College of Science, Oregon State University

Strategic Planning Process

Concept Paper: Education and Learning

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Executive Summary

This paper incorporates the ideas brought forth by all the members of the College of Science (COS) community during the engagement sessions of the strategic planning process in 2021-2022. Synthesizing the topic of Education and Learning was difficult because the many facets that make up what we do building the science leaders of tomorrow are highly interconnected. Learning Assistants can be a part of adopting **innovative teaching strategies** that improve **student success**. They are considered a COS **investment** that can make education more **accessible**. They can even revolutionize the way the community in **Ecampus** is created. Yet all these topics have a different story to tell about how LAs improve that aspect of education. We've chosen to present cross-cutting themes at each of the individual sections, at the risk of sounding redundant. We felt it important to share each lens that our constituents have expressed to us, rather than force everything into only one category or another. After the expanded presentation of topics, actions, and tactics, we summarize and synthesize the Big Picture, presenting **lessons learned**, **trends**, and **strategic themes**. Perhaps a reader pressed on time would benefit from starting with the Big Picture, located on the last two pages. That represents our major take-aways and recommendations to the COS Strategic Planning Committee. If the reader wants to learn the breadth of feedback from the COS community, they should start from the beginning. Here we present

- Lessons Learned
- Trends in Higher Education
- Strategic Themes for the Future

Introduction

As a Land Grant institute, Oregon State University is committed to bringing education to all the people of Oregon and beyond. The College of Science takes pride in promoting and facilitating science education across the state. We provide foundational critical thinking and applied skills to not only the science leaders of tomorrow, but also Engineering, Agricultural Sciences, COEAS, and many other Colleges. As one of our community members said,

> "*STEM emphasizes applied learning, interdisciplinary instruction, and skills like critical thinking and problem solving*"

Modern society relies on science and technology for everything from efficient delivery of goods, to medical procedures, to reducing suffering from global climate change. The success of our society tomorrow starts with the education of our students today. The success of our undergraduate and graduate students is the primary motivation of the authors of this work. It permeates every aspect of this concept paper.

Equity, Access and Inclusion

As one of our community members said,

> "*Changes need to be made to systems that are built on cultural values from the past. We can't be competitive by leaving people out*"

The College of Science has been working very hard on education and awareness regarding the topics of diversity, equity, and inclusion. In 2021 the COS convened a working group, the Diversity, Equity, Justice and Inclusion (DEJI) Working Group, who developed a Strategic Diversity Action Plan (DAP), "Embedding Equity, Access and Inclusion," a result of numerous conversations with COS community members. Just recently, COS hired a permanent director, Kameron Kadooka, for Equity, Access and Inclusion (EAI), to guide the college's implementation of the DAP.

The college has adopted a number of mechanisms that have the opportunity to positively impact EAI issues, such as the inclusion of education-based innovative practices, which can encourage academic success for a more diverse student population, and the overhaul of COS foundational science courses to address inequitable outcomes for underprivileged populations. The COS has also been pursuing various opportunities for increased offerings of online courses and programs, allowing us to connect with a wider and more diverse array of students.

The COS has a commitment to continuing its efforts towards advancing Equity, Access and Inclusion for all students, staff and faculty by continuing to fully implement actions identified in its Strategic Diversity Action Plan.

College of Science Teaching

In this section we highlight the innovative practices and future trends related to teaching that were identified by the community.

Active Learning | The COS has made impressive strides towards adopting modern teaching strategies and curriculum. We are using science to improve teaching by choosing evidence-based instructional practices (EBIPs). Student-centered classrooms that promote active learning through discussions, problem solving, and peer-based approaches, have transformed the way students engage with the learning process. These methods are shown to improve learning outcomes for a more diverse set of students.

Evolving Classroom | To facilitate these active learning communities the instructional team, physical space, and out-of-class resources are also shifting. The OSU Learning Assistant (LA) program was created in the COS to train undergraduates in teaching pedagogy and course specific content. LAs then facilitate discussions in the classroom, manage online message boards, and host supplemental study sessions. Many courses now leverage a comprehensive instructional team that include instructors, TAs, and LAs. Studio-style spaces that promote group engagement are being chosen over instructor-centered classrooms. Passive learning content, such as traditional lectures, are increasingly being moved out of the classroom in the form of digital text and videos. This makes room for active learning and application when experts and near experts are more able to support and scaffold the learning process.

Graduate Reform | We must put the same care into critically evaluating and reforming our graduate curriculum, teaching pedagogies, and assessments as we do in our undergraduate offerings.

Professional Development of Teaching | Transforming learning starts by transforming educators. We are committed to the professional development of teaching in our graduate students and faculty. We continue to hire tenure-track discipline-based education researchers (DBER) who push the bleeding edge of our understanding and have invested in programs that promote the scholarship of teaching and learning. Further investments should be made to strengthen these opportunities and provide professional support, such as instructional designers, to people interested in improving the courses they teach. Most importantly, the hidden work associated with professional development of teaching, and meaningful reform of curriculum, must be recognized as essential investments in providing the type of education that makes OSU a world leader in science.

Hiring | The Professor of Teaching rank (in development) creates a new opportunity to strategically hire science education experts proven to promote student success. Hiring decisions, even for tenure-track faculty, need to consider a candidate's commitment to effective teaching. Hiring should also aim to improve the diversity among our faculty so that students are taught from people with diverse experiences.

Transform Assessments | All of these reforms have had a tremendous impact on student success as measured by retention rates (D/F/W). The next big area of improvement should be in student assessment at all levels. Starting with formative and summative assessment within a course, all the way to program and college-wide assessment. The college, with its deep knowledge and culture around intellectual rigor and accountability in science, along with its DBER experts, is poised to systematically evaluate and evolve what we assess, how we assess it, and why. We should adopt models that provide a steady stream of formative assessment to our students, including leveraging online resources and dashboards. Summative assessments should be aligned with education research best practices that encourage more equitable grading through transparency of learning outcomes and less high-stakes, *binge-and-purge* examinations. Many smaller assessments, especially those which encourage and reward growth, provide a better evaluation tool for both student and the instructor. Grading for equity should be standard practice. Courses that have reformed to value peer learning should also consider elements of peer assessment. We've transformed our pedagogy, our classrooms, and our curriculum; it's time to transform our assessments.

Transdisciplinary Education | One of the greatest strengths of the COS is the diverse, deep, and rich set of course offerings. Students have an opportunity to learn from world leaders in almost all branches of science. Units have reformed introductory courses along with upper division to align a more seamless path for their majors and ease the transition for transfer students. We've done much work to improve individual courses or internal degree paths, now we need to focus on consistency and integration across disciplines. As the tree of science grows, and there becomes a larger ensemble of fields and subfields, it is inevitable there will be greater need for transdisciplinary 'connective tissue' in our curriculum. This will better enable us to continue teaching the bleeding edge of science to our students. The rank of Professor of Practice is a way we can strategically hire experts knowledgeable in these integrated applied fields.

Pandemic Lessons | Social unrest leading up to the pandemic, then immediate emergency teaching protocols during the pandemic, created a necessity for flexible teaching practices.

Collectively we learned a valuable lesson in empathy and patience through respecting student's personal life and the diversity of hardships they experience. Emerging from the pandemic, we need to embrace these needs as real and ongoing. They represent the great diversity of personal experience our students and faculty face. We also took a crash course on digital learning tools that bring people closer when physically being together is not possible. We all have new digital resources, tools, and pedagogies that will improve our courses for a more diverse group of students even after we return to the classroom. Providing more modes of engagement (hybrid/online), more online resources, more diverse sets of assessment strategies, and larger flexibility where possible, tells our students we respect their whole person. It creates more trust from a wider group of people and moves us closer to providing an equitable experience. We must find ways to incorporate the best lessons learned during the pandemic.

Action	Tactics
Continue to expand curriculum reform efforts that promote EBIPs.	Create PLCs around teaching and learning ♦ Ensure equity in the way unit's value teaching ♦ Develop continual improvement plans for each unit's curriculum ♦ Incentivize new faculty and first-time reformers to work an Instructional Designer ♦ Continue to invest in DBER experts and promote Ed research among interested faculty
Recognize and support the professional development of teaching in our graduate students and faculty as essential to COS mission.	Recognize quality teaching and best practices explicitly in P&T and merit raises ♦ Create an equitable and transparent system for faculty to acquire professional development funds for conferences, workshops, and other events that enable them to remain teaching experts in their field ♦ Expand support for GCUT and other GTA training opportunities, including mentorships and professor of practice opportunities ♦ Incentivize reform by providing meaningful FTE reduction in teaching ♦ Acknowledge the value Ed research has to student learning by recognizing it in P&T and position descriptions
Respond to how changes in curriculum, instructional teams, and physical space are affecting teaching.	Promote collaborative teaching models that provide diverse avenues of support ♦ Design new learning spaces to the specifications of the faculty using the space

Transform student assessments methods to align with EBIPs	Provide training and incentives for diverse assessments methods and strategies in courses ♦ Expand the tools available to students to track and evaluate their own growth ♦ Support faculty in developing methods that ensure timely formative feedback that helps ♦ Create systems of transparency between course objectives and assessments ♦ Develop a community of experts focused on clear, equitable, transparent evaluation of programs and the COS as a whole ♦
Expand our use of LAs in COS classes, including the necessary training and equitable compensation.	Offer training, both to faculty and LAs, in the appropriate use of LAs in a COS classroom ♦ Support the equitable use of LAs by offering compensation to all programs utilizing them
Develop a transdisciplinary education for everyone that supports our science mission	Develop more transdisciplinary courses to strategically align with current expansions in science at OSU and beyond ♦ Create incentives for faculty in different units with a common student population to work on vertical alignment of curriculum ♦ Develop course structure, resource, and assessment standards so that students experience more consistency between courses ♦ Provide Ecampus students opportunities to engage with transdisciplinary education experiences ♦ Hire interdisciplinary experts into the Professor of Practice rank to help build
Learn from lessons during the pandemic about empathy, flexibility, and diverse modes of engagement	Continue to expand hybrid, hyflex, and Ecampus offerings ♦ Encourage faculty to develop flexible grading policies where possible ♦ Train faculty in the diverse experience of the modern student ♦ Create and curate online learning communities for both Ecampus and Corvallis campus students ♦ Expand access to digital resources ♦ Continue to use a diverse set of assessments
Hire to improve learning	Show a commitment to quality education by promoting exceptional education experts already among our instructor ranks to the new Professor of Teaching rank ♦ Strategically hire education experts outside of OSU into the new Professor of Teaching rank ♦ Hiring decisions for all faculty should formally recognize teaching strengths and potential for growth ♦ Hire to

	increase the diversity of experience among our faculty ♦ Incentivize new faculty to undergo professional development of teaching

EAI Lens | The adoption of EBIPs can be a mechanism for more equity in the COS. We must expand our efforts to embrace modern teaching strategies that work for a more diverse student population. We must also assess whether these efforts are working to make OSU more inclusive by expanding and refining the metrics and methods by which we evaluate our progress. The path every student takes through our curriculum needs to be filled with access to support, compassion, and opportunities for diverse learning experiences.

Extracurricular Experiential Learning

Student Research | As part of a Tier-1 research institution, the College of Science can offer its students dynamic opportunities to be part of cutting-edge research. New undergraduate students can participate in the OSU Undergraduate, Research, Scholarships and the Arts (URSA) program, which provides connections to research faculty and their projects, as well as a stipend for participating students. Many COS faculty researchers participate in URSA, offering projects designed to engage first- and second-year students in the exciting world of research. COS students who are more established in their research project can participate in the COS Summer Undergraduate Research Experience (SURE), which provides full time funding for students to immerse themselves in a research experience. For COS students with the opportunity to attend international professional conferences to present their research findings, there is the COS Student Travel Fund.

Internships and Shadowing | Students can greatly benefit both personally and professionally from internship and shadowing opportunities, learning more about a field of interest to them while acquiring real-world experience and knowledge. For undergraduates interested in applying to a healthcare graduate program, COS offers shadowing opportunities through our Preceptorship Program, which pairs juniors and seniors with a medical professional in the area. For graduate students COS offers two internships in partnership with Oregon Nanoscience and Microtechnologies Institute (ONAMI).

Student Clubs | OSU has more than 300 different student clubs, offering activities associated with cultural identity, sports, major, professional fields, and more. For COS students there are clubs associated with every major, in addition to several healthcare focused clubs such as the pre-med club and the pre-dental club. The science sorority Sigma

Delta Omega draws a large membership from COS students, as well as other majors, to offer social, volunteering, and professional development opportunities.

Action Item	Tactics
Expand research opportunities for underprivileged groups	Establish a research opportunity specifically for URMs ♦ Provide more funding support for URM graduate students.
Support and encourage strong cross-college collaborations	Establish mechanisms to make sure cross college collaborations are appreciated and valued ♦ Ensure flexibility for graduate students in terms of funding and thesis authorship requirements.
Expand internship opportunities specifically of interest to COS students	Officially partner with industries and companies to establish internship and shadowing opportunities ♦ Establish a college-wide system to catalog and advertise known internship opportunities
Ensure club opportunities exist for all students	Help existing clubs develop programs for Ecampus students ♦ Partner with Sigma Delta Omega (science sorority) to advertise their experiential activities
Establish a formalized outreach program within COS	Provide resources for students and faculty who want to engage in science outreach ♦ Set up credit opportunities for students that want to engage in science outreach ♦ Organize interested faculty to coordinate science outreach activities ♦ Adequately recognize the efforts of COS faculty engaged in science outreach

EAI Lens: Commitment to increasing student participation in undergraduate research by populations historically marginalized in higher education STEM spaces

Student Support

The College of Science takes pride in promoting and facilitating the success of OSU students. Many of the themes below crosscut through other sections in the paper, but they all share a goal of promoting better outcomes for our students. In this section, we highlight current ongoing efforts that support students in their academic experience, facilitate their participation in campus activities and help our graduates in their future careers after OSU.

Science as a Foundation | The COS is uniquely challenging as it encompasses teaching foundational courses for several other colleges, as well as the need to address the training of undergraduate and graduate students in the different scientific disciplines that compose the College. Engineering students take courses all across the College. As do students from all 10 of the other colleges in the University. The COS is known for preparing students for post-secondary learning. Around 40% of students in the pharmacy program come from the COS. The COS must continue to be a leader providing these types of foundational skills to all students.

Making Education Accessible

Partnerships | The COS strives to make education accessible to all students. This is evidenced by the strengthening of their partnerships with programs whose impacts include increased access to quality education and its outcomes. These include programs such as LSAMP, TRiO SSS and STEM Leaders. Other ways in which the COS has made education accessible includes the creation of department-specific tutoring centers where students can obtain access to help for their specific course needs. Additionally, the introduction of learning assistants (LA's) in undergraduate courses increases access to individualized help for students in courses offered within the COS.

Removing Barriers | Disparity of opportunity that disproportionately affects marginalized groups, along with the diversity of nontraditional pathways through education, result in challenges teaching our foundational courses. The students are not all the same place in their knowledge and skills when they get to us. We admitted them to the University, we have an obligation to meet them where they are at and find ways to provide individualized support. This will help to remove the barrier to entry preventing students from becoming scientists, or engineers, or any of the other disciplines we serve. Additionally, we need to

remove the cultural reference to foundational courses as gatekeeping mechanisms through training LAs, TAs, faculty, administrators, and advisors.

Flexibility | Similarities between first- and second-year curriculum models for most COS majors provides students with a more flexible course pathway where exploration of different courses is more accessible. The COS is also known for its strong Ecampus programs, which ensure that location is not a barrier to accessing a quality education.

Open Educational Resources (OER) | Many COS faculty have made a commitment to lowering barriers to education for students by authoring or incorporating Open Educational Resources (OER) within their courses, resulting in a number of no-cost and low-cost courses. This both saves students money, as well as ensures that all students have access to the educational tools that they need to have the best chance at academic success.

Disability Access Services (DAS) | DAS offers invaluable support to students across OSU by providing accommodations, education, consultation and advocacy. COS faculty work closely with DAS to ensure that eligible students in COS courses have the accommodations that they need to increase academic success. DAS works with students at all OSU campuses, as well as distance degree students.

Increased Modes of Learning | Lessons learned during the pandemic have enabled the COS to deliver more modes of engagement and support in its courses. There are more hybrid, hyflex, and Ecampus courses. Traditional courses also tend to be able to support more flexibility and provide more online resources. There are also more online support centers such as the Physics' WormHole, that service both Ecampus and Corvallis students. This provides students greater accessibility to learning modes that meet their individual needs.

Universal Design for Learners | Faculty in the COS - often working with Ecampus instructional designers - strive to meet UDL standards in their courses. This includes following all accessibility guidelines when presenting content and developing systems to support all learners.

International Students | International students are an invaluable resource for our college, providing diverse perspectives and exposure to a wide variety of cultures that is often lacking in Oregon. Our graduates should have the opportunity to work and interact with myriad people, benefiting from alternate experiences and ideas. The international students deserve to be fully supported by the college, to ensure their success both academically and professionally.

Action Item	Tactics
Ensure accessibility to experiential programs for all students	Evaluate the cost of these experiential programs and consider supporting students through on campus endeavors in order to increase affordability
Increase academic support opportunities	Ensure all students (Ecampus, Corvallis, DAS, URM, etc.) have access to tutoring support ♦ Consider adding after hours options for tutoring support programs
Understand and address current and expected financial barriers to education	Evaluate and improve accessibility to and awareness of current financial aid programs ♦ Encourage more COS faculty to utilize OER for their courses by offering incentives, providing adequate recognition, and awarding the necessary release time for development of course materials
Expand learning modes	Continue to increase the number of hybrid, hyflex, and Ecampus courses ♦ Incentivize faculty to develop courses with more flexibility and a more diverse set of learning resources
Ensure access to course materials and activities for all learners	Provide faculty with Instructional Designers to help implement UDL standards in their courses

EAI Lens: The COS is redesigning foundational courses in order to address inequitable outcomes ♦ The COS is establishing and augmenting support for affinity groups (e.g. Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), Association for Women in Mathematics (AWM), Women in Science (WIS), with the aim of making education more accessible to all students.

College Services and Resources

Overview | The College of Science has committed itself to ensuring the success of all its students, both in and out of the classroom. We offer a wide variety of services to provide support for students navigating a broad array of challenges while at OSU. We strive to provide a welcoming, supportive environment for all students, with complete resources to meet their needs and help them achieve their goals.

Science Tutoring Centers | The COS resources available to promote curricular success include the Mathematics & Statistics Learning Center, the Worm Hole (physics), the Mole Hole (chemistry), and the Vole Hole (biology). These Science Tutoring Centers offer services that are available to any OSU student. Support is typically available in physical spaces on campus, as well as virtually. COS initiated and spearheaded the OSU Learning Assistant (LA) program, designed to utilize trained undergraduates in the implementation of active and engaged learning, particularly in large enrollment science and mathematics courses.

Peer Advisors | A fundamental part of the support of the COS students is provided by the COS Peer Advisors, who are trained to assist students with many different issues, such as course scheduling or accessing campus programs. The Peer Advisors are recruited from every major and are readily available. COS also has a dedicated team of faculty members specially trained in health professions advising, available to guide students through the competitive admissions process.

Science Success Center (SSC) | The COS Science Success Center (SSC) provides a welcoming physical location where students can engage in collaborative learning, seek assistance, or learn about opportunities and events. The SSC also houses Career Development, a place for students to find resources, guidance and professional training designed to help individuals move from students to career readiness.

Scholarships | The COS offers a wide array of scholarships to majors across the college. As part of a recent study, COS examined the impact of financial support and has changed to a targeted dispersal of scholarship funds to better aid Underrepresented Minorities, first generation students, and low-income students. More aid should continue to be directed to the first- and second-year students at OSU, when engagement and retention of COS students is most critical. Additionally, the results of the study indicated that achievement gaps exist in six-year graduation rates for students with financial need, as determined by their expected family contribution, and first-generation students. Therefore, we must also

make sure to continue strategically awarding financial aid to these students as they near graduation so that they can successfully complete their education.

COS also established the Equity Promise Scholarship to provide financial assistance to students who may have experienced sudden, extreme circumstances or life events that threaten to delay or derail their degree completion.

Cultural Centers | There is a call for investing in cultural centers as places for attracting students to Science and for providing tutoring and academic support. This could help attract a more diverse population into Science, a challenge mentioned by several participants in the engagement sessions.

Action	Tactics
Maintain a robust COS Peer Advisor program, with comprehensive training and oversight	Continue support of the COS Peer Advisor program, making sure to hire students from all majors, and provide necessary training
Fully commit to the success of all our students, particularly at-risk students such as URMs, first generation, and students from underprivileged backgrounds	Expand services of the Science Tutoring Centers to ensure both in-person and virtual assistance for all students. ♦ Ensure access to Supplemental Instruction for all students that want it. ♦ Partner with or invest in the on-campus Cultural Centers as a way to provide support to diverse populations of students
Capitalize on the COS Student Success Center as a way to connect with students and fulfill their needs	Continue to explore ways in which the COS Student Success Center can assist students by offering new events and soliciting student feedback ♦ Develop online programs through the SSC to support Ecampus students
Seek additional sources of scholarship funding and financial support for students	Actively seek funds from donors to assist students most at risk

EAI Lens | Newly hired EAI director who will implement an action plan designed to improve outcomes for underrepresented students in COS ♦ Targeted dispersal of scholarship funds to better aid URM, 1st generation, and low-income students.

Academic Advising

New Students | To promote the academic success of each student, COS offers comprehensive academic advising, which begins when students first matriculate to OSU. Trained advisors from each major fully participate in the process, known as START, ensuring that each student gets connected with the appropriate services and information from the very start. COS faculty play a role in this as well, with many COS faculty members participating in the Beaver Connect Program, establishing relationships between first year students, peers, and faculty members.

Established Students | Academic advisors serve as an indispensable source of information, throughout each student's academic career, tailoring their advice to each student's goals and aspirations. COS advisors are highly trained while embedded within each department, allowing each advisor to cover both essential resources and offer information specific to a particular major.

Specific Support | For those students who might be experiencing difficulties in their college journey, COS has a Student Success Advisor, who works with students to determine the best resources and establish an individualized plan for each student. Freshmen who are experiencing difficulty participate in STAR (Student Taking Academic Responsibility) advising with the COS Head Advisor, an intervention protocol designed to assist students to get back on track academically.

Action Item	Tactics
Standardize advising practices across COS to best serve student needs	Solicit opinions from students about inefficiencies within the COS in regards to advising practices
Develop ways for students and advisors to know they need help	Encourage faculty to develop frequent formative assessments that help students track their progress

	♦ Develop early warning sign protocols to find students in need of additional support

EAI Lens: make sure that all advisors are fully trained in regards to best practices for URMs, 1st generation students, military veterans

Graduate Education

The strength of our research enterprise is exemplified and measured by the success of our graduate students impacting academic and research institutions, pursuing professional careers in industry, financial institutions and government, and following in their entrepreneurship initiative to create new successful companies. Success in this essential aspect of the COS mission requires incorporating and developing innovative teaching methods, expanding the reach of our recruiting efforts to increase the number of under-represented minorities in our classrooms and to continue to challenge ourselves to develop research and graduate educational programs that enhance students' professional preparation.

Crosscutting Science | There is a call for action to develop transdisciplinary programs that recognize a national trend in offering innovative degrees. Departments should be encouraged and provided with academic positions that support this enterprise.

Beyond Academia | Academic units are challenged to develop Master Degree programs that prepare Graduate students for non-academic environments. These programs should be flexible to adapt and redirect efforts as new areas of applied research and training are identified. An example is to train students with basic and practical knowledge targeted to data science with specific curricular focuses, e.g. medical or biological sciences, physical sciences, or insurance and finance.

Accessible | The Accelerated Master Platform (AMP) can be an effective tool for expanding participation of various URM in our graduate programs. By specifically encouraging our own undergraduate students to continue graduate studies at OSU, we can attract a significant group of students that benefit from the saving in cost and time to graduation afforded by the flexibility of the AMP.

Infrastructure | Student success and retention can be impacted by antiquated facilities. Expand the notion of 'laboratories' to include learning environments that facilitate interactions of small groups. This can be achieved by remodeling small classrooms as discussion/seminar rooms with their schedules controlled directly by academic units.

Streamlining our Graduate Programs: Academic units are challenged by alumni and students to maintain and continue to streamline their graduate programs. Recognizing the changing and sometimes limited access to advanced undergraduate curricular for our incoming students identifies a challenge in equitable opportunity for success. In response some programs have been reforming their advancement to candidacy procedures to remove barriers that disproportionately affect certain groups or non-traditional backgrounds. Assessment of graduate students' preparation for success in their coursework, as well as in independent research, should recognize this diversity of backgrounds and find ways to meet the students where they are when they are accepted to the program.

Ecampus

Distance learning has become increasingly popular, due to its increased flexibility and accessibility as an instructional delivery method. OSU's Ecampus has been on the forefront of this trend and is consistently ranked in the top 10 U.S. News and World Report online institutions. In this section we will outline the important aspects of how the College is working with Ecampus to support our distance learners.

COS contribution to Ecampus | The College of Science currently offers three degree programs entirely online, an M.S. in Data Analytics and a B.S. degree in both Zoology and BioHealth Sciences, as well as two minors. Currently we have over 500 online COS majors, which has been rapidly increasing.

Revenue | Online courses and programs are an increasing revenue source for the college, resulting in more than $10 million dollars in 2020-21, mostly from tuition revenue sharing. This represents almost a doubling over a 5 year period. The college now accounts for 14.7% of total Ecampus Student Credit Hours, and 29.4% of all OSU students taking Ecampus courses have taken an online course offered by COS. The college offers approximately 85 courses online, which take full advantage of the teaching innovations available, as well as the support available from Ecampus for both educators and program administrators.

COS Commitment to Quality | The COS is committed to upholding the highest standards for all of its courses, regardless of campus. Ecampus courses will continue to align learning objectives, rigor, and opportunities for experiential learning with Corvallis campus courses. The College also supports Ecampus's dedication to the human experience, realizing delivery of a quality online course often requires a greater student to teacher ratio. Understanding the needs of individual course teaching teams will continue to be a priority as Ecampus expands and lessons from DBER experts improve the online experience.

Experiential Learning | One area of growth in the college is expansion of opportunities for Ecampus students to engage in experiential learning, research, and extracurricular college activities such as clubs and events. There is a real need for Ecampus students to work with faculty outside of the classroom, make personal connections, and acquire recommendations for the next step in their career. These connections can help decrease the stop out rate and provide a more equitable learning experience for our distance learners.

Expanding the Online Teaching Team | An increase in the number of COS online courses offers an opportunity for the greater involvement of graduate students as teaching assistants or even instructors of record. It also offers an opportunity for the further expansion of the LA program, with LAs being more actively involved in the facilitation of online learning. This could provide a connection and experiential learning for distance degree students to act as LAs. These activities would require adequate training, mentoring, and supervision, to ensure successful deployment.

Action Item	Tactics
Expand both courses and programs offered online by COS	Work with Ecampus to identify additional markets that might be served by COS ♦ Continue to increase online course offerings, especially one's with transdisciplinary and experiential experiences. ♦ Identify mechanisms that allow Ecampus students to feel fully connected with COS (clubs, networking, virtual activities, etc)
Pursue the unique opportunities for innovative teaching that online classes offer	Fully support and encourage innovative online teaching with compensation and release time for interested faculty members ♦ Establish training for GTAs and LAs for teaching and assistance in online courses ♦ Support DBER experts in implementation of online

	learning best practices, including the value of active learning, peer instruction, and synchronous events
Expand research and mentorship opportunities for Ecampus students	Offer incentives for faculty members to pursue online research projects ♦ Expand COS representation in the Ecampus Research Fellowship Program ♦ Encourage curriculum reform groups to work with Ecampus students in development and testing
Support alignment of course learning outcomes across campuses	Incentivize Corvallis, Ecampus, and Cascades faculty teaching the same courses to collaborate on learning outcomes
Create equity in teaching loads when comparing Ecampus to Corvallis	Each unit needs to work with individual faculty and Ecampus Instructional Designers to determine teaching team best practices, e.g. number of faculty, TAs, and LAs to students ♦ The COS needs to encourage continual improvement principles, even when it changes teacher to student ratios

EAI Lens: Online courses provide an opportunity to connect with a wider and more diverse array of students.

Big Picture - Education and Learning

Lessons Learned

The COS community has provided a wealth of feedback on what we do well, and what we could improve on going forward. The full breadth of these topics is presented in the sections above. The list below is a summary of the most common and pressing lessons we've learned from the community, and what we suggest highlighted in the COS Strategic Plan & implementation.

- **Financial Support** | Strategic implementation of student financial support creates better outcomes for more people.

- **Pandemic Lessons** | Changes necessary during remote learning created opportunities for continual improvement. Increased digital resources, modes of engagement, and flexibility can help all students.

- **Learning Assistants** | LAs are becoming essential members of a teaching team. We should continue to expand the program while providing equitable opportunities to all students.

- **Abolish Gatekeeping** | The foundational science courses are cornerstones of the COS, but they are potential barriers to some. We must remove the barrier by meeting our students where they are and providing individualized support – we are responsible for getting them to where they need to be.

- **Academic Advising** | Successfully navigating college is directly dependent on quality advising. The COS must continue to support advisers and respect the value of unit specific knowledge.

- **Essential Workers** | GTAs and LAs are at the heart of successfully delivering quality education in many of our courses. We must respect their full spectrum of duties and compensate for their teaching work properly.

- **Non-Academic Careers** | Most of our graduate students go on to non-academic careers. We must expand the pathways in which they can succeed in STEM industry jobs and beyond.

- **Interdisciplinary** | As science expands into new fields and sub-fields, there is a need for more integrated knowledge.

- **Faculty Support** | Continual improvement, which includes curriculum development and reform, is integral to the success of our college. Faculty need more support in the form of teaching relief, professional development funds, and access to DBER experts and instructional designers to stay current on the science of teaching.

- **Respect Teaching** | OSU's Strategic Plan 4.0 Mission places education on equal footing with research and outreach. We need to improve the culture, compensation, and recognition around the value of good teaching and dedicated life-long educators.

Trends in Higher Education

Through evaluation of resources external to OSU, including articles from national societies and strategic plans from similar institutions, along with conversations and feedback from the COS community, we have created a list of trends in higher education. We suggest these trends be highlighted in the COS Strategic Plan & implementation.

- **Distance Learning** | Online learning is increasing around the world, potentially even more so after the rapid expansion of online learning opportunities created in response to the pandemic.

- **Experiential Learning** | Opportunities for experiential learning such as research and internships are becoming increasingly important training for our grads. Providing these transformative experiences to all our students, especially our distance learners, is a significant challenge.

- **Innovative Teaching** | Educators are moving away from the *sage on the stage* modality of teaching. EBIPs that promote student-centered active engagement to increase critical thinking are becoming the norm in many parts of higher education and K-12.

- **Social Contract** | Students are becoming more aware of their inherent value and rights in all aspects of society. Their expectations to respect their autonomy result in a movement for more flexibility, accessibility, and accommodations associated with navigating their whole lived experience.

- **K-12 Changes** | What our students experience before coming to OSU greatly affects how we best serve them. Programs like *No Child Left Behind* and *Common Core* provide opportunities and challenges. The pandemic also brought on rapid shifts in learning that are affecting our students.

- **SB 233** | Oregon Senate Bill 233 requires universities and community colleges improve transferring pathways between institutions by creating common course numbering and transfer maps.

- **Values Questioned** | The value of higher education, and science in particular, is increasingly being questioned. Some of this is due to unwarranted use as political fodder, but there is also a real need to *better communicate* the values of science and a university education to the public.

- **Education Costs** | The cost of college is increasing more rapidly than most people's wages. This exacerbates people's skepticism of the value of our degrees and is a direct challenge to our goals as a Land Grant institute. It especially undermines our commitment to equity and serving URM.

- **Interdisciplinary** | Science is broadening, creating a larger need for an integrated curriculum to create more interdisciplinary and transdisciplinary scientists.

Strategic Themes for the Future

Through evaluation of community feedback, articles, presentations, and discussions with colleagues, we have created a list of strategic themes for the future that should be highlighted in the COS Strategic Plan & implementation.

- **Support Teachers** | Invest in the professional development of teaching that focuses on training new faculty, GTAs, LAs, and people engaged in curriculum reform. Make continual improvement a valued part of faculty's position description and provide teaching release and professional development funds for the work.

- **Modernize Curriculum** | Continue to be a world leader in education by supporting continual reform movements that adopt EBIPs in both undergraduate and graduate programs. Increase equity and access by adopting a wider variety of learning resources and modalities.

- **Expand Online** | The COS must continue to expand course and program offerings available through Ecampus. We must find ways to provide equivalent online learning experiences and test if they are working.

- **Financial Support** | We should focus scholarships on need-based 1st/2nd year, URM, 1st generation students, and work study opportunities in the COS.

- **Academic Support** | Direct resources for foundational science courses to increase academic success and remove gatekeeping barriers. Investments shown to work at OSU include: LAs, SI tables, adopting EBIPs, tutoring centers, instructional designers, and education research experts.

- **Bridge Programs** | Provide support and targeted programs for students transferring from community college to OSU. Likewise create a more robust program aimed at increased success for all incoming graduate students.

- **Experiential Learning** | Increased experiential learning opportunities for all students that provide transformative experiences and create meaningful connections that open doors beyond OSU. This is especially needed for our Ecampus students.

- **Transdisciplinarity** | The COS should invest in interdisciplinary communities of practice and curriculum to prepare the first generation of transdisciplinary experts. Graduate students especially need more opportunities for integrated learning and research.