

UCAR Office of Education and Outreach Strategic Plan (02-14-11)

Preamble

The atmospheric and related sciences are increasingly relevant to our prosperity, security, and sustainability as a nation and as part of the global community. The Office of Education and Outreach (EO) at University Corporation for Atmospheric Research (UCAR) helps to connect the advances and innovations developed at the National Center for Atmospheric Research (NCAR) and the UCAR Member Universities to the needs and priorities of a diverse people by helping them to learn, understand, and apply these advances and innovations. Like UCAR and NCAR, EO seeks to serve the university community by catalyzing efforts and building tools that expand the capability of universities, while also pursuing our own pioneering work.

Our overarching goal of this plan is to make an impact on public understanding of atmospheric science concepts and process through alliances and partnerships that disseminate proven experience and resources from EO and our University Community to a national audience. Atmospheric and related sciences includes not only sciences associated with advancing understanding of the Earth-Sun system, but also the computational and engineering sciences and technology that afford those advances. We will leverage existing and high-quality efforts in workforce development and local to regional K-12 and public engagements in science, using these efforts as an “Atmospheric and Related Sciences Community Learning Laboratory” to research about how diverse people most appropriately engage in and learn about methods of our fields. We emphasize scientific methods as well as content for three reasons: the methods of science are currently underemphasized in many curricula; learning how to think like a scientist is a useful skill for people regardless of their career path; and the pervasive misunderstanding of scientific processes, such as uncertainty, opens the door to the misuse of science in civic decision-making. This plan focuses on the activities of the Office of Education and Outreach. Information in the appendix describes the ways in which EO interacts with our potential collaborators and competitors.

Vision

A world in which people understand, value, and use the atmospheric and related sciences to improve their lives and life on Earth through access to relevant, engaging, and accurate educational experiences.

Mission

UCAR Education and Outreach helps people from all backgrounds to learn about the atmospheric and related sciences by collaborating with scientists and educators to create, test, deliver, and disseminate scientifically accurate and pedagogically sound experiences and resources that emphasize doing science.

Principles

EO makes an impact on local, national, and international scales; collaborates with NCAR, UCAR Community Programs (UCP), and University Members; and focuses on activities that leverage the unique capabilities of a national lab and a university consortium.

Values

Learning science by doing science, scientific accuracy, educational effectiveness, creativity, and collaboration

Office of Education and Outreach Strategic Goals

The following strategic goals address our responsibilities as a national and regional resource, and our role in serving the universities and pursuing innovation. Within each goal, specific activities for which we will be held accountable are described in priority order.

Goal 1.0: With internal, national, and international partners, connect UCAR science to millions annually by disseminating our proven learning experiences and resources.

- 1.1. Supply resources and experiences which have been proven effective to partners and organizations with national reach in informal and formal science education.
- 1.2. Reach a national audience of stakeholders, including the media and policy makers, by working closely with UCAR's Offices of Communications and Government Affairs.
- 1.3. Support programs and grant proposals to reach target audiences by leveraging our expertise for the benefit of UCAR, UCP, NCAR, and university community.

Goal 2: Develop an "Atmospheric and Related Sciences Community Learning Laboratory" by selecting and applying appropriate methods to evaluate resources and perform research in atmospheric sciences education with local to national audiences.

- 2.1. Develop and implement methods that test experiences and resources by ensuring that they are educationally effective and scientifically sound.
- 2.2. Invite UCAR members, NCAR scientists, and UCP Programs to use our Community Learning Laboratory to enhance skills in communicating science and meet their goals for educational resource development, testing, and dissemination.
- 2.3. Contribute to a culture of educational innovation in the atmospheric and related sciences by developing the educational research capacity of our institution and community, and sharing effective science education knowledge, attitudes, and practices.

Goal 3.0: Working with NCAR, UCP, and our University Members, help students and the public participate in and understand the process of science by building state-of-the-art experiences and resources.

- 3.1. Develop innovative learning experiences and resources, such as exhibits, web sites, interactive learning media, and curriculum enhancement modules that emphasize engagement in science by leveraging the research advances of NCAR, UCAR, and Member Universities coupled with research from the Community Learning Laboratory.
- 3.2. Develop educational expertise in current and our future scientists by inviting them to develop and deliver experiences and resources with the office of education and outreach.

Goal 4.0: In close partnership with the UCAR Universities, catalyze the development of a diverse and diverse-thinking workforce by developing, evaluating, and disseminating strategies to engage students in our sciences.

- 4.1. Prepare students from diverse backgrounds for careers in science by providing internships, offering mentoring at critical academic transitions, and helping connect students to opportunities at UCAR Universities.

- 4.2. Prepare students for international and community-based research by including them in field experiences.
- 4.3. Launch research and education collaborations that advance atmospheric and related sciences and serve the priorities of historically underrepresented communities.

Appendix A: UCAR-wide Education and Outreach

The formal mechanism for coordination across UCAR is the Education Council, which regularly brings together representatives of all programs with education components. This council is jointly chaired by the EO Director, an NCAR representative (typically the director of the Advanced Study Program), and a representative of a UCP program. EO assumes primary administrative support for this group, and takes the lead in developing the agenda for the meetings.

In addition to its own efforts, therefore, the Office of Education and Outreach has a role in coordinating communications among education and outreach programs across NCAR and UCP. These programs have their own plans, stakeholders, and management, so the primary short-term goal of coordination is to identify complementary and overlapping activities that would benefit from increased collaboration and to enable that collaboration. A longer-term goal is to articulate, from and with these programs and with our University Members, a UCAR-wide mission that is greater than the sum of individual programs, commensurate with our role as a national center, and complementary to the educational missions of our University Members.

For completeness, we include a brief summary of the education-related programs from across UCAR and examples of alignments between these programs and EO's four strategic goals. These points of alliance provide a basis for collaboration and support from the Office of Education and Outreach and the potential for an UCAR-wide strategy.

- **NCAR:** Collaborations between NCAR scientific divisions and EO to interpret NCAR and university science to diverse audiences align with the goals of workforce development, resource creation, and local to international dissemination.
- **Advanced Study Program:** Training the next generation of atmospheric scientists through post-docs and colloquia aligns with workforce development goal.
- **COMET:** Creates state-of-the-art instructional resources, based on the latest NCAR and university science, for the national weather service and others – all resources are available to universities. Aligns with goals of resource creation and national reach.
- **DLS:** Enables the discovery and use of quality geoscience teaching and learning online resources: aligns with goal of educational research and national reach
- **GLOBE:** Allowing students to measure and understand the environment aligns most closely with the goal of national (even international) reach
- **NSDL:** Enables the discovery and use of high-quality science teaching and learning resources and experiences; aligns with the goals of educational research and national reach
- **Unidata:** Enabling universities to get and use real-time atmospheric and related data in teaching. Aligns with the goal of creating, piloting, and testing resources and national reach.
- **Visiting Scientist Program:** Develops and manages postdoctoral and visiting scientist programs and associated educational workshops for the advancement of the atmospheric and related sciences. Aligns with the workforce goal.

Appendix B: Office of Education and Outreach Strategic Plan Policy Value Proposition

	Goal 1: With internal, national, and international partners, connect UCAR science to millions annually by disseminating our proven learning experiences and resources.	Goal 2: Develop an Atmospheric and Related Sciences Community Learning Laboratory by selecting and applying appropriate methods to evaluate resources and perform research in science education.	Goal 3.0: Working with NCAR, UCP, and University members, help students and the public participate in and understand our science by building state-of-the-art experiences and resources.	Goal 4.0: With Universities, catalyze the development of a diverse and diverse-thinking workforce for the nation and interconnected world, by inviting students to participate in research experiences at our national lab.
Customers	NCAR, UCP, NSF, Universities, Science Centers	NCAR, UCP, NSF, Universities as consultants with educational research and evaluation expertise	NCAR, UCP, NSF, Universities, Science Centers	NCAR, undergraduate to graduate students, HBCs, Tribal Colleges, EPSCoR community
Target audiences	The internal and external partners, including but not limited to the media, science and education professional societies, libraries, science centers	Visitors to the NCAR Mesa Lab and our web sites, partnering community institutions, including the general public, K-12 teachers and students	Visitors to the NCAR Mesa Lab, NCAR Labs, and partnering community institutions, including the public, K-12 teachers and students, and undergraduates students	Participants in EO's High School Interns in Research Opportunity, Undergraduate Leadership Workshop, and Significant Opportunities in Atmospheric Research and Science (SOARS) as well as in partnering programs
Core competencies	Providing scientists and educators with deep content knowledge, pedagogic excellence, and knowledge of educational landscape; building on testing and lessons learned in Mesa Lab learning laboratory; partnerships for national reach with professional societies and organizations such as the American Meteorological Society (AMS).	Knowledge of our target audiences; established and ongoing records of evaluation metrics, qualitative data, and methodologies for some programs; partnerships with some external experts in informal and formal science education research and evaluation. Even so, this is an important area for greatly expanded competency building for EO. Continual relationship building is also needed to deepen knowledge of our core competencies with our customers.	Integrating cutting edge atmospheric research and technology from across NCAR and UCP programs into educational activities and resources; providing scaffolding to make this understandable, engaging, and relevant to local weather and climate; testing activities and resources with audiences who have contact with scientists and science tools through our Community Learning Lab.	Access to a rich suite of student research experiences through our national lab and University members' programs and scientists; mentoring skills; knowledge of atmospheric science career landscape and academic preparation needed to enter the workforce.
Competitor differentiation	<i>For audience:</i> Proven (pedagogic, engaging, accurate, inclusive) that can be easily used to teach climate-related concepts in classroom, after-school programs, museums, libraries, and websites. <i>For customers:</i> translating their science into educational activities that they and others can use with demonstrated efficacy and national distribution.	We are not known for this area of expertise by our audiences or competitors. We should be strategic in defining our niche, seeking to build partnerships and opportunities for other educational researchers rather than becoming a direct competitor to them.	Excellence born of deep content knowledge, connection to/participation of scientists, rigorous evaluation of activities to ensure impact on learning	National lab allows community/cohort approaches, breadth of inquiry, and persistence through time; connection to university and scientific enterprise supports next-step placement for intern/protégés in our programs
Strategic differentiation	Best Product around. UCAR is a respected and recognized source of such educational products in the region and the nation.	Educational research and evaluation of our resources and experiences illustrates and reinforces respect and recognition (see Goal 1).	Low cost to audience and close partnerships with customers.	Customer Intimacy

<p>Extendibility</p>	<p>We have the reach to connect new science to a library of existing activities and supports</p>	<p>Supports goals 2 and 3. The NCAR Mesa Laboratory is a laboratory for educational innovation in the atmospheric sciences from which resources and best practices can be disseminated broadly throughout the UCAR community.</p>		<p>SOARS protégés become educators and scientists knowledgeable in other fields, new kind of workforce for climate adaptation, near-peer teaching with workforce role models, training “graduates” to be the messengers for external replication.</p>
<p>Metrics</p>	<p>Through partners’ target audience demographics, describe the:</p> <ul style="list-style-type: none"> - Estimated numbers of people reached sectors of public and K-12 audiences - Representation of nation’s diversity - Measurable impacts on learning and appreciation of science. 	<p>Through research and evaluation of resources and experiences, demonstrate:</p> <ul style="list-style-type: none"> - Appropriateness of pedagogy for engagement of target informal education audiences - Measurable impacts on their learning and appreciation of science. 	<p>In providing educational content required for implementation of Goals 1 and 2, confirm that:</p> <ul style="list-style-type: none"> - Scientific content in resources and experiences is correct - Scientific endeavors portrayed are realistic - Scientific “stories” are societally relevant and linked to tangible and regional examples as much as possible 	<p>Show that:</p> <ul style="list-style-type: none"> - a significant fraction of our future scientists from underrepresented groups have participated in and benefited from UCAR efforts - some new NCAR research and education activities are designed in partnership with underserved communities whose priorities are addressed while advancing knowledge.