

The Symbiotic Interaction between Industry and Academia in Tertiary Education: A Case Study on Internships

Leonard BUSUTTIL

*Department of Technology & Entrepreneurship Education,
Faculty of Education University of Malta, Malta
e-mail: leonard.busuttill@um.edu.mt*

Received: May 2022

Abstract. The misalignment between the skills learned in tertiary education and the skills demanded by industry is well documented. One of the ways this misalignment can be reduced is through the introduction of an internship phase in degrees. This article identifies the perceived benefits and challenges that internship programmes offer academic staff in a tertiary educational facility. It also determines how feedback from the industry helps shape the curriculum of the degree. A qualitative case study is employed through interviews with various staff working at a tertiary education institution. The data generated is analysed using a thematic approach. The results show that internships not only place value on soft skills but also build a communication channel between the mentors that visit students whilst out on placement and the industry staff that oversee the students during the work-based phase. This mutually beneficial interaction between the industry and the education institution helps the mentors maintain familiarity with the latest technologies adopted in the industry and allows the industry to influence the curriculum of the degrees. Internships were shown to offer a means of advertising the skills gained in academia to the audience that would eventually employ the graduates.

Keywords: ICT internships, ICT apprenticeship, curriculum, mentors, industry.

1. Introduction

The past few decades have been characterised by the spread of information and communication technologies, resulting in an increased demand for skilled workers that outweighed the supply (Brunello and Wruuck, 2021). According to Eurostat, in 2019, more than half of EU enterprises that recruited or tried to recruit ICT specialists had difficulties filling these vacancies. This considerable ‘Digital Skills Gap’ in Europe is making it hard for the industry to employ IT specialists and non-IT personnel with sufficient digital literacy (Curtarelli *et al.*, 2016; EC, 2017).

The demand for ICT workers is overweighing the supply of candidates is only one of the problems hindering recruitment. Research reports a misalignment between the skills learned during university education with what the industry demands (Garousi *et al.*, 2019). One way of bridging this gap is to introduce industry certifications into the existing university curricula (Rob, 2014).

Another approach is to introduce internships into the degrees. Whilst academic programs impart key technical skills, most employers require applied, or soft skills such as critical thinking, problem solving, teamwork, and written and verbal communication (Mardis *et al.*, 2018; Tynjälä *et al.*, 2006). Many programs have integrated internships into their curriculum to overcome the skills gap between industry demands and learning outcomes achieved by graduates. Through these internships, students encounter authentic tasks and recent technologies in the workplace (Aldewereld and van der Stappen, 2019). This paper explores the interactions between the academic members of staff at a Maltese tertiary educational institution and industry whilst the academics visit the students on placement and discusses the challenges and benefits that internships offer to the staff at the academic institution and how these interactions affect the curriculum of the degree that the students are following. In this paper the author sought to answer the following research questions:

1. What are the perceived benefits and challenges that internship programmes offer to academic staff in a tertiary educational facility?
 - a) What are the benefits of internships for the teaching staff?
 - b) What challenges do internships pose?
2. How does the feedback attain from employers taking part in the internship programme help shape the curriculum of the degree.
 - a) How is feedback obtained and how is it used to enact changes in the curriculum?

2. Background

In education, internships are seen as a prime example of experiential learning or learning by doing (Kolb and Kolb, 2005). Internships are considered distinct from other forms of experiential learning such as cooperative education, fieldwork, and practica Sauder *et al.* (2019). Although one could argue that courses can be designed to be hands-on, internships allow students to be immersed in a real-world scenario solving real-world problems. According to the triple helix model for innovation, the interaction between university, industry and government is the key to innovation and growth in the knowledge-based economy (Etzkowitz, 2008; Galvao *et al.*, 2019). In such a model, the university and industry are seen to take the role of each other, with universities stimulating the development of new firms for research whilst firms developing training and sharing knowledge through joint ventures. Internships can be seen as another link of interaction between these two important institutions of the knowledge-based economy, with the industry hosting students for training whilst the university adapting its teach-

ing to make it more relevant to the industry. The European Centre for the Development of Vocational training (Cedefop) defines the term apprenticeships as a “Systematic, long-term training alternating periods at the workplace and in an educational institution or training centre” (Cedefop, 2014). According to Cedefop a contract binds the apprentice with the employer, and the employer provides financial remuneration to the apprentice during the apprenticeship. The terms internship and apprenticeship are at times, used interchangeably. Cunningham and Dawes (2004) note that both terms fall under the umbrella term work based learning. They define internships as a special type of apprenticeship which might be paid or unpaid and occurs after the acquisition of the degree or equivalent qualification. Galloway *et al.* (2014) use the term internship to describe a student placement programme developed by e-Skills, the UK industry body for the IT sector, in 2010. The programme involved a substantial number of UK universities, from which students of computing, IT, business and other disciplines have been placed in an organisation. E-skills offered the internship programme exclusively to students following degree programmes, with all paid placements usually lasting one year. Given the interchangeable nature that the terms apprenticeship and internship are used in literature, in this paper, the term internship will be taken to also refer to apprenticeships.

2.1. Skills Development through Internships

Research reports that internships increase the quality of education (Bolli *et al.*, 2021). Internships provide students with practical experience, which is not easy to recreate in the classroom (Elarde and Chong, 2012). Given the practical experience, interns are better prepared to cope with the challenges of the work environment, and their job performance may be accelerated (Maertz Jr *et al.*, 2014). Internships also have a crucial effect on subsequent academic outcomes, with Binder *et al.* (2015) claiming that independent of student characteristics, chances for top-class degrees are doubled when students embark on an internship. Internships allow students to apply the skills they learn in classroom settings in the world of work (Green *et al.*, 2011). Internships usually include supervision and self-study, allowing students to learn by doing and reflect on the learning. Feedback is essential during the internship experience (O’Neill, 2010).

The use of internships in information technology (IT) and entrepreneurship studies is on the rise (Dobratz *et al.*, 2014; Galloway *et al.*, 2014). Since technical skills alone are no longer adequate for graduates entering the IT industry, internships are being used as a means for graduates to obtain entry-level work experience in a commercial organisation. In addition, the interns can be exposed to an IT specialism in a market context, develop their business and commercial skills and become more employable (Galloway *et al.*, 2014). Pereira *et al.* (2020) argue that higher educational institutions should create curricula that include work placements as an integral part of their study programmes.

Research stresses the importance of internships in developing soft and interpersonal skills, such as professionalism, cultural sensitivity, time management and integrity. These skills are not generally part of a formal tertiary education curriculum (Holyoak, 2013; Shoenfelt *et al.*, 2013). Interpersonal skills are generally a good predictor of job performance (Shoenfelt *et al.*, 2013). Other soft skills that can be fostered by internships include confidence and self-efficacy, which are especially useful for budding entrepreneurs (Dobratz *et al.*, 2014; Elarde and Chong, 2012). Internship programmes can positively affect student understanding, attitudes, perceptions and intentions relating to entrepreneurship and small business activity (Holyoak, 2013).

In a study by Galloway *et al.* (2014) about a student placement programme developed by eSkills in the UK, students reported that internship and university studies have contributed to their skills development. The combination of an internship with tertiary studies was effective in terms of boosting both technical skills and problem-solving skills. During some of the internship experiences, the interns were introduced to programming languages they were not taught at university, improving their technical skills. One of the most commonly cited benefits of internships was the opportunity to experience the world of work and the personal development this entailed (Galloway *et al.*, 2014). The internship helped the students prepare for self-employment, which is expanding in the UK IT sector as work is increasingly outsourced to contractors. Galloway *et al.* (2014) reported that some of the interns became employed as subcontractors to the firms they were interned with following the successful completion of the internship.

2.2. *The Benefits for Industry*

The research conducted by Caballero *et al.* (2015) suggests that in terms of defining the curriculum, the power held by university teaching staff may be excessive and that representatives of employers should be more present in the decision-making bodies. This approach should reduce the gap between the skills developed by graduates and the skills demanded by recruiters (Maxwell *et al.*, 2009). Through collaboration programmes such as internship schemes industry can help shape curricula that form their future employees. There are also long-term monetary advantages for the industry when participating in internships. Students following internship programmes are generally viewed as a good source of low-cost labour for industry (Green *et al.*, 2011; Galloway *et al.*, 2014; McKenzie *et al.*, 2016). Interns can participate in low-priority or value-added projects, which might not have been allotted resources had it not been for the extra resources offered by interns (Maertz Jr *et al.*, 2014). When firms employ interns after the completion of the internship, recruitment and training costs are reduced (Holyoak, 2013). The internship acts as a trial period for both the employer and the intern, with the employers assessing the likelihood of a fit between a prospective employee and the organisation (Elarde and Chong, 2012; Dobratz *et al.*, 2014). Through the internship, students gain valuable real-world experience, which reduces the adjustment period required when adapting to new employment (Maertz Jr *et al.*, 2014).

3. Method

To generate data to answer the research questions outlined in section 1, the author held semi-structured interviews with staff that work at a local tertiary education institution that implements mandatory apprenticeships as part of its level 6 tertiary IT degrees. Interviews can be defined as conversations between the researcher and the research participants (Hammond and Wellington, 2012). They allow the researcher to go deep into the participants' accounts while probing them to elaborate on their thoughts (King *et al.*, 2019; Merriam, 2009). They also allow participants to articulate their thoughts, feelings and values and, at the same time, permit the researcher to interact with the participant. Moreover, the researcher can tap on points that need further clarification and also prompt the participant to elaborate on unexpected themes that may arise (Merriam, 2009). The same interview protocol (Klenke, 2016) was used in the different interviews conducted; however, given the nature of semi-structured interviews, the answers provided by the interviewees were further probed to clarify the answers provided. Through these interviews, the participants recounted their experiences of internships and how these affected the course curriculum over the years. This qualitative research was conducted using one-to-one semi-structured online interviews through the Zoom platform. Various researchers point out that online interviews mitigate the challenge of time barriers and that the participants might find their home or work environment less intrusive, providing a better opportunity for reflective answers (King *et al.*, 2019; Hammond and Wellington, 2012). The interviews were held with five members of staff that fulfilled different roles within the internship ecosystem. These included two lecturers who teach units in the degree and visit the students when out on placements, two leadership team members within the institution and a work-based learning coordinator who oversaw internships across multiple faculties.

Ethical approval was sought and gained from participants. As Wiles (2013) emphasises in most qualitative research, confidentiality through the process of anonymity cannot be assured. This is especially the case when a study involves individuals with distinct roles and a small number of organisations. For this reason, the participants were informed that their responses would be anonymised however anonymity cannot be guaranteed.

A necessary precursor to the analysis of data is transcription. King *et al.* (2019) stress the importance of adopting a consistent style during transcription so that anyone reading the material can understand the features of speech the notation used indicates. They also warn about three threats to quality transcription which the research should mitigate against, namely quality of the recording, missing context and "tidying up". The researcher used the Zoom platform to conduct and record the interview. The quality of the discussion undertaken via Zoom depends on the quality of the internet connection at the interviewer and interviewee. In this research, the internet connection quality did not pose a problem. Non-verbal communication and paralinguistic aspects are just as important as the answers provided the questions posed during the interview. Zoom recorded the video and audio of the discussions. This allowed the researcher to consider non-verbal communication and paralinguistic aspects whilst transcribing the

interviews. Every interview was transcribed as soon as the interview was conducted. Whilst transcribing, every care was taken to produce an accurate account of what the interviewee said rather than a grammatically correct version of the interview.

Thematic analysis (Braun and Clarke, 2006; Nowell *et al.*, 2017) was used to analyse the data generated through the interviews. Braun and Clarke (2006) identify six phases in a thematic analysis approach to analysing data. Although the phases are usually presented as a sequential list, and each phase builds on the preceding one, Braun and Clarke (2006) note that analysis is typically recursive. The researcher found himself navigating back and forth between different phases. The researcher read the transcripts several times to become immersed in the content. The Coding phase, or identifying important data features that might be relevant to answering the research questions, was conducted soon after. Codes were grouped to identify potential themes or broader patterns of meaning. As Saldana (2009) stresses, qualitative enquiry demands meticulous attention to language and deep reflection on emergent patterns and meanings of human experience. This attention to detail resulted in the coding process being iterated several times, with each coding cycle resulting in more refined codes and resulting themes. The potential themes identified were reviewed to determine that they answered the research questions. Finally, the themes were named, and the analytic narrative and data extracts were weaved together. Taguette (Rampin and Rampin, 2021), an open-source tool for qualitative research was used to aid the coding process.

4. Findings

In the following section, the themes that emerged from the analysis are presented, organised by the research questions. As expected, the internship model provided benefits as well as challenges.

4.1. *The Local Scenario*

The work-based learning and apprenticeship act came into force in March 2018 (Government of Malta, 2018). This act provides a framework for the development of effective work placements. The main thrust of this act is the right of apprentices to receive an income equivalent to the national minimum wage per hour of work (Cedefop, 2018). In the words of the work-based learning coordinator, the scope is “to create a smooth transition between education and the place of work. The concept is that when we’ll have fresh graduates, they immediately hit the ground running, they’re ready to be embedded within the system.” This interview excerpt from the work-based learning coordinator seems to suggest a total reduction in the skills gap between the internship-based degree and the needs of the industry.

The Act outlines responsibilities and governance structures while defining rights and obligations for educational institutions, employers and learners. According to the Act the organisation that offers the placement (referred to as a sponsor) needs to appoint a staff

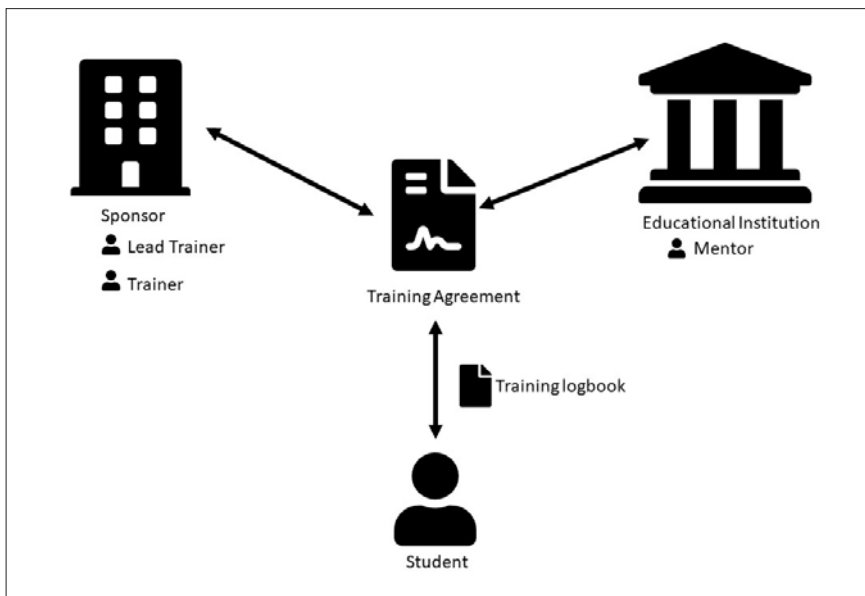


Fig. 1. A three way agreement.

member to act as a trainer for the student during the placement period. If more than one trainer is assigned to the student, a lead trainer needs to be appointed to act as the main reference point for the student and to coordinate the other trainers. The educational institution needs to monitor the student’s learning during the placement. This is done through a minimum of two visits per academic year by a staff member acting as a mentor. When a student agrees to attend a placement at a sponsoring organisation, a three-way training agreement is signed between the sponsor, the educational institution and the student (see Fig. 1). This agreement contains the training programme the student will undertake during the placement and includes the number of hours spent at the sponsoring organisation and the learning outcomes to be targeted during this placement. During the course of the placement, the student needs to maintain a training logbook. This reflective logbook includes a systematic report of activities conducted during the placement period and refers to the learning outcomes outlined in the learning programme.

4.2. The Implementation of Internships in the Educational Institution under Study

All the IT degrees offered by the educational institution participating in this study contained two mandatory units of six ECTS each, devoted to the work placements. These units titled “Work Based Learning 1” and “Work Based Learning 2” are held in the second and third year of the 180 ECTS degree. The college has set up a dedicated unit to oversee the internship process. This unit approaches companies to explain the internship process and list any opportunities in a dedicated web portal created. The students use

this web portal to apply for internship opportunities that interest them. According to the course director students start looking for a placement in the first semester of the second year. Students sit for an interview with the company offering the internship. A three-way agreement between the student, the company offering the internship and the academic institution is signed if the interview is successful. Students who successfully complete an internship agreement start attending the place of work during the second and third years of the degree:

If accepted, the students start visiting the organisation two days per week in the second year of their course. In summer they work full time at the organisation whilst in the third year they visit once a week.

The course director explained that before the current structure of the degree came into place where students are required to spend two periods in industry placements, the institution offered the possibility of optional placements:

Internships at level 6 started about 4 years ago. Students were already working on part-time basis during their degree. We wanted to record that activity in the transcript by listing the number of hours spend in industry. At the time this was purely optional.

Visiting organisations weekly during semester time and daily during the summer semester seems to benefit the industry since, as explained by the course director, “Some companies prefer the block placement mode, so summer works for them.” Whilst on placement, the students need to keep a logbook portfolio listing all the tasks the industry trainer assigns them at their place of work, as well as a reflective journal about their experience. The course director explained that the log book had to account for at least 60% of the time allotted to the work placement for the students to record a pass in the mandatory units.

4.3. What are the Benefits of Internships for the Teaching Staff?

Internships can be seen as one of the ways that educational institutions can demonstrate to the industry the contents of the degree’s curriculum. According to the course director, initially, employers might be reluctant to take on students on placements; however, after their first experience, they usually offer more placements for succeeding years. The teachers who acted as mentors agreed that one of the main benefits of taking on the role of a mentor was that through the visits they conducted at the workplace where students were placed, the mentors kept track of the latest technologies used in the industry. The visits and the discussions that ensued with the company employees that were mentoring the students in the workplace acted as a means of personal development for the mentor.

Serving as a mentor is beneficial for me as a teacher too as it keeps me up to date with the latest skills being discussed.

Mentors visit each student at least four times, twice in the second year of study and another two visits during the third year of study. The mentors tend to visit the same workplaces over the years, and this helps the mentors build a positive relationship with the industry partner. This relationship was equally beneficial for the mentor and the partnering institution since the industry members acting as industry mentors found themselves comfortable suggesting changes to the curriculum so that the internship would be more beneficial to the institution and the student.

Since every year you are visiting mostly the same organisations you build a relationship with the industry partner. They then start feeling comfortable to suggest new units, or changes to existing units. You become the first point of contact between the industry and the teaching organisation.

The relationship built between the industry (company trainer) and the academia (mentor) is further reinforced by the actions taken during every visit conducted by the mentor. During each visit, the mentor holds a meeting with the student in the presence of the industry trainer.

I hold meeting with the student in the presence of the company trainer to see how the student is faring not just content wise but also on things like work ethic and at the same time ensuring that the student is working on tasks which are relevant to the course he is enrolled in

A report about the visit is compiled by the mentor and the company trainer, with the company trainer remaining in contact with the mentor not just on visits but throughout the placement duration. This interview excerpt also demonstrates the importance attributed during the visits to the development of soft skills, which are not usually represented in the taught curriculum.

4.4. What are the Challenges of Internships for the Educational Institution?

The interviewees mentioned a number of challenges they faced in order to make the internship system work. One of the toughest challenges is finding companies to host the students. Not every student ends up getting a placement. In such cases, the academic institution needs to ensure that an alternative is offered since, in this case, the internship experience is a mandatory part of the course.

A student might end up not being chosen or not enough placements are available.

In that case taught units are offered instead.

The lack of placements is not the only concern shown by the staff interviewed. Placements need to be vetted to ensure that these companies offer a learning environment for the students to flourish. In the interview excerpt, the interviewee provides an example of

situations where the benefit a student gains from an internship depends on the environment offered by the company:

Not all students benefit as much as we would like from it. For example, if a student is studying software development and is placed in a company which does not have an in-house development role, the student might be asked to build a small data reporting tool. In such scenarios, the student does not benefit as much as when s/he is placed in a company with a software development structure, and the student can be placed in a team.

Another concern raised by the staff interviewed was the amount of time devoted to the work-based component during the block component in summer and the adverse effect this has on the final year project.

Some students work extra hours in summer and this leads to students dedicating less time on their final year project since they are spending so much time in industry.

It was interesting to note that most of the final year projects were not linked with the workplace where the students were following their placements. When asked about this, the academic director and the lecturers noted that students started working on their final year projects in the second year. Since this coincides with the period when they begin working at their placement, the students would not be familiar enough with their place of work to be able to root the final year project within the industry in which they were spending their internship. Similar to the concern that the amount of time spent on work-based learning seems to harm the quality of the final year project, mentors also aired their concern that internships might stop good students from embarking on further education. This concern was especially illustrated in the interview excerpt below from one of the lecturers interviewed:

For example we had the case of a student who was studying a level five advanced diploma who went out on an internship with a small company. At the end of the internship the student was offered a full time job and he decided to stop rather than continue studying the level six degree

4.5. How Does the Internship Effect the Degree Curriculum

The mutually beneficial relationship built between the mentors and the industry trainers through the regular visits to students following their placement helps the industry to react to the curriculum the students are taught and to suggest changes. These changes might be a change to the order of how things are taught as well as new areas to be added to the curriculum. As one of the teachers interviewed explained, there are times when the industry partner would need to assign tasks to the student requiring skills that have not yet been covered during the academic course. In such situations:

The company offers direct training to the student. This might also be the case if they might need to use something that they will cover later in the course. The industry trainer usually picks this up and then the student finds it easier later in the course because they would have already covered the topic during their placement.

Although suggestions for changes from the industry partner occur, there are challenges too. Changing a course outcome requires several quality control cycles, which inherently take time. According to one of the mentors interviewed, this delay might result in the requirement becoming redundant by the time the change is enacted:

A change in a course outcome takes a lot of time because it needs to be vetted by the curriculum department and quality control. It could be the case that by the time the change is enacted, industry would have moved on.

In order to mitigate such situations, an action taken by the educational institution is to keep the learning outcomes as open as possible and to keep the units technology agnostic. Keeping the learning outcomes as open as possible shifts the onus onto the lecturer to react to minor changes requested by the industry. The entire degree curriculum is reviewed every three years. This review requires the educational institution to engage with the industry partners to identify areas of the course that need improvement. Feedback from the industry partners is joined to that of the lecturing staff and students to group changes to the units. As the course director explained:

Every three years we go through a review of all our offerings. The degrees are reviewed by companies, by students and by the lecturing staff too.

5. Conclusions and Discussion

This study aimed to shed light on the perceived benefits and challenges that internship programmes offer to academic staff in a tertiary educational facility and to try to understand how feedback from employers taking part in the internship programme helps shape the degree's curriculum.

Similar to the findings in other research (Holyoak, 2013; Shoenfelt *et al.*, 2013) this research noted the importance attributed to the development of soft skills during the internship phase. The visits by mentors in the industry are essential for several reasons. As research shows, feedback is very important in an internship programme (O'Neill, 2010); however, the findings in this research confirm the visits by academic staff acting as mentors in an internship program not only provide feedback to the student but also help build a bridge with the academic counterparts in the industry. Hence internships do not just have benefits for the students who are the ultimate beneficiaries of this system, but they are also acting as a two-way symbiotic system where academic institutions, as well as the industry, benefit from this relationship setup. The importance of interaction between industry and educational institutions is paramount in a knowledge-based

society (Etzkowitz, 2008). Through repeated visits by mentors in the same institutions, industry becomes more comfortable in suggesting changes to academic programmes giving more power to industry in influencing change in academia (Caballero *et al.*, 2015). Since the quality control systems at academic institutions were deemed to be rigid and hindering continuous change at a unit level, the academic institution created a mitigating process to collate feedback from industry partners amongst others periodically to then batch the changes.

Internships have proved to be an important tool in advertising the skills gained in the academic programme to an industry audience. As this research shows, successful internships not only reduce the reluctance from the industry side to offer more internship opportunities but also act as an actual public relations vehicle to promote the contents of the degree to prospective employers. The industry's openness to offer more internships can also help reduce a challenge identified in this research, that of lack of internship placements. This challenge led to some students not having an internship experience and required the educational institution to offer traditional units in place of this experience. One surprising finding from this research was the absence of a link between the final year project chosen by the students and the place where the internship placement is conducted. This has led to the claim that the amount of work spent on the job reduced the focus on the final year project, possibly leading to a loss of quality in the final year project.

5.1. Comparing the Findings to other Internships Schemes

Although the research on internships is abundant, most of this research focuses on business disciplines, followed by hospitality, travel and tourism Sauder *et al.* (2019). To identify if the findings in this paper are IT-specific, in this section, the author will compare the findings outlined in section 4 to the literature focusing on business internships, the more common type of domain where research on internships is conducted. The findings support the ones identified in the literature focusing on business internships. Sanahuja Vélez and Ribes Giner (2015) conducted a systematic review of the literature on the impact of internships completed by university students in the business domain on three stakeholders: students, employers and higher education institutions. In this section, I will focus on the impact of internships on higher education institutions, given the similarity to the focus of this paper. Following the fifty-seven studies analysed during the systematic review, Velez concludes that higher education institutions' significant benefits are enhanced reputation and visibility. This conclusion echoes the finding in this study, where internships were deemed beneficial to show the value of the curriculum contents to the industry.

Another conclusion reached by Sanahuja Vélez and Ribes Giner (2015) is that employer feedback can provide input for curricular assessment. Similarly, this study concludes that repeated visits over the years by mentors to the industry partner results in building a positive relationship, which leads the industry partner to be comfortable in suggesting curricular changes.

Notwithstanding these similarities, there are areas where the findings in this study differ from the conclusions reached by Sanahuja Vélez and Ribes Giner (2015). Sanahuja Vélez and Ribes Giner (2015) state that universities can use internships as a recruitment tool to attract students. Although this might be the case, the interviewees did not mention this argument. On the contrary, the interviewees noted that the success of an internship has, at times, led students to abandon their studies in favour of taking up a paid position with the company providing the internship post.

Similar to the findings by Prescott *et al.* (2021), that noted that the student's academic performance was negatively affected by the internship whilst it was ongoing, interviewees for this study indicated that one of the effects of the extended length of an internship was the reduction in the quality of work of the final year project. This reduction in the quality of work was especially the case when the internship spans the summer months, leaving little time for the student to focus extensively on the final year project.

This study foregrounds the advantages that the internship visits play on the role of the lecturers acting as mentors. As recounted by the interviewees, the industry visits act as professional development as it allows mentors to be aware of the latest technology in use in the industry. This finding might be unique to the IT domain and does not feature in studies concerning internships in business disciplines.

5.2. Limitations and the Need for Further Research

The findings of this study are based on qualitative analysis of data generated through interviews with members of staff of one educational institution. Although the findings are valid and the results are important since they add to the existing knowledge about internships and their effects on educational institutions, one must note that further studies in different institutions are required to replicate these results.

This study noted that notwithstanding the importance attributed to the mandatory internship in the academic qualification under investigation, most of the research conducted as part of the final year project was not rooted in the organisation hosting the student during the internship phase. Further research would be required to identify if changes to the timing of the internship phase would allow students enough time to root their research in the place of work where the students conduct their placement. This research would also identify if the quality of the final year project increased following such a change.

References

- Aldewereld, H., van der Stappen, E. (2019). Programming, research and... coffee? an analysis of workplace activities by computing interns. In: *Proceedings of the 8th Computer Science Education Research Conference*, pp. 39–49.
- Binder, J.F., Baguley, T., Crook, C., Miller, F. (2015). The academic value of internships: Benefits across disciplines and student backgrounds. *Contemporary Educational Psychology*, 41, 73–82.
<https://doi.org/10.1016/j.cedpsych.2014.12.001>
<https://www.sciencedirect.com/science/article/pii/S0361476X14000745>

- Bolli, T., Caves, K., Oswald-Egg, M.E. (2021). Valuable experience: how university internships affect graduates' income. *Research in Higher Education*, 62(8), 1198–1247.
- Braun, V., Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77–101.
- Brunello, G., Wruuck, P. (2021). Skill shortages and skill mismatch: A review of the literature. *Journal of Economic Surveys*, 35(4), 1145–1167.
- Caballero, G., Vazquez, X.H., Quintas, M.A. (2015). Improving employability through stakeholders in European higher education: the case of Spain. *Long Range Planning*, 48(6), 398–411.
- Cedefop (2014). *Terminology of European Education and Training Policy: A Selection of 130 Key Terms. Second edition*. Office for Official Publ. of the Europ. Communities, Thessaloniki, Greece.
- Cedefop (2018). Malta: work-based learning and apprenticeship act comes into force. <https://www.cedefop.europa.eu/en/news/malta-work-based-learning-and-apprenticeship-act-comes-force>
- Cunningham, I., Dawes, G. (2004). *The Handbook of Work Based Learning*. Gower Publishing, London, England.
- Curtarelli, M., Gualtieri, V., Jannati, M.S., Donlevy, V. (2016). *Digital Skills in the EU Labour Market: In Depth Analysis*. European Parliament. Directorate General for Parliamentary Research Services., ??? <https://doi.org/10.2861/451320>. <https://data.europa.eu/doi/10.2861/451320>
- Dobratz, C.L., Singh, R.P., Abbey, A. (2014). Using formal internships to improve entrepreneurship education programs. *Journal of Entrepreneurship Education*, 17(2), 62.
- EC (2017). *ICT for Work: Digital Skills in the Workplace: Final Report*. Publications Office, ??? <https://doi.org/10.2759/498467>. <https://data.europa.eu/doi/10.2759/498467>
- Elarde, J.V., Chong, F.-F. (2012). The pedagogical value of “eduployment” information technology internships in rural areas. In: *Proceedings of the 13th Annual Conference on Information Technology Education*, pp. 189–194.
- Etzkowitz, H. (2008). *The Triple Helix*. Routledge, London, England.
- Galloway, L., Marks, A., Chillias, S. (2014). The use of internships to foster employability, enterprise and entrepreneurship in the IT sector. *Journal of Small Business and Enterprise Development*.
- Galvao, A., Mascarenhas, C., Marques, C., Ferreira, J., Ratten, V. (2019). Triple helix and its evolution: A systematic literature review. *Journal of Science and Technology Policy Management*, 10(3), 812–833. <https://doi.org/10.1108/JSTPM-10-2018-0103>
- Garousi, V., Giray, G., Tuzun, E., Catal, C., Felderer, M. (2019). Closing the gap between software engineering education and industrial needs. *IEEE Software*, 37(2), 68–77.
- Government of Malta (2018). Work-based learning and apprenticeship act. <https://legislation.mt/eli/cap/576/eng/pdf>.
- Green, B.P., Graybeal, P., Madison, R.L. (2011). An exploratory study of the effect of professional internships on students' perception of the importance of employment traits. *Journal of Education for Business*, 86(2), 100–110.
- Hammond, M., Wellington, J. (2012). *Research Methods: The Key Concepts*. Routledge Key Guides. Routledge, London, England.
- Holyoak, L. (2013). Are all internships beneficial learning experiences? An exploratory study. *Education+Training*.
- King, N., Horrocks, C., Brooks, J.M. (2019). *Interviews in Qualitative Research* (2nd ed.). SAGE Publications, Thousand Oaks, CA.
- Klenke, K. (2016). *Qualitative Research in the Study of Leadership* (2nd ed.). Emerald Publishing, Bingley, England.
- Kolb, A.Y., Kolb, D.A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, 4(2), 193–212.
- Maertz Jr, C.P., Stoeberl, P.A., Marks, J. (2014). Building successful internships: lessons from the research for interns, schools, and employers. *Career Development International*, 19(1), 123–142.
- Mardis, M.A., Ma, J., Jones, F.R., Ambavarapu, C.R., Kelleher, H.M., Spears, L.I., McClure, C.R. (2018). Assessing alignment between information technology educational opportunities, professional requirements, and industry demands. *Education and Information Technologies*, 23(4), 1547–1584. <https://doi.org/10.1007/s10639-017-9678-y>
- Maxwell, G., Scott, B., Macfarlane, D., Williamson, E. (2009). Employers as stakeholders in postgraduate employability skills development. *International Journal of Management Education*, 8(2), 13–22.

- McKenzie, D., Assaf, N., Cusolito, A.P. (2016). The demand for, and impact of, youth internships: evidence from a randomized experiment in Yemen. *IZA Journal of Labor & Development*, 5(1), 1–15.
- Merriam, S.B. (2009). *Qualitative research*. John Wiley & Sons, Chichester, England.
- Nowell, L.S., Norris, J.M., White, D.E., Moules, N.J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1).
- O'Neill, N. (2010). Internships as a high-impact practice: Some reflections on quality. *Peer Review*, 12(4), 4–9.
- Pereira, E.T., Vilas-Boas, M., Rebelo, C.F.C. (2020). University curricula and employability: The stakeholders' views for a future agenda. *Industry and Higher Education*, 34(5), 321–329.
<https://doi.org/10.1177/0950422220901676>
- Prescott, P., Gjerde, K.P., Rice, J.L. (2021). Analyzing mandatory college internships: academic effects and implications for curricular design. *Studies in Higher Education*, 46(11), 2444–2459.
- Rampin, R., Rampin, V. (2021). Taguette: open-source qualitative data analysis. *Journal of Open Source Software*, 6(68), 3522.
- Rob, M.A. (2014). IT certification: Demand, characteristics and integration into traditional university MIS curriculum. *Communications of the IIMA*, 14(1), 2.
- Saldana, J. (2009). *The Coding Manual for Qualitative Researchers*. SAGE Publications, London, England.
- Sanahuja Vélez, G., Ribes Giner, G. (2015). Effects of business internships on students, employers, and higher education institutions: A systematic review. *Journal of Employment Counseling*, 52(3), 121–130.
- Sauder, M.H., Mudrick, M., Strassle, C.G., Maitoza, R., Malcarne, B., Evans, B. (2019). What did you expect? Divergent perceptions among internship stakeholders. *Journal of Experiential Education*, 42(2), 105–120.
- Shoenfelt, E.L., Stone, N.J., Kottke, J.L. (2013). Internships: An established mechanism for increasing employability. *Industrial and Organizational Psychology*, 6(1), 24–27.
- Tynjälä, P., Slotte, V., Nieminen, J., Lonka, K., Olkinuora, E. (2006). From university to working life: Graduates' workplace skills in practice. *Higher Education and Working Life: Collaborations, Confrontations and Challenges*, 73–88.
- Wiles, R. (2013). *Anonymity and Confidentiality* (1st ed.). The 'What is?' Research Methods Series. Bloomsbury Academic, London, pp. 41–54. <http://www.bloomsburycollections.com/book/whatare-qualitative-research-ethics/ch4-anonymity-and-confidentiality/>

L. Busuttil is a senior lecturer in Computing Education at the Department of Technology & Entrepreneurship Education (TEE) within the Faculty of Education. He received a PhD from the University of Sheffield in 2014. As part of his work in TEE, Leonard is involved in the formation of pre-service and in-service Computing educators. His research interests include Computational Thinking, Computing education, design of educational software, game-based learning and human computer interaction.