

Project-Based Work-Integrated Learning: Engaging Youth in Ocean Industries of the 21st Century



PROGRAM EFFECTIVENESS REPORT: Examining the efficacy of the
COVE Ocean Internship Program in a virtual world

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Prepared by Dr. Sherry Scully | Executive Director, COVE Workforce Initiative | October 2020

Executive Summary

In May 2020 we launched our COVE Internship pilot on time and with 100% participation from Interns and companies - all in the face of the COVID-19 pandemic and the gathering restrictions it had imposed. In order to do so we quickly adapted our orientation and training programs, as well as the Internship projects themselves, to an online and virtual model. This Internship pilot was already a unique model that included interdisciplinary cohorts, project-based WIL (work integrated learning), peer-to-peer learning, dedicated senior Mentoring, and sprint projects, all with the combined objectives of attracting a more diverse candidate to the industry, building future skills and competencies, and raising awareness of the range of blue economy careers available to youth. This report examines the efficacy of this unique Internship model generally, and concurrently evaluates the efficacy of virtualization of the learning and collaborating experiences, a variable of the program that was unexpected and unplanned, but that required immediate, real-time adaptations to an ever-evolving scenario.

The components of the program that were viewed most positively by the Industry Hosts were the diversity of the interns themselves, the benefits to the company of having students engaged in project based learning (PBL) versus scrambling to find tasks to keep them busy, the initial and ongoing support from COVE, the ability of the students to self-manage, and the flexibility of all involved to adapt to a virtual and online format. All of the Hosts indicated that, if they were in a position to hire, they would offer a position to one or more of the interns. Indeed, 5 interns were offered positions with a Host following the internship pilot.

The interns provided the most positive feedback on their experiences at COVE, noting the project-based learning, the multi-disciplinary teams, and the opportunities to network with other industry members and broaden their awareness of the industry as the highlights of the WIL experience. Nine out of ten Interns indicated that, based on their experiences with COVE, they would be interested in pursuing a career pathway in the ocean industry.

The Mentors cited their interactions with engaged youth, the opportunity to provide technical coaching, and the opportunity to be part of something ‘new’ as the highlights of their experiences. All of the Mentors indicated that they would recommend one or more of the Interns that they worked with, for employment following the pilot, and all of the Mentors indicated that they would like to participate in future Internship programs in the role of Mentor.

The full report provides a detailed description of the COVE Internship pilot program, including its strategy and objectives, and its unique features. It summarizes the findings, captured through observation, survey and interview data collection, related to the efficacy of the program against a range of variables, including learning and skill acquisition, building industry awareness, impact of peer-to-peer learning and dedicated mentoring, impact of project-based learning, and the benefits of interdisciplinary cohorts. This study also pursues a serendipitous line of inquiry by examining the efficacy of a virtual WIL program, as the pilot was launched during the unexpected and very uncertain conditions of a global pandemic (COVID-19).

As a not-for-profit with a key mandate of workforce development for the future of Canada's marine industry, sharing our research, insights and recommendations is central to our purpose. Through this work we hope to not only share our findings, but also connect with others with whom we can engage in future collaborations.

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The Current Context for Internship in the Canadian Marine Industry

The marine industry is suffering from perceptions that linger across the country regarding careers in the marine industry. Research conducted at the Centre for Ocean Ventures and Entrepreneurship (COVE) by the COVE Workforce Initiative (COVE WI), a special project at COVE that focuses on workforce development across the national marine industry, provides some insights into the character and sources of these enduring misperceptions. This research has shown that youth, parents, and teachers, as well as experienced workers in analogous industries, share dated notions of the marine industry that are bound to traditional sectors (i.e. Navy, commercial fishing), and that are characterized as involving dirty, cold, dangerous, dull, and labor-intensive (versus creative/cognitive) work. Additionally, a long history of boom and bust within these traditional industries have reinforced the belief that any ocean career is unstable, unpredictable, and likely to disappear again. These negative perceptions impair the ability to recruit new workers, and particularly a diverse range of talent, to the marine industry, as our research has shown that parents, teachers and other relevant role models actively coach youth away from these pathways.

The industry, with its heavy reliance on skilled trades and technology workers, is also hampered by a 'prestige' bias that privileges traditional (i.e. academic) education pathways, drawing top talent away from high demand trades and tech roles. This bias has been identified in our research in youth as young as grade 6.

As part of a strategy to elevate the perceptions and status of ocean careers, the COVE Internship Pilot program has endeavored to leverage the curiosity, interest and growing awareness of the Blue Economy that is emerging in relation to the growing visibility of COVE, the Ocean Super-cluster, and the UN's Decade of Ocean Science. As we see an already lively marine sector accelerate and labor for prominence, we are able to take an innovative approach to work integrated learning (WIL).

Traditionally it has been difficult to run a successful Internship program within the ocean technology industry in Atlantic Canada, and the challenges have existed on both sides of the employer/intern equation. A study¹ of co-ops in the ocean technology sector investigated this challenge and reported several key insights, including:

¹ Naylor, Anna. (May 2018). A review of co-operative education placements within the Marine Industry. Institute for Ocean Research Enterprise (IORE). Halifax, Canada.

- the ubiquity of (student/parent) perceptions of a dated industry left few students seeking these opportunities;
- employer reluctance to take on the responsibility of Mentoring a student for a continuous 4-month period;
- the administrative burden of recruiting students and completing assessments/paperwork (i.e. most organizations operating in the marine industry are very small-medium in size and lack the capacity to ‘release’ one employee to a Mentoring or supervisory role, especially for up-front orientation and training);
- absence of strong (or any) HR support to conduct interviews and establish development plans for youth;
- employers not sure how to identify ‘good talent’ among youth candidates who do not possess the customary certification or experience they look for;
- concerns that students would lack basic skills and knowledge needed to contribute value during the Internship;
- challenge of finding enough work to ‘keep Interns busy’ for duration of Internship (i.e. project cycles often don’t align with the 4-month co-op model; much of the work is too highly-skilled for untrained Interns to participate in). This is coupled with the assumption that all work must be entirely ‘engineering’ or design/production oriented, and must have strong alignment with students’ courses of study;
- lack of strong ‘learning culture’ in many organizations which relates to reluctance of critical employees to assume a Mentoring role;
- the assumption that companies can only recruit Interns from engineering/technology programs; failure to recognize opportunities of recruiting students with broader range/mix of skills and education;

Additionally, in discussions with ESDC regarding adoption of a federally funded WIL program for the ocean tech industry we concluded that it was not a good fit², as it did not address the above-mentioned challenges, and the scope of participation (100+ Interns) was far too ambitious for this industry, where current co-op participation is barely in the double-digits. As well, the requirement for funding to be assigned to ‘incremental co-ops’ would not serve an industry that struggles to absorb a single co-op at a time within each company. Finally, despite the financial incentives to hire under-represented workers, the Federal WIL program, which prioritized students in STEM programs, did not resolve a key hurdle, that many under-represented workers are still not pursuing traditional STEM pathways into the marine sector, and thus are not able to benefit from this funding. Helping companies to consider a broader range of potential Interns (i.e. from STEM as well as non-STEM programs; from community colleges and institutes of technology/art & design, as well as University programs) will help provide new points of entry for non-traditional workers and socialize industry to the benefits of diversely-skilled workers.

Diversity and Inclusion are central to our mandate for workforce development in the national marine industry. Engaging under represented workers is a key objective of our research and program development. The Internship pilot that is the subject of this study, was developed with diversity and

² The version of the ESDC WIL (SWILP) program that existed in 2018/2019.

inclusion as key objectives and success metrics. We hypothesize that this project will demonstrate that strategic hiring for diversity can have a positive impact on the industry by;

- growing diversity of the workforce;
- socializing employers to the benefits of a more diverse workforce;
- building networks and allies of under-represented workers within the industry;
- and, accelerating growth and innovation by introducing new entrants with diverse perspectives, education and experiences into an increasingly collaborative environment.

The following report provides a detailed description of the COVE Internship pilot program, including its strategy and objectives, and its unique features. It summarizes the findings, captured through survey and interview data collection, related to the efficacy of the program as evidenced by a range of variables and constructs, including;

- mitigating barriers to entry for under-represented workers,
- developing essential future skills and competencies,
- facilitating peer-to-peer learning and collaboration,
- innovation and creativity benefits of interdisciplinary teams,
- building awareness of the industry,
- developing an essential network within the industry,
- socializing employers to a more diverse candidate,
- facilitating knowledge transfer among and between employers, supervisors, Mentors, Interns and peers,
- and effectively mimicking the work-place-based WIL experience through a virtual collaboration and work experience.

This report will contribute to the growing bodies of research and literature relating to effective new WIL and PBL models for engaging youth, cultivating 21st century skills and competencies, attracting more diverse range of candidates to participate in Canada's future industries, and onboarding and integrating new-to-role employees into virtual workplaces. This report will also provide recommendations for the next iteration of the COVE Internship model; a model that can be replicated and scaled across the Canadian Marine Industry, as well as within other analogous industries.

Serendipitous Lines of Inquiry

COVID-19 presented a unique challenge to running an Internship project, yet the opportunities for building key future skills like resilience, adaptability, virtual collaboration and more were undeniable. This study advances our goals of building knowledge and contributing to wider social benefit by examining the efficacy of a novel, evidence-based approach to Internships that was designed to be emphatically future-skills focused, to address the workforce needs of the ocean industry, and with consideration for the career access needs of a more diverse but under-represented workforce. This Internship, already novel in so many ways, became itself an example of resilience and recovery as we pushed forward and found creative ways to proceed virtually and remotely in an industry that is very traditional and workplace-based. Insights from this pilot can help inform the development of future Internship programs, to have greater impact and wider reach, and can help inform the best-practices for the future of work where that work is simultaneously increasingly collaborative and increasingly virtual.

Background

The ideation for the Internship pilot was grounded in several industry studies, including; Scully, S. (October 2015), *The Challenges, Needs and Opportunities for strategic workforce development in the greater marine industry*, which highlighted the significant workforce gaps and lack of diversity across Canada's marine industries, as well as the need for more work integrated learning experiences for youth to raise awareness about the range of Blue Economy careers available, and connect the industry to domestic talent. Additionally, Scully, S. (June 2017), *Ocean Technology Sector Study: Competency Assessment and Workforce Study*, highlighted the gaps and high demand future skills and competencies in the ocean technology sector, combined with the absence of talent management strategies for recruiting for future skills. Finally, a report by Naylor, Anna. (May 2018), *A review of co-operative education placements within the Marine Industry*, highlighted significant barriers to participation (for employers and Interns) in Internships in the marine industry such as; the ubiquity of (student/parent) perceptions of a dated industry that has resulted in few students seeking these opportunities; employer reluctance to take on the responsibility of Mentoring a student for a continuous 4-month period; the administrative burden of recruiting students and completing assessments/paperwork; and the absence of strong (or any) HR support to conduct interviews and establish development plans, as well as employer uncertainty about how to identify 'good talent' among youth candidates who do not possess the customary certification or experience they look for.

Addressing the Challenges and Proposing a new Solution

The COVE Internship Program was developed to address each of the aforementioned challenges and the misalignment of the Federal WIL programs with the key workforce development objectives that COVE established to meet the unique needs of the marine industry.

Key Stakeholder Groups

This report summarizes the feedback from three key stakeholder groups who participated in this pilot; the **Interns**, the host companies with whom the Interns worked for their 7-8 week sprint projects (referred to in this report as the **Hosts**), and the **Mentors**, who provided volunteer support to each interdisciplinary team on their respective sprint projects.

Primary Objectives of the COVE Internship Pilot Program

The COVE Internship program was launched with several ambitious objectives in mind, including;

- To provide a high-quality career building experience that has academic and experiential benefit for youth;
- To reach a more diverse range of students, (with diversity relating to racial/cultural, gender, education, age, experience;)
- To provide a high-quality WIL experience that benefits local industry, that builds awareness of the benefits of a broader range of talents, and that facilitates workforce recruitment and retention;
- To provide robust WIL opportunities to a more diverse range of future candidates;
- To elevate awareness of career options across the ocean technology industry and the Canadian Blue Economy;
- To apply an innovative approach to recruitment and selection of intern candidates;
- To build a robust WIL experience for Interns and employers (Hosts) alike.

The COVE Internship Program Model

This model (see Table 1: Summary of Key Features of the Ocean Internship Program) was developed with COVE in a central role, functioning as both the employer of the student Interns and the administrator of the program itself. In this role, COVE hired a cohort of 10 interdisciplinary students representing varied pathways (i.e. University, Community College, co-op and non-co-op programs) and programs (i.e. traditional ocean STEM programs including engineering, and

computer science programs), as well as non-traditional programs including social sciences, business and commerce programs, and art, design and technology programs.

We had intended to create a competitive audition opportunity that is inspired by a School 42 pedagogical model, the IBM CSC (Corporate Service Corp) model, and by the ‘hack-a-thon’ phenomenon that would have involved a 2-day intensive audition where creative individuals from across programs (i.e. business, engineering, IT, design, humanities) and across post-secondary institutions (PSIs) would have come together to work in collaborative, interdisciplinary teams, to work through a series of simulations and problem-solving scenarios. The intention was to observe individuals as they worked on teams on a tangible and authentic problem-solving challenge to identify those who excelled according to a set of critical competencies that are essential in emerging ocean careers. These competencies include technical, digital, numerical, communication, critical, analytical, computational and divergent thinking, and collaboration skills – or future skills. Our timelines became shortened due to several factors, and as a result, we opted for another approach that would still enable us to identify a broad range of talent, anchored in a deliberate diversity strategy. This strategy employed a broad definition of diversity to include gender, experience, education pathway, culture, age, and race.

Interested students submitted an application, their resume, and a short video (that responded to prompts), that helped reviewers to assess; communication skills, curiosity, previous work experience, ability to apply and reflect on application of learning, teamwork and critical contributions, and other essential 21st century skills, as well as technical skill and knowledge.

Prior to entry into any of the participating organizations, COVE provided 35 hours of onboarding training in workplace skills, health and safety, industry orientation, ideation and design-thinking, and basic consulting and project management strategies.

Students were deployed to companies for project-based WIL in interdisciplinary teams of 3-4 where they tackled a pre-determined project (submitted by companies ahead of time), and where each intern contributed skills in engineering, computer science, business, marketing and communications, or design and technology. This combination of skills meant that each team brought a holistic approach to the project, and it provided opportunities for peer-to-peer learning. Much evidence exists for the benefits of using project-based learning (PBL) where a real problem or initiative is used as authentic provocation for learning on the job. This project-based Internship involved participation in at least two sprint (7-8 week) projects over the 4-month period, and enabled Interns to gain exposure to at least two different companies or ocean careers (i.e. including start-ups and established companies or organizations).

Throughout the project cycle, teams and individuals received weekly in-house supervision from the host sponsor, Mentoring from a senior industry partner assigned to each group, as well as dedicated supervision from the COVE management team. In these meetings the mentors/supervisors discussed workplace issues/insights, project strategy/guidance, technical challenges, team challenges/insights, etc. The intention of this Mentoring model was to ensure strong alignment between the participating companies and the host (COVE), and facilitate project and individual success (see Table 2: Anticipated Benefits and Outcomes of the Internship).

Table 1: Summary of Key Features of the Ocean Internship Program

Diversity Strategy and Interdisciplinary Cohort	<ul style="list-style-type: none"> • Provide access to a broader range of diverse talent • Hosts will have first access to top talent in the region and have a chance to 'try out' a non-traditional hire (e.g. non-engineering, non-ocean STEM; racial/cultural/gender/age diversity) • Provide access to under-represented workers who might not otherwise consider our industry; or who might not otherwise find a point of entry into the industry • Implement an explicit strategy that prioritizes recruitment of diverse, qualified talent
Competitive Audition	<ul style="list-style-type: none"> • COVE conducted all recruitment and screening of Interns • Initially the recruitment strategy was intended to include a competitive audition that would include an experiential activity that would permit observation and assessment of a range of competencies (academic, technical, socio-cognitive, interest, self-direction, coachability). Shortened timelines did not allow for this • Interns submitted traditional applications and CVs as well as individual videos that profiled each intern with respect to the above-mentioned competencies
Orientation: Pre-deployment Training and Development	<ul style="list-style-type: none"> • COVE provided upfront workplace readiness training (including safety training, industry orientation, workplace skills, project preparation, project management and consulting, and Design Thinking) • The mandatory orientation program was implemented virtually (due to Covid) during the first week of the Internship program, and involved 35 hours of instructor-led, Mentor-led, supervisor-led, or team-led learning • The orientation week was designed to reduce the on-boarding burden for Hosts and minimize the non-productive time on the job

4. Project-Based WIL	<ul style="list-style-type: none"> Participating companies (Hosts) submitted a project proposal prior to acceptance into the program as a Host. Projects were sprint, with scope and objectives that could be completed within (7-8 weeks). COVE helped in the formulation of those proposals Project-based learning (PBL) offered a broader range of practical experiences, and provided an opportunity to work on a project from start to finish Created an opportunity to undertake a project outside of the traditional co-op scope (i.e. projects didn't need to be limited to course of study of a single student)
5. Peer-to-Peer Learning	<ul style="list-style-type: none"> COVE deployed interdisciplinary groups of students to participating businesses for project-based learning The interdisciplinarity of the teams meant that rather than working with peers who think like alike and draw on similar experiences or knowledge, our Interns were exposed to peers who brought very different backgrounds, perspectives and ideas. The intention was to create the conditions where Interns can develop a more integrated understanding of the issue, the opportunity and the range of potential approaches
6. Continuous Mentorship	<ul style="list-style-type: none"> COVE assigned each project team a senior industry Mentor who met with them regularly (weekly) throughout the project period for ongoing guidance, project management support and technical support COVE provided weekly supervision from the Manager of Learning Programs Hosts provided weekly (or more often) supervision and Mentoring from an in-house supervisor Interns tracked progress in weekly progress reports that were submitted to the COVE management team for review
7. Industry Exposure and Network Building	<ul style="list-style-type: none"> Interns work with two different companies on at least two separate sprint projects Exposure to a variety of ocean-based industries/careers, and access to a wide network of industry Mentors and connections It was intended that the Interns would have significant opportunities to connect with employers and members of the COVE community and of the broader ocean technology community. COVID-19 restrictions limited these opportunities, however we did create several virtual (and a few distanced, in-person) networking opportunities

Table 2: Anticipated Benefits and Outcomes of the Internship

Benefits to Interns	Opportunity to build awareness of a broader range of career options; opportunity to develop further 21 st century skills while working with an integrated team; opportunities for self and peer teaching/learning; opportunities to develop workplace experience; opportunities to participate in several different workplace projects during an Internship; opportunities to interact with leading experts in the industry and benefit from Mentorship; broaden personal skillsets, knowledge and experience; opportunities to explore a range of ocean careers to build career literacy.
Benefits to Hosts	Hosts will receive a group of students with a specific mandate/project to work on during their Internship; the teams will arrive with pre-training on workplace skills and expectations which will minimize the non-productive time on the job; teams will be largely self-regulating and monitoring and will require less-intensive supervision (although supervision will always be required); teams will be able to provide an integrated and interdisciplinary approach to their projects; Hosts will develop their own teams internally through Mentorship; the timely process of interviewing and screening applicants will have been done for Hosts, and they will have first access to top talent in the region; Hosts will benefit from the ongoing Mentoring provided to Interns from COVE leaders; small businesses will benefit from exposure to a more diverse range of employees.
Benefits to industry	Elevate the status of the industry by introducing an innovative and exciting audition process and work experience; the industry will benefit from elevated awareness and potential youth champions. Once this model is developed and refined, it can be scaled across the ocean super-cluster, which will amplify its impact

Implementing the Pilot

In May 2020 we launched our COVE Internship pilot on time and with 100% participation from Interns (10) and companies (6) - all in the face of the COVID-19 pandemic and the gathering restrictions it had imposed. In order to do so we quickly adapted our orientation and training programs, as well as the Internship projects themselves, to an online and virtual model. Over the first 8 weeks, the Interns participated in a full week of orientation and onboarding, virtually, followed by their first 6-7 week sprint project, which was conducted via virtual working platforms. In July and August, the Interns were shuffled to new teams and new sprint projects, and with easing COVID restrictions, were eventually able to interact with their host companies and their peers in person, with a flexible combination of virtual and small-group on-site work for part of the project.

Evaluating Program Effectiveness

Gathering the Data

This qualitative study collected data from three key stakeholder groups who were directly involved in the Internship pilot (Hosts, Mentors, Interns) through online survey combined with one-on-one interviews. The survey tools and the interview protocols were developed by the principle investigator. Data was collected at the mid-way (week 7-8) and at the conclusion (week 16) of the Internship program.

The online surveys evaluated immediate (short-term) perceptions of;

- the learning environment,
- efficacy of the interdisciplinary model,
- benefits of the Mentoring contribution,
- technical contribution to the project,
- relevance of Host's project,
- benefits of peer-to-peer learning;
- efficacy of team management and communication;
- efficacy and relevance of orientation program and ongoing management;
- likelihood of pursuing a career/young diverse talent in the marine industry

Open-text prompts solicited comments relating to the overall reactions to the Internship experience, and self-reporting on technical and personal effectiveness skill acquisition.

Analyzing the data³

The learning environment

Assessments of the learning environment ascertain the degree to which the conditions for effective learning have been created. This includes establishing a warm and welcoming work environment (made more difficult by the pandemic conditions and the virtual work environments), as well as communicating expectations and workplace norms (achieved through the orientation program). This also includes setting work expectations that are relevant and challenging but achievable

³ Among our Host respondents we had one outlier who responded 'disagree' or 'strongly disagree' for every Likert-type response category. During a one-on-one interview with this Host, they communicated that they thought the pilot was a success, they were extremely happy with the experience, they planned to (and did) hire 2 of the Interns following the pilot, and they expressed an interest in participating in future Internship programs at COVE. This is highlighted to identify the inconsistencies between the survey and the interview data, as well as the outlier data relative to the other responses.

(100% of Interns felt this had been achieved), communicating a project purpose and parameters that were clear and understandable (100% of Interns felt this had been achieved), and establishing milestones that were practical and achievable in the given timeframe (90% of Interns felt this had been achieved).

Intern responses showed that 80% of them felt the project was well-paced with sufficient time to complete the objectives that were set. Conversely, only half of the Mentors and Hosts felt the project was well-paced with sufficient time to complete the objectives that were set. It is important to note that the objectives for the projects were set by the Hosts at the outset of the project, with an awareness of the timeframe (i.e. 7-8 week sprint projects). Half of the Mentors neither agreed nor disagreed which suggests that they weren't well-informed about the overall objectives or the pace at which the teams were expected to work.

All Interns and all Hosts (except one) felt supported and well-informed throughout the Internship process. Conversely only 25% of Mentors indicated that they felt this support, highlighting a gap in the support network that failed to extend to the Mentors or that assumed greater independence than was wanted.

Efficacy of the interdisciplinary and peer-to-peer learning models

Participants were asked to reflect on the extent to which the project and the Interns themselves benefitted from the range of skills, experiences and perspectives that were brought together through the interdisciplinary model. Both Hosts and Interns, and most of the Mentors felt strongly that this offered great benefit. One Mentor was unaware of the impact, as they indicated that they tended to interact with only the team leader, and thus did not have first-hand observations of the team interactions.

A key objective of the interdisciplinary design of this Internship program was the anticipated peer-to-peer learning that would occur in an authentic project-based learning situation. Hosts, Mentors and the Interns were unanimous in their reports of the positive and evident benefits of interdisciplinary team and peer-to-peer learning that occurred. Similarly, all of the Interns reported learning new skills and perspectives from their team mates.

Benefits of the Mentoring contribution

Mentors were identified to work with each team of Interns for the duration of the 7-8 week projects. Selection of Mentors prioritized technical knowledge in the area most relevant to the project, though Mentors also contributed project management support and industry knowledge. Hosts approved the Mentor selection.

Among both Mentors and Hosts, 75% felt that the Interns responded well and quickly to feedback, which benefited their learning and the project overall. Most Hosts felt that the Mentor was knowledgeable and brought relevant experience, and one employer wasn't sure. Similarly, most Hosts felt the Mentor provided useful advice and feedback to the Interns, but one employer wasn't sure, suggesting that there was a gap in interactions between one employer and their Mentor.

Mentors and Hosts reporting that they had learnt things from their interactions with the team of Interns. All but one employer agreed or strongly agreed that the project and the Interns benefited from the participation of the Mentor, however none of the Hosts felt the Mentor effectively liaised between the employer and the team. This highlights a gap in expectations about the respective roles of Mentors and Hosts in this pilot.

All of the Interns reported that the employer and supervisor were readily available and approachable when needed, that the employer and supervisor provided useful and timely information and feedback, and that they learnt and developed skills as a result of interactions with the employer and supervisor. The Interns also felt that the employer and supervisor helped to connect them with a broader network in the industry, despite limitations to traditional networking events and gatherings imposed by COVID.

Technical contribution to the project

All of the Mentors, and all Hosts (except one) felt the Interns arrived with an expected level of technical and personal effectiveness skills. This speaks to general understanding and aligned perceptions among most Hosts and Mentors of the expected level of skills that Interns bring. Similarly, all of the Interns themselves felt that the project made effective use of their respective skillsets. This suggests that the projects were targeted at an appropriate level for technical skills and were written to leverage the range of skills that were manifest in an interdisciplinary team (or that the Interns were effectively hired to match the requirements of the pre-submitted project proposals). The Internship also provided an opportunity for the Interns to develop and apply industry relevant skills, and all groups (except one host) felt that it was evident that this had occurred during the pilot.

Efficacy of team management and communication

A central feature in the design of this Internship program was the expectation for greater self-management of the team. While the teams were given weekly support from an assigned Mentor, COVE supervisor, and host supervisor, the day-to-day management of time, schedules, division of work, prioritization of tasks, and meeting management was left to the intern teams to self-manage. All of the Interns, Mentors and hosts (except one) felt they were effectively self-managed, and that they were able to establish clear and relevant roles on the team.

All of the Interns and Mentors felt that the Interns were able to deliver on the project within the desired scope and parameters, and met expectations for quality and value. Two of the Hosts disagreed with this, however during follow-up interviews it became evident that the scope and parameters for those projects were not as well established at the beginning of the projects, and the deliverables and timeline were more fluid throughout the project period. Those same two Hosts felt that the Interns required more support in the management of the project than initially expected.

All three stakeholder groups (except two hosts) agreed that the teams were able to self-manage effectively. One host shared the following feedback with regards to the self-management of the team; *"We learned that we should have supported the students more early on. We took the approach that with the new skills that we would see what they could produce so we wouldn't influence new creativity. I believe that ended up not helping them but holding them back. That error was on me. I hope for the students' purpose that it worked out for them for real world experience."*

All of the Interns felt that they shared equally in workload and effort, even if they performed different tasks/roles, but only 25% of Mentors and half of Hosts agreed with this. This difference in perception of the division of effort may be attributable to the virtual environment, where typically one team member tended to handle meetings and interactions with Hosts and Mentors, reporting back to their teams. This may have resulted in the contribution and expertise of one or a few being more evident than that of the rest of their team.

Efficacy and relevance of orientation program and ongoing supervision

A full 35-hour orientation program was delivered, virtually, to provide an introduction to COVE and to the ocean tech industry. This program also covered workplace skills and expectations, a health and safety overview, the design thinking methodology, consulting and project management skills, and orientation to the host companies. During this week the Interns met their Internship teams as well as the COVE team, and had time to meet with their employer and their Mentor to review the

project proposal and begin developing a project roadmap, strategy and weekly milestones. All aspects of the orientation program were adapted to a virtual, online setting, and all program components were included, despite the abrupt shift to an online model.

All of the Interns, and all of the Hosts (except one) reported high value in the orientation week, and the Interns felt they had received effective ongoing supervision throughout the Internship period. Half of Mentors reporting not being sure if the orientation week was effective, which suggests they weren't aware of what was covered in advance during that week. Open-text feedback from one of the Interns expressed an interest in having even more orientation programming throughout the Internship; *"It would be nice to have more skill building sessions like we did during the first week, throughout the term. Maybe biweekly or once a month. Gives a chance to interact with the broader group and learn more outside of the project work."*

One employer commented, *"I don't think as a company I did enough early on to go over basics company expectations. I think because of Covid this spring, it made for some confusion of what was expected."* This highlighted an unexpected consequence of providing a general orientation to the intern cohort, which resulted in some hosts not providing an introduction to the unique culture and expectations of their own company. At the same time, Covid restrictions imposed limitations on in-person gatherings for the first two months, and some Interns were reticent to switch back to working on-site during the last two months, despite those restrictions being lifted. This resulted in some confusion about the requirement/option of continuing to work from home, and left some Interns with the expectation that they could set their own hours rather than adapting to the standard working day observed by their respective companies.

Benefits to the Host Organization

Among all three reporting groups there was complete consensus (100%) on the relevance of the project to the host companies, and all felt that the milestones were practical and achievable. In response to open-text prompts, hosts identified key skills/knowledge that their organization gained from interacting with the Internship team, including ; "Skills we do not have, marketing, design, planning, the team was able to explore problems the organization did not have skill or capacity to execute."

Discussion, Insights and Recommendations

The following summarizes key insights drawn from observations and anecdotal feedback throughout the Internship pilot, as well as insights drawn from the formal feedback reported from all three stakeholder groups.

1. Hosts

Feedback from the Host companies indicated that, overall, they were thrilled with the internship program. For one of the Hosts, this was their first foray into WIL with students, and they, as the others, expressed a strong interest in participating in future programs. The components of the program that were viewed most positively were the diversity of the interns themselves, the benefits to the company of having students work on projects (PBL) versus scrambling to find tasks to keep them busy, the initial and ongoing support from COVE, the ability of the students to self-manage, and the flexibility of all involved to adapt to a virtual and online format. All of the Hosts indicated that, if they were in a position to hire, they would offer a position to one or more of the interns. Indeed, 5 interns were offered positions with a Host following the internship pilot.

Program areas that are recommended for modification to improve efficiency or effectiveness with the Hosts include;

- a. **Project proposal development.** It became evident that the project proposals that were most robust and well-developed allowed the interns to meet expectations for timelines, milestones, scoping and deliverables. Those that were less well-developed, resulted in more confusion, scope creep, and took more time to initiate activity and engagement. Some of the projects were more engineering focused, and as a result the engineering students were able to contribute disproportionately to the work. More coaching and support is recommended to help Hosts to understand suitable scope that aligns with the timelines and with the intern capabilities. Some companies were challenged to find short duration projects that were not entirely dominated by engineering, so that the interdisciplinary skills of the team members could be contributed and leveraged. It is recommended that COVE provide more support in cultivating multi-disciplinary projects. This support can come from two sources; first from a well-designed project proposal application that employs good prompts and a strong framework for organizing the proposed PBL. Secondly, more coaching from the COVE WI team during the project proposal phase to ensure the Hosts understand the intended multi-disciplinarity of the program and design the project with multiple roles in mind. This will also help to identify key competencies and technical skills for recruitment from the intern candidates, and will clearly establish the scope and parameters for the projects. The potential challenge with this recommendation is that it does require more upfront work from the Hosts, well in advance of the actual project being initiated. Some Hosts communicated that their operations are so busy, that it was difficult to anticipate and ideate around a project that wouldn't occur for 6 months. It is hoped that the benefits of this advance work will excuse the effort, and that potential Hosts will not be dissuaded from participation.
- b. **Orientation and Onboarding.** While a robust Orientation and Onboarding program was developed and delivered by COVE, the intention of this program was to provide basic training in key workplace skills and

expectations and in health and safety. Students were also trained in essential skills relating to design thinking, consultation, and project management – all skills that would help them to manage their respective projects more independently and effectively, and approach the PBL from a creative and critical thinking perspective. Interns were also given an overview of the industry that would provide more context for the projects and companies they were working with. The intention of this orientation program was to address many of the generic administrative and onboarding tasks and concepts on behalf of the Hosts, and set expectations for the coming weeks. An assumption was made, but was not explicitly stated, that the Hosts would in turn, conduct their own brief orientation to their companies that would outline their own, unique expectations. For some hosts, this did not occur, which resulted in a misunderstanding of expectations early on. One Host commented, “*I don't think as a company I did enough early on to go over basics company expectations. I think because of Covid this spring, it made for some confusion of what was expected.*” This highlighted an unexpected consequence of providing a general orientation to the intern cohort, which resulted in some hosts not providing an introduction to the unique culture and expectations of their own company. Going forward, COVE will provide a resource summarizing the onboarding that is delivered to all interns, and outlining additional orientation that should be conducted separately by the Host.

2. Interns

The interns provided the most positive feedback on their experiences at COVE, noting the project-based learning, the multi-disciplinary teams, and the opportunities to network with other industry members and broaden their awareness of the industry as the highlights of WIL experience. Five of the interns were offered employment with Host companies following completion of the internship, and 9 out of 10 Interns indicated that, based on their experiences with COVE, they would be interested in pursuing a career pathway in the ocean industry. Only one intern indicated that based on their experience, they realized that this is not a career path they are interested in pursuing. This is a very positive outcome of the program. A key mandate at COVE WI is to raise awareness of and exposure to the marine industry. With this in mind, it is regarded as a positive outcome if youth give consideration to the careers in the marine industry, even if they decide it is not for them. For too long youth have been dismissing the industry without any experience or consideration, and thus an informed ‘no’ is far preferable.

Program areas that are in need of modification to improve efficiency or effectiveness with the Interns include;

a. **Additional and ongoing training and development.** The interns enjoyed the onboarding content, but found the volume of new learning that occurred in the first week to be significant. Once the new Hosts and their projects were introduced, it became challenging to integrate so much new learning. One Intern commented, “*It would be nice to have more skill building sessions like we did during the first week, throughout the term. Maybe biweekly or once a month. Gives a chance to interact with the broader group and learn more outside of the project work.*” It is recommended that the Onboarding and Orientation program be rolled out over 8-10 work days (instead of 5) to facilitate greater absorption and integration of learning, and to provide a Host and project context in which to anchor the new learning. It is also recommended that 4 additional training experiences (1-2 hours) be provided throughout the Internship term to help advance learning and to encourage active peer-to-peer learning.

b. **In-person versus Virtual onboarding.** We were able to swiftly adapt our orientation and onboarding program to a virtual and online format, in response to the COVID restrictions, which allowed us to launch on time and deliver on our training commitments to the Interns regardless of location and geography. And while all deliverables were achieved, the impact of virtual training was far less than could have been achieved in an in-person setting. Virtual platforms are good but imperfectly mimic the types of in-person interactions that help to build the essential team cohesion and familiarity that is needed to launch high performing teams. Going forward, with the assumption that interns can safely gather in small teams, it is recommended that the original, in-person format be used for orientation, onboarding and for team PBL.

c. **Leadership Roles.** As the multi-disciplinary teams identified roles and responsibilities, some students emerged into critical leadership roles. While the projects progressed in the relative social vacuum of the virtual platforms, these roles were rarely or never refreshed, meaning that on each team, one Intern cultivated their leadership skills, while the others missed out. It is recommended that teams intentionally cycle through key roles (including Leadership, but also other key roles), so that each intern has an opportunity to develop essential competencies, rather than remain in their default roles.

3. Mentors

The Mentors provided highly favourable feedback on the Internship pilot, citing their interactions with engaged youth, the opportunity to provide technical coaching, and the opportunity to be part of something 'new' as the highlights of their experiences. All of the Mentors indicated that they would recommend one or more of the Interns that they worked with, for employment following the pilot, and all of the Mentors indicated that they would like to participate in future Internship programs in the role of Mentor.

Program areas that are in need of modification to improve impact of the Mentoring role include;

a. **Full team engagement with Mentors.** On most of the teams, the groups chose to identify one member to interact with the Mentor. They may have been done, as part of their 'identifying roles and responsibilities' task, to streamline communications for the efficiency of the project, but the unintended negative effect was that the other individuals missed out on the benefits of mentorship. The objective of having dedicated senior Industry mentorship was to provide deep technical expertise, but also to provide general industry guidance and network access, and one-on-one counsel. It was felt that the Interns did not make full use of their Mentors as a resource, and some did not engage individually with their Mentors at all. This was exacerbated by the virtual platform that permitted individuals to 'participate' with their cameras off and their microphones muted, leaving the responsibility of the conversation to a single team member. It is recommended that all team members be required to attend weekly Mentor meetings, either in person (ideally) or virtually, and that all team members participate, coming prepared contributing questions, project summaries, and ideas to the discussion. A team leader will be permitted to represent the team for scheduling interactions, but the full team will engage in the mentoring process, as this is an essential part of the peer-to-peer learning, and individual development processes.

b. Improved Support and Communication from COVE. While all of the Interns and Hosts (except one) felt supported and well-informed throughout the Internship process, only 25% of the Mentors reported this to be the case, highlighting a gap in the support network that failed to extend to the Mentors or that assumed greater independence than was wanted. Similarly, several of the Mentors reported being unsure about the scope and milestones for the projects they were advising on, and none of the Hosts felt the Mentor effectively liaised between the employer and the team. These findings highlight several gaps in communication about the expectations and role of the Mentors in this pilot. And ownership for this gap in communication falls squarely on the shoulders of COVE. It is recommended that COVE fully document the role of the Mentor (see Recommendations 4a. Roles and Responsibilities), and lead an orientation session with the Hosts and Mentors prior to commencement of the Internship program, to outline their respective roles, expectations, and how they can best liaise to support and advance the Interns and the project. Additionally, it is recommended that the COVE program manager proactively connect with the Mentor and the Host together on a weekly basis to solicit feedback on how the respective teams are working, on any challenges or issues that are arising, and to ensure that the teams are receiving all the support and resources needed to meet each milestone of the project. These meetings can be brief but impactful, and will ensure ongoing communication among the stakeholder groups,

4. Project-Based Learning and Networking

This Internship Pilot Program was designed with a project-based learning (PBL) pedagogy in mind, as it would provide the most authentic provocation for learning, and would in-turn relate the most genuine Industry experience. This would also invite the most integration into the Ocean Industry network, thus building awareness and exposure to the breadth of the industry and the key players within. All three stakeholder groups provided highly positive feedback about the PBL approach, and agreed that the efforts to mimic the project team activities via virtual platforms was effective. Conversely, most found that the opportunities for networking were limited or entirely hampered by the remote working requirements, and even once teams were permitted to gather in small, in-person groups, the opportunities (and interest) to do so were few and slow to gather speed.

Program areas that are in need of modification to improve impact of the PBL model and the Networking opportunities include;

a. Roles and Responsibilities Documentation. The task of defining the team roles and responsibilities was left to the respective project teams. However, it became evident that everyone would have benefited from greater clarity (and documentation) on the roles and responsibilities of all 3 stakeholder groups (plus COVE) at the outset of the program to set expectations and direction. Teams were expected to develop a written requirements document, however this was not readily accessible to everyone. It is recommended that these pieces be documented, reviewed during orientation (with all stakeholders), and stored in an accessible file for

ongoing review. Included in this would be a defined structure or protocol for interactions and communications between the three entities (plus COVE).

b. Project Duration. Feedback on the project duration was mixed, with half of the stakeholders appreciating the manageability and value of the sprint projects (7-8 weeks), and the other half expressing an interest in projects with longer duration (4-8 months). One Intern commented, “I would have loved for the first placement to last for longer to a more fruitful experience.” It is recommended that future Internship programs offer flexibility in the duration of programs. This is already a low volume, high touch program, with several bespoke features, that could offer additional flexibility in team composition (of skills) and in project duration, as an added benefit to potential Host companies. Alternative scheduling could also be considered to permit full-year internships, with 2-days/week placements, and 3 days/week in school. This longer duration would permit Interns to engage in larger projects with longer cycles, and would benefit deeper integration of learning between the classroom and the WIL site. This type of program flexibility and customization would entail added administration, and reporting, as well as continuous intake and supervision which can add a resourcing challenge. This in turn would limit the scalability of the program (without adding additional resources), but could result in deeper student engagement and retention, and improved access to top talent, as well as greater value to Host companies.

c. Industry awareness and Networking. COVID imposed significant restrictions on networking during the Internship program. Efforts to virtualize networking did not obtain the same result as they relied on familiarity and some Industry knowledge to effectively emulate a real-life dynamic. It is recommended that Interns be required to participate in some networking events as part of their program and part of their workday (i.e. monthly COVE Ocean Connectors). Additionally, it is recommended that the networking function be outlined in the Roles and Responsibilities documentation, and that key stakeholders (Hosts, Mentors) and COVE each take on the task of introducing Interns to at least one additional Industry member. This task can be performed whether future networking events are held virtually or in person.

5. Virtualization of the WIL program.

An unanticipated feature of this WIL pilot program, provoked by the global COVID pandemic, became the virtualization of all activities and functions. In turn, an additional success metric was added that evaluated the extent to which a virtual collaboration and work experience could effectively mimic the intended in-person orientation and work-place-based WIL experience. Based on feedback and observational data, it can be concluded that the virtual COVE Internship program was an effective but not ideal proxy for the in-person program. All stakeholders felt that the experience was good, and that the project expectations were delivered upon, but that the experience did not match the thrill of working collaboratively, in settings where innovation happens, with engaged industry leaders and peers, where ideas and learning can flourish. Perhaps the greatest value that came from this experience, from a future skills perspective, was the cultivation of competencies relating to adaptability, resourcefulness, and working with ambiguity. Our interns witnessed and participated in industry responding in-real-time to an ever-evolving global challenge

that changed the ‘what’ and ‘how’ of work. These may prove to be the greatest take-aways for this cohort of Interns.

A Concluding Thought...

This internship pilot set out with several lofty objectives, most of which related to changing peoples’ minds; about hiring diverse talent; about considering an industry that they’d not considered before; about working with peers with different backgrounds and capabilities; about taking on the challenge of an ill-defined problem and working it through. Perhaps not a traditional measure of ROI, it is possible to assess the return on investment for this program by considering the data we gathered and how it helps us answer a few key questions. Are more young people engaged in the ocean industry? Nine of the ten Interns said yes. Did many transition their Internship experience into employment? Five out of ten did – and the others are returning students. Are the Host organizations more willing to participate in future WIL programs? All Hosts said they would do so. Are more Industry members willing to hire young talent if they have a role, and willing to commit to their development on the job? All Mentors and Hosts said yes. And finally, are more Industry members willing to hire diverse students? Of the five interns who were hired, four were from non-traditional programs, and 4 were from non-traditional groups in terms of gender, visible minority or immigrant/international student. When evaluating the success of this COVE Internship Pilot program against these metrics, one can conclude that the program was highly successful.

This program will potentially have tremendous impact on the industry insofar as it will help to attract top-talent that might never have considered ocean industries. It will also reinforce the importance of taking a multi-disciplinary approach to an industry that seems emphatically STEM-oriented. This program also reinforces the innovative nature of the industry overall and can itself serve to support as a re-branding effort for an industry in need of a new narrative. The east coast has long been a region that has suffered out-of-province mobility and brain drain. This program has demonstrated that the east coast is on the vanguard of the Blue Economy and is a place where regional talent can stay, and where talent from-away can come to explore the Blue Economy.