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UW SCIENCE INITIATIVE

STRATEGIC PLAN UPDATE

SPRING 2023

EXTENDED
VERSION

GOAL 1

Catalyze Active, Inclusive, Evidence-based Teaching Statewide

LAMP continues to train college educators across Wyoming in active, inclusive pedagogies. At UW alone, more than 26,000 students have now benefitted from these evidence-based practices that are known to enhance student success. This year, LAMP welcomes a new class of 40 college teachers from NWC, EWC, Casper College, LCCC, CWC and from 18 UW departments. Educators in this yearlong LAMP class will redesign their courses to incorporate student-centered active learning practices with an emphasis on problem-based learning. In order to support professors in their active learning classrooms, LAMP trains an ever-increasing number of Learning Assistants (LAs) – UW students who assist instructors in facilitating active learning. This year, LAMP Director Rachel Watson has reflected deeply on the synergies that are possible when the development of both LAMP professors and LAMP LAs is unified and coordinated:

“When I reflect on the 2022-2023 academic year, I realize that one of the things that I have valued most is the opportunity to really nurture the Best Practices in Active Learning (EDSE 4900/5900) course and the holistic development of the Learning Assistants (LAs). At first when Michelle Mason was the LAMP graduate assistant, she served as the lead instructor. However, I was able to take over as lead during COVID. In 2022, when we shifted to in-person and in the active learning classroom, a real community started to form. The LAs became a force of nature and began more deeply influencing their instructors. During the Fall of 2022, for the first time ever, more than half of the LAs chose to do original SoTL projects. LAs have the choice to either write something that augments the active learning spectrum, or to assist with or do their own SoTL. We began to see the immense power of students as partners in SoTL – the LAs felt like they were driving the SoTL and taking ownership of student success.”

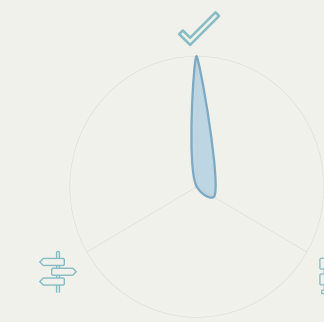
Trail Conditions:

Making progress - Because of the HHMI grant we have been able to surpass goals for community-building at community colleges, establishing an ELC at NWC and in the near future establishing an additional one at another community college; LAMP fellows have been sharing their teaching strategies and outcomes in a variety of spaces at UW and nationwide; we have submitted SoTL research related to LAMP for publication; and we have a core of LAMP fellows that are using the LA program to its full effect

Barriers to progress - The loss of funding for a full GA has limited our ability to do course observations for LAMP fellows and SoTL research, current funding for LAs limits the ability for all LAMP-trained instructors to use the program to its full extent in courses, LAMP fellow cohort sizes have increased due to changing the program to every other year - this can make relationship-building between director and participants more challenging

New opportunities and directions - Because of HHMI funding Wyoming community college ELCs are focused specifically on inclusive excellence, due to available resources we are finding new ways to assess changes in LAMP fellows' curriculum implementation and their social networks

Newly hired STEM teaching faculty (at UW and all 7 community colleges) and incoming teaching graduate students will be trained in active, inclusive, evidence-based pedagogies by the LAMP yearlong Fellows program.



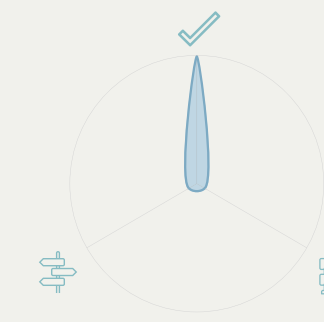
Making progress

- Because of the HHMI grant, we have surpassed many of the metrics related to this goal and have been able to get to know all STEM faculty at community colleges.
- We have collaborated with the ECTL to talk at graduate student and new faculty orientations.

Barriers to progress

- We have not emailed all STEM faculty and graduate students as it is difficult to get all contact information, and we already are getting many more applicants to LAMP than we can admit.

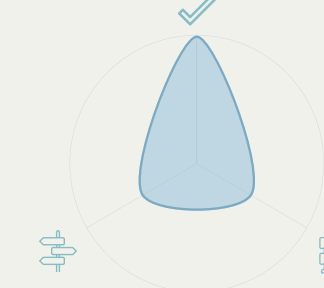
All LAMP-trained fellows will develop an informed written or multimodal teaching philosophy.



Making progress

- In the past, fellows were not required to provide a teaching philosophy, but many times Rachel has received this multiple years after fellows completed the program. This will now be a required part of the program.

LAMP-trained fellows will design and implement evidence-based curriculum that aligns with their teaching philosophy and incorporates one or more active, inclusive learning modality. They will assess how this curriculum allows achievement of clear, measurable learning outcomes.



Making progress

- We already assess instructional strategy mastery of outcomes.

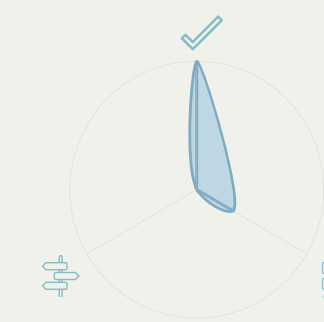
Barriers to progress

- We have lost funding for a full GA to support assessment of this through course observation (a donor has provided funding for a half GA, however).

New opportunities and directions

- We can pivot and assess this outcome by evaluating changes from the fellows' proposal to their final poster presentation after training is complete.

LAMP-trained fellows will share their process of instructional design, active, inclusive learning experience, and student learning assessment (facilitated by LAMP) with other practitioners both within and outside of the Science Initiative.



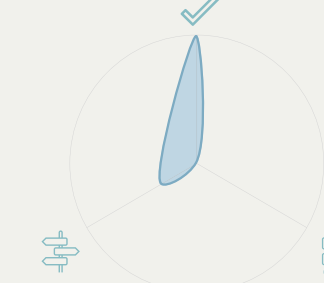
Making progress

- Many educators are presenting in LAMP's Coffee and Curriculum training series. Select educators have presented at the UW ECTL and nationally.

Barriers to progress

- Tracking this can be difficult because of the range of settings involved, and because education-related conference proceedings usually don't come up in internet searches.

In collaboration with the Howard Hughes Medical Institute (HHMI) Inclusive Excellence team, LAMP will expand the Educator Learning (ELC) (Leaving the Light On) to Wyoming community colleges.



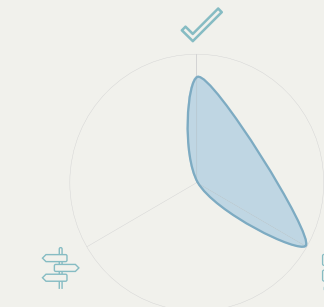
Making progress

- We have launched the pilot learning community at NWC and will be launching a second community during year 1 of Phase II of the grant.

New opportunities and directions

- There is a slight change to this outcome in that the learning communities are specifically focused on inclusive excellence, so they differ somewhat in overall goals and outcomes compared to the LAMP ELC.

Conduct educational research (that is broader than SoTL), with an emphasis on what is working in active learning classrooms, to investigate relationships between teaching practices and student success, literacy, engagement, and feelings of inclusion.



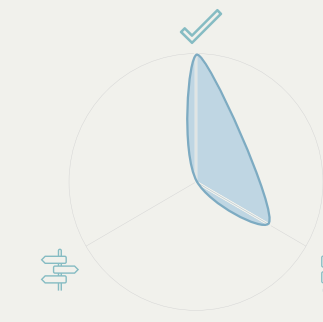
Making progress

- In addition to the ELC's research, research relating to inclusion data from the LAMP active learning survey has been submitted to an educational journal.

Barriers to progress

- Much of this work was supported by a full GA, but with the loss of this funding, we cannot continue at the current rate (although other collaborators help in this effort).

Undergraduate, graduate and post-baccalaureate students will be trained as LAMP Learning Assistants (LAs) through a teaching practicum and a pedagogy course (Best Practices in Active Learning).



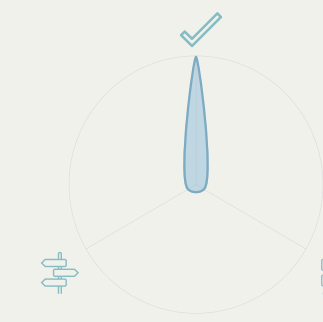
Making progress

- Currently, there is a core of LAMP-trained instructors who utilize the LA program to its highest effect, using 1 LA for every 25 students.

Barriers to progress

- In reference to the above progress, however, we are currently limited in achieving the metric of having 50% of LAMP-trained faculty use LAs because we cannot yet fund enough LAs. We could enable 1 LA per LAMP-trained faculty member, but that would not be implementing to the greatest effect.

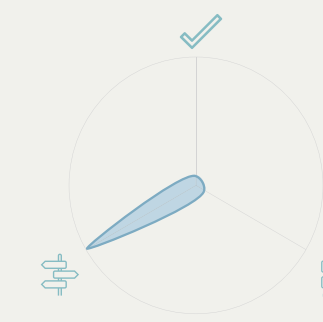
Improve retention and pass rates of all students with particular emphasis on marginalized students in STEM classrooms.



Making progress

- 50% of Chemistry instructors have now been LAMP trained, so we will look at changes in DWF rates in these courses. This may be particularly informative to do for Organic Chemistry.

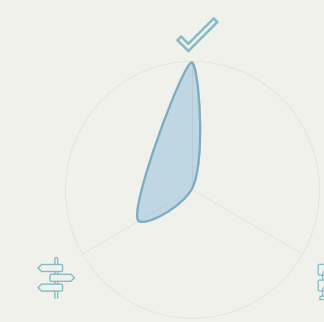
Establish professional development/collaboration opportunities for community college science instructors across the state with the goal of impacting Wyoming learners (K-community) as they transition through educational levels.



New opportunities and directions

- To date, we have accomplished this goal in the context of the annual EON (Education and Outreach Network) Conference and ensuing collaborations between COPSE graduate students (who make this programming possible) and educators that are doing community- and problem-based learning projects. However, this is not a fully funded effort, so COPSE students will be shifting their focus to community college outreach. Therefore, this goal will need to shift (as noted in the goals' stating above).

Visualize and describe the impacts of LAMP training on educators' campus, statewide, national and international social connectedness as well as on their affective feelings of connection through community, their engagement in future learning (educational development) and self-assessment capacity.



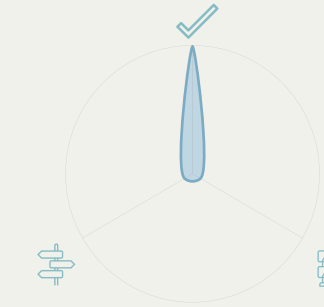
Making progress

- We have used the post-LAMP survey and surveys including ELC members to collect some of this data.

New opportunities and directions

- To collect more of this data, we will use LAMP applications and community college focus groups, as well as possible future interviews.

LAMP will grow revenue by engaging select paying individuals and teams external to the Wyoming college network.



Making progress

- We piloted this with one external member in 2021-22, and hope to ramp this up throughout the coming cohorts.

GOAL 2


Provide Research Opportunities for Undergraduate Students


WRSP is committed to providing mentored research opportunities for UW undergraduate students. Our program helps young researchers develop critical skills and confidence that will bolster them throughout their careers. Research Scholars have come from most counties in Wyoming, and many have returned to their hometowns to talk about the power of hands-on learning. WRSP students and their mentors have also continued to present their research findings in peer-reviewed publications and at professional conferences throughout the world. In addition to the WRSP, in fall 2022, we offered the fourth iteration of the LIFE 1101 Course-based Undergraduate Research Experience (CURE), Introduction to Ecological Research, where students took part in guided ecological research in the Medicine Bow National Forest. WRSP Director Jamie Crait reflected on the past year and how the SI will look to provide high-quality research experiences to many more students in the future:

“The 2022-23 year for WRSP seemed to settle back to a bit more of what “normalcy” felt like pre-pandemic. The fall WRSP seminar culminated in our Third Annual Poster Symposium, a celebration of the high-quality research students are doing under the supervision of their mentors. We also continue to try to construct a robust CURE program to accommodate many more research students. One new challenge to building out CUREs is the loss of FYS courses. The FYS student learning outcomes align well with the spirit of CUREs, so it is unfortunate that we do not have this vehicle to provide early-undergraduate research experiences to more students. I continue to think it would be transformative for all undergraduates to have hands-on research experiences right out of the gate in college – opportunities to try, and fail, and try again, just as happens in the real research world. I am working with faculty who taught FYS course in the past to develop and build out CUREs. Funding for the SCROLL space will be a huge help in seeing CUREs expand at UW, however. I am excited that we will have the capacity to fund more WRSP students in the coming year, and CUREs should provide a good pipeline for these students into WRSP as well.”

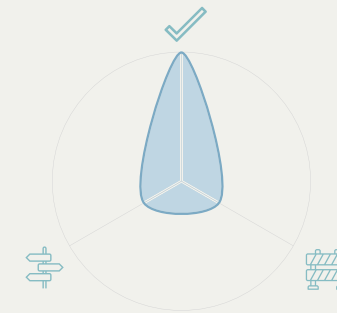
Trail Conditions:

 **Making progress** - With an increase in funding we will be hiring an assistant director to increase capacity for more scholars and CUREs, the easing of COVID restrictions has helped us with interactive programming, this summer we will be offering a CURE that meets at the AMK Ranch and transitions to on-campus, and the Student Collaborative Research, Outreach, and Learning Laboratory (SCROLL) has been funded - this will help immensely with CUREs and building entrepreneurship into our programming

 **Barriers to progress** - We have been seeing fewer applicants to the WRSP (we hope to help this with increased marketing efforts and partnerships), and the loss of FYS courses has made it more difficult to implement CUREs and align them with students’ degree program requirements

 **New opportunities and directions** - We will be capping the number of annual WRSP scholars around 75 (down from our goal of 110) because of mentor capacity and the emerging opportunity for research experiences through CUREs, and we are heading up a grassroots effort with previous FYS instructors to help implement CUREs in different ways

Increase the number of undergraduate students at UW involved in high-quality, productive research experiences by 100% (original SI Task Force Metric #1).



Making progress

- Increased funding will allow us to hire an assistant director (of WRSP and CUREs), increasing capacity for both 1-on-1 faculty mentoring and CUREs.
- We have been able to offer more workshops for student presentation skills.

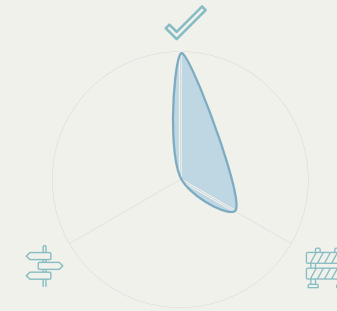
Barriers to progress

- We have seen fewer applicants to the WRSP (which we hope to help with increased marketing and CURE implementation).

New opportunities and directions

- We will be capping the number of annual WRSP scholars around 75 (down from our goal of 110) because of mentor capacity and the emerging opportunity for research experiences through CUREs.

Recruit promising Wyoming high school students and community college transfer students (with special focus on underrepresented students) to UW.



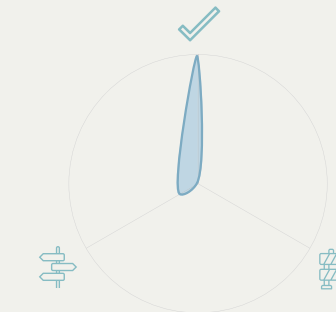
Making progress

- We will have more marketing materials (videos) after the AMK CURE is implemented.

Barriers to progress

- CUREs can be a powerful tool for students and faculty alike to identify which students might thrive in research, especially underrepresented students. With the loss of FYS courses, CURE implementation is more complicated and therefore makes it more difficult for students to make connections with researchers.

Retain current UW students in STEM fields through graduation and beyond.



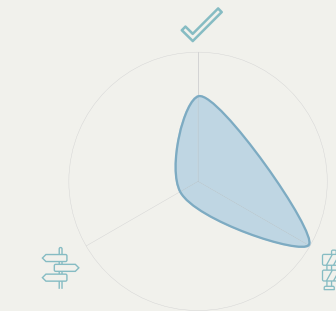
Making progress

- Participation in and programming related to the Wyoming Undergraduate Research Coalition (WURC) RSO has increased post-pandemic, helping nurture student relationship-building and training opportunities.
- The WRSP Symposium 1-credit course provides general research and communication training and student cohort-building.
- The collaborative Speed Mentoring event will be revitalized in fall of 2023.

New opportunities and directions

- We are exploring the implementation of smaller peer groups within WRSP.

Build a robust, multi-semester, Course-based Undergraduate Research Experience (CURE) program by 2026.



Making progress

- As mentioned previously, increased funding will allow us to hire an assistant director who can assist with CURE implementation.
- Increased funding will also allow the hire of a laboratory coordinator for SCROLL, helping with the day to day running of CUREs.
- Hiring an undergraduate and graduate student for a summer to help create the research topic for a CURE helped immensely with CURE implementation this fall.
- We will be implementing a CURE that will be meeting at the AMK Ranch for 1 week before fall semester 2023 and continue through fall 2023.

Barriers to progress

- The loss of FYS courses has made it difficult to implement CUREs within the General Education curriculum.

New opportunities and directions

- We are mounting a grassroots effort with past FYS instructors to envision implementation of CUREs.

GOAL 3

Transform Teaching, Learning, & Wyoming Communities through STEM Engagement

The SI Roadshow continues to bring hands-on active STEM learning to communities across the state of Wyoming. This past academic year, we have reached 2,505 K-12 students, for a total of 8,039 students since 2017. We have collaborated with educators in nearly all Wyoming counties and have been part of numerous K-12 teacher professional development opportunities. SI Roadshow Director Karagh Brummond has spent time reflecting on ways to increase our reach across the state and assess the Roadshow program as a whole:

“This past year was exciting as we hired eight dedicated outreach assistants to help with Roadshow events. Having this many students dedicated to outreach has substantially helped the Roadshow provide enriching events to learners across the state. We have also had the busiest spring semester ever with 14 outreach events covering 12 different K-12 locations and 6 Wyoming counties. We have been challenged by road conditions and travel arrangements with such a busy schedule. We have found new partners through advertising our program in relevant Wyoming science newsletters and then re-connecting with teachers we have collaborated with in the past. The major new problem this creates is making sure we have enough people to perform this many outreach events and guarantee travel that is sustainable for the team and myself. We are working to manage these issues by leveraging new funds to hire a full time staff position to help with the Roadshow. When I first wrote the goals for this section, we were still coming out of the pandemic and travel and getting into schools was difficult. Now, however, I have found that K-12 schools and programs really want us in the classroom doing hands-on, in person activities. Because of this and because of time constraints, we have shifted our focus from increasing online/virtual curriculum back to developing more in-classroom activities. Moving forward, I would also like to think more deeply about the assessment of the program and the K-12 lessons we implement.”

Trail Conditions:



Making progress - Hiring 8 student outreach assistants has built our capacity substantially, we have built relationships with K-12 teacher groups and related professional development conferences, our relationship with WYAA has grown, and we have increased inreach with the STEM Carnival

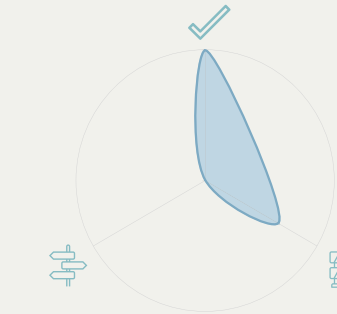


Barriers to progress - A high volume of requests from teachers necessitates continued growth to meet them, funding for community college and K-Community projects has not come through yet, time constraints on outreach assistants have limited their professional development and assessment opportunities (but a plan has been developed to address this with minimal time and funding), our model of aligning curriculum to teachers' goals can complicate faculty involvement (but we can address this in creative ways)



New opportunities and directions - The demand from schools for online resources has diminished so we are shifting our digital focus to new opportunities, we have created a new student partnership model for professional development and assessment for the outreach assistant program, and we will leverage the SI Executive Director's role as a Presidential Fellow for K-Community projects

The SI Roadshow will improve community access to STEM education by facilitating outreach and in-reach opportunities for faculty and students at UW to communicate and share their research across the state.



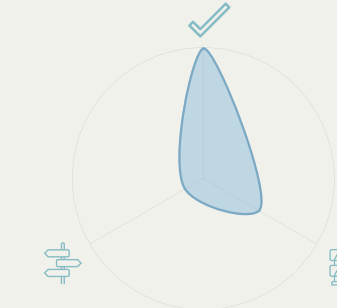
Making progress

- We have hired 8 new outreach assistants (OAs).
- Demand and capacity have increased the number of outreach events.
- We have provided development to K-12 teachers through the WDE Innovations in Learning Conference, WDE Next Level Summit, Wyoming School-University Partnership, Wyoming Science Fair teacher workshop, and WDE Curriculum Directors meeting.

Barriers to progress

- We need to expand our reach with academic departments on campus to integrate our programming in broader impacts in grants across departments.
- A NASA grant proposal to create a STEM Community Fellows program was rejected. The grant was written by NASA Space Grant, the SI, the Cooperative Fish and Wildlife Research Unit, WYAA, and other collaborators from other states.

Continue to develop K-12 classroom partnerships while expanding engagement opportunities to include afterschool programming.



Making progress

- The Roadshow has facilitated 4 WYAA-related outreach events.
- We have expanded our geographic reach to include more WY counties.

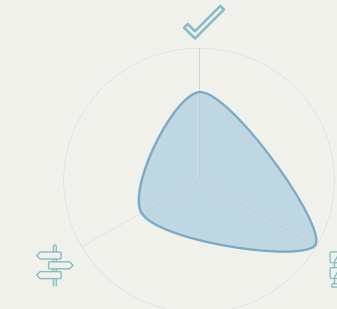
Barriers to progress

- We have not made movement on inclusion of STEM faculty at community colleges, but now that we have set a solid foundation on getting to K-12 schools, we can look at more creative ways to engage these faculty.

New opportunities and directions

- We have begun conversations with WYAA to engage and support their programming to train UW's pre-sevice teachers in running WYAA-related summer outreach events.

The SI Roadshow will create collaborative opportunities for undergraduate and graduate students at UW to develop engagement activities that promote best practices.



Making progress

- OAs have developed their own outreach curriculum that uses best practices.

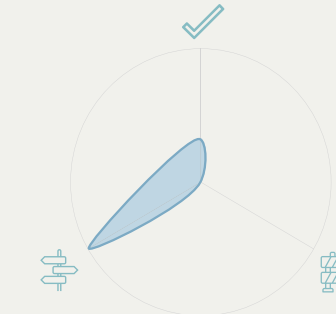
Barriers to progress

- Because of the volume of outreach visits, time for professional development and training for OAs is limited.

New opportunities and directions

- We have developed a new student partnership model for professional development and assessment of the OA program, and will leverage this to provide training related to curriculum development and assessment for OAs.

The SI Roadshow will build and improve our digital outreach and in-reach materials for K-community entities in Wyoming.



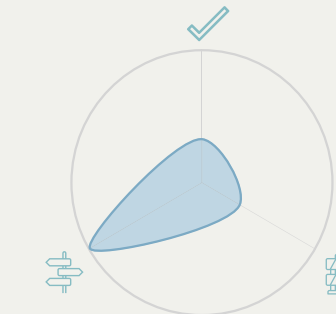
Making progress

- We have collaborated with the Malcolm Wallop K-12 Curriculum Project to create 4 videos for its library.

New opportunities and directions

- This year, we have not hosted any virtual in-reach events as most teachers and afterschool programs ask for in-person activities. We will continue to collaborate with the Malcolm Wallop program and look to develop online virtual lab tours and spotlight videos for engagement.

Establish programmatic assessment procedures to evaluate and measure the effectiveness of outreach and in-reach events.



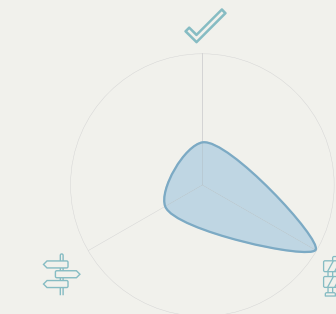
Barriers to progress

- As mentioned previously, high demand along with shortage of time have impeded our ability to provide training on assessment for OAs.

New opportunities and directions

- With the development of a student partnership model for professional development and assessment of the OA program, we will be providing training embedded in the program for both self-assessment and assessment of K-12 student learning.

Improve knowledge about the real-world and applied connections among STEM education, basic research, and Wyoming communities for students, teachers, faculty, and community members to foster creative collaborations with one another to better Wyoming.



Making progress

- We align our outreach to WY-relevant issues when poignant and have taken initiative to integrate UW student research into curriculum.

Barriers to progress

- Funding for large-scale K-Community projects has not come through yet. These partnerships can also take years to develop organically.

New opportunities and directions

- We may be able to leverage the work of the SI's Executive Director as a Presidential Fellow to help create community-based projects.

GOAL 4

Foster New & Unique Collaborations to Sustain Synergistic Impacts

Core to the success of the Science Initiative Programs has been fostering working relationships with a diverse set of highly engaged partners at UW and across the state. The SI Programs have made great progress in establishing more and stronger collaborations on campus and across the state. LAMP continues to strengthen ties with the Community Colleges through the Summer Institute. These connections will deepen in the coming years through the HHMI grant that Rachel Watson is leading. The Wyoming Research Scholars Program continues to reach students and faculty from across campus, touching more departments and faculty mentors. Now that we are out of the pandemic, programming is in the works to get our students to the AMK Ranch for summer STEM learning opportunities. The K-Community Roadshow has grown its reach across the state with new district and school connections, as well as stronger and new relationships with collaborators like the Wyoming Department of Education, Wyoming School-University Partnership, Wyoming Afterschool Alliance, and the NASA Science Kitchen. With completion of the Student Collaborative Research, Outreach, and Learning Laboratory (SCROLL) in 2024 and full funding of the SI Programs in summer 2023, collaborations will continue to grow. Establishment of a proposed Center (Center for Outreach & Engagement, Experiential Learning, and Excellence in STEM Education) centered in SCROLL will focus on developing greater connections across campus and the state. It will house a Center for Undergraduate STEM Education and serve as a nexus for outreach and engagement programs at UW as well as STEM teaching and learning.

- Mark Lyford, Executive Director, Science Initiative Programs

Trail Conditions:



Making progress - The Roadshow has collaborated with the WY Department of Education, the WY School-University Partnership, and WY Curriculum Directors to provide professional development and resources to WY K-12 teachers; this summer we will be offering a CURE that meets at the AMK Ranch for one week and then transitions to campus for the fall semester; SCROLL has been funded and will provide a space for talks about entrepreneurship; WRSP is collaborating with other research programs and ORED to vision what an undergraduate research office would look like

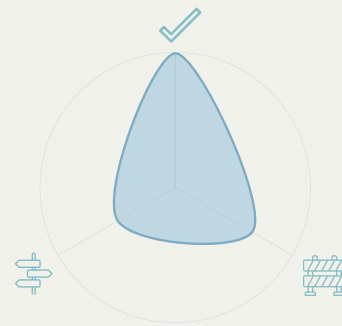


Barriers to progress - the loss of FYS courses has made it more difficult to build out the CURE program and expand it to community colleges, some funding for collaborative Roadshow projects has not come through



New opportunities and directions - The HHMI Inclusive Excellence grant has determined much of LAMP's capacity for engaging with community colleges - this has helped create a network of educator learning communities (ELCs) at most Wyoming community colleges, UW's forthcoming partnership with Plenty will help provide research and internship experiences for WRSP students, LAMP and WRSP will begin to collaborate with Wyoming Stargazing (based in Jackson) to provide research opportunities for students and training for educators as part of Wyoming Stargazing's JEDI in STEM Initiative

The Science Initiative will collaborate with the Wyoming Department of Education, the College of Education, the Office of Outreach and Engagement, the Science and Math Teaching Center, the Wyoming School-University Partnership, and others to design, develop, and implement holistic pedagogical and action research-based development opportunities for K-community educators.



Making progress

- The SI Roadshow has provided development to K-12 teachers through the WDE Innovations in Learning Conference, WDE Next Level Summit, Wyoming School-University Partnership, Wyoming Science Fair teacher workshop, and WDE Curriculum Directors meeting.
- The SI Roadshow has also facilitated 4 WYAA-related outreach events.

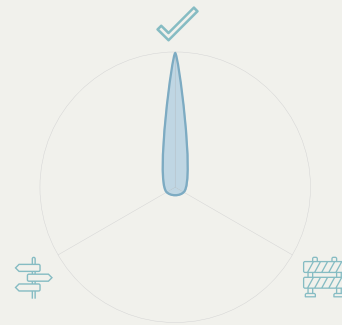
Barriers to progress

- A grant proposal to create a Wycola summer program was not funded.
- A NASA grant proposal to create a STEM Community Fellows program was rejected. The grant was written by NASA Space Grant, the SI, the Cooperative Fish and Wildlife Research Unit, WYAA, and collaborators from South Dakota and Utah.

New opportunities and directions

- LAMP and WRSP will begin to collaborate with Wyoming Stargazing (based in Jackson) to provide research opportunities for students and training for educators as part of Wyoming Stargazing's JEDI in STEM Initiative.

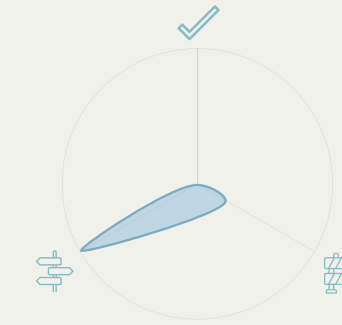
Partner with the UW-National Parks Research Station, INBRE, the Biodiversity Institute, EPSCoR, the School of Energy Resources and other programs to facilitate interdisciplinary research, provide inclusive undergraduate research experiences, and create meaningful opportunities for outreach.



Making progress

- WRSP collaborates with EPSCoR, INBRE, and SER to provide funding support and training for undergraduate scholars.
- We will be implementing a CURE that will be meeting at the AMK Ranch for 1 week before fall semester 2023 and continuing through fall.

Collaborate with Wyoming community colleges and their associated communities to enhance the reach of science outreach, research, and educational scholarship programs.



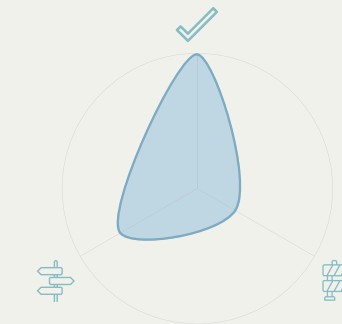
Barriers to progress

- UW's USP development process and FYS are currently on hold, making it more difficult to implement CUREs at UW and at WY community colleges.

New opportunities and directions

- The HHMI Inclusive Excellence grant has determined much of LAMP's capacity for engaging with community colleges - this has helped create a network of educator learning communities (ELCs) at most Wyoming community colleges, supported by UW graduate students from the Community Outreach Program for STEAM Engagement (COPSE).

Build entrepreneurship into undergraduate research programs, pairing interested WRSP students with local scientist entrepreneurs and providing other opportunities for entrepreneurship education in STEM.



Making progress

- SCROLL (now funded) will include spaces for undergraduate students to take part in informal talks with business leaders, IMPACT 307, WIP's CEI, the College of Business, etc.
- The Speed Mentoring event will be revitalized in fall of 2023.

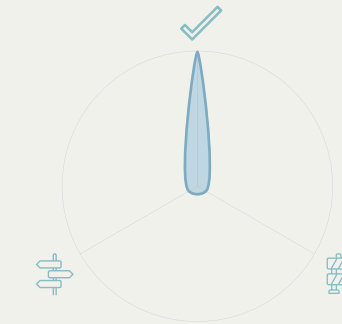
Barriers to progress

- Relationships with businesses have been difficult to cultivate.

New opportunities and directions

- UW's forthcoming partnership with Plenty will help provide research and internship experiences for WRSP students.

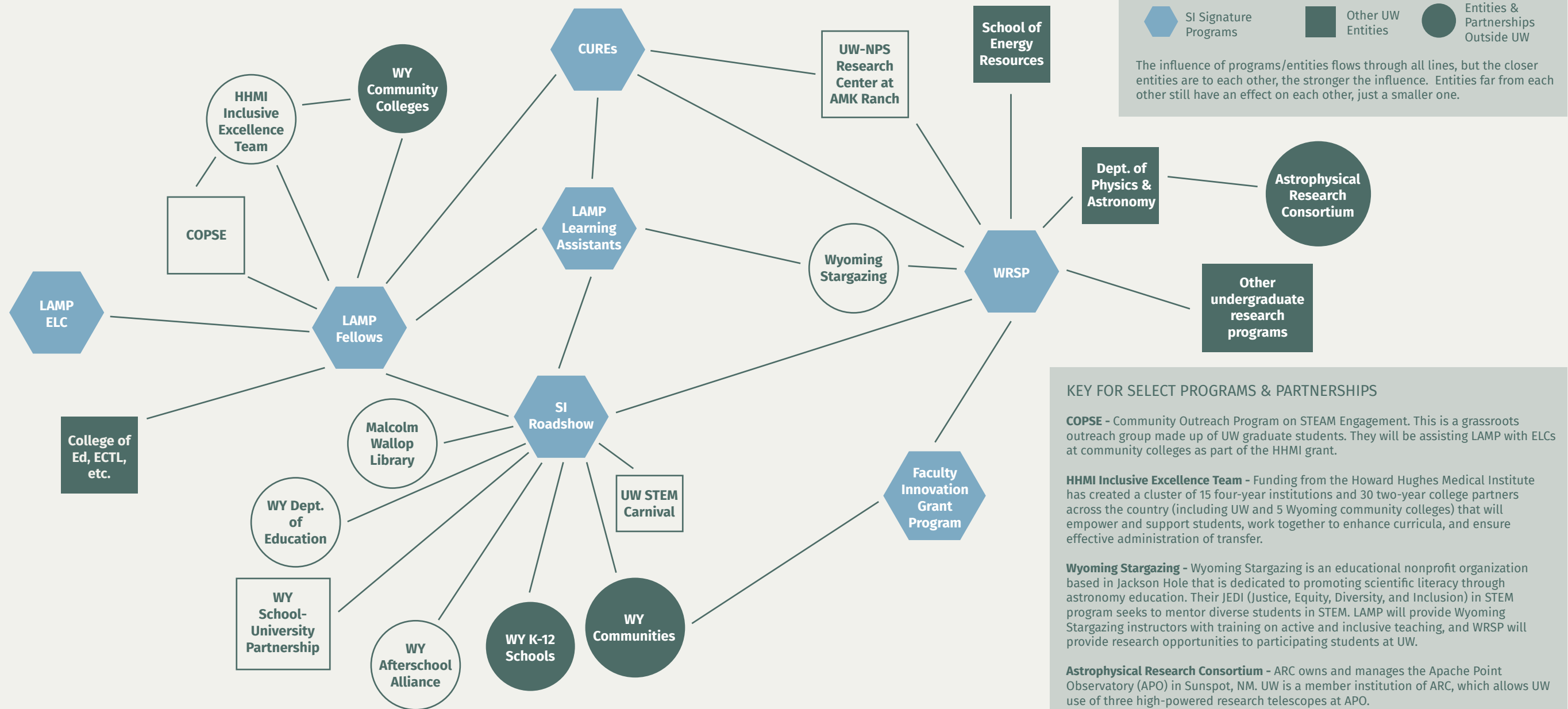
Increase accessibility to undergraduate research opportunities through partnership with research programs across campus and support of the new Undergraduate Research Office.

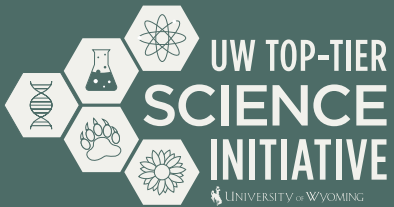


Making progress

- WRSP collaborates with other research programs and ORED to vision what an undergraduate research office would look like.

Expanding our Interactions





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