measured?

Conceptual Physics Course Development

Teacher outcomes were measured based on the successful implementation of the curriculum as developed and overall teacher workload and satisfaction with the course.

Each unit and lesson were initially implemented per the scope and sequence established during development. A journal of notes was kept by each teacher, recording all required modifications/revisions. The materials, lesson plans and unit plans were edited as errors, issues and shortcomings were encountered, in real-time when possible, and after implementation when not.

Overall, very few major problems arose during the first year of implementation. Some lessons had to be omitted due to underestimation of the length of time students required to complete activities. Some project parameters were adjusted to better align with student skills and limitations. An expected amount of text editing was conducted as students found small errors in the materials. Otherwise, the teachers were able to implement most all of the curriculum with fidelity to the original planned scope and sequence.

Teachers thoroughly enjoyed teaching the course and regularly noted the high level of student engagement and success of the hands-on nature of the course at maintaining student interest and empowering student understanding of complex physics concepts.

Dual Language Immersion Social Studies OER Project

One outcome connected to teachers was developing an integrated scope and sequence in both Mandarin and Spanish showing where these materials were being used within the grade level social studies curriculum and how specific lessons using these open resources provided opportunities for students to demonstrate standards and skills in social studies and the target language.

A future goal is to translate more OER resources and integrate them into curriculum in the same ways. It will make it clearer to measure efficacy if any and all open resources are connected to standards and skills and the teachers have identified that in advance of instruction.

Elementary Science Units

During the 2019-2020 school year 8 teachers participated in piloting this unit. During the 2020 -21 school year approximately 35 - 4th grade classroom teachers will be using this unit after debriefing meetings with the 8 pilot teachers and revisions were made.

Teacher outcomes using/adapting and developing the open resource was open to all the piloting teachers. Efficacy was measured by several measures; all 3rd - 5th teachers were trained in the Ambitious Science Teaching Framework in the Fall, August 2019 for 2 full days, by 2 University of Washington facilitators. Teachers were also given the opportunity to participate in Ambitious Science Teaching Book Study. Many participated. We will continue to adapt and access the effectiveness and efficacy of this unit during the 2020-21 year through reflective and debrief meeting.

Regional STEM Instructional Materials Collaborative

There were several ways that teachers were supported with STEM materials and training as a result of our grant work this year.

For the first two trimesters in the year, our STEM Storylines from the 2018-2019 school year were implemented. Several opportunities for professional development were provided to teachers in the fall of 2019 to aid in seamless implementation of STEM storylines in grades 1-2.

In response to school closures, a STEM mini-project map (template) was created along with sample projects in grades K-5. STEM mini-project webinars were hosted by the Integrated Curriculum Coordinator with support from the Regional Science Coordinator (Pranjali Upadhyay and Stacy Meyer) to provide support for teachers who are producing materials to be used by students and families. A total of 240 teachers were trained during these webinars and ready to implement materials with their students during COVID-19 instruction. During the webinars, teachers were also trained to use the STEM Mini-Project Map to develop their own STEM mini-projects that allow for a continuation of STEM learning while leveraging the experiences that students are having at home due to school closures. Many teachers have expressed their excitement in using the Project Map to create a STEM experience that is anchored around a household phenomenon.

Teachers have been asked to share these resources with our team so they can be made available on our OER hub. In addition to the new resources we have developed due to school closures, teachers are being supported in turning STEM storylines into STEM mini projects which can be implemented in the home space. We have also continued development on three new STEM storylines for 5th grade (2) and Kindergarten (1) which will be published by the end of June 2020 and will be accompanied with training materials on implementation during a blended instruction model as schools partially reopen in Fall 2020.

BENEFITS

Conceptual Physics Course Development

By far the largest benefit was the ability to collaborate with colleagues to develop a custom physics curriculum from scratch that was both closely aligned to the Next Generation Science Standards (NGSS), and highly engaging to the average high school student. No such commercially available curriculum existed at the time of development, nor do any known examples exist to date.

Through the development process, teachers built deep and extensive understanding of the concepts embodied by the NGSS and how to teach in truly three-dimensional ways, in line with the core principles of the NGSS. As a result, students experienced truly three-dimensional learning of the concepts.

Dual Language Immersion Social Studies OER Project

This was an incredible opportunity for dual language teachers to collaborate around common instructional materials and identify resources to be used in Chinese, Spanish and Japanese dual language classroom to support grade level standards in social studies.

It also provided an opportunity for us as a team to align curriculum and open resources to grade level standards and language proficiency standards. Teachers benefited from receiving professional

development and collaboration time. This year we were also able to invite the Japanese dual language team into our work and collaboration. They slowly began to work on resources also and are hopeful they will have future opportunities to do more with open educational resources, especially as the Japanese dual language program adds social studies at the high school level and there is a focus on Northwest history from Japanese American perspectives and resources.

Another huge benefit was to use this project to reach out to other districts who have similar dual language social studies needs at the middle school level and begin to create opportunities for shared resources across districts and the state. Two examples of this are with Burlington-Edison School District and the Highline School District. We were excited to lead the work and create resources that we know other districts need and are looking for.

Elementary Science Units

There were many benefits of this project:

- Working with colleagues to teach lessons, debrief and reflect on student learning, using student samples (these were used to calibrating, adjusting time, creating student talk moves, and/or making changes to the lesson and then re-teaching the lesson in another class.
- Going into classes and teaching lessons within the unit allowed teachers with less confidence in teaching science, to see lessons in action
- Going into classrooms also allowed for in-the moment adjustments with the lessons - modeling the importance of integrating content areas, science, reading, writing, engineering
- Working with pilot teachers to deepen their pedagogy on how the NGSS are written, the overlap between DCI and the importance of using the SEP's in other content areas
- Cross-building idea sharing and debriefing of how they tweaked or ideas they add to lessons

Regional STEM Instructional Materials Collaborative

By June 2020, we will have produced four STEM mini-projects designed to support teachers with remote learning, four STEM@Home projects designed to facilitate STEM experiences directly for students in the home environment, and three STEM storylines intended to further our progress on creating a full scope of phenomenon-based STEM curricula to support our science kits.

Although the second half of this year presented some serious challenges (as explained in the next response), our materials provided some meaningful support that was needed in order to continue STEM learning during this school year. The added commitment to provide professional development (throughout the year) definitely fulfilled a need and increased the effectiveness of our materials by boosting teachers' excitement and comfort with implementing these materials.

In addition, our focus on producing materials that facilitate integrated learning across disciplines and provide ample opportunities for teachers to overlap ELA, Mathematics, and STEM learning have made them more effective and well received than the plethora of other STEM resources that teachers have free access to.

Our focus on producing materials that are specifically relevant to the students in our region and our emphasis on leveraging on the strengths of students' home lives have been an element that have helped our message resonate strongly with the teachers we are working with. Our dedication to fulfilling the needs of our region and continuing to meet teachers where they are at has forced us to

pivot numerous times through the second half of the year, causing us to meander from our original plan. ESD 112 looks forward to supporting teachers, students, and families in continuing STEM learning the school year wraps to a close and as we all gear up to restart the 2020-2021 school year in an unprecedented manner.

CHALLENGES

Conceptual Physics Course Development

The major challenges included all the usual obstacles present when developing instructional materials from scratch.

Without an externally provided road map or game plan, the development team was left to devise a path forward on their own. Drawing from the many valuable lessons learned during the previous development of the Conceptual Chemistry course, the team was able to quickly layout a plan and templates for the major structure of the course. From there, the challenges were in developing quality story lines to guide the flow and content of each unit. The final challenge was to find or develop high quality lessons that simultaneously adhered to the story lines as well as addressing all three dimensions of the NGSS Performance Expectations.

Sometimes, searches would result in discovery of OER resources that met these criteria beautifully. Other times, the searches revealed that no such sources existed and so the team would have to develop the resources themselves, which proved very time consuming, but also highly successful.

Dual Language Immersion Social Studies OER Project

A few challenges we encountered were the following:

1) I was new to this position and this grant to learning exactly what had been done, who did it, reinforcing the vision and mission with the team and meeting our goals. Barbra Soots and Michele Aoki were huge resources.
2) Finding time for teachers to translate. Since it is a thorough process the work can get delayed if all team members are not onboard with the same timeline. We worked through this by having language team check-ins scheduled once a month and also making time to work through team dynamics when we met for professional development. Also, by establishing a clear timeline as a team and being open to adjusting it but also trying to stick to it.
3) Ensuring implementation of materials. I would like to increase ways for teachers to share how they are using the materials. A few suggestions for this might be to build this into future professional development and meetings, partner with OSPI to visit and create videos and interviews and create guiding documents that show when the resources are being used throughout the course.

Elementary Science Units

Some of the challenges were:

- Difficulty for teachers to find time in their master schedules to teach science
- It was a challenge to get in-real time reflection from pilot teachers due to their busy schedules
- NGSS and the art of teaching 3 dimensionally is newer for most teachers
- Teachers are learning to navigate the Ambitious Science Teaching Framework, which the unit is written in

Regional STEM Instructional Materials Collaborative

School closures created a situation that completely derailed our previous plans for development of OER materials in this grant cycle. Needs being expressed by teachers, schools, and districts were overwhelmingly focused on producing materials that could aid teachers in remote instruction. This resulted in our project budding into a few sub-projects that each addressed a specific need.

The STEM mini projects addressed the regional need for high quality instructional materials that could help teachers to continue STEM learning remotely. The focus of the materials and the webinars was for us to create.

The STEM@home project aimed to create student and family facing materials (that were delivered to schools along with some basic consumable items) that could support meaningful STEM while taking pressure of teachers and districts to produce these resources. The flow of our regular development of units was interrupted due to teachers' inability to collaborate with the Integrated Curriculum Coordinator (Pranjali Upadhyay) due to overwhelming schedules.

As a result of this difficulty in collaboration in addition to the prioritization of staff time on immediate student-facing materials, we will only be producing 3 new STEM storylines for grades 5 and K in addition to the mini-projects that came about as a result of emerging needs.

ADDITIONAL COMMENTS

Conceptual Physics Course Development

The development of the Conceptual Physics course was a great success on all counts. The curriculum was implemented successfully, with a high degree of enthusiasm and engagement for both students and teachers. Almost no major changes had to be made to the curriculum upon implementation. The OER nature of the development proved liberating, rather than restricting, and the final product is one that should prove easily adoptable for any high school that wishes to add a physics option for the general student population. Future work will be required to development high quality assessments that closely align to the Washington Comprehensive Assessment of Science.

Dual Language Immersion Social Studies OER Project

I am very thankful to have inherited this grant and the support of Barbara Soots and the SPS OER team on this project. I was excited to see the work come along this year and look forward to increasing its use and efficacy in coming years throughout our program.

I will be applying for another year of the grant and believe we can do much more work with OER resources that we from the University of Washington, as well as identify new resources that we can use in alignment with grade level standards in social studies for Spanish, Chinese and Japanese. I also think across SPS and other districts we will be able to share openly about these resources and their effectiveness and meaningfulness with English language learners that are in need of materials in their native language. Lastly, I am hopeful with another year of the grant I can extend connections and increase use of already created materials by other districts, as well as potentially identify new resources.

Elementary Science Units

I would like to thank the OER Grant Foundation for giving Sumner-Bonney Lake School District the opportunity to participate in this program. We are looking forward to hearing from other colleagues around the state to continue to grow this unit and support students deepen understanding of the world around them.

Regional STEM Instructional Materials Collaborative

Thank you so much for the opportunity to participate in the project for another year. We are so grateful for the support and for the encouragement. Our anticipated deliverables have changed due to interruption of instruction this school year and due to a need for different materials intended for remote learning that takes place in the home environment. We hope to continue to create high-quality STEM materials that can be used during the next school year by teachers and families.

FOR MORE INFORMATION

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