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The World is Our Classroom: Developing a Model for International Virtual Internships - the Global Innovations Project

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Abstract: In the aftermath of COVID-19, remote working has become the norm, and graduates now need an even wider range of skills, which traditional classrooms and internships do not always provide. Working in multiple time zones, within global multi-cultural teams, and only ever meeting colleagues through online technology are just some of the challenges, which require a new type of global graduate. Transversal skills including leadership, collaboration, innovation, digital, green, organization and communication skills are critical. The disruption from COVID-19 also presents unprecedented opportunities to develop more inclusive approaches to internships and international experiences, to level the playing field for students with special needs, from underrepresented groups or with caring commitments. In this position paper, we present a new Global Innovation internship model that has the aim of allowing students to complete technology internships and projects by working together virtually on real world challenges, guided by experienced industry and academic mentors. The model is being developed as part of an Erasmus+ funded project, and the partnership includes seven Higher Education Institutions from six different countries around the world. This position paper describes the design and development of a pilot programme of the Global Innovations internship model.

1   INTRODUCTION

An internship is a work experience offered by an organization for a limited period of time. Internships are pedagogically founded upon experiential learning, where the learner actively creates "knowledge through direct experience that is meaningful to the student with guided reflection and analysis" (Klob, 1984). They provide opportunities through which students experience their chosen professions before formally entering them. Internships have become commonplace in higher education and are often an embedded part of computing programmes. Internships usually take the form of supervised introductory career opportunities provided in partnership between academic institutions and professional organizations. Internships provide significant benefits for employers, academic institutions and students. Graduate recruiters use internships as a means of

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developing future talent pipelines, bringing innovation and new ideas into their organizations as well as giving students a real sense of what is involved in working in a particular company or sector of industry. Academic institutions can use internships to forge collaborative relationships with industry, to gain an insight into contemporary industry practices with knock-on positive impacts on teaching. Students who return from internships are often better prepared to take on larger pieces of work such as dissertations. From a student perspective, they afford the opportunity to engage in the practical application of theories learned in the classroom, to reinforce technical competencies and allow for development of other skills including communication, teamwork, time management and interpersonal skills. Internships are proven differentiators with students who have completed them having a significant advantage on graduation (Aasir, 2018, Eyler 2009, Silva, 2018).

The COVID-19 pandemic precipitated a shift to remote working and remote learning worldwide. Unfortunately, many internship opportunities were cancelled or had changes made to the internship scope. In many computing programmes, students completed online or virtual internships. Virtual internships predate the pandemic. One of the first reported virtual internships in the literature is by Cheney in 2008 (Cheney, 2008), where students undertook a virtual internship that facilitated the development of technology skills. Others have worked to incorporate virtual internships into MOOC programmes (Pillutla, 2019). Advantages of virtual internships are increased access to a more diverse and geographically wider talent pool from an employer point of view. From a student perspective, a virtual internship can build the skills necessary for remote work, for example digital literacy and digital professionalism, telecommunication, self-discipline, and independence. Recent findings have also shown that students on virtual internships had more access to senior staff within organizations - traditionally, only those interns at head office locations had the opportunity to engage with the most senior leaders. However, in travelling less, senior leaders could commit to the sessions such as inductions, virtual coffees, and networking sessions (Woo, 2021, Collings, 2021).

In this position paper, we describe the design and development of a new model of virtual internships. The Global Innovations (GI) internship model aims to allow students to complete computing internships by working together virtually in international teams on real world challenges guided by experienced industry mentors and academic mentors. The model is being developed as part of an Erasmus+ project and the partnership includes seven higher education institutions from six different countries (Ireland, France, Sweden, Slovenia, China, South Korea), industry professionals and remote learning experts. The model aims to address the challenges posed to the traditional internship model during COVID-19, to develop a shared understanding beyond national borders and to design innovative curricula to create graduates that are not only capable of adapting to hybrid and online workplaces and situations, but that were specifically trained to work within it. The ultimate aim of the research will produce an open and comprehensive toolkit for the implementation of remote and hybrid internships including a set of guidelines, training materials and reusable artefacts (e.g. resources to support recruitment, onboarding, professional development, and checklists for industry and academic mentors).

In the next section, we provide context on the importance of internship programmes, the pedagogical approaches that underpin them and discuss the emergence of virtual internships. In Section 3 we outline the GI internship model and describe the design and development of a pilot implementation of the programme. We conclude in Section 4 with a description of insights, recommendations, and challenges in delivering such a programme.

2 BACKGROUND

Internships are based around the concept of 'experiential learning', an engaged learning process whereby students "learn by doing" and by reflecting on the experience (Klob, 1984). The pedagogy of learning through experience originated in the 19th century (Champagne, 2006, Furco 2004). In (Klob, 2001), Kolb, et al provided an explanation of the Experiential Learning Theory (ELT) - "ELT emphasises the central role that experience plays in

the learning process, an emphasis that distinguishes ELT from other learning theories. The term "experiential" is used therefore to differentiate ELT both from cognitive learning theories, which tend to emphasise cognition over affect, and behavioural learning theories that deny any role for subjective experience in the learning process".

The introduction of experiential learning as a pedagogy challenged previous academic theories. It challenged the "cognitive style" of "teaching through lecturing" that was and still is prevalent in academic classrooms (Furco 2002). It also challenged the "one-directional" method of teaching and learning and raised questions about the role of academic institutions in student's learning process while on internship. The literature reveals several important considerations in the development of any internship programme: Firstly, the work environment is often substantially different from what the students are taught or what they experience in the classroom (Trede, 2013). Second, academic institutions must prepare the students for the internship work environment (D'Abate, 2009). Third, although there is no direct transfer of knowledge from the teacher to the students in most internship courses, the academic institution should take an active role in the learning process, for example through a mentoring process. Internship programs should coordinate with the industry internship sites to manage this mentoring process and thus facilitate the learning process (Trede, 2013). Finally, experiential learning should complement and enhance learning that takes place in the classroom (Morris, 2020).

As a result of the COVID-19 pandemic, working remotely is now mainstream and has also given rise to an increase in remote internships (Jeske, 2020). Before the pandemic, growth in online education, advancements in remote-work technologies, diversity of the workforce, and the need for flexibility in location and time were key drivers of remote internships (Jeske, 2019, Khushwant, 2021). Virtual internships resemble traditional internships in most aspects, except that communication takes place via messaging services or interactive software communication. The literature identifies much work on successful virtual internship programmes (Woo, 2021, D'Abate, 2009, Khushwant 2021), but also outlines a number of common challenges associated with virtual internships. A key challenge is the

authenticity of the experience in simulating professional workplaces. The use of mentorship to provide the guidance necessary for interns to make meaningful connections between professional knowledge elements is vital to overcome this challenge. Furthermore, mentors need to be available to engage with virtual interns on a regular basis to foster engagement and prevent drop-out in an online environment. Other skills such as interpersonal communication, cultural understanding of how to relate to individuals from different cultures, time and performance management needed to organise meetings across time zones are critical in the online environment and interns need guidance on these aspects (Jeske, 2016). Careful preparation and planning are also required to enable virtual interns to manage their work effectively (and possibly entirely independently). In the absence of everyday interactions, the materials, instructions, and task descriptions need to be well prepared (Jeske, 2017). The provision of opportunities for interns to work collaboratively on projects in an online environment is a key requirement for preparing students for online or hybrid workplaces post-graduation and should be provided by industry partners (Gill, 2020).

Our work on developing the GI internship model aims to tackle these challenges. In the next section we provide an overview of the GI internship model and describe our approach and the design and development of a pilot implementation of the model.

2 APPROACH

The GI internship model is focused on simulation of an industry-based internship experience for students in computing and other technology-based disciplines. The GI internship is run within existing validated academic internship modules at each partner institution to ensure a valid learning environment for students is achieved, and to ensure an assessment model consistent with traditional internships is performed. It borrows essential traits from both academic project-based modules, and industry-based internships. The GI internship is also designed to buffer students from the recent fluctuations of the industry-based internship environment that were evident in the first two years of the recent COVID-19 pandemic where technology-based companies have

been forced to undergo rapid transformations in their work structures and cultures. These transformations include the requirement for establishing a remote working culture, reliance on video conferencing for meetings, an increase in use of non-verbal digital based collaboration, and increased emphasis on chat applications and other social media platforms for social interaction. As a by-product of these transformations, some of the key advantages of the industry-based internship model are potentially under threat, such as the establishing of professional role-models within the work environment, the creation of social contacts and the development of work based social norms. Our research in developing the GI internship model has the following aims:

1. To design a virtual internship which simulates a collaborative environment where students work on an industry project, but with additional academic support to help create graduates that are capable of adapting to hybrid and online workplaces and situation.
2. To construct an inclusive, multicultural, international, and entrepreneurial experience for students through our collaboration with European and Asian universities.
3. To upskill academic and industry mentors to ensure the successful implementation of the virtual internship program.
4. To produce an open toolkit for the implementation of remote and hybrid internships including a set of guidelines, training materials and reusable artefacts.

3.1   GI Project Phases

The GI internship model will be developed as part of an Erasmus+ project over a two-year period. The project has four distinct but overlapping phases as shown in Figure 1. The initial phase is the pilot phase which will be run for 6 months to obtain real-world data of a simulated virtual internship including an understanding of required upskilling for industry and academic stakeholders, while the second phase focuses on evaluation of the pilot against the project aims. The third phase will take the combined learning of the pilot, prior experience of each of the partner universities running similar modules, and a review of the literature to ensure a pedagogically sound module

is created. The final phase focuses on the implementation of the model across multiple universities in order to   develop a shared understanding of virtual and hybrid internships beyond national borders and to ensue that the model can be successfully operationalised.

3.2   The Pilot in Context

The GI pilot provides an early opportunity within the project to evaluate how the project aims may be best achieved. In the creation of a virtual internship, a start-up company model was the most feasible type of business environment which could be best simulated.

Figure 1. Global Innovations project phases.

While a typical SME will have established and existing employees within a company to help mentor and act as role models for interns, start-ups are often formed with minimal hierarchy and with limited support structure, procedures and access to senior resources. The core ethos of the project is that it must operate as a new start-up company with a specific technology-based project to focus on. All aspects of the start-up will be run like a business under the direction of the managing director (MD) who will be appointed from industry but who will have limited contact hours with the students. The MD will be recruited based on their experience in business development within small start-up companies and will be the primary point of contact for the students on internship. The MD will also oversee an academic staff member appointed as a consulting chief technical officer (CTO), and a staff officer from an Industry Engagement Office who will act as a business development manager (BDO). These three roles will be the core of the start-up company. Students will be recruited from standard internship programmes. The BDO will secure access to support services for the team, including access to industry consultants in the areas of project management, marketing, business development, human resources, and staff training. The MD, with the support of the CTO and BDO, will control the use of all services and resources.

The GI internship team will simulate the work environment of a new company which has limited resources, but with the added benefit of academic

scaffolding. This scaffolding will be in the form of academic mentors who act as experts in the project domain and the creation of a structured internship plan for the students to follow which will focus on developmental workshops and professional training to help students develop the core skills required to achieve the learning outcomes of an internship. Using a start-up model, a company culture is created where the team takes more direct responsibility and ownership for the work they are undertaking. This culture is developed by establishing a client for the project who has a specific requirement in mind, and who will meet with the team to provide input and feedback regarding the progress being made. The concept of academic grading is removed from the project deliverable as the output should be client facing. Grading within the internship is performed in the same way as other internships and is performed separately using our internship support structure and reflective assessment methodology.

The GI team is treated like any other company involved in an academic internship programme. The scaffolding approach ensures that the students work within a diverse team environment, which is multicultural, international and multidisciplinary. This is achieved through our recruitment process which requires students to interview for the position from multiple schools, and multiple international partners, and via a process, where students are split into two groups, which will rotate between working online and onsite at a campus incubation location.

3.2   The Pilot Design Methodology Context

The start-up company will include several key roles designed to establish a company environment and to ensure that there are sufficient support structures to facilitate the student learning environment. The MD, appointed from industry, will have between 6-9 contact hours with the team each, and will perform the basic management duties for the internship groups, structuring the work activities of the team. The CTO will be appointed from the academic staff to act as a discipline technology expert to provide high-level guidance and input as the teams explore technology solutions. The DBO role is run by our Industry engagement officer who will work with companies that support start-up companies and facilitate the team by providing access to workshops, training and services designed to support an entrepreneurial business in its early stage of development. A structure will also be developed for

the internship to ensure that the learning outcomes of the internship module are achieved.

With the basic structure of the start-up company defined in Figure 2, the following process was followed to develop and assess the pilot programme.

3.3.1 Recruitment

The business focus of the company will be on a technology-based project sourced from a non-governmental organization (NGO), Charity or organization focused on supporting the United Nations Sustainable Development Goals (SDG's).
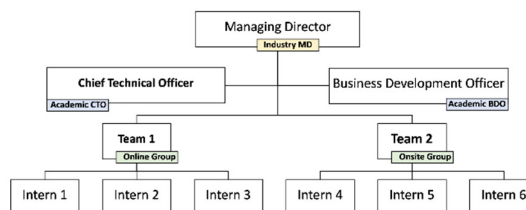

Figure 2. Global Innovations internship pilot company structure.

For the pilot, the client will be a research group with a focus on applied and socially responsible technology within the university who proposed a project on smart energy conservation. For future projects, an Expression of Interest (EOI) will be issued, seeking input from the wider community. Once a project brief is finalized, the company engages with the internship process of the university to interview and select students to work within the GI team as per standard internship recruitment procedure. Students will be interviewed with a view to the roles within the team they will occupy. The interview process will assess the students in terms of software design and development skills, analytic skills, knowledge of business process, communication and leadership skills.

3.3.2 Team Development

An essential element in the creation of an internship environment is the securing of resources from industry and the business development agencies to provide industry engagement opportunities for the newly formed team. These services include accessing national agencies support programmes such as Enterprise Ireland and the academic incubation

centres within the university, which are specifically designed to support and advise small start-up companies. Additional resources are provided in the form of specified and limited hours of consultancy from our university industry partners. The MD of the start-up will work to ensure that these limited industry resources are used effectively to support the students and provide access to experts in the field of human resources, software development, software testing, project management and business development. Additional academic sources from within the university will be used to provide targeted workshops to help develop both transversal skills such as design thinking, problem solving, teambuilding, and goal setting, in additional to more general technical skills such as understanding ethics within technology, data privacy, followed by more targeted technology seminars directly relevant to the project being developed.

3.3.3 Assessment

The pilot will be assessed to determine how well it met the project aims and objectives and to understand how it might be developed for deployment across the European and Asian project partners. Different forms of assessment will be used to help determine the strengths and weaknesses of the pilot, allowing for the assessment to be considered from different perspectives. A specific strength of the pilot model is that the assessment of the students will be done in parallel with and using the same assessment approach by the internship academic coordinator. This provides an independent and external analysis of how the students performed with respect to achieving the learning outcomes compared to standard internships. A second and equally independent assessment of the pilot will be performed by one of our European university partners who are not involved in the development or running of the pilot. This assessment will probe into the cost of the internship model, the structure of the company and how it performed, and review methods of improving the overall experience of the internships itself.

4   CONCLUSIONS

The merits of internships are well known and proven differentiators which offer significant advantages to students who undertake them. This position paper presents a model for the implementation of a virtual internship which not only replicates a complete work environment but provides additional academic scaffolding support structures to help create graduates that can adapt to hybrid and online workplaces and situations.

The GI internship model strives to create a collaborative internship environment based on industry best practice, models of experiential learning but with greater academic support. The model identifies and addresses the challenges associated with virtual internships such as the authenticity of the experience and access to industry role-models and experts. The environment promotes interculturalism by design and fosters an entrepreneurial experience. A start-up company is seen as favourable for the model due to its minimal hierarchy and limited support structure. The start-up company include several key roles designed to establish a company environment and to ensure that there are sufficient support structures to facilitate the student learning environment. This provides a uniform experience and facilitates student access to experts and core staff.

The model is seamlessly integrated within an existing validated academic internship modules . The approach will buffer students from recent fluctuations in industry-based internship environments caused by COVID-19 and a move towards remote and hybrid workplaces, offering safeguards over the environment and the student experience. The model offers unique support mechanisms via academic expertise which provides scaffolding not seen in traditional internships. This support is implemented by means of targeted workshops and training to develop core skills. Training is not assessed but instead used to develop a culture of engagement and problem solving for the client. Reflective assessment is used to determine the success of the students' performance and learning experience. Students work in groups and utilise a blended work environment including both online and onsite activities.

The ongoing pilot will be assessed to determine how well it met its aims and objectives and to understand how it might be developed in the future to run across multiple universities in Europe and Asia. This will involve detailed interviews with the participating students, industry and academic stakeholders. A particular focus will be on the upskilling requirements of academic and industry

stakeholders to determine specific training needs. A second and independent assessment of the pilot will be performed by a European university partner not involved in the development or running of the pilot. This assessment will probe more into the cost of the internship model for academic and industry organizations, an analysis the internship company performed, and review methods of improving the overall experience of the internships itself. The research will produce an open and comprehensive toolkit for the implementation of remote and hybrid internships including a set of guidelines, training materials and reusable artefacts (e.g. resources to support recruitment, onboarding, professional development and assessment).

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