INSTITUTIONAL COLLABORATION

Presented to

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Institutional Collaboration

A growing number of institutions of higher education (IHEs) are seeking financial sustainability through collaboration with other IHEs. As an example, Rogue Community College (RCC), Klamath Community College (KCC), Oregon Institute of Technology (OIT), and Southern Oregon University (SOU) formed the Southern Oregon Higher Education Consortium (SOHEC). This consortium is “a first-of-its-kind alliance of Oregon colleges and universities” and “is considered a pioneering step toward preparing students and workforce members in the region for a rapidly changing future.” (Mosley, 2019). The consortium is exploring ways to work together to better serve the learners and employers of southern Oregon. This paper will explore models of IHE collaborations relating to curriculum, industry, and resources by addressing the following questions:

1. What issues are facing our region that collaboration can help solve?
2. What other types of state, regional, or national collaborations should we explore?
3. What are the challenges to these types of collaborations?
4. What are the keys to successful collaborations?

Executive Summary

The recent creation of the Southern Oregon Higher Education Consortium is a timely example of IHEs working with partners to achieve efficiency and sustainability. Demographic trends and fast-changing workforce targets will challenge regional universities over the next decade and beyond. Collaborations between IHEs, government and private-sector partners will be critical pathways to success for the most flexible and innovative institutions.

Industry. Knowledge transfer between academia and industry is critical to the success of partnerships. As partnerships develop, interactions between individuals and free-flow of ideas and methodologies become important in sustaining effective partnerships through the creation of trust and familiarity. The “Triple Helix” concept (state/academy/industry) of collaboration is a foundational concept in which the three institutions work in concert to create innovation. Collaboration is widely seen as a key to lower costs and graduating more students with higher-quality transferable skills, although some fear that academic-industry collaborations may bring the pressures of commerce and privatization on campus.

Curriculum. Collaboration between two- and four-year institutions is increasingly mandatory at the state level, and some do it better than others. At least 30 states now require a transferable core of lower-division courses and the guaranteed transfer of associate degree within the state. Seventeen states have reverse-transfer policies and another 22 states encourage reverse-transfers less formally. Other curricular partnerships include dual-enrollment programs and online course-sharing. A majority of community college students say they want to transfer and earn a bachelor’s degree but most don’t follow through. Barriers include the complexity of the transfer process, tuition costs and financial aid availability, and disincentives for institutions that receive transfer students.

Resources and Operations. Student housing, transportation, renewable energy, information technology systems and blockchain technology are areas in which institutions of higher education are actively seeking collaborative partners among other IHEs, and private and public sector organizations. Each of these areas of collaboration offer advantages, such as the expertise and fiscal flexibility of private-sector partners, access to large projects at low average costs, increased scalability and research from decentralized platforms. Some obstacles to resource collaborations include cemented institutional policies, tensions between stakeholders and alignment of schedules. It has also proven challenging to sustain program funding for shared services.

Conclusion. Forging inter-institutional collaborations requires planning, funding, and buy-in. The most successful collaborations have multiple champions – dedicated, consistent and visionary – and an independent project manager or group.

Introduction

Regional four-year institutions are expected to lose more than 11 percent of their students by 2029 due to demographic changes (Barshay, 2018). There will be fewer high school students going to college, and declining enrollment may force reducing liberal arts courses and increasing technical education. The rapidly changing economy related to industry advancements requires graduates with broad soft skills and deep technical knowledge to be successful in the current and future workforce (Arce et al., 2017). It has been noted that the quality of a college degree does not meet the quality expected by employers (Maugad, 2018) and there is demonstrated need for digital literacy and best practices for new tech-savvy standards expected of all graduates. Preparing students for a rapidly changing economy raises the bar for liberal arts colleges and universities to ensure that the curriculum anticipates the workforce of the future by more closely aligning with innovations in industry and technology.

The inherent role for IHEs is to serve as a major source of preparing students for employment, and advances in digital technologies embedded in everyday social and professional lives at SOU, will have a significant impact (Christ et al., 2017). Some of the challenges to overcome are: 1) the accelerated rate of innovation, evolution, and adoption of new technologies as experienced by different stakeholders; 2) the need for a culture of sound digital literacy and technological best practices in a liberal arts tradition; and 3) resource constraints across campus. The job market will be impacted by the acceleration of technology, and although it will require people with effective technological skills, it will always require human interaction (Fountain et al., 2017). While the labor market is in the midst of transformative technological advancements, IHEs must improve upon teaching skills for jobs that do not exist yet. A new baseline of standards has emerged to prepare students with broad soft skills and deep technical proficiencies which, in the right combinations, will be in highest demand.

The “learners of tomorrow” include “career switcher” or “career accelerator” students in the fields of healthcare, information technology, and business management (Arce et al., 2017). Considering the general shift in student demographics and the rising costs of college, students will be even more focused on successful career paths with ‘good paying jobs’. Colleges and universities have found ways to attract and retain students by increasing curricular, fiscal, and operational efficiencies through partnerships. Sharing resources should not only be about cost savings and financial sustainability, but creating experiences that benefit all stakeholders including: 1) students, 2) faculty, 3) non-teaching staff, 4) administrators, 5) programs, departments, and units, 6) off-campus employers, 7) other colleges/universities, 8) suppliers, 9) government, 10) community, 11) donors, 12) alumni, and 13) accrediting agencies (Maguad, 2018).

Tapscott & Tapscott (2017) state that there is no doubt that the next-generation faculty will be responsible for learning how to teach, in tandem with teaching, the next generation of entrepreneurial innovators. They continue to address four areas of opportunities for technological innovations related to industry, academic, and technological advancements: 1) cyber-security; 2) record and credential verification, 3) new pedagogies for customized teaching, and 4) new models of learning. The value of extending the reach of educational institutions to the industry sector to provide programs, workforce training, and managerial development at a

regional level has been favored over a broad mandate to improve innovation at a national level (Madgett, Belanger, & Mount, 2005).

Industry

Knowledge transfer between academia and industry is critical to the success of partnerships. The perception and measurement of the success of knowledge transfer differ between industry and academic viewpoints. Broadly defined, from an industry view, success is measured from a company performance perspective, while in academia, the perspective is more closely aligned with leadership, incentives, and researchers motivations (Schofield, 2013). As partnerships develop, interactions between individuals and free-flow of ideas and methodologies become important in sustaining effective partnerships through the creation of trust and familiarity. Continued diligence with respect of measuring and delivering project goals is critical to the continuation of successful partnerships (Liew, Shahdanb, & Lim, 2012). An example of the sustainability of programs that fuse both theory and practical-based education in the interior design industry allowed real life issues to be incorporated into the class (Afacan, 2013). This allows students, instructors, and industry partners to have real-time and cooperative discussions increasing the hands-on experience and creativity to enhance active learning.

The “Triple Helix” (state/academy/industry) of collaboration is a foundational concept of the rise of the Knowledge Society and for the current interest in the “Entrepreneurial University,” where the three institutions work in concert to create innovation through “new institutional and social formats for the production, transfer, and application of knowledge” (Ranga and Etzkowitz, 2013, p. 238). It will be interesting to map southern Oregon’s government, academic, and industry players using this systemic model to see what types of relationships are revealed. From a survey of about 250 press releases and news articles published since 2015, this PLC identified a variety of collaborations arranged into three categories: pedagogical strategies, faculty based strategies, and visionary initiatives.

Pedagogical strategies

Collaborations to bring industry to the classroom and the classroom to industry requires integrating both theoretical and practical education to adapt to the industry’s dynamic nature of rapid innovations and advancements (Yu, 2018). Using the workplace as a classroom directly links academics to real-time interest in role development within the industry, but a major obstacle is demonstrating an evidence-based evaluation system executed on the industry side so the university can track performance and make changes as necessary. Revising pedagogy in this model can include industry training for faculty to enrich teaching methods, and would demonstrate how IHEs engage in dynamic learning opportunities for roles that develop faster than policy (Chalmers et al., 2001).

Faculty-based strategies

Creating incentives to engage in interdisciplinary opportunities such as consultancies, industry partner freelance work, and using sabbaticals or other release time, would help build

and fortify bridges with the industry sector. At its simplest, incentives might include a funding for entrepreneurship among faculty and staff for added entrepreneurship degrees and certificates to cultivate a culture more aligned with private enterprise (Ranga and Etzkowitz, 2013). Some go farther, such as the University of Missouri's fast-tracked funding for professors working in commercialization, or at Arizona State University where they implemented the "NewSpace" initiative to mitigate reduced government funding for space science programs, and taking advantage of the opportunity to engage in the private sector of space exploration and technology. NewSpace looks for ways to connect faculty with private space companies and identify opportunities for students. Otherwise, collaboration originating from the industry side could result in flexible work opportunities to attract faculty interest for building deeper faculty-student-industry relationships through information sessions, portfolio reviews, interviewing, meet-greets, low stakes but structured networking events, and mentorships.

Visionary Initiatives

Industries can flourish when business and academy work together in visionary initiatives to explore and propose research opportunities of regional significance (i.e. wine, cannabis, logistics, forestry). Industry consortia constitute a mix of stakeholders that generally use an IHEs facilities and resources as a common shared space. While large companies have existing resources for research, smaller companies may not. By cooperating with regional or local universities, companies can utilize the research expertise at these institutions to make more informed business decisions based on the evidence presented (Cukurova, Luckin, & Clark-Wilson, 2019). For example, the University of British Columbia partners with DigiBC, an interactive and digital media trade association, to create video games, visual effects, animation, digital creative and marketing strategies (Digital Media Comes of Age, 2017), and established evidence-informed business decisions. In another example, the 'Rethink the Rink' 2018 partnership between the Pittsburgh Penguins hockey team, Covestro (a manufacturer of high performance polymers), and Carnegie Mellon University College of Engineering (CMU) leveraged the interdisciplinary background of engineering students and faculty, hockey players and coaches, and Covestro product technicians to improve hockey rink safety for players and spectators. Campus MakerSpace facilities were used for meetups; materials and prototypes were provided by the manufacturer; and the faculty-guided instruction (Covestro LLC, 2019*).*

A local example of an industry collaboration is the Business Education Partnership (BEP) established in 2016, and supported by Southern Oregon Regional Economic Development Incorporated (SOREDI), the Rogue Valley Workforce Partnership (RVWP). industry leaders, administrators from K-12, RCC, and SOU. Members have met monthly to develop programs to increase high school graduation rates, develop an internship program, and create an employability rubric that has been implemented by all the high schools in the region. What makes this partnership work is: 1) having the right experts at the table including decision makers, administrators, staff, and anyone with their "boots on the ground"; 2) having dedicated resources to support the work; 3) having a coordinator to bring everyone together on a regular basis and document its work and set goals; and 4) regular meetings to keep everyone on task. In other words, there are resources and a project manager to keep the effort going (McBee, 2019).

Challenges of Industry Collaborations

While much of the literature suggests collaboration is the key to lower costs, and graduating more students with higher quality transferable skills, some questioned the value of academic-industry collaborations, citing fears of bringing the pressures of commerce and capital on campus, creeping privatization of services, or diluting the creativity and expansiveness of the academic mission (Roberts, 2007). Academia finds itself protecting its role as an educator, knowledge creator, and disseminator of ideas, whereas industry partners have a need for creating value through proprietary knowledge and processes. “The university mandate to publish research results and the private sector's desire to maintain company secrets for competitive advantages are important and often contradictory issues that can form a barrier to university-industry relationships” (Bosley, 1995, p. 617). In relation, Roberts noted that the rewards structure in academics does not encourage collaboration, and a larger role for industry may help shift that. Individual research contributions, publications, and grant funding are viewed as greater accomplishments than facilitating creative collaborations. Design firms, professional associations, and government institutions must begin to wield a collective influence for resource and funding power in support of interdisciplinary initiatives.

Community colleges are traditionally tasked with delivering vocational skills that directly serve workforce development with close industry ties. The university, on the other hand, is primarily tasked with research and managerial education, and perceptions of the academic community not producing marketable skills (by industry definitions) for graduates for the sake of maintaining academic freedom. The specific needs of industry, in many cases, are perceived to be mismatched with the mission of the academic institution. Reconciliation of these differences must precede successful academic-industry collaborations.

Curriculum collaborations

In June 2018, the Education Commission of the States (ECS) published a 50-State Comparison on 1) Transferable Core of Lower Division Courses; 2) Statewide Common Course Numbering; 3) Statewide Guaranteed Transfer of Associate Degree; and 4) Reverse Transfer for credit tracking across IHEs. Within each policy, there are nuances to how the policy is defined. For example, some transferable core policies specify if the university requires additional courses, eligible course numbers, class standings, or specific grade requirements. For common course numbering, some policies may only impact public institutions, and others for only community college to university transfers (Anderson, 2018). The key takeaways are:

1. At least 30 states have policies requiring a transferable core of lower-division courses and statewide guaranteed transfer of an associate degree.
2. Seventeen states have reverse transfer policies set in legislation or board policy. An additional 22 states provide reverse transfer opportunities outside of policy, including through institutional agreements, MOUs and statewide programs.
3. 2018 is seeing the refinement of multiple statewide transfer policies, pointing to a commitment to increase student completion rates.

These policies require collaboration between two-year and four-year colleges, and do it better than others. Described below are some unique partnerships to aid students in transferability between institutions (Transfer Collaborative, 2016).

Credit Transfer

The California Guided Pathways (2016) program incorporates infographic framework for students for their guided pathways project, with the goal to take existing state initiatives and integrate them into an easy-to-follow pathway. Institutions had to compete for the chance to be one of 20 colleges to participate, pay $15,000 per year, and have teams attend one of six institutes where they receive coaching and guidance. The project is led by a large collaboration of different professional organizations including the American Association of Community Colleges (AACC). Funding is provided by foundation support and fees paid by the colleges.

A West Virginia non-profit organization, TechConnectWV (2014), focused on STEM field for Transfer Consortiums to bring together institutions of higher education and non-research institutions by recognizing them with strong STEM expertise and connecting them to "commercialization resources" to turn their work into products and jobs.

The Tennessee Reverse Transfer Program (2019) stands out as far as transfer programs go, because it formalizes the reverse transfer with Tennessee colleges and universities to guarantee credits are utilized. Students can work on degree requirements at a four-year school and qualify for an associate's degree by reverse transfer. In effect, they are simultaneously making progress toward an associate's and a bachelor's degree, and by obtaining an associate degree, students are more marketable in job search efforts while continuing on for a four-year degree. In the event that students are not able to complete the degree, the program ensures those credits do not go to waste. When the student is ready to return, all of the coursework done at the community college will transfer to a four-year institution.

Beyond the transfer of courses, some institutions implement joint admissions programs. Western New England University has this arrangement with four community colleges with the intent to have structured plans and access to advisors at the university while attending the community college (Joint Admissions, 2007). This is in line with The New England Board of Higher Education's goal of a smooth transfer practice that includes dual admissions as one of the items to implement. Oregon State University (OSU, 2019) has a similar joint admissions Degree Partnership Program (DPP) for students to be dual enrolled at OSU and one of 20 other community colleges in Oregon or Hawaii. Students have access to full services on both campuses and can combine classes from both institutions as one enrollment level for Financial Aid, scholarship, and Veteran/Military funding.

Shared Assessment & Evaluation

Another collection of institutional approaches to collaborations is proved by the Association of American Colleges and Universities (Campus Models, 2015). It has a Resource Hub presenting Campus Models and Case Studies that include studies on large initiatives in states and individual campus partnerships. Led by Christopher Cratsley and Ruth Slotnick, one of the case studies is about Mount Wachusett Community College and Fitchburg State University working together "[...] to establish shared assessment practices, faculty leadership and development opportunities, and policies related to student learning and success" . Outside

funding allowed them to provide stipends for faculty to encourage participation and have dedicated focus. During the process,"[t]hey agreed it was important to include staff members, who are often overlooked in curriculum discussions; and in this case, they decided it was especially important to involve academic librarians and advisers who had considerable contact with transfer students". The feedback on this initiative was positive, but the next stage of transfer issues was seen as more challenging by the leaders. Cratsley commented:

> You can set the stage for it with some campuses and get to a place where everyone understands the shared learning outcomes and ways of assessing them ... but translating that into policies that go beyond assessment on individual campuses to facilitating transfer between institutions is a real challenge. It's a challenge in part influenced by time and priorities—we had a great joint faculty development day, but how do I keep getting attention back to that on both campuses when there are so many other priorities for the individual campuses?

Another initiative for sharing resources is The Council of Independent Colleges Consortium (CIC, 2018) that allows members with similar curricular goals for academic quality, and a commitment to the liberal arts, to engage in online course sharing. The consortium provides the technology platform for members to access to the content. Massive Open Online Courses (MOOC's), which can have hundreds or thousands of enrolled students, with each choosing their own level of participation. The schools will leverage their individual strengths and produce two upper-level humanities courses distributed among the consortium. Opportunities outlined by the consortium are: 1) increase of online access for students; 2) support consistent course offerings; 3) avoid graduation delays; 4) accelerate graduation; 5) provide alternative meeting patterns and length; 6) revenue sharing; 7) supplement with smaller or specialized programs; 8) explore interest in new programs without the risk and cost; and 9) create a unified approach to course development.

American Association of Collegiate Registrars and Admissions Officers (AACRAO, 2006) is a non-profit professional organization that brings together higher education leaders to create best practices and standards. It collaborates with institutions to create a large library of publications contributed by and for higher education professionals and is a repository for any institution to look at when they are exploring new approaches to policy or practices. Two particularly helpful guides when considering collaborations are *A Guide to Best Practices: Awarding Transfer and Prior Learning Credit* (AACRAO 2017) and *2015 U.S. Higher Education Transcript Practices and Best Practice Opinions* (AACRAO, 2015).

Transfer Pathways

The need for smooth transfer paths has gained attention as demonstrated by College Consortium (CC), which includes the Independent Colleges and Universities of Texas Foundation, and Texas Success Center at the Texas Association of Community Colleges. The CC advertises a portal that "[...] automates articulation, application, and admissions to help students enroll in the best pathway, based on major, time, and cost for completion" (Matching Students, 2018). They currently have opportunities for pilot schools and promise the following benefits: 1) access more transfer students who have already completed their Associate Degree;

2) participate in a statewide pathway project to better serve students in Texas; 3) partner with new community colleges outside home regions; 4) securely receive all the data needed to financially package, admit, and enroll students; and 5) better meet state by granting degrees to more students with little to no debt.

The Associated Colleges of the South (ACS), is a consortium of 16 liberal arts colleges and universities that have joined to offer online and blended courses to students on any of the campuses. The process is seamless for students in that they do not have to transfer credits or exchange money between institutions. Professors on the home campus of a course deliver the class using conference facilities and students on other campuses join in the discussion. Part of their Vision 2020 Strategic Plan is to: 1) expand curricular offerings, and support faculty through cross-institutional collaboration; 2) explore more intercampus classroom collaborations nurtured by technology; 3) develop a pilot to investigate the usefulness of virtual departments among some or all of the 16 colleges, starting with a single discipline; and 4) provide opportunities for faculty to share their experiences and build collaborations.

Transfer pathways for international students in a given regional area is the focus of the San Mateo County Community College District in California. Students who successfully complete the Silicon Valley Intensive English Program are guaranteed admission into the three colleges. From there, they can transfer to other universities and colleges (SVIEP, 2019). Although SOU has a small Intensive English Program (IEP), the closest testing center is in Portland. It would be beneficial for the SOHEC to develop a more robust Intensive English Program in this region and create pathways for international students to easily transfer among and between regional schools, and beyond.

Challenges to Curriculum Collaborations

Numerous two- and four-year institutions around the country have built and nurtured transfer partnerships for decades, serving thousands of students in the process. According to the Education Commission of the States, 36 states have a transferable core of lower-division courses, 16 have common course numbering system, 31 have guaranteed transfer of an associate degree, and 15 have enacted reverse transfer legislation (Anderson, 2018). The majority of today's community college students say they want to transfer and earn a baccalaureate degree; however, more often than not, they don't. What stops them?

Transfer between colleges is popular, but has not improved despite more students wishing to transfer (Handel & Williams, 2012). Some challenges to provide seamless and supportive transfer programs include conflicting financial aid policies and practices, lack of incentives to support transfer programs, and conflicting cultures between the two-year and four-year institutions. Separate admissions processes to enroll transfer students requires four-year institutions to absorb substantial costs to analyze of upper-division preparation, and evaluate how to apply community college credits to apply towards the baccalaureate degree. Bureaucratic rules and regulations intended to ensure academic rigor, compliance with graduation requirements, and changes in content knowledge of disciplines creates confusion, and students find the transfer process too complex.

Another barrier for transfer is the cost of tuition and understanding financial aid eligibility. At four-year institutions, where part-time enrollment and excessive off-campus work is not manageable (or permitted), students believe they need to be enrolled full time to get financial

aid, but they don't (Sheehy, 2014). Some are making enrollment decisions to get money when it should be the other way around, and those who overload on classes are more likely to drop a course later, which can affect their chances of getting financial aid in the future. Starting at a community college may save money on tuition, but if a student takes too many credits at the community college, they could run out of financial aid to complete the bachelor's degree.

When considering a common course numbering system, a major challenge is updating institutional student information systems (SIS). Generally, SIS transfer tables are built for each individual institution to send and receive transcripts; then, each course is evaluated and built with either a generic equivalent or a direct equivalent; and then, each course at each institution has individual records for each iteration of that course dictated by the other institution's catalog definitions. While much effort is placed on making the transfer process seamless and efficient for students moving between the two- and four-year institutions, most programs are not perfect. The challenges outlined below (Policy Spotlight, 2015) can be addressed with active communication between colleges and high schools, faculty and staff, as well as increases in training.

1) Unpredictability of whether and when conditionally admitted students will enroll at four-year colleges, which complicates enrollment management;
2) Unclear information on or changes to degree requirements, which complicates course-taking and advising; and
3) Disincentives for institutions that receive transfer students, such as their degree completions not counted in federal calculations of graduation rates.

Resources and Operations

Housing

To address housing issues, colleges and universities have partnered with private developers to be better positioned to finance, construct, and manage residential housing and services. Although loose partnerships with third-party servicers have existed, colleges and universities have become more aware of competitive housing markets, outdated inventory, and their own financial situations, and put more quality efforts into plans for mutually beneficial arrangements for the institutions, servicers and residents. Bronstein, Taylor, & Samuels (2010). Motivations for why or how partners identify their roles is dependent upon specific needs. For example, the University of California in Riverside (UCR), California, has had increased enrollment in recent years and recognized the lack of modern, stable, and affordable on-campus housing. UCR leveraged private sector innovations and expertise to develop a master-planned community for 6,000 students on 50 acres, to be financed, designed and constructed by a private real estate firm. This partnership is projected to stabilize the financial landscape and accommodate current and longitudinal increased enrollment (La Salle, 2018).

Drexel University in Philadelphia entered into a partnership with American Campus Communities which leases property from the university, but owns, operates and markets three student housing buildings (Fang, 2017). The students sign leases directly with ACC, but the institution and developer maintain a joint advisory board that governs the services. Wayne State

University in Detroit, and the Georgia public university system, have partnered with Corvias Campus Living (NAA, 2015), to renovate and provide additional housing, but the universities maintain ownership, and market, lease, and collects rent. The role of CCL is to manage broad performance, and long-term maintenance and sustainability. Financing comes off of Corvias' balance sheet, and they operate the properties on a fixed partnership fee. The arrangements allow these two university systems to focus more on core academics, reduce students' housing costs, and increase housing stock portfolios. CCL is contracted to develop, build, manage, and maintain existing and new housing, and a reserve account from student rent payments pays for maintenance and updates.

Transportation & Energy

Transportation is a key element to physically connect people with places, and when considering geographically remote areas like southern Oregon, it is necessary to consider economical and effective means for inter-campus transportation. A successful transportation cooperative managed by Five Colleges, Inc. (Five Colleges, 2019), is a nonprofit educational corporation that manages transportation for five liberal arts colleges in western Massachusetts. Resources and services are leveraged by one or more member institutions to be shared by all, and other services are provided by Five Colleges, Inc. Another example is the California State University Transportation Consortium (CSUTC), managed by the Mineta Transportation Institute, to facilitate meaningful research and workforce development opportunities through the network of California State University (CSU) institutions. Due to the cultural and socioeconomic diversity of California, and the geographical distance between each institution, the focused effort by CSU to support affordability of, and access to, transportation throughout its educational network makes sense for dedicated transportation consortium management.

The evolution of technology in the transportation industry may be one solution to reducing fossil fuel carbon footprints as colleges and universities transition to renewable, sustainable, and clean sources of energy. Aggregated energy procurement through a consortium provides access to large projects with lower costs on average, which can also improve community relations. New York Campuses' Aggregate Renewable Energy Solutions (NYCARES) consists of twenty-one public and private IHEs in New York, including the State University of New York system (SUNY). It was formed to consider large-scale renewable energy projects (i.e. solar photovoltaic, wind, and hydroelectric). The consortium members anticipate potential shared benefits of procurement collaborations to include lower costs, mitigation of volatile prices, and to provide new research opportunities for faculty, students, and researchers (Danigelis, 2018).

A smaller energy procurement collaboration is demonstrated by the buyer syndicate model that brings together small companies or organizations interested in getting in on a deal. For example, the Massachusetts Institute of Technology (MIT), the Boston Medical Center, and the Post Office Square Redevelopment Corporation, entered a partnership where they purchase at least 60 megawatts of renewable energy from a specific solar farm in North Carolina. As a result of this project, an education program called Second Nature's Climate Leadership Network, was created for higher education partners (Donge & Haley, 2016). SOU is a member of this network and may be able to find an aggregated renewable energy agreement with other partners in the Rogue Valley, or with other state institutions.

Technology

Information-technology and communication costs continue to rise with the demand for more bandwidth, new adaptive technologies, and systems upgrades. The challenge of cost management for infrastructure, equipment, and data storage is being addressed by collaborative cloud computing services to save money, increase scalability, and retain leverage for licensing negotiations (Hignite, Katz, & Yanosky, 2010). The entirety of California's three-tiered education system, and the New York SUNY education system, created consortiums to aggregate resources for computing equipment, applications, and cloud-based services (Roebuck, 2019). Not only did they reduce costs for resources and staffing, but were able to streamline tracking students across member institutions, improve the delivery of online courses, and integrate industry expertise on campus.

Beginning in May 2020, the commercial rollout of the 5th generation (5G) of the wireless internet network is anticipated to truly revolutionize the global economy by connecting more devices, with increased speed, and low to zero latency (i.e. lag time) (Weijie, 2018). While the superficial benefits of 5G capability can be imagined for a better user experience (i.e. high-quality movies, more realistic gaming, and collaborative online sharing), it will demand increased need for knowledge, skills, and abilities to handle the more vast amounts of data, and more securely. 5G capability may one day be viewed as the harbinger for the mass adoption of blockchain technology, or decentralized super databases, with encrypted transaction content, immutable blocks to prevent hacking, and that is stored on the computers of the people who use it (Reichtental, 2017). It is also referred to as a public ledger, because even though the information is encrypted, transactions are verified by a protocol of consensus, and therefore, transparent. Blockchain technology is being heralded as the solution to many of today's challenges including those discussed throughout this paper, but with more emphasis about online security, identification, ownership verification, digital asset exchanges, and peer to peer payment protocols (Tapscott & Tapscott, 2017). With a global market capitalization of nearly $200 billion (CoinMarketCap, 2019), it has already had a reverberating worldwide impact that will become more obvious with 5G in 2020, and again with 6G in 2030.

Student interest in the topic encouraged University of Oregon faculty, Stephen McKeon, to create blockchain-based lesson plans that are offered as electives to Master of Business Administration, and Master of Finance students. "People are going to run into this technology in virtually all industries [… and giving] students a foundation is important" (Diahl, 2018). MBA programs throughout the world have integrated, or begun to research integrations, of blockchain education into the curriculum. Academic partnerships sought by Ripple Labs, Inc., a technology company that develops the Ripple ($XRP) payment protocol and exchange network (RippleNet), created the University Blockchain Research Institute (UBRI, 2019) to collaborate with small businesses and universities to develop programs and host conferences. The company provides expertise, resources, and funding for research in blockchain technology, smart contracts, and digital assets. Funding provides faculty professorships, graduate research topics, and student engagement. The collaborations are intended to prepare the next generation of professionals and increase the awareness of the transformative impact that blockchain technology will have across the globe (Ripple Partnership, 2018).

Other examples of collaborations between the blockchain industry, government agencies, and academia is the University Training and Research Initiative (UTRI), developed by by the U.S. Department of Education, Office of Fossil Energy (OFE), to fund the next generation of engineering professionals in early-stage technologies that will improve electric grid reliability and resilience. One specific area of research is "Cybersecure Sensors for Fossil Power Generation", to explore more accurate and secure sensor data processing, distribution, and payments (Energy Department, 2019). Also, Department of Homeland Security's (DHS), Small Business Innovation Research program (SBIR), partnered with Evernym, a private sector blockchain startup company, to research and develop a decentralized key management system, or an application used to protect the privacy and identity of online users (Tian, 2019).

Challenges to Resources and Operations Collaborations

Institutional collaborations for shared resources and operations can provide supply-cost benefits to all stakeholders, but cemented institutional policies and regulations, tensions between stakeholders, and aligning schedules with project timelines prove to be recurring issues. Sustainable funding in the current context of changing student demographics, initiatives to increase enrollments, and recruiting top-notch employees, seems formidable. Some institutions are bound by local regulations for what and where they can build, and limited space with a high density of residents is dependent upon resources for scalable, economical, and environmentally feasible projects. Consortium-style approaches to outsourcing, or sharing housing, facilities, resources, and operations, will continue to evolve over time, and must be addressed at the community level.

University partners in aggregated energy consortiums advise having a clear project timeline, key decision points, and established project criteria early in the process. Participants should consider what is required for each institution to benefit and includes financial benefits (reduced price risk, budget stability, reduced energy costs), location of project, retention of attributes, and academic integration. Finally, members will need to agree on the terms of contract with partners, allowing each to identify individual terms, though efficiency is better achieved if the same terms and agreements apply to all parties. Small scale renewable energy syndicate partnership challenges were reduced or eliminated by having a convener, an unbiased third party to provide consultation, and an independent broker or consultant that organizes syndicate partners, and sometimes, partnering institutions find this out late too late.

Technological consortium collaborations and other information-technology-communications partnership opportunities are many, but with unique challenges of identifying current resources, keeping up to date with technological advancements, assessing risk, and implementing a plan to address shifts in the academic, government, and industrial sectors, it is clear that new roles for SOU and the SOHEC have emerged. The upcoming co-evolution for developing infrastructure, skilled staff, and sustainable lifelong learning opportunities in this rapidly changing field magnifies the challenge. Rising above it will require a deep restructuring of existing IHE theory and practice from a techno-socio-economic perspective.

What should we further explore?

On the surface, the four SOHEC institutions complement each other very well based on individual strengths: SOU has a strong liberal arts tradition, OIT has a strong science and technology tradition, and RCC and KCC have strong practical training program traditions. A well planned and functioning consortium would benefit to draw upon these strengths and will no doubt establish a notable presence in this geographically rural region. Forging inter-institutional collaborations requires a considerable amount of planning, funding, and buy-in from everyone who will be impacted by the benefits and challenges. Shared relationships offer students an edge during and after academia, and meeting the challenges of today's learners requires patience, regular communication, commitment from all stakeholders, and rethinking the way education is delivered (Fishman, Ludgate, & Tutak, 2017). Institutions must focus on offering holistic student-centered strategies relevant to the student experience including the admissions process, support services, classroom relationships, and engagement with the broader community. It is imperative for coordinated efforts to be conceptualized, created, developed, and implemented with efficiency and sustainability.

It is clear that the most successful collaborations have multiple champions (rather than just one) who are dedicated, consistent, and visionary contributors, and an "independent" project manager, or management group that includes institutional employees, or members who are well versed in policy, operations, and procedures. Creating anchored staffing models will ensure that work will carry forward during absences, attrition, or other reasons of unforeseen circumstances. Ideally, an independent management group with the same vision and goals is necessary for successful inter-institutional collaboration (Chmelir, 2015). All of the stakeholders must be involved from the start, and therefore, all stakeholders must be identified and brought on board. The more stakeholders, the more time, patience, and diligence is required.

Collaborations are hard to sustain when adding to existing responsibilities and duties of faculty, staff, and industry professionals, rather than creating new positions. In addition to adequate funding, dedicated time and incentives for all stakeholders to focus on the project development, implementation, and progression is imperative. Release time can be helpful, but often results in backlogged work due to released staff absence. Seed funding to begin research and exploration for entering into a collaborative consortium should include setting aside reserve funding to account for resources or staff positions that were not thought of in earlier planning stages. Other themes throughout the literature are: a 'think tank' composed of interdisciplinary groups, thinking big but starting small, establishing a governance structure, incentivizing participation, making sure every partner is represented, facilitating expertise from multiple stakeholders, and providing opportunities for everyone to contribute to their own professional development. Areas of further exploration for the SOHEC consortium may include:

Industry: 1) Faculty and staff professional development incentives to engage in and integrate regional industry collaborations; 2) investigate an expanded role for Southern Oregon Research Center (SOURCE); and 3) develop a plan for effective, ongoing engagement with employers to better understand their needs and develop realistic career pathways.

Curriculum: 1) Partnership that contextualizes and interacts with interdisciplinary fields and testing of programs to ensure they offer the right skills; 2) visible, sustained interaction in the fast-moving fields, with key partners and stakeholders to remain aware of workforce needs and opportunities; 3) creative work to develop revenue-generating services that will support sustainable collaborations; and 4) long-term investment in K-12 programs.

Resources: 1) Inventory and audit of existing properties, facilities, operations systems, funding sources, etc.; 2) explore outsourcing the finance, development, and operating housing services; 3) year-round campus housing for enrolled students who intend to attend the following term, and dedicated transitional/permanent housing for employees; 4) procurement buying cooperatives for traditional and non- traditional supplies and resources; 5) blockchain technology.

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